APPENDIX H: Rehabilitation Study Report

CONNECTICUT DEPARTMENT OF TRANSPORTATION

REHABILITATION STUDY REPORT

Submitted by Close, Jensen & Miller, P.C.

BRIDGE NO. 01349

Route 136 over Saugatuck River

Town of Westport



Issued June 2016

State Project No. 0158-212

BRIDGE REHABILITATION STUDY REPORT
BRIDGE NO. 01349
ROUTE 136 OVER THE SAUGATUCK RIVER
TOWN OF WESTPORT

Executive Summary	1
Location Map	4
Introduction	5
Description	5
Field Observations	8
Load Rating & Structural Analysis	12
Analysis & Alternate Evaluations	14
Cost Considerations	21
Recommendations	21

APPENDICES

Appendix A	Photographs
Appendix B	Cost Estimates
Appendix C	Department Inspection Report
Appendix D	FEMA FIRMette
Appendix E	Load Rating & Structural Analysis
Appendix F	Life Cycle Cost Analysis
Appendix G	Traffic Analysis
Appendix H	Alternate A: Major Rehabilitation Details
Appendix I	Accident Data
Appendix J	Definitions

EXECUTIVE SUMMARY

Purpose of the Project:

The project was initiated to address the structural and functional deficiencies of Bridge No. 01349, carrying Route 136 over the Saugatuck River in the Town of Westport. The truss continues to see collision damage due to the deficient width of the bridge for the high volume of traffic crossing the bridge. Portions of the original substructure that were repaired in the 1950's now need reconstruction to continue to support the loads under current requirements. The purpose and need is to change the conditions to bring the structure to a state of good repair, fix the functional issues that are causing continuous damage to the trusses, and be sensitive to the historical importance of the structure.

Current Bridge Deficiencies:

The existing bridge exhibits the following structural and functional deficiencies:

Existing Truss System:

The existing truss system is in critical condition. During the bridge replacement performed in 1993, the trusses were retained for ornamental purposes only and carry no live load. While the trusses are no longer considered fracture critical to the superstructure, they remain fracture critical by design; and as such, failure to a primary truss member, if not properly maintained, could risk truss collapse and pose a safety hazard to vehicles and pedestrians. The trusses have sustained severe and consistent vehicular impact damage throughout the entire structure. The wind load capacities for the truss are also substandard.

Deteriorated Condition of Pier 2 piles and cross bracing:

The load capacity of the bridge is substandard, because the Pier 2 support system observed in both the as-built (1951) condition and current deteriorated condition does not meet the current code criteria based on today's standards. The support system piles exhibit substandard Capacity to Demand ratios. The steel diagonal cross-bracing members at Pier 2 have heavy rust and up to 100 percent section loss and are rated as critical. Five of the six piles have loose or missing fiberglass jackets, and the exposed concrete is scaled and exhibits exposed reinforcement.

Bridge Geometry:

Based upon the guidelines put forth in the "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges", the deck geometry is rated a "2", which is classified as "basically intolerable requiring high priority of replacement". The rating comes from the comparison of the Average Daily Traffic (ADT) of 13,100 vehicles in relation to the 19'-6" curb-to-curb width of the roadway along the bridge. The very low rating is an indication that the existing bridge is not functionally capable of handling existing traffic demands. The existing vertical clearance is 12'-10", which is also substandard from the required 14'-0".

Accident History:

The substandard horizontal roadway width is contributing to the high frequency of accidents that occur on the existing bridge structure. There were 16 reported accidents on the bridge and its approaches from 2010-2014. 69% of the recorded accidents are sideswipes, which may be attributed to the narrow lanes on the bridge. The intersections of Route 136 and Riverside Avenue as well as Route 136 and the commercial driveway just west of the bridge are also locations of high accident frequency.

Substandard Guiderail System:

The guiderail system across the bridge is substandard. The existing system is not crash-test compliant. The existing substandard railing, narrow roadway width, and the proximity of the truss system to the edge of the roadway are all contributing to the extensive vehicular impact damage to the truss members. It should also be noted that when

impacted, guiderail is designed to deflect. Because the existing guiderail is located against the truss, the truss is not protected by this type of system.

Mechanical and Electrical System:

The mechanical and electrical equipment, while currently in good condition, are susceptible to damage during flood event of a 10-year storm frequency or higher. The equipment beneath the bridge is positioned between the elevations of 6.0 and 8.4 feet. The 10-year design storm flood elevation is approximately 8.1 feet, resulting in the equipment being nearly submerged during such an event. This occurred during Hurricane Sandy in 2012 and required significant repairs and expense. These events will continue to occur unless the structure is raised above the design flood level.

East Coast Greenway:

Route 136, along the structure, is a part of the East Coast Greenway and supports added pedestrian and bicycle traffic. Currently, the cyclists are forced to use traffic lanes across the bridge due to the lack of proper shoulder widths, thereby creating unsafe conditions for bicycle traffic.

Alternates Studied in the RSR:

A number of alternatives were investigated as a part of the RSR and are as listed below:

No Action

This alternate was dismissed, because it did not address the public safety concerns which cannot be ignored. This alternative would not address the extensively damaged truss elements or the substandard Pier 2 load carrying capacity based upon today's standards.

Minor Repairs

This option involves repair of the damaged and deteriorated truss system in its current position, repairs to Pier 2, and other minor repairs throughout the structure. This alternative was also dismissed because it does not incorporate preventative measures to preclude further truss vehicular damage and does not address the substandard load capacity of Pier 2 based upon today's standards.

One-way Bridge Access

This alternative involves repairing the damaged and deteriorated truss system in its current position, repairs to Pier 2, and replacing the existing bridge railing with a crash compliant system set in order to provide adequate horizontal clearance to preclude impact damage to the trusses. The new railing system would further reduce the existing 19'-6" curb-to-curb width, reducing capacity to one lane of traffic. This alternative was not deemed viable due to the negative impact the redirection of vehicular traffic would cause along the resultant permanent detour route, which is already at or beyond capacity.

Major Rehabilitation

This alternate consists of remediating only the bridge's major structural issues:

- Repair, painting and widening of the ornamental trusses
- Installation of a new bridge railing system to preclude vehicular impact damage
- Reconstruction of the Pier 2 support system
- Increasing the vertical clearance along the bridge to 14'-3" to satisfy functional adequacy for vertical clearance
- Addition of a moment connection to the trusses at panel points to resist wind load stresses
- Deck patching, membrane waterproofing, and paving
- Complete painting of the superstructure steel
- Installation of a solid roadway barrier at both approaches
- Structural steel repairs
- Substructure patching

The bridge would need to be closed to traffic to perform the required rehabilitation measures due to the narrowness of the structure and the significantly deteriorated condition of the truss and pier. The estimated construction schedule for performing the rehabilitation work would be 2.5 to 3 years, and would require construction of a temporary bridge to maintain traffic along Route 136. A detour option was investigated but was determined to provide an unacceptable level of service for the required construction duration. The cost of the major rehabilitation option, including the temporary bridge, is estimated at $19.8 million.

Structure Replacement

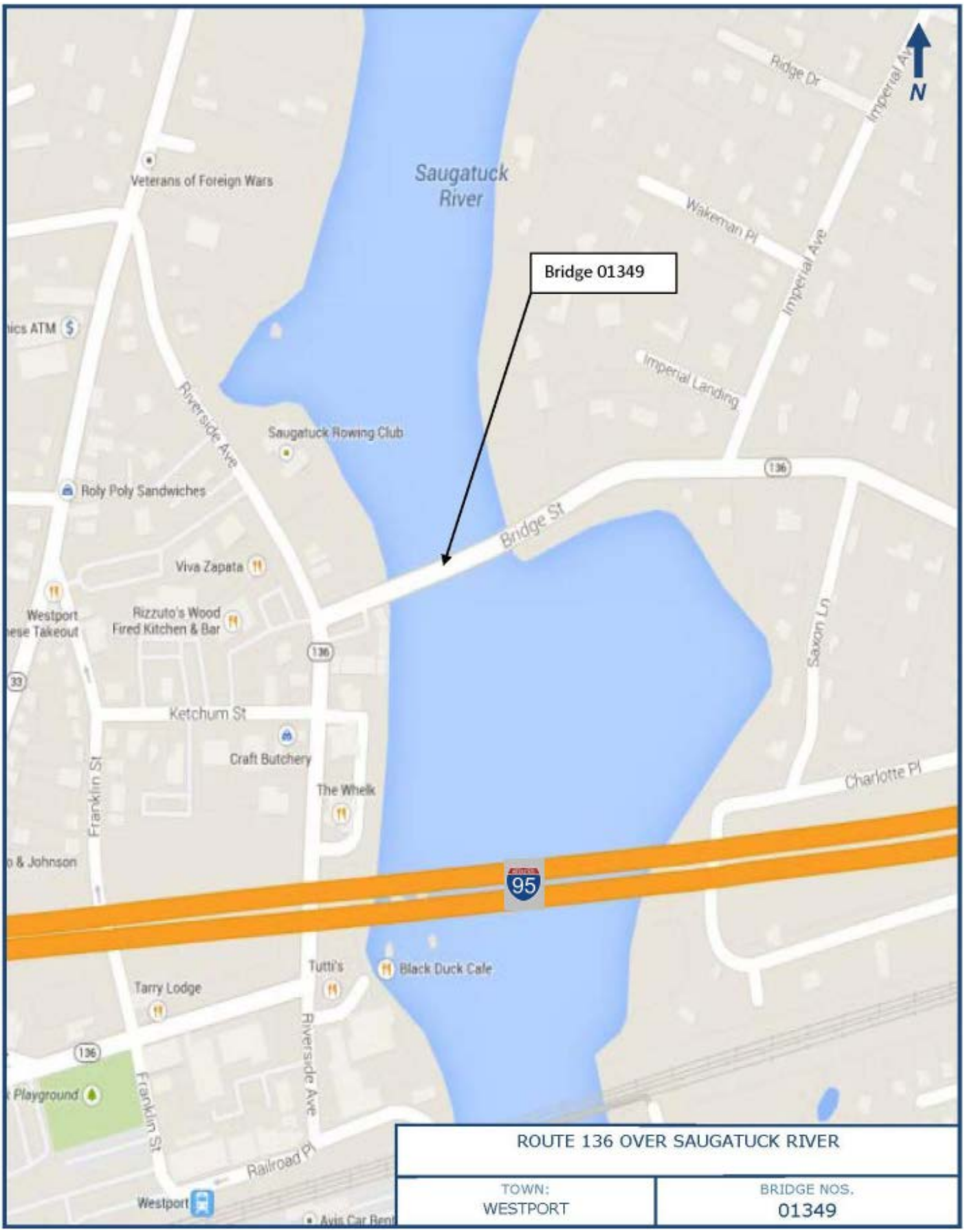
A complete bridge replacement was also investigated as a base line cost comparison for the Major Rehabilitation alternate, which also involved a life cycle cost analysis. A conceptual replacement bridge option would consist of a new four span structure with two multi-girder fixed spans and a two span Pratt Truss swing span. The cost for a new structure was estimated to be $35.8 million.

A lifecycle cost analysis was performed to estimate the overall cost of each alternative over a span of 75 years and represents costs in today's dollar amounts. The life cycle cost is $41.27 million for Major Rehabilitation and $41.43 million for a Structure Replacement.

Design Recommendation:

The No Action alternative does not resolve any of the issues. The Minor Repairs alternate retains the historic character but does not resolve the continued structural damage that occurs to the truss. The One Way Bridge alternate resolves the ongoing bridge damage and retains the historic character, but causes un-resolvable traffic problems for vehicles and bicycles.

The two options that go a long way to address the purpose and need are the Major Rehabilitation alternate and the Structure Replacement alternate. The lifecycle costs for both options are essentially the same and, as such, it is recommended that further in-depth studies of various bridge replacement alternatives be completed before any determinations can be made whether to rehabilitate the bridge or to replace it. A more in-depth benefit/cost analysis is also warranted to take into consideration the cost of lost commuter time due to traffic queues as well as the environmental impacts associated with fuel emissions resulting from idling vehicles. It should also be noted, that in addition to the high initial cost of the major rehabilitation, a number of significant functional deficiencies would still remain unaddressed with a major rehabilitation. These include the geometric deficiencies of the existing bridge for handling the volume of traffic, continued susceptibility of damage to mechanical and electrical features of the structure due to 10-year or greater storm events, and the notable fact that Route 136 is part of the East Coast Greenway, and the substandard width is not acceptable for safe passage for future bikeway and pedestrian needs. Further engagement of all affected stakeholders would be initiated in a public outreach process for developing and assessing bridge replacement alternatives before any determination is made for bridge rehabilitation or replacement.


Saugatuck River
Bridge 01349
N
Veterans of Foreign Wars
Ridge Dr
Imperial Ave
Wakeman Pl
Imperial Landing
Saugatuck Rowing Club
Riverside Ave
Roly Poly Sandwiches
Bridge St
136
Viva Zapata
Westport
Rizzuto's Wood Fired Kitchen & Bar
Saxon Ln
33
Ketchum St
Craft Butchery
The Whelk
Franklin St
Charlotte Pl
95
Tutti's
Black Duck Cafe
Tarry Lodge
Riverside Ave
Playground
Railroad Pl
Westport
ROUTE 136 OVER SAUGATUCK RIVER
TOWN:
WESTPORT
BRIDGE NOS.
01349

INTRODUCTION

Close, Jensen and Miller, P.C. has been retained by the Connecticut Department of Transportation (Department) to perform the rehabilitation evaluation for this bridge as part of the State Bridge Program. A compilation of inspection observations, pertinent bridge data and conceptual design plans are included. The report includes detailed inspections of the structure performed by the Department. The recommendations presented have been developed after careful appraisal of the existing structure to ensure the long-term structural and functional adequacy of this crossing. This report considers the safety, serviceability, economics, historical significance and aesthetics of the structure, and serves as the vehicle by which the design and rehabilitation shall be implemented.

DESCRIPTION

General

Bridge No. 01349, built in 1884 and reconstructed in 1993, is a continuous steel multi-girder swing span and fixed span bridge that carries one lane of Route 136 traffic in each direction over the Saugatuck River in Westport. The structure is located between Interchanges 17 and 18 of I-95.

Geometry and Design

Bridge No. 01349, also known as the William F. Cribari Memorial Bridge, is a four span steel multi-girder bridge with an ornamental truss and swing spans that has a curb-to-curb width of 19.5 feet and a structure length of 287 feet, with a maximum span length of 70 feet. The bridge is on a tangent horizontal alignment and is essentially level. The approach from the east is slightly curved and the approach to the west is tangent. The bridge has a minimum vertical clearance of 12'-10" and the roadway curb-to-curb width of 19.5 feet is also the rail-to-rail width. The vertical clearance throughout the structure varies, with the 12'-10" point occurring at one location due to the presence of an electrical box. Along the northern (westbound) side of the bridge, the vertical clearance of the roadway to the truss (with exception to the 12'-10" location) varies from 13'-6" to 13'-10". The vertical clearance along the southern (eastbound) side of the bridge varies from 13'-9" to 14'-0", and varies between 14'-1" to 14'-2" along the centerline of the roadway.

The original bridge was built in 1884 and consisted of a three span Pratt Truss iron superstructure supported by stone piers and abutments founded upon timber mats on native soil. From the west to the east the bridge was comprised of a 145-foot long two span swing truss span and an easterly 142-foot long fixed truss span. Reportedly, Pier 2 sustained vessel collision damage and required repair. In 1951, a rehabilitation project constructed a steel pile bent support system at Pier 2. This pile bent system transferred the superstructure and upper pier loads of Pier 2 to rock bearing H-piles. The rehabilitation project also added a pressure grouted steel jacket encapsulation to Pier 1 (swing pier). The steel pile support system of Pier 2 was rehabilitated in 1979 with the addition of concrete encasement of the H-piles and new bracing.

In 1991 to 1993 the bridge superstructure was replaced and a new pier added, creating the current four span multi-girder and ornamental truss bridge. From west to east the first two spans of the bridge consist of a continuous, two span swing span, supported by the rehabilitated center pier, west abutment and Pier 2; and a two span continuous fixed span supported by Piers 2 and 3 and Abutment 2. The west abutment is comprised of the original soil or rock supported cut stone and received a new concrete cap in 1993. The Swing Pier (Pier 1) was reinforced with cored steel pipe piles bearing in cored rock. The new pipe pile system transferred all loads to the rock bearing pipe piles. The swing spans are comprised of

multi girders with steel plate deck, and bituminous concrete overlay. The swing spans support the original iron truss as a decorative façade. Spans 3 and 4 consist of multi-girder spans with an exodermic (reinforced concrete slab on top of an unfilled steel grid) deck. The original iron truss decorative façade is supported independently of the new superstructure upon its original bearings at Pier 2 and Abutment 2. Pier 2 remains as a pile supported pier and received a new concrete cap. A new pier (Pier 3) was added, comprised of a concrete encased steel H-pile bent with concrete cap. The east abutment is comprised of the original soil or rock supported cut stone and received a new concrete cap in 1993. There is a 4-foot wide timber sidewalk located on the north side of the bridge consisting of pressure-treated 2 by 6 planks supported by timber stringers and steel cantilever brackets, protected by metal hand rail.

Historic

The bridge was listed in the U.S. Department of the Interior, National Park Service, National Register of a Historic Places February 12, 1987, as a rare example of an early movable iron bridge. The bridge is the oldest surviving movable bridge in Connecticut and one of the oldest such bridges in the United States. The bridge was substantially altered from its original construction in the 1993 rehabilitation.

It was constructed in 1884, when the Town of Westport contracted with Union Bridge Company of Buffalo, New York. The original design of the bridge consisted of a fixed and moveable span, both of which are Pratt through-trusses comprised of wrought iron, pin connected elements. The abutments on each bank are comprised of granite blocks. The center pier was of similar construction originally, but has since been encased in cast iron plate, behind which is a fill of gravel and sand.

Following an extensive rehabilitation campaign in 1993, the live load of the bridge is now carried by multi-girder superstructures. The 1884 wrought iron Pratt through-trusses have been retained as character-defining elements, though they no longer serve their purpose in supporting the bridge. In 2007, the bridge was officially renamed the "William F. Cribari Memorial Bridge" by the State of Connecticut.

Use of federal funding or permitting will require review under Section 106 of the National Historic Preservation Act of 1966. If this review determines that alterations to the bridge constitute an "Adverse Effect", additional evaluation through the FHWA (DOT Act of 1966) Section 4(f) is required. Replacement, or any alteration of the bridge would constitute an "Adverse Effect" under Section 106 and require evaluation through the FHWA (DOT Act of 1966) Section 4(f).

Accident Data

Traffic accident data between 2010 and 2014 was analyzed on Route 136 between mileposts 8.63 – located at the intersection with Riverside Avenue – and 8.74 – the approximate end of the bridge. The data indicates a high rate of accidents on or near the Cribari Bridge; the intersection of Route 136 and Riverside Avenue; and the commercial driveway between the intersection and the bridge. The total number of accidents in the five-year analysis period for the section of roadway studied shows a total of 59 accidents. 31 of those are attributed to the intersection of Route 136 and Riverside Avenue; 16 are attributed to the bridge or its immediate approaches; and 12 are attributed to various maneuvers into or out of commercial driveways. See Appendix I for accident data.

Approximately 85 percent of the accidents occurred on dry pavement conditions, with the remainder on wet pavement due to rain (approximately 12 percent) or snow/ice (approximately 3 percent). Both the intersection of Route 136 and Riverside Avenue and Route 136 and the commercial driveway have street lights, so all those accidents occurred under either natural or street lighting. And, while the bridge itself is not lighted, only one accident attributed to the bridge occurred under other than daylight conditions.

Nine accidents resulted in injury with the remainder resulting in property damage only. No fatalities were reported.

Approximately 69 percent of the accidents on or near the bridge involve sideswipes. The remaining accidents involve mostly rear-ends. There may also be a high number of unreported accidents involving a single vehicle hitting a bridge member. This assumption is reasonably made based on the evidence of continual damage on the bridge's guiderails, trusses, and approach guiderails. However, for all the evidence of damage to the bridge, only one accident in the analysis involved a single vehicle and a fixed object. Furthermore, that accident involved an injury, which may have contributed to it being reported.

While human error can be attributed to most traffic accidents in general, roadway geometry and traffic patterns can increase the chances of an accident occurring. All other factors held equal (e.g. weather, driver experience, tangent roadway section, etc…), it is reasonable to correlate the substandard curb-to-curb width of the Cribari Bridge with the high number of accidents recorded on or near the bridge. That is because, for a tangent roadway section on an almost flat profile, the number of accidents (reported and unreported) is very high. The comparison was made with bridges of similar roadway classification; between 200 and 500 feet in length; with average daily traffic between 10,000 and 15,000 vehicles; and carrying one lane in each direction. The 3 other bridges studied registered 1, 2, and 5 accidents (an average of 2.67 accidents per bridge) between them in the 5-year period in comparison to the 16 accidents that can be attributed to the Cribari Bridge. The common factor is that the other bridges are all over 28 feet wide curb-to-curb, meeting or exceeding the standard for this type of bridge.

Analysis of the accidents attributed to the intersection of Route 136 and Riverside Avenue shows that almost one-half of those accidents involved turning maneuvers; approximately one-third involved rear-ends; and approximately one-fifth involved sideswipes. Although turning maneuvers and rear-ends are normal accident occurrences at busy intersections such as this one, sideswipes are not. The sideswipes at or near this intersection can be reasonably correlated to the narrowness of the two lanes approaching the intersection from the east (Bridge Street). Further investigation of the traffic signal cycles; intersection configuration; the storage capacity of the right-turning lane from Bridge Street to Riverside Avenue; and proximity of commercial driveways in all legs of the intersection is required in order to fully address the high number of accidents at this location.

Analysis of the accidents attributed to the intersection of Route 136 and a commercial drive indicates that over 80 percent involved turning maneuvers. The remainder were rear-ends and sideswipes. Further investigation is required to fully account for the reasoning behind these accidents. However, the proximity of the intersection to the west of the driveway and the bridge to the east are factors that may be influencing the accidents. This is especially true due to the long queues on Route 136 just east of the intersection, which may cause drivers taking a left onto Route 136 from the driveway to "force" their way into the queue.

FIELD OBSERVATIONS

Recent inspections of this bridge by the Department identified needs for rehabilitation. All bridges in Connecticut are inspected on a biennial cycle. The biennial inspection cycle provides a continuous record of bridge condition. Guidelines for interpreting defects and deterioration and assigning a numeric rating to the structural element are contained in the Department's Bridge Inspection Manual and in Appendix J - Definitions. The condition evaluation establishes the structural and functional condition of the bridge components including the extent of deterioration and other defects.

This report was developed based upon review of the Department's Inspection Reports, bridge records and a site inspection performed in February 2015 by Close, Jensen and Miller, PC. Original construction plans, rehabilitation plans, maintenance reports, and other actions were reviewed. The findings and recommendations are summarized below.

Deck

The deck is in satisfactory condition (Overall rating = 6). The bituminous concrete overlay with membrane waterproofing displays extensive rutting up to 2 inches in the wheel lines. There are also potholes up to 3 inches deep and isolated longitudinal cracks. There is a steel deck plate in spans 1 and 2 (swing spans) that functions as a top flange for the girders. The steel form pans exhibit areas of rust; some areas are completely rusted through. The deck underside in spans 3 and 4 shows areas of heavy rust and large perforations in the deck pans. The bridge curbs are steel channel sections that exhibit minor scrapes and light rust. The average curb reveal is about 7 inches and the east approach curb has settled about 2 inches. There are six scuppers in each span and the grates are typically 50% clogged, but the down pipes are clear. The steel-armored open deck joints at the west abutment and Pier 2 have minor scrapes and gouges in the steel armor, and minor bituminous raveling along the edges. The joint at the east abutment in the eastbound lane has exposed rebar at the north end, which may be hazardous to snow plows.

Superstructure

The superstructure is in fair condition (Overall rating = 5). There are swing span screw jack bearings at the west abutment and Pier 2. The elastomeric bearings under the trusses and under the girders in spans 3 and 4 have areas of light rust and peeling paint. The elastomeric bearings for both trusses at Pier 2 have anchor bolt spacers with heavy rust and several spacers are missing washers. Spans 1 and 2 (swing spans) have a common plate that is continuous across all girders and Pier 1. Girders exhibit isolated areas of peeling paint and light rust. The girder bottom flanges in span 2 have minor scrapes and girder 1 in span 3 has a rolling defect in the web. The floor beams have heavy rust and accumulation of debris on the bottom flanges. The diaphragms have areas of heavy rust along the bottom and there are 10-inch diameter holes cut in the solid end diaphragms. The interior of the pivot girder has heavy laminar rust with minor section loss. The exterior pivot girder at Pier 1 has isolated areas of peeling paint, light rust, and debris accumulation under the trusses.

The sidewalk stringers have minor checks and wear. The sidewalk stringer support members have peeling paint and moderate rust. The first sidewalk support east of Pier 2 has connection bolts missing with the remaining bolts loose. The sidewalk support beams in the swing span have flame cut flanges over the substructure units, and a few stringer attachment channels have laminar rust. There is minor impact damage to the bridge metal beam rail. The west rail has disconnected posts and rubs against the southwest approach rail when the bridge opens.

Trusses

The trusses were retained during the 1993 rehabilitation for ornamental purposes only and carry no vehicular live load; therefore, trusses are no longer considered fracture critical to the superstructure. However, they are independently fracture critical by design and their collapse poses a safety hazard to vehicles and pedestrians. The trusses are in critical condition with an overall rating of 2. The bottom chord bottom flange plates have several areas of section loss and isolated rusted through holes. There is extensive collision damage to the truss members along the roadway. Several of the truss diagonal and vertical members have bent flanges, bent webs and cracks. The transverse sway braces at the truss ends display locations of bent flanges and dented angle legs due to vehicle impact. The field welded connections are typically uneven, sloppy and not ground smooth, and have isolated areas of light rust.

Mechanical & Electrical Systems

The most recent in-depth inspection report dated December 9, 2014 rated the Mechanical System Good (Overall rating = 7) and the Electrical System Good (Overall rating = 7). The machinery and electrical systems were repaired in 2012 due to previous storm damage.

Repairs are needed for the following deficiencies:

- Covers to the screw jacks need to be installed and oil leaks fixed.
- Screw jack limit switches should be replaced.
- The roller track of the pivot pier should be adjusted to level and the limit switch replaced.
- Add a maintenance platform at Pier 2.
- The power feed to the span drive motors should be relocated off of the truss.

Substructure

The substructure is in fair condition (Overall rating = 5). The stone masonry abutment stems have missing and deteriorated mortar at joints, voids up to 4-inches deep and isolated cracks. The west abutment concrete bridge seat has hairline cracks with efflorescence and areas of map cracking. The dry set stone masonry retaining walls along the channel have missing stones as large as 2.5 feet. The pedestals contain hollow areas, scaling and map cracking. The concrete pedestal under the north truss has light scale and the north face has map cracking and rust stains that had been coated with grout and re-cracked. The pier caps have areas of cracking with efflorescence and rust. The cap beam at Pier 2 has isolated areas of light rust and the carrier beams have light rust and section loss. The piles for Piers 2 and 3 are concrete encased H-piles with fiberglass jackets. At Pier 2, five of the six piles have loose or missing fiberglass jackets, and the exposed concrete has scaled with exposed reinforcement. The steel jacket at Pier 1 has heavy laminar rust and rusted through holes that expose the concrete. The exposed concrete has severe scales and spalls with exposed reinforcement. The footing at Pier 2 is exposed and undermined at both the southwest and northwest corners. The steel diagonal cross-bracing members at Pier 2 have heavy rust and up to 100-percent section loss. Due to its severe deterioration, the cross bracing at Pier 2 is rated critical (rating = 2) although the pier is rated to be fair overall. The southeast cross brace horizontal member is completely detached. There is scour up to 1.3-feet deep along the west abutment and up to 0.7-feet deep along Pier 1.

Hydraulic Adequacy and Scour

All elevations referenced to NAVD88.

The drainage area for this structure is 89.2 square miles. The water surface at the bridge is tidally affected from the Long Island Sound. The FEMA Flood Insurance Rate map (FIRM) indicates the effects of wave setup on the 100-year frequency tidal flood terminate at the south side of the bridge with the total (stillwater plus effects of wave setup) 100-year water surface elevation of 13 feet. The FIRM shows the 100-year water surface elevation on the north of the bridge is 10 feet. The Flood Insurance Study

(FIS) indicates stillwater elevations (due to the effects of astronomic tide and storm surge) for the 10-, 50-, 100-, and 500-year tidal flood frequencies of 8.1 feet, 9.7 feet, 10.4 feet, and 11.8 feet respectively, in the vicinity of the bridge. A storm-tide sensor deployed by the USGS for Hurricanes Irene and Sandy measured a peak storm tide elevation of 8.9 feet (08/28/2011) and 10.2 feet (10/29/2012) respectively, for these storms.

The Tidal Flood Profiles for the New England Coastline prepared by the U.S. Army Corps of Engineers indicates mean high water, mean low water, and 1-year frequency tidal flood elevations of 3.3 feet, -3.7 feet, and 4.7 feet respectively.

The Route 136 centerline profile and low chord of the bridge elevations are approximately 11.9 feet and 8.4 feet respectively. The machinery and electrical system of the swing span are positioned between approximate elevations 6.0 feet and 8.4 feet. The machinery and electrical system are exposed to flood flows and have received damage from previous storm flooding. The waterway opening of the bridge may be sufficient to pass the riverine flood without the effect of storm surge; however, due to the relative elevations of the low chord, machinery, and electrical systems, the existing bridge is susceptible to damage and closure from tidal storms.

The astronomic tide and storm surge elevations reported above do not consider the effects of sea level rise (SLR) that may be anticipated over the service life of the structure. Based on projections of SLR, the existing structure, with the mechanical and electrical systems at the current elevations, may be subject to more frequent damage from future SLR over the service life of the structure.

The channel is in fair condition (Overall rating = 5) based on the latest underwater inspection (12/29/2014) which reported:

- *"As compared to the 2012 Inspections, channel bottom elevations along the upstream (north) fascia, the abutments, Pier 1, and Pier 3 have remained relatively unchanged (variations up to 1.9') with areas of localized degradation up to 2.4' high at Span 3 at the north fascia and at the northwest corner of Pier 2. No repair recommendations requested at this time."*
- *"At Pier 2, the previously observed scour has exposed the footing up to full-height (1.5' high). The footing is undermined at the northwest corner 1.8' long x 1.3' high x 4' penetration (previously noted as 2.1' penetration) with the timber cribbing exposed. The footing is undermined at the southwest corner 1.5' long x 8" high x 2' penetration (previously noted as 2.5' long x 5" high x 4" penetration) with the timber cribbing exposed. Design and install scour countermeasures for Pier 2. (2 CY)."*
- *"There is riprap up to 3' diameter along the East abutment, and riprap near the northeast corner of Pier 3."* The condition rating of the riprap was entered as "7".

The "Scour Criticality" rating (NBI Item 113) in the database for this structure is an "8", indicating low risk. No formal documentation has been found for this rating; however, it is likely based on initial screening performed by the USGS for the Department, the assumption that all of the substructure elements are founded on piles driven to rock and flood history. Portions of the bridge were constructed in 1870 and the bridge has survived several significant flood events without any apparent scour related damage or concerns.

However, the last available underwater inspection has reported scour and undermining at Pier 2. In addition, it has come to light that the abutment footing type and bottom elevations (depth of embedment) are unknown; therefore, the susceptibility of the abutment footings to scour and/or degradation in the river channel is also unknown. Given these conditions, the Item 113 rating of the existing structure should be reconsidered, at a minimum, revising "low risk" to "scour susceptible" and

the depth of the existing abutment footings should be investigated as well as the condition/extent of any existing scour protection.

The fender system at Piers 1 and 2 is constructed of timber piles and horizontal wales and is in fair condition (Overall rating = 5). The piles and wales exhibit splits and cracks ¼" to ½" wide throughout. The hardware exhibits heavy corrosion particularly in the tidal zone. Wales at random locations exhibit minor abrasion damage (possible vessel scrapes). The fender system appears to be substandard with respect to current AASHTO Design Code requirements.

Approach Roadways

The roadway approaches are in good condition (Overall rating = 7). The metal beam approach guide rails have areas of impact damage. The east approach pavement has areas of map cracking and settlement along the east abutment deck joint. The rail system along the east approach wingwalls does not meet AASHTO or CTDOT design codes for crash protection (does not provide system stiffness transitions to the trusses).

Utilities

There is an electrical box located in the sidewalk on the north side of the structure. There are also decorative holiday lights attached to all truss members above the deck. Overhead utilities are located at both approaches of the bridge and one utility line reaches from the west approach to the north side of Pier 1 (swing pier).

Property

The State's right-of-way for Route 136 at the bridge site encompasses Bridge No. 01349 entirely.

LOAD RATING & STRUCTURAL ANALYSIS

Load rating is the determination of live load carrying capacity of an existing bridge using existing bridge plans supplemented by information gathered during the field inspection. Engineering judgment is required to incorporate the effect of defects and deterioration in the load rating analysis. The AASHTO Condition Evaluation Manual recognizes load ratings at two levels—the inventory rating and the operating rating. The inventory rating generally corresponds to the design level of stress, and results in a live load that can safely use the bridge for an indefinite period of time, while the operating rating describes the maximum permissible live load that should not be exceeded on the bridge. Load ratings are computed and updated as part of the Department's Bridge Inspection Program. The existing bridge is not posted for live load restriction.

This structure is unique in several ways with respect to structural adequacy. The following conditions exist and dictate the means and methods of structural analysis of the bridge system:

- The original abutments of the bridge are utilized for support of the new superstructure and the ornamental truss.
- Pier 1 was retrofitted in 1993 with a drilled shaft support system to support the loads of the new superstructure and the ornamental truss.
- Pier 2 utilizes the steel frame system built in 1951 and rehabilitated in 1979, to support the loads of the new superstructure and the ornamental truss.
- Pier 3 was added to the bridge in 1993 and supports only the new superstructure loads (the ornamental truss bears upon Pier 2 and Abutment 2, spanning Pier 3).
- The new superstructure of the swing span (Spans 1 & 2) was designed to carry the truss loads through moment connection to the fascia girders at the panel points and dead load end bearing at the span ends.
- The new superstructure of the fixed spans (Spans 3 & 4) was designed to have the truss be self-supporting, with bearing connections at Pier 2 and Abutment 2.

To assess the load carrying capacity of the bridge it was modeled in MIDAS Civil, finite element analysis and rating software to determine stress levels. The rating analysis was also performed utilizing MIDAS Civil analysis and rating software (see Appendix E for results of the analysis). The truss span from Pier 2 to Abutment 2 was modeled as a separate structure since it provides no live load capacity and does not contribute load to the new superstructure. The load rating and structural capacity of the bridge are summarized below:

Superstructure Spans 1 & 2: The live load rating capacity of these spans for all legal loads is greater than 1.0. (A rating factor of 1.0 indicates that the member(s) safely carry the applied loads).

Superstructure Spans 3 & 4: The live load rating capacity of these spans for all legal loads is greater than 1.0. (A rating factor of 1.0 indicates that the member(s) safely carry the applied loads).

Independent Truss Span Abutment 1 to Pier 2: The truss was not live load rated as it does not carry live load. The truss was analyzed for dead and wind load and found to be overstressed. A wind speed in excess of 100 mph produces an overstressed condition of the truss main members while a wind speed of 90 mph produces an overstressed condition for the cross bracing. The design wind speed is 125 mph as prescribed by AASHTO.

Independent Truss Span Pier 2 to Abutment 2: The truss was not live load rated as it does not carry live load. The truss was analyzed for dead and wind load and found to be overstressed. The truss main members and cross bracing exhibit acceptable stress levels for the design wind load of 125 mph.

Abutments 1 & 2: The abutments were not live load rated because as-built drawings do not exist. The abutments do not exhibit signs of distress and are thus assumed to be capable of carrying current loads.

Piers 1 & 3: An analysis of these piers indicated that stress levels are acceptable for design loads.

Pier 2 Support System: The support system for the pier does not meet the current code criteria based on today's standards in its current deteriorated condition. In its present condition the support system cap cross beams are stressed to 32.9 ksi with HL-93 loading in flexure. The yield capacity for the member is 33x0.95=31.35 ksi. When load rated these members yield rating as low as 0.87 for the HL-93 Truck (AASHTO Design Vehicles). The support system piles also exhibit substandard Capacity to Demand Ratio of 0.89 for axial compressive loads and combined axial compressive and flexural resistance overstress of 50% under HL 93 Truck loading (AASHTO Design Vehicles).

Vessel Collision Analysis: The pile supported system protecting Pier 1 consists of timber piles protected by timber fenders. There are six layers of 4-in. by 12-in. fenders spaced at 15 inches on center. The pile diameter varies from 13 inches minimum at the butt to 7 inches minimum at the tip. All timber material used in the fender system consists of Southern Yellow Pine.
An analysis of the existing fender system was performed. The design vessel incorporated in the analysis has a dead weight (DWT) of 1,000 ton, an overall length of 200 feet, and a bow depth of 27.2 feet as specified in the *Guide Specifications* Table 3.5.2-1, and with an impact velocity of 5.0 knots (approximately 8.44 feet/second). Based on the calculations contained herein, the fenders and piles would both fail in bending due to the design vessel collision.

According to the *Guide Specifications and Commentary for Vessel Collision Design of Highway Bridges*, because of their relatively low cost, timber fenders are frequently used for protecting piers from minor vessel impact forces. It also states, however, that for the large collision impact loads associated with the design vessels in the *Guide Specifications*, the resulting timber fenders would have to be much larger and might be uneconomical in most circumstances (See G.S. Section 7.3.1.1).

Current practice recommends that a concrete pile system protected by steel or concrete fenders be used, as these materials have higher modulus and allowable stresses.

ANALYSIS & ALTERNATE EVALUATIONS

Preliminary alternates were assessed based on criteria including, but not limited to the State legislated criteria: (1) the functional classification of the highway; (2) the load capacity and geometric constraints of the bridge within its existing footprint and the availability of alternative routes; (3) the comparative long-term costs, risks and benefits of rehabilitation and new construction; (4) the requirements of state standards for geometric design; (5) disruption to homes and businesses; (6) environmental impacts; (7) the potential effects on the local and state economies; (8) cost-effectiveness; (9) mobility; (10) safety, as determined by factors such as accident history for motorists, pedestrians and bicyclists; and (11) the impact on the historic, scenic and aesthetic values of the municipality in which the bridge is or may be located. The determination of "No Adverse Effects" or "Adverse Effects" would be reviewed and determined during the Section 106 review process. During this review, the baseline integrity of the structure will be analyzed, focusing on aspects including but not limited to the number of members being replaced for each alternate, methods of replacing or maintaining truss members, parameters of any new members and their ability to visually match those being replaced, as well as documentation of members that have already undergone replacement/rehabilitation. Alternates that show promise or feasibility within the parameters were pursued.

The conditions of the structure which affect public safety and functionality include:

- The substandard load capacity of the bridge.
- The substandard roadway barrier system.
- The substandard roadway functional width and vertical clearance.
- The lack of a solid roadway barrier system during bridge openings.
- The substandard wind load capacity of the trusses (fracture critical).
- The substandard east approach wingwall traffic barrier.
- The hydraulic inadequacy and susceptibility of the bridge to flooding (10-year frequency event).
- The substandard fender system.

The options for rehabilitation are limited by several constraints:

- The east approach embankment and stone wingwalls preclude substantial widening.
- The ornamental truss configuration limits access for construction.
- The load carrying capacity of the substructure limits the addition of load.
- Access to the bridge is difficult due to the tidal fluctuation and sensitive mud flats it crosses.

Three alternates were investigated and deemed not viable as discussed below.

No Action - There are several bridge conditions which pose public safety concern and cannot be ignored. These include but are not limited to the substandard live load capacity of the Pier 2 support system; the substandard bridge railing system; the capacity of the trusses to withstand wind loading; and the damaged truss condition. If left uncorrected, these conditions will continue to worsen and eventually create a hazardous condition for anyone using the bridge. Continued and prolonged use of the structure without any form of repair or rehabilitation would eventually result in a failure of one or more of these items, resulting in closure of the bridge in addition to the obvious safety hazards. One of the goals of the Department of Transportation is to maintain the State's Highway and Bridge systems in a safe, efficient manner balanced with the needs of the travelling public; therefore, not performing any corrective measures is not a feasible option.

Minor Repairs – This rehabilitation alternate would only involve repair of the damaged and deteriorated elements: repairs to the truss system and Pier 2 with additional minor repairs to the structure throughout. However, this option would not correct the cause of the damage that occurs to the structure: i.e. the existing railing would be maintained, resulting in vehicles continuing to strike and damage the truss members; detrimental to both the structure and motorists. Failure to incorporate such preventative measures would increase the frequency of rehabilitation projects that would be required, and is therefore not realistic economically. The goal of a rehabilitation project should be to get in, get out, and stay out, as opposed to the need for recurrent minor repairs. The minor repair option also does not result in any improvements in safety to the travelling public along the bridge.

One-way Bridge Access – A rehabilitation alternate which would replace the existing bridge railing system with a safety and crash compliant system and provide clearance to the trusses, in addition to performing repairs to the damaged and deteriorated elements, was investigated. The installation of a new rail system would reduce the existing bridge roadway width, making the bridge unsuitable to provide 2-way traffic; and therefore requiring a one-way lane configuration over the bridge (westbound). Reducing the bridge to one lane would allow for wider shoulders on each side, which would also accommodate bicyclists. The option would permanently re-route eastbound Route 136 traffic north along Riverside Avenue/Route 33 to Route 1. As noted in the Appendix G traffic analysis, conditions along Route 1 are not ideal, and the permanent redirection of such a substantial amount of traffic would only worsen the already inadequate traffic operation. The implementation of a one-way lane would also restrict emergency medical services, law enforcement, and the fire department from efficiently accessing key locations within Westport. Implementation of a Contra-flow bike lane (a lane in which traffic flows in the opposite direction of the surrounding lanes) is not an ideal situation, as they encourage cyclists to ride against traffic, which is contrary to the rules of the road and is a leading cause of bicycle/motorist accidents. Public outreach with the Town of Westport, as well as an internal review of this option by CTDOT Traffic and Intermodal Planning, had both generated responses that implementation of a one-way roadway is not an acceptable solution as a rehabilitation alternate.

After careful consideration two alternates were selected for further consideration; Alternate A: Major Rehabilitation and Alternate B: Structure Replacement.

Life Cycle Cost Analysis - A life-cycle cost analysis has been prepared to estimate the anticipated present value for both alternates reviewed in this Rehabilitation Study Report. An analysis period of 75 years is shown for the two alternates in Appendix F. The life cycle cost is $41.27 million for Alternate A: Major Rehabilitation and $41.43 million for Alternate B: Structure Replacement. The scenarios applied to the alternates are as follows:

Alternate A: Major Rehabilitation

- A 25-year service life is assumed for the rehabilitation work, which is fairly consistent with the history of rehabilitation projects performed on the structure (previous construction being required in 1951, 1979 and 1993).
- At the end of the 25 year life of the rehabilitation project, a new rehabilitation project is assumed to take place, which will primarily involve repairs to the deck and superstructure with repairs-as-needed to the substructure.
- At year 40, it is assumed the structure will be in such a condition where full replacement would be required. The future value is consistent with the cost for the complete replacement alternate.
- At year 65, consistent with the history of projects for the structure, a minor rehabilitation project is assumed to take place. The rehabilitation project will include minor repairs to the structure and full painting of the superstructure (life cycle of painting is typically 25 years).

- Milling and paving is assumed to take place every 15 years, up to year 40, where a full structure replacement is assumed, and is assumed to continue every 15 years after the full replacement.
- Due to the mechanical and electrical systems being located below the 10-year storm event, an additional cost is shown every 10 years for its repair/replacement as a result of storm damage. The future value for this item is consistent with the cost for the electrical/mechanical repair that had taken place in 2012. For consistency with the Alternate B analysis, once the full replacement of the structure is performed (year 40), the location of the mechanical/electrical equipment will be at an elevation outside of the 500-year storm event. It is assumed that any additional repairs or rehabilitation would be performed during the major/minor rehabilitation projects shown in the analysis.

Alternate B: Complete Structure Replacement

- A 75-year service life is assumed for the complete replacement of the bridge.
- At year 25, consistent with Alternate A after full structure replacement, a minor rehabilitation project is assumed to take place. The rehabilitation project will include minor repairs to the structure and full painting of the superstructure (life cycle of painting is typically 25 years).
- At year 50, a rehabilitation project is assumed to be required for full structure painting (based upon previously noted life for paint) with some additional repairs to the substructure.
- Milling and paving is assumed to take place every 15 years.
- As noted in the bullet item for Alternate A regarding mechanical/electrical maintenance, with a new structure in place, the mechanical/electrical equipment will be installed above of the 500-year storm event; and it is assumed that any additional repairs or rehabilitation would be performed during the major/minor rehabilitation projects shown in the analysis.

Traffic Analysis - A traffic analysis of the surrounding intersections was prepared to determine the feasibility of closing the bridge and detouring traffic during certain construction tasks. The detour route would direct traffic along Route 33 (Riverside Avenue), Route 1 (Post Road to State Street), and Route 136 (South Compo Road) in both directions. A detailed report can be found in Appendix G.

As a result of the traffic analysis, it was determined the noted detour route would not operate at an acceptable level of service during extended construction periods without the need for significant roadway capacity and intersection improvements. The use of a temporary bridge or the existing bridge to direct traffic during construction in lieu of a detour would therefore be implemented for both options presented in this report.

Bicycle/Pedestrian Access – Bridge No. 01349 serves as a vital bridge that connects communities, business developments, and the train station for Westport south of I-95. It is therefore understood that consideration must be given to pedestrians and cyclists for the options presented below. Route 136, within the vicinity of the project, is part of the East Coast Greenway On-Road and interest is shown in Westport for more and better facilities for bicycles and pedestrians, as outlined in Westport's 2007 Town Plan for Conservation and Development. The Town's goal, according to the Westport Town Plan, includes preserving open space and creating greenways, improving connectivity of sidewalks and bicycle paths along and near roads, and providing alternatives to automobiles, including pedestrian, bicycle, and transit. The Westport Town Plan goes on to recommend improvements for pedestrians, such as encouragement of sidewalks in higher density areas, sidewalks be considered along arterial and collector roads, and that the existing sidewalk system be maintained and improved. Recommendations for Bicycles per the Town Plan include marking and maintenance of the existing and new bike lanes, promoting of bicycle use, and the establishment of new safe bicycle routes along arterial and collector

roads. The inclusion of such improvements for accommodation of cyclists and pedestrians have been reviewed and incorporated, where applicable, as a part of the alternates described below.

Alternate A: Major Rehabilitation

This alternate consists of remediating only the bridge's major public safety and functional issues. The major items of work would include:

- Widening the ornamental truss and installing a new barrier system.
- Reconstruction of the Pier 2 support system.
- Increase the vertical clearance to 14'-3" to satisfy functional adequacy.
- Adding a moment connection to the trusses at panel points to resist wind load stresses.
- Deck patching, membrane waterproofing and paving.
- Complete painting of the superstructure steel and ornamental truss.
- Installing a solid roadway barrier system at both approaches (precludes vehicles from accidentally driving into the waterway).
- Structural steel repairs.
- Substructure patching.
- Replacement of the existing fender system.

The following minor repairs would be included:

- Install screw jack covers and correct oil leaks.
- Replace screw jack limit switches.
- Adjust the roller track of the pivot pier level and replace the limit switch.
- Add a maintenance platform at Pier 2.
- Relocate the power feed to the span drive motors off of the truss.

Widening the ornamental truss and installing a new barrier system would require separating the leaves and moving them outward approximately 2 feet in each direction. Separating the truss leaves to accommodate the new barrier systems would require widening the top chord bracing and portals and extending the bottom chord bracing system. Widening the truss of the movable span will require the screw jack motors and machinery and limit switches to be modified. It will also require modification to the pivot pier limit switches. Widening the truss will offset the top bracing connection plates thus increasing the vertical clearance to 14'-1", which satisfies the criteria for functional adequacy.

To achieve the design standard for vertical clearance over a Minor Urban Arterial Route (Route 136), a height of 14'-3" would be required. The connection points of the truss system currently control the vertical clearance along the bridge; however, the vertical clearance along the centerline of the roadway is consistently 14'-1" or greater. Once the truss is splayed, the connection points of the truss would be past the proposed guiderail and outside of the traffic envelope, resulting in 14'-1" as the new minimum vertical clearance. A functional vertical clearance could then be achieved by raising the truss 2 inches. Construction of a new barrier system would also require the construction of a new fascia beam support system. The existing sidewalk would be shifted to the north to accommodate the widening of the truss, requiring lengthening the cantilever bracket supports and reconstructing the sidewalk and rail system. To minimize the load increase to the existing substructure, it is not proposed to increase the sidewalk width. Temporary support of the leaves or removing the existing truss to an off-site location would be required to facilitate the widening. Conceptual details of the proposed truss and superstructure widening and proposed barrier system and attachment are included in Appendix H. During the support or temporary removal and replacement operations, the bridge would be closed to vehicular and pedestrian traffic (See Appendix H - Conceptual Schedule).

Replacement of Pier 2 was investigated and the concept dismissed. Replacement would require removing and replacing the superstructure of spans 3 and 4 in their entirety, which would be cost prohibitive. Another concept that was investigated and dismissed was coring through the existing stone column of Pier 2 and constructing reinforced concrete shafts. The spatial constraints of the beams and end diaphragms would also require removal and replacement of the spans 3 and 4 superstructure.

Reconstructing the existing steel bent support system was pursued. Reconstruction of the Pier 2 support system would require removal and an upgraded replacement of the existing system. The new support system would be constructed of concrete encased galvanized steel beams and bracing with cathodic protection. This work would require partial removal of the deck for pile removal and driving or augering operations. This work would also require the closure of the bridge to vehicular and pedestrian traffic (See Appendix H).

Deck patching, membrane waterproofing and paving operations would require the closure of the bridge to vehicular traffic. Painting of the bridge will require a negative air containment system due to the presence of lead paint. This work would also require the closure of the bridge to vehicular and pedestrian traffic due to intrusion of the containment enclosures and the blast cleaning equipment. Installing a solid roadway barrier system would require the closure of the bridge to vehicular traffic.

Structural steel repairs will be performed and the stone masonry substructure will be repointed as needed and the reinforced concrete substructure repaired as necessary.

The final roadway width will be maintained at 19.5 feet curb to curb. It is anticipated that the roadway would be closed to vehicular and pedestrian traffic for the duration of construction. A temporary bridge would be constructed to maintain traffic during the timeframe the existing bridge will be closed. The complete rehabilitation construction duration is estimated to be approximately 2.5 to 3 years, which includes two winter shut down periods. During this time, restrictions will also be in place for aquatic vessels, which will not be allowed to cross beneath the bridge during certain tasks being performed beneath the existing structure. Improvements would also be performed at the intersection of Route 136 (Bridge Street) and Riverside Avenue. Improvements would include modification of the traffic signal to provide added green time for the Bridge Street movement phase in the AM and increasing the length of the Bridge Street westbound right-turn storage lane to approximately 105 feet. As noted in Appendix G, the proposed modifications would bring the intersection to an acceptable operating level, improving the flow of traffic along Route 136, and will likely result in a reduction of the number of rear-end accidents that occur along the bridge.

Details associated with the rehabilitation are included in Appendix H.

ADVANTAGES

- ✓ Addresses structural deficiencies
- ✓ Maintains historic elements
- ✓ Less initial cost than full replacement option



DISADVANTAGES

- Bridge remains functionally obsolete
- The bridge remains hydraulically inadequate and the machinery susceptible to storm flooding (10+ year storm frequency)
- Substandard pedestrian and bikeway facilities remain
- Does not address the substandard west approach wingwall traffic barrier
- Causes an adverse effect to the historic elements

Alternate B: Structure Replacement (New Pratt Truss Swing Span)

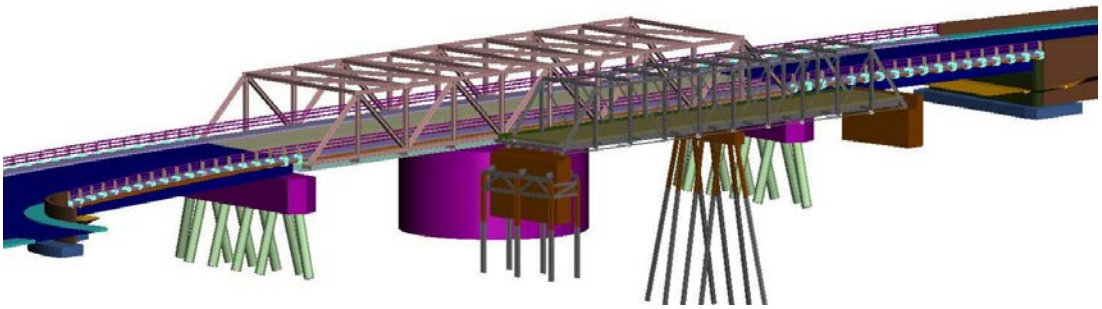
This alternate consists of replacing the existing structure with a new four span structure, consisting of two multi-girder fixed spans and a two span Pratt Truss swing span (see Conceptual plans). The new bridge would be constructed to the north of the existing bridge and utilize the existing bridge to maintain traffic during construction. The approach roadways would be reconstructed and realigned to accommodate the new structure.

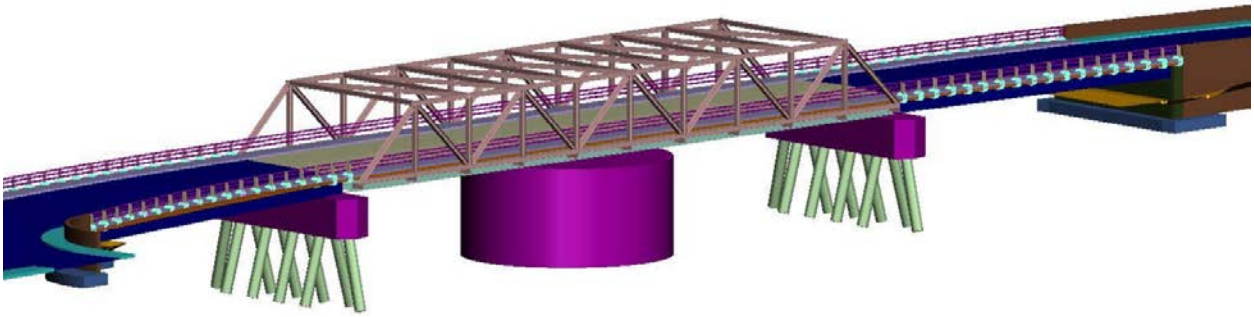
The swing span would be located at the center of the structure and cantilevered at a length of 105 feet each direction. The approach spans would be approximately 100 feet in length each (see Sketch plans). The west abutment would be constructed behind the existing stone walls that line the channel. In-line retaining walls would be used to contain the east approach roadway. Abutments and piers would be pile supported. The superstructure would utilize a reinforced concrete deck and metal bridge rail. The bridge would have a roadway width of 47 feet to accommodate an 11-foot travel lane, a 5-foot shoulder/ bikeway with a 1.5-foot marked buffers between the vehicular travel lanes and bike lanes, and a 6-foot sidewalk in each direction. The structure would be skewed at an angle of 10-degrees to accommodate the channel alignment. The bridge's low chord and mechanical and electrical systems would be constructed above the 500-year storm elevation. The bridge underclearance would be increased and the approach roadways raised. New signals and gate arms and solid barriers would be installed at each approach roadway.

Similar improvements to those noted in Alternate A would be applied to the intersection of Route 136 (Bridge Street) and Riverside Avenue. The existing signal timing would be modified to provide added green time for Bridge Street during the AM and the Bridge Street westbound right-turn storage lane would be lengthened to approximately 105 feet. An additional lane across the bridge to replace the existing right-turn lane was looked into, as noted in Appendix G; however, only a slight improvement to the operation of the intersection was observed, and a single lane in each direction across the bridge is recommended. The intersection modifications in addition to the new structure width would not only reduce the number of rear-end collisions, but also the sideswipes that commonly occur along the existing bridge.

Construction of the proposed off-alignment replacement bridge is anticipated to take approximately 2.5 to 3 years, including two winter shutdown periods, and vehicular and pedestrian traffic would be maintained throughout construction on the existing bridge.

The structure proposed is for comparative purposes only. Should a bridge replacement option be selected, a structure-type study would determine the actual bridge type to be selected and the geometry and lane capacity. For relative location comparison, the structure modeled for this report is depicted below, first with the existing fixed spans shown, followed by a depiction of just the replacement bridge.





ADVANTAGES

- ✓ Longest structure life
- ✓ Addresses all functional, structural, and public safety issues
- ✓ The bridge would be hydraulically adequate
- ✓ Adds adequate and safer bicycle and pedestrian access



DISADVANTAGES

- Highest initial cost
- Loss of historic truss

COST CONSIDERATIONS

Appendix B contains an itemized cost estimate for each alternate. The quantities reflected in each estimate represent roadway and structure items. The anticipated total costs for Alternate A and B are:

Alternate A: Rehabilitation	$ 19,800,000
Alternate A: Rehabilitation Life Cycle Cost	$ 41,269,335
Alternate B: Structure Replacement (New Pratt Truss Swing Span)	$ 35,800,000
Alternate B: Structure Replacement Life Cycle Cost	$ 41,431,486

RECOMMENDATIONS

The No Action alternative does not resolve any of the issues. The Minor Repairs alternate retains the historic character but does not resolve the continued structural damage that occurs to the truss. The One Way Bridge alternate resolves the ongoing bridge damage and retains the historic character, but causes un-resolvable traffic problems for vehicles and bicycles.

The two options that go a long way to address the purpose and need are the Major Rehabilitation alternate and the Structure Replacement alternate. The lifecycle costs for both options are essentially the same and, as such, it is recommended that further in-depth studies of various bridge replacement alternatives be completed before any determinations can be made whether to rehabilitate the bridge or to replace it. A more in-depth benefit/cost analysis is also warranted to take into consideration the cost of lost commuter time due to traffic queues as well as the environmental impacts associated with fuel emissions resulting from idling vehicles. It should also be noted, that in addition to the high initial cost of the major rehabilitation, a number of significant functional deficiencies would still remain unaddressed with a major rehabilitation. These include the geometric deficiencies of the existing bridge for handling the volume of traffic, continued susceptibility of damage to mechanical and electrical features of the structure due to 10-year or greater storm events, and the notable fact that Route 136 is part of the East Coast Greenway, and the substandard width is not acceptable for safe passage for future bikeway and pedestrian needs. Further engagement of all affected stakeholders would be initiated in a public outreach process for developing and assessing bridge replacement alternatives before any determination is made for bridge rehabilitation or replacement.

APPENDICES

Appendix A	Photographs
Appendix B	Cost Estimates
Appendix C	Department Inspection Report
Appendix D	FEMA FIRMette
Appendix E	Load Rating & Structural Analysis
Appendix F	Life Cycle Cost Analysis
Appendix G	Traffic Analysis
Appendix H	Alternate A: Major Rehabilitation Details
Appendix I	Accident Data
Appendix J	Definitions

APPENDIX A

Photographs



1. Upstream elevation of Bridge No. 01349



2. Downstream elevation of Bridge No. 01349



3. Downstream view from Bridge No. 01349



4. Upstream view from Bridge No. 01349



5. Typical condition of underside of deck



6. Typical condition of the truss



7. Typical condition of truss bearings



8. Typical condition of stone masonry abutments



9. Typical condition of stone masonry wingwalls



10. Typical condition of swing pier machinery



11. Typical condition of pier 2



12. Aerial view of Bridge No. 01349



13. Looking west on Route 136



14. Looking east on Route 136



15. Pier 2



16. Pier 2



17. Pier 2



18. Pier 2

APPENDIX B

Cost Estimates

Bridge No. 01349
Route 136 over Saugatuck River
Town of Westport

Preliminary Cost Analysis
Alternate A - Rehabilitation

Item	Unit	Quantity	Unit Price	Total Cost
Roadway and Structure Items				
Blast Cleaning and Field Painting of Structure	L.S.	1	$1,450,000.00	$1,450,000.00
Class 1 Containment and Collection	L.S.	1	$1,000,000.00	$1,000,000.00
Rehabilitation of Existing Structural Steel	cwt.	720	$816.67	$588,002.40
Remove and Replace Existing Truss	L.S.	1	$850,000.00	$850,000.00
Truss Modifications & Bracing Modifications	L.S.	1	$500,000.00	$500,000.00
Mechanical/Electrical (Screw Jacks Adjustments)	L.S.	1	$300,000.00	$300,000.00
Partial Depth Patch	C.F.	150	$260.00	$39,000.00
Class "S" Concrete	C.Y.	6	$12,927.48	$77,564.88
Variable Depth Patch	C.F.	40	$1,120.88	$44,835.20
Mechanical/Electrical repairs	L.sS.	1	$250,000.00	$250,000.00
Removal of Pier 2 Support System	L.S.	1	$225,000.00	$225,000.00
Pier 2 Support System	L.S.	1	$350,000.00	$350,000.00
Membrane Waterproofing (Cold Liquid Elastomeric)	S.Y.	700	$80.00	$56,000.00
Bituminous Concrete	TON	225	$140.00	$31,500.00
Asphaltic Plug Expansion Joint System	C.F.	20	$300.00	$6,000.00
Barrier Gates	EA	2	$275,000.00	$550,000.00
Metal Bridge Rail Support System	L.F.	580	$350.00	$203,000.00
Metal Bridge Rail	L.F.	580	$200.00	$116,000.00
Removal of Fender System (PIER2)	L.S.	1	$250,000.00	$250,000.00
Removal of Existing Fender System	L.S.	1	$175,000.00	$175,000.00
Fender System	L.S.	1	$340,000.00	$340,000.00
Temporary Bridge (See attached cost estimate)	L.S.	1	$3,400,000.00	$3,400,000.00
Repointed Masonry	S.Y.	50	$215.00	$10,750.00
			Subtotal A:	$10,812,652.48
Traffic Items				
Trafficmen	HR.	500	$75.00	$37,500.00
Trafficperson (Municipal Police Officer)	L.S.	1	$200,000.00	$200,000.00
			Subtotal B:	$11,050,152.48
Lump Sum Items				
Clearing and Grubbing (2.0% of Subtotal B)				$221,003.05
Maintenance and Protection of Traffic (5% of Subtotal B)				$552,507.62
Mobilization (7.5% of Subtotal B)				$828,761.44
Construction Staking (1.0% of Subtotal B)				$110,501.52
			Subtotal C:	$12,762,926.11
Minor Items (15% of Subtotal A)				$1,914,438.92
			Subtotal D:	$14,677,365.03
Incidental and Contingencies (35% of Subtotal D)				$5,137,077.76
			TOTAL:	$19,814,442.79
			SAY:	**$19,800,000.00**

Bridge No. 01349

Route 136 over Saugatuck River
Town of Westport

Preliminary Cost Analysis
Alternate B - Structure Replacement (New Pratt Truss Swing Span)

Item	Unit	Quantity	Unit Price	Total Cost
Roadway and Structure Items				
Removal of Superstructure	L.S.	1	$580,000.00	$580,000.00
Removal of Existing Masonry	C.Y.	500	$115.00	$57,500.00
Class "A" Concrete	C.Y.	1,600	$550.00	$880,000.00
Class "F" Concrete	C.Y.	774	$825.00	$638,550.00
Cofferdam and Dewatering	L.F.	1,250	$175.00	$218,750.00
Deformed Steel Bars (Epoxy Coated)	LB.	173,400	$1.40	$242,760.00
Deformed Steel Bars	LB.	130,000	$1.20	$156,000.00
Structural Steel	LB.	1,100,000	$2.00	$2,200,000.00
Elastomeric Bearings	EA.	28	$950.00	$26,600.00
Membrane Waterproofing (Cold Liquid Elastomeric)	S.Y.	1,570	$80.00	$125,600.00
Bituminous Concrete	TON	650	$140.00	$91,000.00
Earth Excavation	C.Y.	5,750	$25.00	$143,750.00
Structure Excavation - Earth	C.Y.	2,000	$25.00	$50,000.00
Pervious Structure Backfill	C.Y.	1,000	$50.00	$50,000.00
Driving Piles	L.F.	4,075	$50.00	$203,750.00
Operating machinery	L.S.	1	$4,500,000.00	$4,500,000.00
Operators House	L.S.	1	$1,750,000.00	$1,750,000.00
Submarine cable	L.S.	1	$500,000.00	$500,000.00
Electrical System	L.S.	1	$3,750,000.00	$3,750,000.00
Furnish Piles	LB.	398,275	$0.70	$278,792.50
Asphaltic Plug Expansion Joint System	C.F.	45	$300.00	$13,500.00
Metal Bridge Rail	L.F.	830	$200.00	$166,000.00
Metal Beam Rail (Type R-B 350)	L.F.	500	$25.00	$12,500.00
Warning & Barrier Gates	L.S.	1	$750,000.00	$750,000.00
Processed Aggregate Base	C.Y.	1,020	$40.00	$40,800.00
Removal of Fender System (PIER2)	L.S.	1	$250,000.00	$250,000.00
Removal of Existing Fender System	L.S.	1	$175,000.00	$175,000.00
Fender System	L.S.	1	$375,000.00	$375,000.00
Temporary Precast Concrete Barrier Curb	L.F.	250	$40.00	$10,000.00
			Subtotal A:	$18,235,852.50
Traffic Items				
Trafficmen	HR.	4000	$75.00	$300,000.00
Trafficperson (Municipal Police Officer)	L.S.	1	$450,000.00	$450,000.00
			Subtotal B:	$18,985,852.50
Lump Sum Items				
Clearing and Grubbing (2.0% of Subtotal B)				$379,717.05
Maintenance and Protection of Traffic (5% of Subtotal B)				$949,292.63
Mobilization (7.5% of Subtotal B)				$1,423,938.94
Construction Staking (1.0% of Subtotal B)				$189,858.53
			Subtotal C:	$21,928,659.64
Minor Items (25% of Subtotal A)				$4,558,963.13
			Subtotal D:	$26,487,622.76
Incidental and Contingencies (35% of Subtotal D)				$9,270,667.97
			TOTAL:	$35,758,290.73
			SAY:	**$35,800,000.00**

Bridge No. 01349
Route 136 over Saugatuck River
Town of Westport

Preliminary Cost Analysis
Temporary Bridge and Roadway

Item	Unit	Quantity	Unit Price	Total Cost
Roadway and Structure Items				
Structure Excavation	C.Y.	176	$35.00	$6,160.00
Fill	C.Y.	900	$30.00	$27,000.00
Pervious Structure Backfill	C.Y.	70	$50.00	$3,500.00
Bituminous Concrete Sidewalk	S.Y.	225	$20.00	$4,500.00
Class "A" Concrete	C.Y.	220	$600.00	$132,000.00
Structural Steel	LB	850,000	$1.40	$1,190,000.00
Temporary Deck	S.F.	18,900	$35.00	$661,500.00
Temporary Parapet	L.F.	1,080	$50.00	$54,000.00
Bituminous Concrete	TON	1,500	$165.00	$247,500.00
Removal of Temporary Bridge	L.S.	1	$425,000.00	$425,000.00
Trench Excavation	C.Y.	320	$15.00	$4,800.00
Temporary Slope Protection	S.Y.	200	$4.00	$800.00
Water Pollution Control (Estimated Cost)	EST.	5,000	$1.00	$5,000.00
Formation of Subgrade	S.Y.	1,350	$3.20	$4,320.00
Subbase	C.Y.	370	$45.00	$16,650.00
Sediment Control System	L.F.	400	$8.00	$3,200.00
15" R.C.P.	L.F.	280	$75.00	$21,000.00
Type "C" Catch Basin	EA.	2	$2,500.00	$5,000.00
Type "C-L" Catch Basin	EA.	2	$2,500.00	$5,000.00
Bedding Material	C.Y.	25	$50.00	$1,250.00
Bituminous Concrete Lip Curbing	L.F.	700	$6.80	$4,760.00
Concrete Curbing	L.F.	520	$35.00	$18,200.00
T.P.C.B.C.	L.F.	200	$50.00	$10,000.00
Relocated T.P.C.B.C.	L.F.	240	$13.00	$3,120.00
Temporary Impact Attenuation System - 700 LB	EA.	4	$390.00	$1,560.00
Temporary Impact Attenuation System - 1400 LB	EA.	8	$390.00	$3,120.00
Temporary Impact Attenuation System - 2100 LB	EA.	8	$390.00	$3,120.00
Relocation of Impact Attenuation System	EA.	5	$420.00	$2,100.00
Remove Metal Beam Rail	L.F.	600	$6.50	$3,900.00
Reset Metal Beam Rail	L.F.	600	$19.00	$11,400.00
R-B End Anchorage - Type II	EA.	1	$1,400.00	$1,400.00
Metal Beam Rail	L.F.	100	$30.00	$3,000.00
Remove and Reset Chain Link Fence	L.F.	150	$35.00	$5,250.00
6' Chain Link Fence	L.F.	300	$25.00	$7,500.00
Rebuild Stone Wall	L.F.	185	$80.00	$14,800.00
Turf Establishment	S.Y.	1,600	$1.80	$2,880.00
				$2,914,290.00
Miscellaneous Items 10%				$291,429.00
			Subtotal A:	$3,205,719.00
Traffic Items				
Trafficmen	HR.	500	$75.00	$37,500.00
Trafficmen (State Police Officers)	L.S.	1	$100,000.00	$100,000.00
			Subtotal B:	$3,343,219.00
			SAY:	**$3,400,000.00**

APPENDIX C

Department Inspection Report

STRUCTURE NO. 01349

ROUTE 136

over

SAUGATUCK RIVER

WESTPORT

Routine Inspection

on

11/3/2014

Inspected by TranSystems - 2

for Area 9

TEAM:	Forwarded to TE3 Krys Kowalski	Date	12/19/2014
TE3:	Reviewed by TE3 Krys Kowalski	Date	1/21/2015
	BMM Required	Yes	
	Town Bridge	No	
	Rating <= 5 (Items 58,59,60 or 62)	Yes	
	Rating Change 2 or More Values	No	
	Forwarded to Supervisor Leo Cain Jr.	Date	1/22/2015
	Forwarded to "To Be Copied Drawer" ☐	Date	
	Date BRI-19 Entered	1/21/2015	
SUPERVISOR:	Reviewed by Supervisor Leo Cain Jr.	Date	2/4/2015
SUPPORT:	Date Copies Made	BMM N	15-070 + 15-071
	Scanned By: LA	Date Scanned	2-22-15
		PDF Box No	

NBI: Yes

NHS: No

Updated 10/5/2015 by RDT
Report to be re-scanned

BRIDGE SAFETY INSPECTION
STATE PROJECT NO. 170-3225

ConnDOT BRIDGE NO. 01349

ROUTE 136 (BRIDGE STREET)
OVER
SAUGATUCK RIVER
WESTPORT, CT

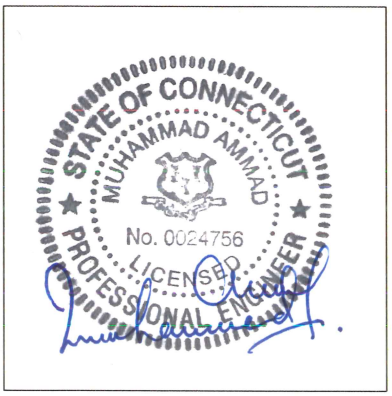
Bridge Type: Steel Movable - Swing

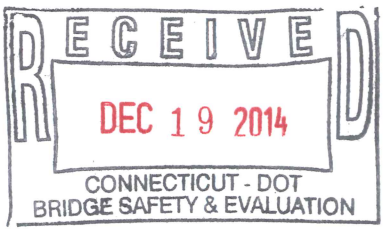
Inspection Type: Routine

Inspection Date: November 3, 2014



Prepared By
TranSystems Corporation
530 Preston Avenue, Suite 100
Meriden, CT 06450





TranSystems®

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

INSPECTION REPORT TRANSMITTAL FORM
Form BRI-27, Rev. 9/97

Structure No. 01349 Town Westport

Inspectors Y. Skoplyak, J. McKenna (TranSystems) Date 11/3/2014

TABLE OF CONTENTS

Loose Forms (not bound in report)	No. of Sheets Enclosed
Maintenance Memo	3 Mechanical 3 Electrical
Flagging Memos	
BRI-11, Seismic Screening Data Sheet	
BRI-39, RR Bridge SI&A Form	
BRI-49, Sign Structure SI&A Form	
Plan Sheets . . . Check here if already on file: ☒	

Bound Report Pages	
Title Cover Sheet	1
Table of Contents	1
Executive Summary	2
BRI-19, HWY Bridge SI&A Form	2
BRI-25, Under Entry SI&A Form	
BRI-18, Bridge Inspection Form	9
BRI-12, Fracture Critical Inspection Data Sheet	2
BRI-48, Sign Structure Inspection Form	
Field Notes (Include Forms BRI-10, BRI-13, BRI-14, BRI-15, BRI-16, BRI-17, BRI-29, BRI-30	38
Calculations :	
Load Rating Evaluation	
Quantities & Cost Estimate	
Photo Sheets	24
BrM Data Collection Form	2
Mechanical and Electrical Inspection reports are attached	

RECEIVED
DEC 19 2014
CONNECTICUT - DOT
BRIDGE SAFETY & EVALUATION

EXECUTIVE SUMMARY
11/3/2014

Bridge No. 01349 carries Route 136 (Bridge Street) over the Saugatuck River in Westport Connecticut. This four span continuous multi-girder swing bridge has a length of 287 feet and a curb to curb width of 19.5 feet. The bridge was constructed in 1870 and rehabilitated in 1993. According to information on file at the Connecticut Department of Transportation, the inventory rating for an AASHTO HS20 loading is 59 tons. The original Pratt Trusses were retained for aesthetic reasons and carry no live load. The mechanical and electrical inspections were completed as part of this assignment and the reports are included with this submission. Repairs were recently completed for the electrical and mechanical components under Emergency Declaration Project No. 158-210.

The bridge was found to be in Fair condition this Routine inspection (Overall Rating = 5). The deficiencies found are as follows:

Deck (Rating = 6, "Satisfactory")

1. The bituminous concrete overlay with membrane waterproofing has rutting up to 2" deep in the wheel lines. There are a few potholes up to 6" long x 2" wide x 1" deep in span 3 and a 2.5' long x 5" wide x 3" deep pothole at the northeast corner in span 4.
2. The first sidewalk support from pier 2 in span 3 and the first support from the east abutment in span 4 have 1 of 2 missing connection bolts and the remaining bolts are loose.
3. The west end of the south rail and the east end of the north rail at pier 2 and the east abutment have impact damage.
4. The scupper grates are clogged up to 50%, but the downspouts are clear.

Superstructure (Rating = ~~6, "Satisfactory"~~ 5 Fair) RDT 10/5/15

1. The end floorbeams (joint side) have heavy rust and accumulation of debris on the bottom flanges and bottom of stiffeners.
2. The interiors of the end floorbeams have moderate rust on the bottom flange and heavy pigeon debris build-up.
3. The diaphragms have areas of heavy rust along the bottom and there are 10" diameter holes cut in the solid end diaphragms.
4. The interior of the pivot girder has laminated rust on the bottom flange with negligible loss. The stiffeners have laminated rust along the bottom. There is moisture throughout.
5. The bottom chord flange plates have several areas of section loss with 1/4"± remaining x full width (truss 1 between L5 and L6) and isolated rusted through holes with adjacent areas of knife edge remaining.
6. The diagonal members have cracks up to 2-1/6" long along the forge line at the connection to the top and bottom chord, mostly in spans 3 and 4.
7. The vertical and diagonal members have tears, bents and cracks up to 3' high from impact damage throughout. Truss 2 in span 3, 1 of 2 diagonal members L4U5 is sheared.
8. There are numerous areas of impact damage throughout the trusses.

Substructure (Rating = 5, "Fair")

1. The stone masonry abutment stems have missing and/or deteriorated mortar at joints and voids up to 4" deep.
2. The fiberglass jackets at pier 2 are loose and/or missing. The exposed concrete has scaling up to full perimeter x 3' high x up to 4" deep with exposed rebar.
3. The pier 1 steel jackets have heavy laminated rust and rusted through holes up to 1' diameter that expose the concrete. The exposed concrete has severe scale and spalls.
4. The steel diagonal cross-bracing members at pier 2 have heavy rust and perforations up to 3' long x full height. The southeast cross-brace horizontal member is completely detached.

Channel & Channel Protection (Rating = 5, "Fair")

1. Per the 2012 Underwater Inspection Report the mudline elevations have random areas of scour with no specific pattern up to 3.6' with the exception of the areas surrounding piers 2 and 3, that exhibit aggradation of 3' to 5' since the 2008 and 2010 inspection.
2. The dry set stone masonry retaining walls along the channel have missing stones up to 2.5' diameter.

Miscellaneous

1. Clearance is posted as 13'-0", the actual clearance over the bridge is 12'-10".
2. The load posting sign at the intersection of Bridge Street and Imperial Avenue does not reflect the current load capacity of the bridge and should be removed.

Bridge Number **01349**

Inspected By: Y. SKOPLYAK & J. MCKENNA

Sufficiency Rating ~~58.38~~ 58.38

Previous Inspection Date 11/9/2012

BS&E Received ☐ Data Entry By:

Copies Made ☐ Data Entry Date: 11/21/2015

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BRIDGE SAFETY & EVALUATION

STRUCTURE EVALUATION

SHEET 1 OF 2 FORM BRI-19 REV 10/00

SHEET 1 OF 2

90) Inspection Date	Inspection Team	91) Frequency	Class:
11/03/14	21 21	24	03
Indepth Insp	**Deck Survey**	**Access**	**Flagman**
11/9/2012	1/1/1900	40	

CRITICAL FEATURE INSPECTIONS

	Type	Frequency	Team	Date	
Fracture:	E 5	24 24	21 21	11/9/2012	11/03/14
Uwater:		24	19	12/7/2012	
Special:					

RED FLAG ☐

IDENTIFICATION

Bridge Name SAUGATUCK RIVER
Town Name WESTPORT Town Code 83500

5) Inventory Route:
A) Record Type 1
B) Signing Prefix 3 State Highway
C) Level of Service 1 Mainline
D) Route Number 00136
E) Directional Suffix 0 NA

6) Feature Intersected SAUGATUCK RIVER

7) Facility Carried: ROUTE 136

9) Location BETWEEN I-95 EXIT 17 & 18

11) Milepoint 8.65 Miles

16) Latitude 41deg 7 min 48.00 sec

17) Longitude 73deg 22 min 12.00 sec

98) Border Bridge:
A) State Code
B) Percent Responsibility %
C) Border Town Name

99) Border Bridge Structure No

STRUCTURE TYPE AND MATERIAL

43) Structure Type, Main:
A) Material 4 Steel continuous
B) Design Type 17 Movable - Swing

44) Structure Type, Approach:
A) Material 4 Steel continuous
B) Design Type 2 Stringer/Multi-beam o

45) Number of Spans, Main Unit 2

46) Number of Approach Spans 2

107) Deck Structure Type 5 Steel Plate (includes orthotropic)

108) Wearing Surface/Protective System:
A) Type of Wearing Surface 6 Bituminous
B) Type of Membrane 1 Built-up
C) Type of Deck Protection 0 None

AGE AND SERVICE

27) Year Built 1870
106) Year Reconstructed 1993

42) Type of Service:
A) On 1 Highway
B) Under 5 WATERWAY

28) Number of Lanes:
A) On 2
B) Under

29) Average Daily Traffic 13600
Half ADT?: No N

109) Percent Truck 5%

30) Year of ADT 2012 2013

19) Bypass, Detour Length 1miles

GEOMETRIC DATA

48) Length of Max Span 70ft

49) Structure Length 287ft

50) Curb or Sidewalk Widths:
A) Left 3.7ft
B) Right 0.0ft

51) Brg Rdwy width,curb-curb 19.5ft

52) Deck Width, Out-Out 20.0ft

32) Approach Roadway Width 21ft

33) Bridge Median 0 No Median

Deck Area 7653 sqft

34) Skew Angle 0deg

35) Structure Flared 0

10)Inv. Rte. Min. Vert Clearance 13ft 9in

47) Log Inv. Rte. Total Horiz Clr.: 19.5ft

47) RLog Inv. Rte. Total Horiz. Clr.: ft

53) Min Vert Clearance Over Bridge 12ft 10in

54) Min Vert Under Clearance N Ref 0ft 0in Ref

55) Min Lat Under Clearance on Right N Ref 99.9ft Ref

56) Min Lat Under Clearance on Left 0.0ft

BRIDGE COMMENTS

Machinery disabled by Storm Sandy, Oct 2012. Repair by Emergency Declaration Proj 158-210. reopened for river traffic May 2013. RDJ 5/19/14

STRUCTURE EVALUATION

SHEET 2 OF 2 FORM BRI-19 REV 10/00

SHEET 2 OF 2

Bridge Number	01349
Town Name	WESTPORT
Facility Carried	ROUTE 136
Feature Crossed	SAUGATUCK RIVER
NBIS Length	Yes 287

Inspected By: Y. SKOPLYAK & J. MCKENNA

CLASSIFICATION

112) NBIS Bridge Length	Yes	
104) Highway System	0	Off System
26) Functional Class	16	Urban Minor Arterial
100) Defense Highway	0	Route is not a STRAHNET Route
101) Parallel Structure	N	No parallel structure exists
102) Direction of Traffic	2	2-way traffic
103) Temporary Structure		
110) Designated National Network	0	Not on national network
20) Toll	3	On Free Road
21) Maintain	1	State Highway Agency
22) Owner	1	State Highway Agency
Report Class	S	STATE
37) Historical Significance	1	On National Register

WATERWAY

DrainageBasinCode	7200	
38) Navigation Control	1	Navigation control on waterway
39) Navigation Vert Clr.	7	40) Navigation Horiz Clr. 50
116) Vert-Lift Brg Nav Min		
111) Pier Abutment Protection	2	In place and functioning

PROPOSED IMPROVEMENTS

75A) Type of Work Proposed	
75B) Work Done By	
76) Length of Struct. Improvement	ft
94) Bridge Improvement Cost	$
95) Roadway Improvement Cost	$
96) Total Project Cost	$
97) Year of Improvement Cost Est.	
114) Future ADT	115) Year Future ADT

List No. 99 28 Project No. Advertised

POSTED SIGNS & UTILITIES

Other Posted Signs 1	8	Other warning signs			
Other Posted Signs 2					
Actual P.L. Single Unit Truck	tons		Actual P.L. 4Axle Truck	tons	
Rec. P.L. Single Unit Truck	tons		Rec. P.L. 4Axle Truck	tons	
Actual P.L. Semi-TrailerTruck	tons		Actual P.L. 3S2 Truck	tons	
Rec. P.L. Semi-TrailerTruck	tons		Rec. P.L. 3S2 Truck	tons	
Rec. P.L. All Vehicles	tons		Actual P.L. All Vehicles	tons	
Posted Vert Clearance On Bridge	13 ft	in		ft	In
Posted Vert UnderClearance	ft	in		ft	In
Posted Speed Limit	25 mph				mph
Utility					

LOAD RATING AND POSTING

31) Design Load	5	Evaluation Code	L
63) Operating Rating Type	1	Year of Evaluation	2000
64) Operating Rating	98.6	70) Bridge Posting	5
65) Inventory Rating Type	1	41) Structure Status	A
66) Inventory Rating	59.2		

CONDITION

	Rating	By
58) Deck 10/15/15 ADT	6	YS
59) Superstructure	5	YS
60) Substructure	5	YS
61) Channel & Chan. Protection	5	YS
62) Culverts	N	YS

APPRAISALS

	Rating	By
67) Structure Evaluation	5	MA
68) Deck Geometry	2	YS
69) Under Clear Vert & Horiz	N	YS
71) Waterway Adequacy	8	YS
72) Approach Rdwy Alignment	6	YS
113) Scour Critical	8	

Items 58 Thru 72 Checked By:

36) Traffic Safety Features:

A) Bridge Railings	0	0
B) Transitions	0	0
C) Approach Guardrail	0	0
D) Approach Guardrail End	0	0

OTHER FEATURES

Fence Required	No		Barrel Ladder	No
Fence Present	Yes	Y	Stand Pipes	No
Fence Height	4.3 ft	ft	Cat Walks	No
Fence Type	2	Chain Link	Movable Inspection System	No
Fence Material	2	Steel	Loose Concrete Checked?	No N
Fence Top Type	1	Vertical		

INSPECTION COMMENTS

Proposed Next Indepth Insp Year	2022
Senior	MAJOR: Kowalsk
Supervisor	MAJOR: Keedy/B

REVIEWED BY: [signature] Date 12/18/14

K. [signature] 1/21/15

Connecticut Department of Transportation

Bridge Inspection Report BRI-18

Bridge #: 01349 **Inspection Date: 11/03/2014**

Inspection Type:	Routine	**Previous Inspection Date:**	11/9/2012	**Snooper Required:**	No
Inspection Performed By:	TranSystems	**Feature Carried:**	ROUTE 136	**Snooper Used:**	No
Town:	WESTPORT	**Feature Intersected:**	SAUGATUCK RIVER	**Year Built:**	1870
Location:	BETWEEN I-95 EXIT 17 & 18	**Main Design:**	Movable - Swing	**Year Rebuilt:**	1993
Main Material:	Steel continuous				

Visits

Visit Date:	Temp:	Start Time:	End Time:
11/3/2014	55	8:30:00 AM	3:00:00 PM
11/4/2014	60	9:00:00 AM	2:00:00 PM
11/18/2014	25	8:00:00 AM	4:00:00 PM

Inspectors:

Inspector:	Task:
J. McKenna	Inspector
Y. Skoplyak	Lead Inspector

DECK: - **Overall Rating:** 6

	Rating	
OVERLAY:	5	The bituminous concrete overlay with membrane waterproofing has rutting up to 2" deep in the wheel lines. There are a few potholes up to 6" long x 2" wide x 1" deep in span 3 and a 2.5' long x 5" wide x 3" deep pothole at the northeast corner in span 4. There is a 30' long x 3/8" wide longitudinal crack in span 2. See field sheet 4 and photos 8 and 9.
DECK-STR. CONDITION:	6	There is steel plate deck in spans 1 and 2 (swing spans) that functions as a top flange for the girders, see item "Girders" item below. The exodermic deck in spans 3 and 4 has areas of heavy rust with rusted through holes up to 2' long x 1' wide in the form pans, mainly at the overhangs and around the weep pipes. See field sheets 5, 7 - 9 and photos 6, 7 and 10.
CURBS:	7	The steel channel curb sections have minor scrapes and light rust. Average curb reveal is 7" (spans 1 & 2) and 6" (spans 3 & 4). The east approach curb at the north side is settled up to 2" deep. See field sheet 4.
MEDIAN:	N	-

Total of 14 areas of heavy rust of which 6 have rusted thru holes (mainly in Span 4) increased from 2012

SIDEWALKS:	6	There is a 5' wide timber sidewalk along the north side of the bridge. The timber planks have minor checks and wear. Some boards are not even with adjacent boards. The timber sidewalk stringers have minor checks and worn coating. The stringer support members have peeling paint and moderate rust. The first sidewalk supports from pier 2 in span 3 and from the east abutment in span 4 have 1 of 2 missing connection bolts and the remaining bolts are loose at both locations. The support beams in the swing span have flame cut flanges over the substructure units. A few stringer attachment channels have laminated rust. The concrete sidewalk at the west approach has a 4' long x 3/8" wide transverse crack. See field sheets 4, 5, 7 - 9 and photo 12.
PARAPET:	N	-
RAILING:	6	There is minor impact damage to the west end of the south rail and to the east end of the north rail at pier 2 and the east abutment. The west rail has a disconnected post between nodes 3 and 4. The bridge rail at the northwest corner rubs on the southwest approach rail when the bridge opens. See field sheet 4 and photo 13.
PAINT:	7	Less than 10% of painted surfaces are deteriorated.
FENCE:	7	The 4'-3" high painted chain link fence along the north sidewalk has isolated areas of light rust. See field sheet 4.
DRAINS:	6	The scupper grates are 50% clogged, but the down spouts are clear. The PVC weeps have no significant deficiencies. See field sheets 4, 5, 7 - 9 and photo 14.
LIGHTING STANDARD:	N	There are Christmas lights attached to the truss.
UTILITIES TYPE/SIZE:	N	-
CONSTR JOINTS:	N	-
EXPANSION JOINTS:	7	The open deck joints at the west abutment and pier 2 have minor scrapes and gouges in the steel extrusions. The previously noted exposed rebar at the north end of the east abutment joint has been repaired. See field sheet 4 and photos 15 and 16.

59. SUPERSTRUCTURE: The trusses were retained during the 1993 rehabilitation for ornamental purposes only, and carry no live load. Therefore, trusses are no longer considered fracture-critical and do not control the overall rating of the superstructure.

Overall Rating: 6 (5) RDT 10/15/15

Trusses are no longer structural, but condition so bad + damage so extensive, overall rating was lowered.

	Rating	
BEARING DEVICES:	6	There are swing span screw jack bearings at the west abutment and piers 1 and 2. See Mechanical Inspection Report dated 11/8/2014. There are elastomeric bearings for trusses and girders in spans 3 and 4. The steel bearing plates have peeling paint and light rust. Elastomeric bearing load plates are slightly dished (appears as-built). The truss bearings at pier 2 have anchor bolt spacers with heavy rust and several spacers are missing washers. The anchor bolts at the east abutment have laminated rust. See field sheets 5, 7 - 9 and photos 17 - 20.
STRINGERS:	N	-
GIRDERS:	7	Girders have isolated areas of peeling paint and light rust. The girder bottom flanges in span 2 have minor scrapes. Girder 1 in span 3 has a rolling defect in the web. See field sheets 5 - 9 and photos 6, 7 and 21.
FLOOR BEAMS:	6	The end floorbeams (joint side) have heavy rust and accumulation of debris on the bottom flanges and bottom of stiffeners. The interiors of the end floorbeams have moderate rust on the bottom flange and heavy pigeon debris build-up. The diaphragms have areas of heavy rust along the bottom and there are 10" diameter holes cut in the solid end diaphragms. The exterior of the pivot girder at pier 1 has isolated areas of peeling paint, light rust, and debris accumulation under the trusses. The interior of the pivot girder has laminated rust on the bottom flange with negligible loss (no change since the last inspection). The stiffeners have laminated rust along the bottom. There is moisture throughout. See field sheets 5 - 9 and photos 21 - 24.
TRUSSES-GENERAL:	3 (2) RDT 10/15/15	The trusses were retained during the 1993 rehabilitation for ornamental purposes only, and carry no live load, only their self-weight. Therefore, trusses are no longer considered fracture-critical. The bottom chord bottom flange plates have several areas of section loss with 1/4"± remaining x full width (truss 1 between L5 and L6) and isolated rusted through holes up to 8" x 3" (node L3, span 1, north truss). There is up to 1/8" thick impacted rust between the bottom flange plates at isolated locations. There is up to 1/8" impacted rust between eye bars and nuts at the bottom chord. The truss members have numerous areas of collision damage. See item "Weld-Cracks" below. Heavy to severe impact damage to most vertical & diagonal members South Truss Span 1 - U3L4 removed L4U4 w/ 2 of 4 angles severed South Truss Span 2 - L4U4 removed due damage South Truss Span 3 - L4U5 one of 2 bars severed See field sheets 10 - 16 and photos 25 - 37.
TRUSSES-PORTALS:	6	The portals have bent flanges and dented angle legs from vehicular impact. See field sheets 16 - 17.

TRUSSES-BRACING:	6	The sway bracing has dented angle legs from vehicular impact. See field sheets 16 - 17 and photo 34.
PAINT:	5	Less than 50% of painted surfaces are deteriorated. See items above.
RUST:	6	See items above.
MACHINERY MOV SPAN:	7	See the Mechanical/Electrical Inspection Report, dated 11/18/2014.
RIVETS & BOLTS:	7	There is a missing rivet at truss 1 member U1-L0 in span 1. See field sheets 10 - 12.
WELDS - CRACKS:	3 2 NOT 10/15/15	The field welded girder connections are sloppy and not ground smooth. The girder to end floorbeam/pivot girder welds have backer bars left in place. The bottom flange transition welds have no notable deficiencies. The girder-to-floorbeam welds (Category E) were checked hands on with no notable deficiencies. The truss diagonal members (eye bars) have cracks up to 2-1/6" long along the forge line at the connection to the top and bottom chord, mostly in spans 3 and 4. The truss vertical and diagonal members have tears, bents and cracks up to 3' high from impact damage throughout. Truss 2 in span 3, 1 of 2 L4U5 diagonal members is sheared. Truss 2 @ Span 1, L4U4 has 2 of 4 angles severed. See field sheets 5 - 16 and photos 25 - 36. NOT 10/15/15
TIMBER DECAY:	N	-
CONCRETE CRACKING:	N	-
COLLISION DAMAGE:	3	There are numerous areas of impact damage throughout the trusses. See "Welds-Cracks" item above.
MEMBER ALIGNMENT:	3	Girder 2 web in span 1 is bowed 1/8"± over the full height at the west welded splice. The truss members are bent from vehicular impact. See "Weld-Cracks" item above.
DEFLECT. UNDER LOAD:	N	'N' - Normal 'E'- Excessive
VIBRATION UNDER LOAD:	N	'N' - Normal 'E'- Excessive
STAND PIPES:	N	-
BARREL LADDERS:	N	-

ARE BARREL LADDERS OSHA COMPLIANT? NA

---

60. SUBSTRUCTURE: - **Overall Rating:** 5

Rating

ABUTMENTS-STEM:	6	The stone masonry abutment stems have missing and/or deteriorated mortar at joints and voids up to 4" deep. The stones have isolated cracks up to 12" high x 1/8" wide. The west abutment concrete bridge seat has hairline cracks with efflorescence. The east abutment concrete bridge seat has a 2' high x 3' wide area of map cracking.

		Pedestal for truss 1 at the west abutment has a 1' diameter hollow area, 1' diameter x 1/4" deep scale and a 2' x 1' area of map cracking. The pedestal for girder 4 at the east abutment has a 4" diameter x 1/2" deep spall. Also, see the Underwater Inspection Report dated 12/7/2012. See field sheets 19 - 20 and photo 38.
ABUTMENTS-BACKWALL:	7	Both backwalls have isolated vertical hairline cracks up to full height. The east abutment backwall has a 1' wide x 1' high area of map cracking. See field sheets 19 - 20.
ABUTMENTS-FOOTINGS:	N	Not visible.
ABUTMENTS-SETTLEMENT:	8	None noted.
ABUTMENTS-WINGWALLS:	N	Stone masonry abutment end faces. Rating revised to N.
PIERS/BENTS-CAPS:	6	The pier caps have hairline cracks and areas of map cracking with efflorescence and rust. The north and south faces of pier 4 have spalls up to 22" long x 10" high x 4" deep. ODOT 10/15/15 2 Pier 3 The cap beams at pier 2 have isolated areas of light rust. The carrier beams have areas of heavy laminted rust. The north and south carrier beam top flange shim plates at the east elevation of pier 2 have section loss with as little as 2' long x 3" wide x 1/8" remaining thickness (north beam). See field sheets 21 - 26 and photo 39 - 42.
PIERS/BENTS-PILE BENT:	5 ODOT 10/15/15	There are concrete encased H-piles with fiberglass jackets at piers 2 and 3. The fiberglass jackets at pier 2 are loose and/or missing. The exposed concrete has scaling up to full perimeter x 3' high x up to 4" deep with exposed rebar. Also, see the Underwater Inspection Report dated 12/07/2012. See field sheets 21 - 26 and photos 40, 41 and 43.
Pier 2 bracing between H-Piles with severe deterioration (Bracing only) Rated 2		
PIERS/BENTS-COLUMNS:	5	The pier 1 steel jackets have heavy laminated rust and rusted through holes up to 1' diameter that expose the concrete. The exposed concrete has severe scale and spalls. Also, see the Underwater Inspection Report dated 12/7/2012. See field sheets 21 - 22 and photo 39.
PIERS/BENTS-FOOTING:	N ODOT 10/15/15	Per the 2012 Underwater Inspection Report the footing is intermittently exposed and undermined up to 1.8' long x 1.3' high x 2.1' deep at the southwest and the northwest corners of pier 2. The timber cribbing has splits and shown marine borer activity. The steel framework installed to repair the pier uses carrier beams to transfer load from the pier cap to the steel piles, leaving the timber cribbing to carry only the dead load of the masonry pier stem. Rating revised to 'N'.
Note - The limited undermining is due to the rotting away of the timber cribbing.		
PIERS/BENTS-SETTLMT:	8	None detected.
EROSION-SCOUR:	5	Per the 2012 Underwater Inspection Report there is scour up to 1.3' deep along the west abutment and up to 0.7' deep along pier 1. There is 2.4' of aggraddation along piers 2 and 3. The mudline is unchanged along the east abutment.
CONCRETE CRACK-SPALL:	5	See items above.
STEEL CORROSION:	5 ODOT 10/15/15 2 See Comments	The steel diagonal cross-bracing members at pier 2 have heavy rust and perforations up to 3' long x full height. The southeast cross-brace horizontal member is completely detached. Also, see "Piers/Bent Columns" and "Piers/Bents Caps" items above and the 2012 Underwater Inspection Report. See sheets 23 and 24 and photo 44.
@ Pier 2 Bent - Pile Bent		
PAINT:	N	-

TIMBER DECAY:	N	-
COLLISION DAMAGE:	8	-
DEBRIS:	7	There is minor debris on abutment seats.

61. CHANNEL & CHANNEL PROTECTION: See Underwater Inspection Report dated 12/7/12. **Overall Rating:** 5

	Rating	
CHANNEL SCOUR:	5	Per the 2012 Underwater Inspection Report the mudline elevations have random areas of scour with no specific pattern up to 3.6' with the exception of the areas surrounding piers 2 and 3, that exhibit aggradation of 3' to 5' since the 2008 and 2010 inspection.
EMBANKMENT EROSION:	6	The dry set stone masonry retaining walls along the channel have missing stones up to 2.5' diameter.
DEBRIS:	7	Minor scattered debris.
VEGETATION:	8	-
CHANNEL CHANGE:	7	Mudline elevations with random scour and aggradation.
FENDER SYSTEM:	5	Per the 2012 Underwater report the timber piles and horizontal wales exhibit splits and checks up to 1/2" wide. Several piles have up to 30% section loss at mudline; however, these piles are abandoned and or part of the old fender system. The hardware exhibits moderate to heavy rust in the tidal zone. The wales at random locations have minor abrasion damage, possibly due to impact. See field sheet 27 and photo 39.
SPUR, DIKES & JETTIES:	N	-
RIP RAP:	6	The riprap at the southeast embankment has a 3' diameter x 3' deep void below the grouted stones. See field sheet 27.

62. CULVERTS & RETAINING WALL: - **Overall Rating:** N

65. APPROACH CONDITION - **Overall Rating:** 7

	Rating	
APPROACH SLAB:	N	-
RELIEF JOINTS:	N	-

APPROACH GUIDE RAIL:	6	The metal beam approach guide rails have areas of impact damage. See field sheet 4.
APPROACH PAVEMENT:	7	The east approach pavement has a 20' long x 2' wide area of map cracking open up to 1/4" wide. There is up to 1" of settlement along the east abutment deck joint. See field sheet 4.
APPROACH EMBANKMENT:	6	The retaining wall at the northwest corner has a collapsed section.

TRAFFIC SAFETY FEATURES

	Rating	
BRIDGE RAILINGS:	Last Inspection: 0 Current: 0	No blockouts. Metal beam rail is attached to trusses.
TRANSITIONS:	Last Inspection: 0 Current: 0	Steel blockouts.
APPROACH GUARDRAILS:	Last Inspection: 0 Current: 0	Steel blockouts.
APPR. GUARDRAIL ENDS:	Last Inspection: 0 Current: 0	Blunt end.

66. LOAD POSTING

	- Posted Loading -	
SINGLE UNIT (TONS):	Last Inspection: - Current: -	-
SEMI TRAILER (TONS):	Last Inspection: - Current: -	-
4 AXLE (TONS):	Last Inspection: - Current: -	-
3S2 (TONS):	Last Inspection: - Current: -	-
ADVANCE WARNING (Y/N):	N	-
LEGIBILITY:	N	-
VISIBILITY/LOCATION:	N	-

67. MISCELLANEOUS

	Rating	
MIN. VERT. UNDERCLEARANCE:	Last Inspection: 0' 0" Current: -' -"	-
POSTED CLR. UNDER BRIDGE:	Last Inspection: -' -" Current: -' -"	-
POSTED CLR. ON BRIDGE:	Last Inspection: 13' -" Current: 13' 0"	Clearance is posted as 13'-0", the actual clearance over the bridge is 12'-10". Consideration should be given to replacing the old sign. See sheets 2 and 3 and photo 47.
ADVANCED WARNING (YES/NO):	Yes	13'-0" at both approaches and "(LEFT ARROW) TRUCKS OVER 7 TON" sign at intersection of Bridge Street and Imperial Avenue. The load posting sign does not reflect the current load capacity of the bridge and should be removed. See photo 48.
SPEED LIMIT (IF ANY):	Last Inspection: 25 Current: -	-
CHARACTER OF TRAFIC:		Heavy / Mixed traffic.

ADDITIONAL NOTES:

The bridge ID is legible.
The bridge is logged from west to east with girder 1/truss 1 at the north side which is consistent with the previous inspection report and the bridge plans.
The interior of the end floorbeams at the west abutment, pier 2, and the pivot girder at pier 1 are confined spaces.
A mechanical and electrical inspection was performed as part of this assignment and the reports are attached.
Underside of bridge was inspected from a barge with 12' high scaffolding.
There is a boat launch ramp at the end of Elaine Road, under the I-95 bridge 00064.

ADDITIONAL COMMENTS:

There are new electrical and mechanical inspection BMM's attached with this report.
The following items form previous BMM's have not been addressed:
- Item 2 in BMM No. 11-133
- Items 1, 3, 4 and 5 in BMM 09-530
- Items 1 and 2 in BMM No. 07-239
- Items 1, 2 and 3 in BMM No. 06-091

Inspectors' Signatures:

1) _____ Date: 12/18/2014

2) FOR J. MCKENNA Date: 12/18/2014

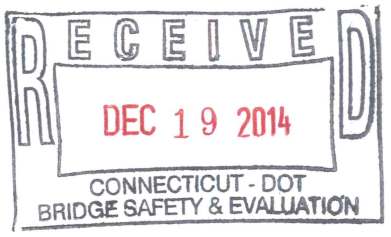
3) _____ Date: ----/----/-----

4) _____ Date: ----/----/-----

P.E. Signature: [signature] Date: 12/18/14

P.E. #: 24756 Date: ----/----/-----

Reviewed by: [signature] conndot Date: 1/16/15



CONNECTICUT DEPARTMENT OF TRANSPORTATION
FRACTURE CRITICAL MEMBERS/FATIGUE PRONE DETAILS
INSPECTION DATA SHEET

Form BRI12, Rev 9/97

Bridge No: 01349

Year Built: 1884

Fracture Critical Inspection Date: 11/03/14

FC Insp Freq: 24 Months **FC Type Code:** J

Town: Westport ADT: 13500 Year of ADT: 2013

Facility Carried: Route 136 (Bridge Street) Structure Type: 417 % Truck: 5

Feature Intersected: Saugatuck River

Access Equipment Needed: Raft with scaffolding

Traffic Control Required: One way alternating lane closure on Route 136

Reference to Plans: Project #158-150 (1989)

MEMBER/DETAIL TYPE # G

Member/Detail Type: Welded steel box floorbeam [X] Fracture Critical

Fatigue Category: [ ] Steel Type: A-588 [ ] Fatigue Prone

Description: Welded steel box floorbeam at the west abutment, pier 1 and pier 2

Inspection Procedure: Hands-on

MEMBER/DETAIL TYPE # A

Member/Detail Type: Top flange for girder 1 - 7 [X] Fracture Critical

Fatigue Category: [ ] Steel Type: A-588 [ ] Fatigue Prone

Description: Spans 1 and 2 have common top flange of girders 1 - 7 that is continuous across pier 1

Inspection Procedure: Hands-on

CONNECTICUT DEPARTMENT OF TRANSPORTATION
FRACTURE CRITICAL MEMBERS/FATIGUE PRONE DETAILS
INSPECTION DATA SHEET

Form BRI12, Rev 9/97

MEMBER/DETAIL TYPE # H

Member/Detail Type: Steel girder welded to box girders ☐ Fracture Critical

Fatigue Category: E Steel Type: A-588 ☒ Fatigue Prone

Description: Longitudinally loaded component attached by a weld in the direction of primary stress (girder 1 - 7 connection to the bottom flange of floorbeams at the west abutment, pier 1 and pier 2).

Inspection Procedure: Hands-on

MEMBER/DETAIL TYPE #

Member/Detail Type: ☐ Fracture Critical

Fatigue Category: Steel Type: ☐ Fatigue Prone

Description:

Inspection Procedure:

MEMBER/DETAIL TYPE #

Member/Detail Type: ☐ Fracture Critical

Fatigue Category: Steel Type: ☐ Fatigue Prone

Description:

Inspection Procedure:

MEMBER/DETAIL TYPE #

Member/Detail Type: ☐ Fracture Critical

Fatigue Category: Steel Type: ☐ Fatigue Prone

Description:

Inspection Procedure:

TranSystems

JOB NO. 170-32 | BRIDGE NO. 01349

DATE: SEE BELOW | SHEET 1

TIME AT SITE

CREW: SEE BELOW

DATE: 11/3/14	CREW: YS, JPM	
	EQUIPMENT USED: BOAT & SCAFFOLDING	
TIME: 8:30 - 3:00 T= 55°	POLICE: (NAME/TIME) —	~~FLAGMAN:~~ NE SAFETY BOAT (NAME/TIME) 8:30 - 3:00
WORK DONE: INSPECTED SPANS 1 & 2		

DATE: 11/4/14 T=60°	CREW: YS, JPM	
	EQUIPMENT USED: BOAT SCAFFOLDING	
TIME: 9:00 - 2:00	POLICE: (NAME/TIME) —	~~FLAGMAN:~~ (NAME/TIME) NE SAFETY BOAT 9:00 - 1:30
WORK DONE: INSPECTED SPANS 3 + 4		

DATE: 11/18/14 T= 25°	CREW: ABB, JD, SK, NS, DOT Maint Crew (9:00-3:00)	
	EQUIPMENT USED: ladders	
TIME: 8:00 - 4:00	POLICE: John Cabral (#1983) West. PD (NAME/TIME) Dan Frantino (#360) 8:30-3:30	FLAGMAN: (NAME/TIME) —
WORK DONE: TOD, Truss, MOE Insp, 100% complete		

DATE:	CREW:	
	EQUIPMENT USED:	
TIME:	POLICE: (NAME/TIME)	FLAGMAN: (NAME/TIME)
WORK DONE:		

DATE:	CREW:	
	EQUIPMENT USED:	
TIME:	POLICE: (NAME/TIME)	FLAGMAN: (NAME/TIME)
WORK DONE:		

1A

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

subject: **BMM No.** 11-133
Bridge No. 01349
Route 136 over Saugatuck River
Westport

MEMORANDUM

date: 3/4/11

to: Mr. Robert P. Mongillo
Transportation Maintenance Administrator
Bureau of Highway Operations

from: Joseph C. Kozlowski
Transportation Supervising Engineer
Bureau of Engineering and Construction

Attached are two copies of our most recent inspection report for the subject structure, which indicates the location of the following structural deficiencies:

1. The turnbuckles for the barrier gate stay wires are not provided with lock nuts at each end of the turnbuckle and were noted to be loose.
2. The west abutment and Pier 2 end floor beams have a 10 in. hole cut in the solid end diaphragm at each end allowing pigeon access and there is an accumulation of debris including pigeon debris inside, especially pier 2. See report photos 20 and 22.
3. The east abutment joint has a 6 ft. length of missing steel extrusion with a 1 ft. x 4 in. x 2 in. deep spall in the elastomeric header, see report photo 15.

Please direct persons under your jurisdiction to:

1. Provide lock nuts at the turnbuckles for the barrier gates to secure wires. (1) Installed
2. Provide pigeon screens that are removable for mechanical inspection access. NOT DONE (1)
3. Repair or replace joint (20 LF). (1) replaced

All repairs shall be performed utilizing appropriate approved materials and tried and proven methods unless otherwise specified.

Item No. 1 should be considered Priority C. The remaining items should be considered Priority D. There are also other deficiencies which are considered routine maintenance that should be corrected. In addition, the inspection report contains listings of various mechanical and electrical items from previous reports that have not been addressed.

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

subject: BMM No. 09-530
Bridge No. 01349
Route 136 over Saugatuck River
Westport, Connecticut

MEMORANDUM

date: 9/25/09

to: Mr. Robert P. Mongillo
Transportation Maintenance Administrator
Bureau of Highway Operations

from: Joseph C. Kozlowski
Transportation Supervising Engineer
Bridge Safety and Evaluation
Bureau of Engineering and Construction

1 11/11/10 RB/BB (TSC) 2 12/7/12 MPP/MLV (TSC) 3 11/3/14 YS, JPM (TSC)

Attached are two copies of our most recent inspection report for the subject structure. The following deficiencies were found:

1. The end of the south rail at the west abutment and the end of the north rail at the east abutment has an impact damages. See Photo No. ~~6~~
2. ~~The ends of the north bridge rail are touching at Pier 2.~~ NC
3. The stone masonry abutments exhibit missing joint mortar (typically below the high tide line) and the concrete pier caps have two spalls up to ~~12 in. x 18 in. x 3 in.~~ deep.
4. The stone masonry retaining walls have missing ~~or non-existent grout and~~ up to 2.5' ~~of penetration~~. A void is present near the top of the southeast wall up to 2' x 3'x 2' deep. See Photo No. ~~22~~.
5. The steel jacket at pier 1 has corrosion and perforations with exposed concrete, causing scaling and spalling of concrete in an area 30 feet long by 2 feet high. See Photo No. ~~24~~.

Please direct persons under your jurisdiction to:

1. Repair the impact damage.
2. ~~Reset or adjust the terminal ends so that they no longer touch when the swing span closes.~~
3. Repoint the abutment joints and patch the spall. Total 70 LF.
4. Repair the voids. Total 12CF.
5. Repair/patch areas of spalled concrete and repair steel jacket. Total < 1 CY

The above item 1 - 5 should be considered Priority "D". There may be other deficiencies which are considered routine maintenance, and should be corrected.

The attached inspection report also notes that the following items were issued under a previous BMM and have not been addressed.

BMM No.	Item
07-239	1. All scupper grates of the bridge drainage system are clogged along the gutter lines throughout. ~~See Photo No. 10~~
	2. The inside of the end floorbeam at the west abutment and the inside of the pivot girder at pier 1 have heavy rust along the bottom flange. See Photo No. ~~13 & 15~~. There is now some trapped water standing inside the pivot girders.

1C

(34)

To: Mr. Robert P. Mongillo
From: Mr. Ralph A. Phillips

BMM No.
Bridge No. 01349

06-091

ITEMS 1-3 NOT DONE

1. There are spalls up to ~~3ft.~~ x 3.5 ft. x ~~6 in.~~ deep with exposed rusted reinforcing bars in the concrete piles of pier 2. The spalls are now up to ~~7~~ 10" deep. ~~REPORT PHOTO 34~~
2. The timber sidewalk stringers in span 3 have ~~two~~ backed off nuts with ~~two~~ missing bolts (1/2 in. diameter x 4 in. grip) near pier 2 and the stringers in span 4 have two backed off nuts near the East abutment. See Report Photo No. ~~8~~. Note: The loose nuts and missing bolts are located at floorbeams 2 & 4.
3. The steel bracing between the H-piles of pier No. 2 exhibit severe section loss. The diagonal members were found to have up to ~~90%~~ section loss at ends next to piles. The horizontal members were found to have up to 100% web and bottom flange section loss. See Report Photo No. ~~25 & 26~~ ~~33~~

Bridge Safety and Evaluation believes that these repairs are structurally important and should be addressed.

All repairs shall be performed utilizing appropriate approved materials and tried and proven methods unless otherwise specified.

If you have any questions concerning these repairs, please contact me at ext. 3159. Please notify this section when the work has been completed.

Attachments

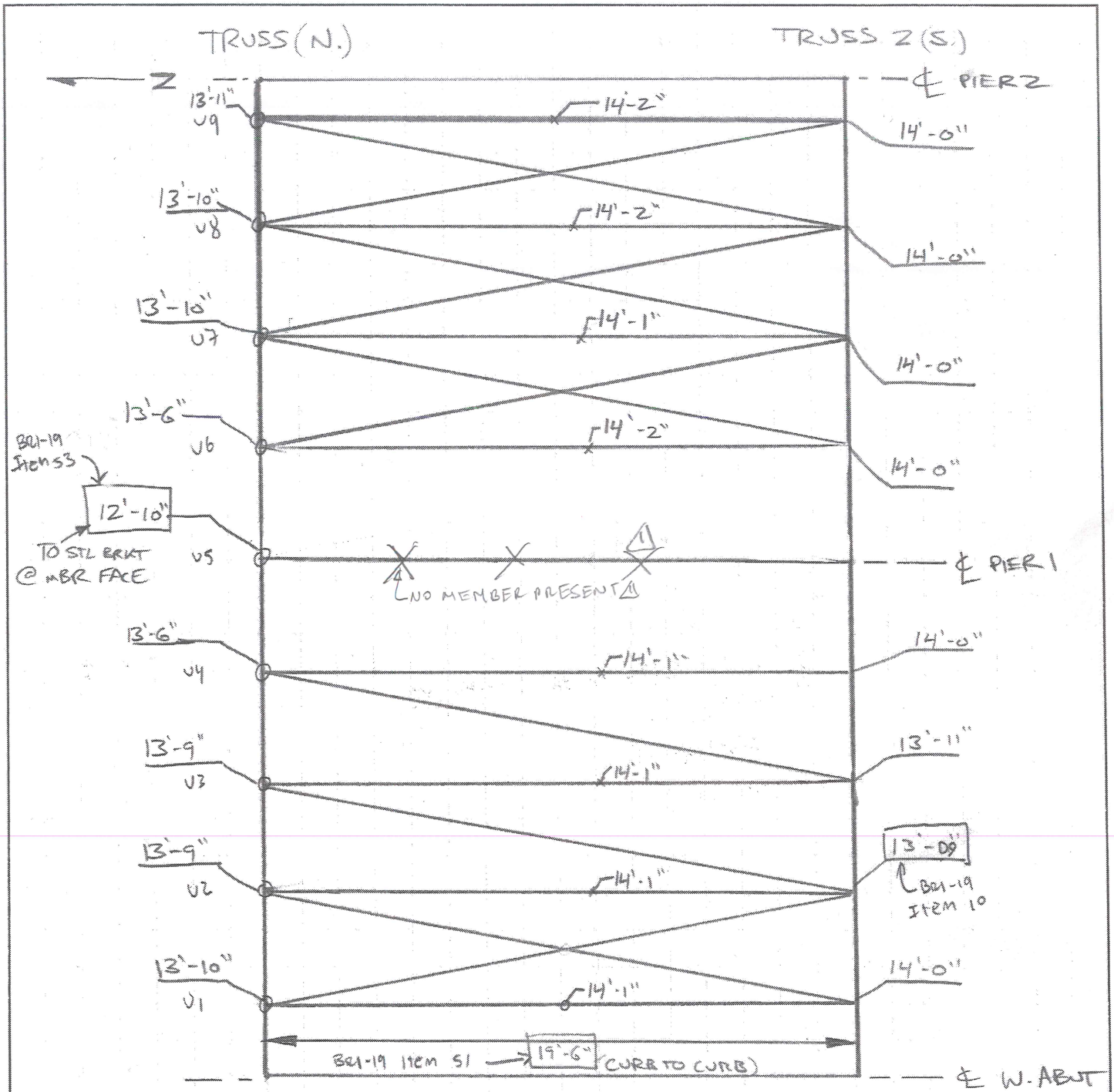
G. Movarej/gm

cc: Joseph J. Obara
Robert P. Zaffetti – Ralph A. Phillips – David Tassavor
Theodore D. Lapierre – Leo Cain
Joseph C. Kozlowski
Al Engineers, Inc.

TranSystems

Field Notes

PROJECT NO. P7121000 4
DATE 11/9/12
CREW ASW/NPH/GAH
BRIDGE NO. 01349
SHEET 2



CLEARANCE DIAGRAM SPANS 1 & 2

GENERAL NOTES:

- ALL TRUSS MSMTS ARE FROM PVMT TO BOLT @ UPPER MEMBER
- MINOR CHANGES TO CLEARANCES DUE TO PVMT RUTTING & WEAR
- VT CLEARANCE POSTED 13'-0" @ BOTH ENDS, ± 150' FROM BRIDGE
- ALL MEASUREMENTS DOUBLE-CHECKED

1 No Change

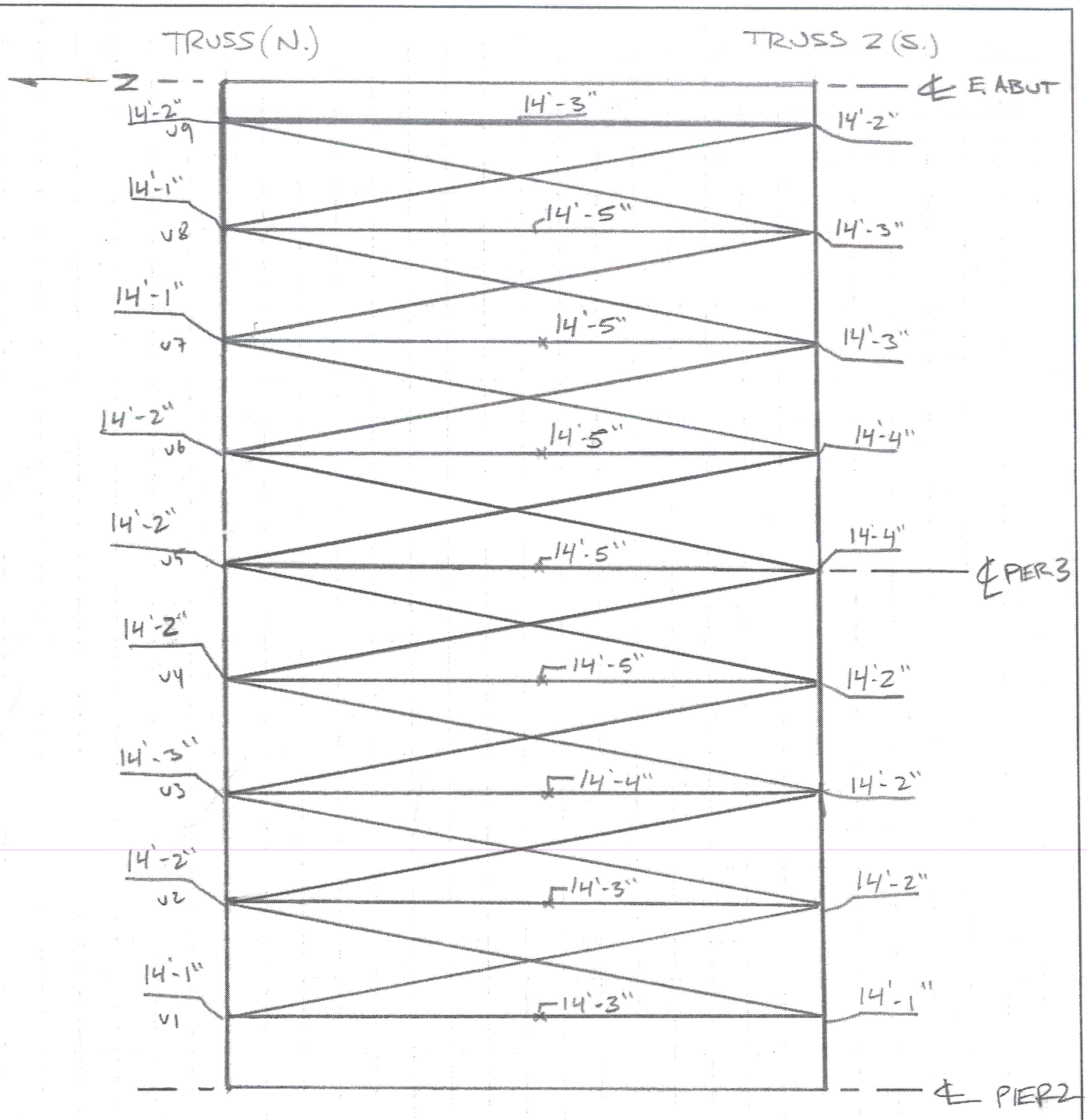
REVISION 1	DATE 11/18/14	CREW ABB (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems

Field Notes

PROJECT NO D712100021 BRIDGE NO 013419
DATE 11/9/12 SHEET 3
CREW ASW/NPH/GAH



CLEARANCE DIAGRAM SPANS 3 & 4

GENERAL NOTES:

- ALL MSMTS @ TRUSSES ARE PAINT TO BOLT.
- CHANGES IN CLEARANCES DUE TO PAINT WEAR & RUSTING.

REVISION 1	DATE 11/18/14	CREW ABB (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

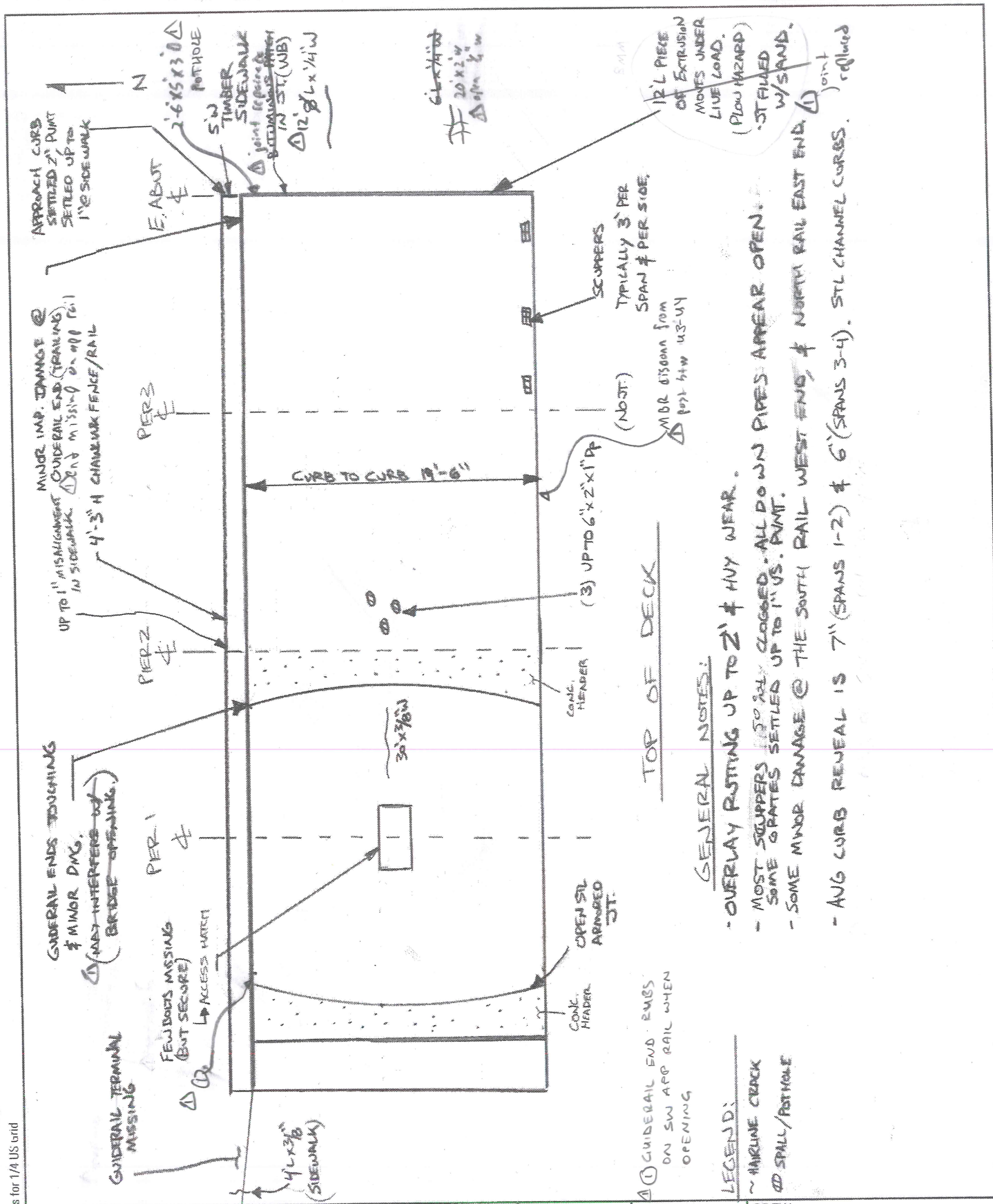
Calculations for 1/4 US grid

Field Notes

TranSystems

PROJECT NO. P712100021
DATE 11/9/12
CREW ASW/GAH/NPH

BRIDGE NO. 01349
SHEET 4

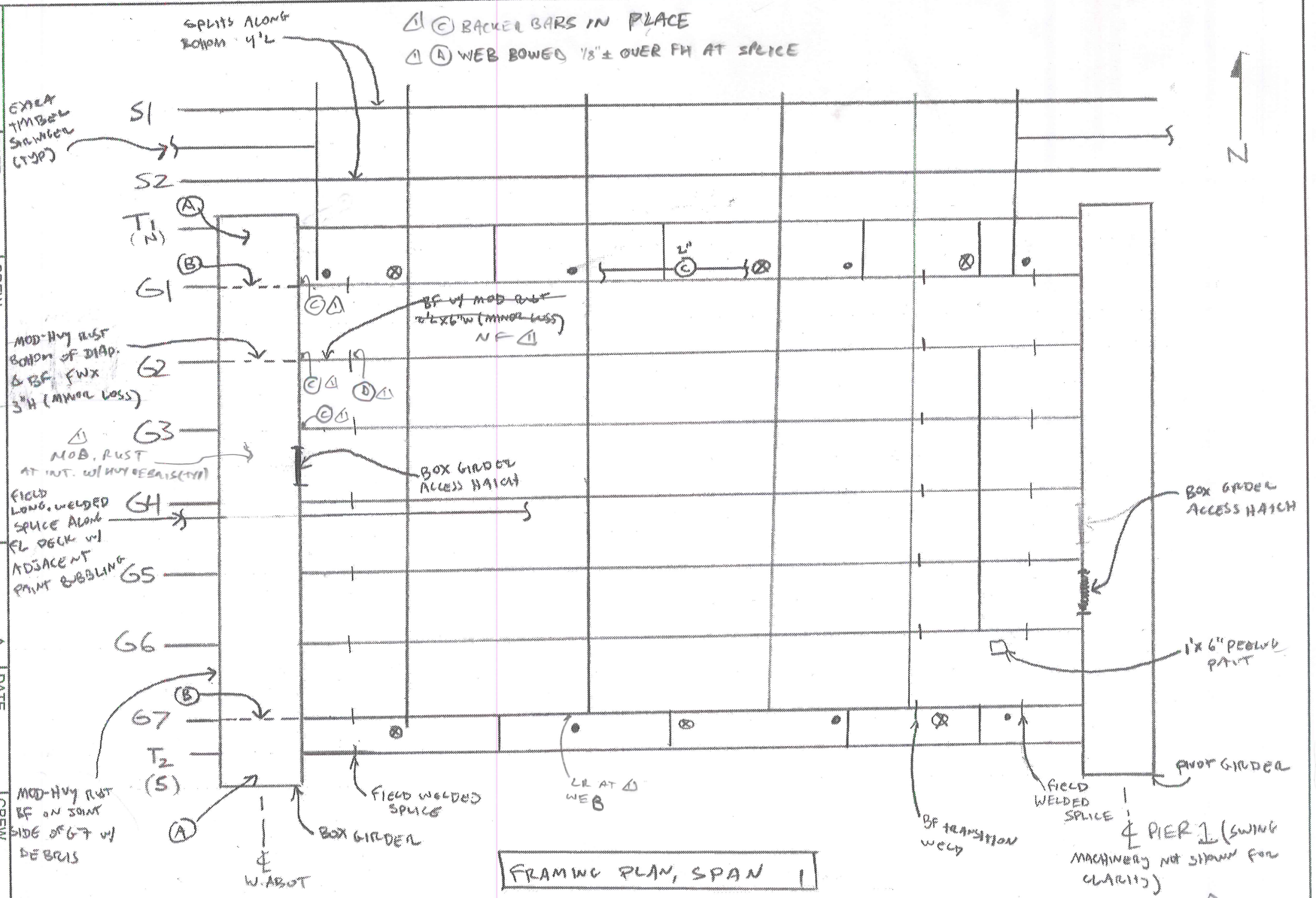


REVISION 1	DATE 11/18/14	CREW ABB (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

Calculations for 1/4 US Grid

REVISION 1	DATE 11/3/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW



FRAMING PLAN, SPAN 1

LEGEND
- PVC WEEP
- SCUPPER DOWNSPOUT 6"Ø
- C CONDUIT

- WELDED STEEL DECK
- S1 & S2 TIMBER STRINGERS
- LOCALIZED SMALL AREAS OF LT-MOD RUST BEGINNING TO FORM IN THE BEAMS UNDER TRUSSES
- FASCIA CONNECTIONS TO DRAINS/TRUSSES/WEEPS W/ MOD-HVY RUST, TYP
- LT PIGEON DEBRIS ON BF, TYP.
- RUST COVERS <1% OF STEEL GIRDER SURFACES
- FIELD WELDED SPLICES NOT GROUND SMOOTH (TYP)

CLEARED 1
~~A HVY DEBRIS & BF INSIDE OF END FLOOR BEAM~~
B SOLID DIAPHRAGM W/ 10"Ø HOLE (PIGEON ACCESS)

TranSystems

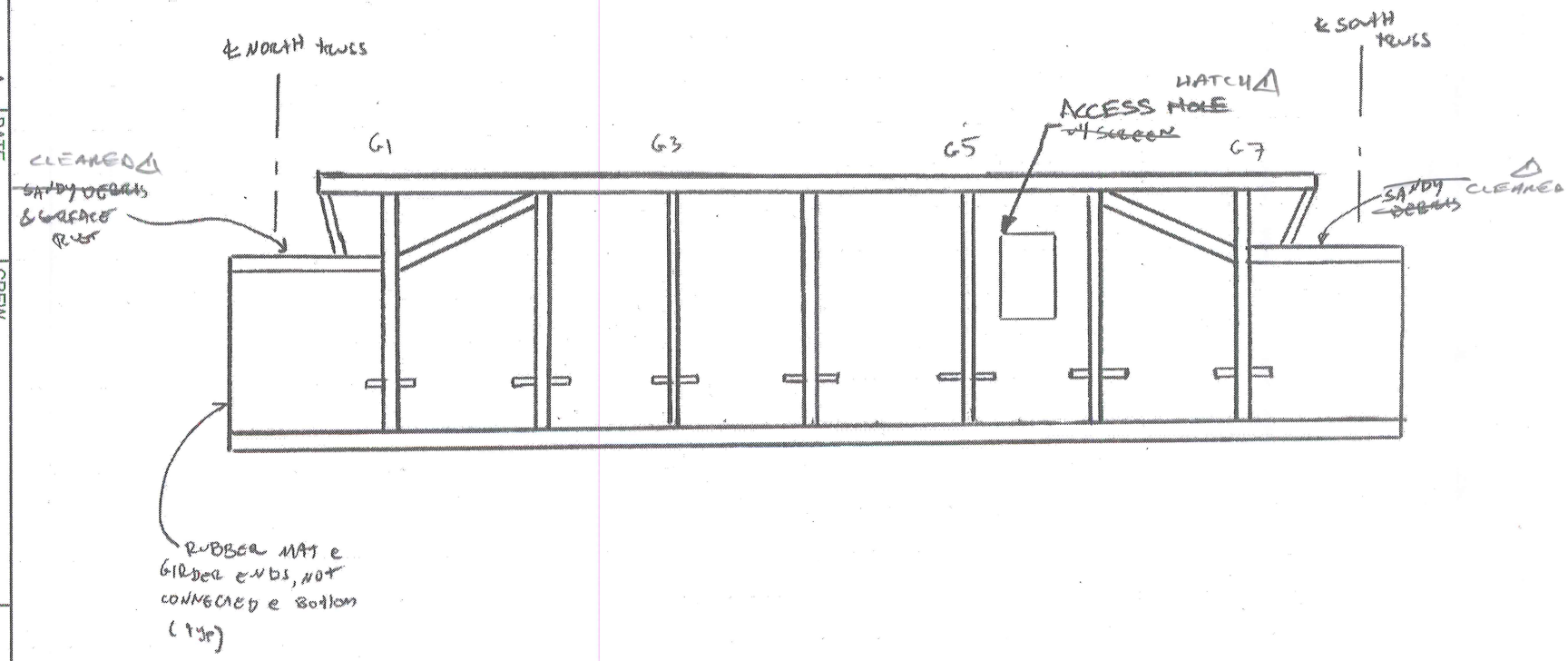
PROJECT NO P7121000 21
DATE 11/9/2012
CREW NPH/ASW/GAH

Field Notes

BRIDGE NO 013419
SHEET 5

Calculations for 1/4 US Grid

REVISION 1	DATE 11/3/14	CREW YS, JOM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW



PIVOT GIRDER @ PIER 1

GENERAL NOTES:

- FLOOR W/ EVIDENCE OF MOISTURE THROUGHOUT ~~& EVIDENCE OF PONDING INSIDE @ NORTH END~~ 1
- MOD. TO HVY LAMINATED RUST ON FLOOR x FL x FW W/ ~~MINOR SL 1/8"D ±~~ NEGLIGIBLE LOSS 1 1
  & @ BASE OF STIFFENERS UP TO 6"H
- ONLY ONE OPENING, NO DRAINS / VENTILATION INSIDE
- WELDS NOT GROUND SMOOTH / UNEVEN, BACKER BARS REMAIN IN PLACE (BACKER BARS @ BF TO WEB WELDS 1
- SWING MACHINERY NOT SHOWN FOR CLARITY

TranSystems

PROJECT NO P7R10002
DATE 11/9/12
CREW NDH/ATW/GAH

Field Notes

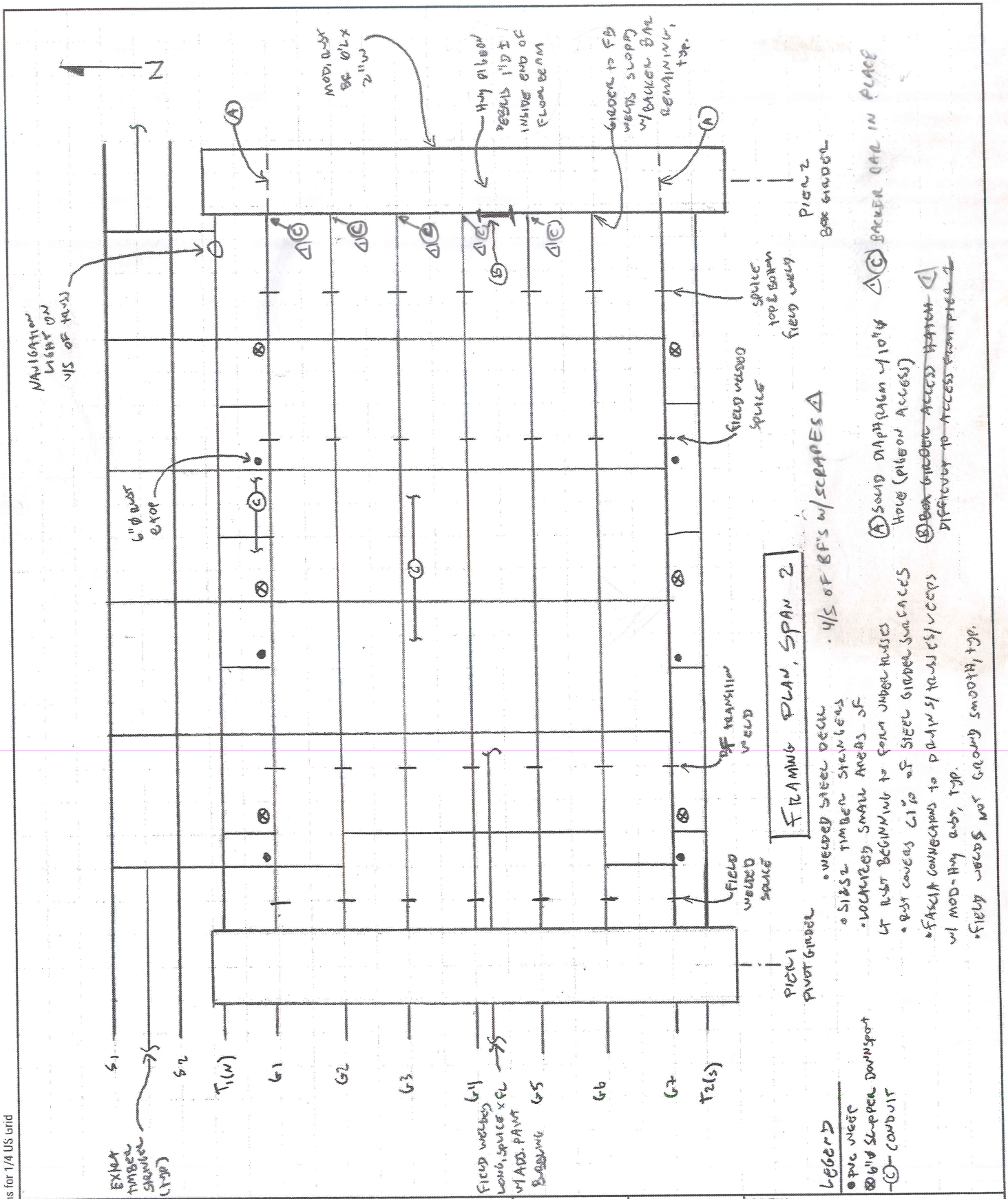
BRIDGE NO 01349
SHEET 6

TranSystems

Field Notes

PROJECT NO PTR100021
DATE 11/9/2012
CREW MPH/GAH/ASW

BRIDGE NO 0134/9
SHEET 7



REVISION 1	DATE 11/3/2014	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

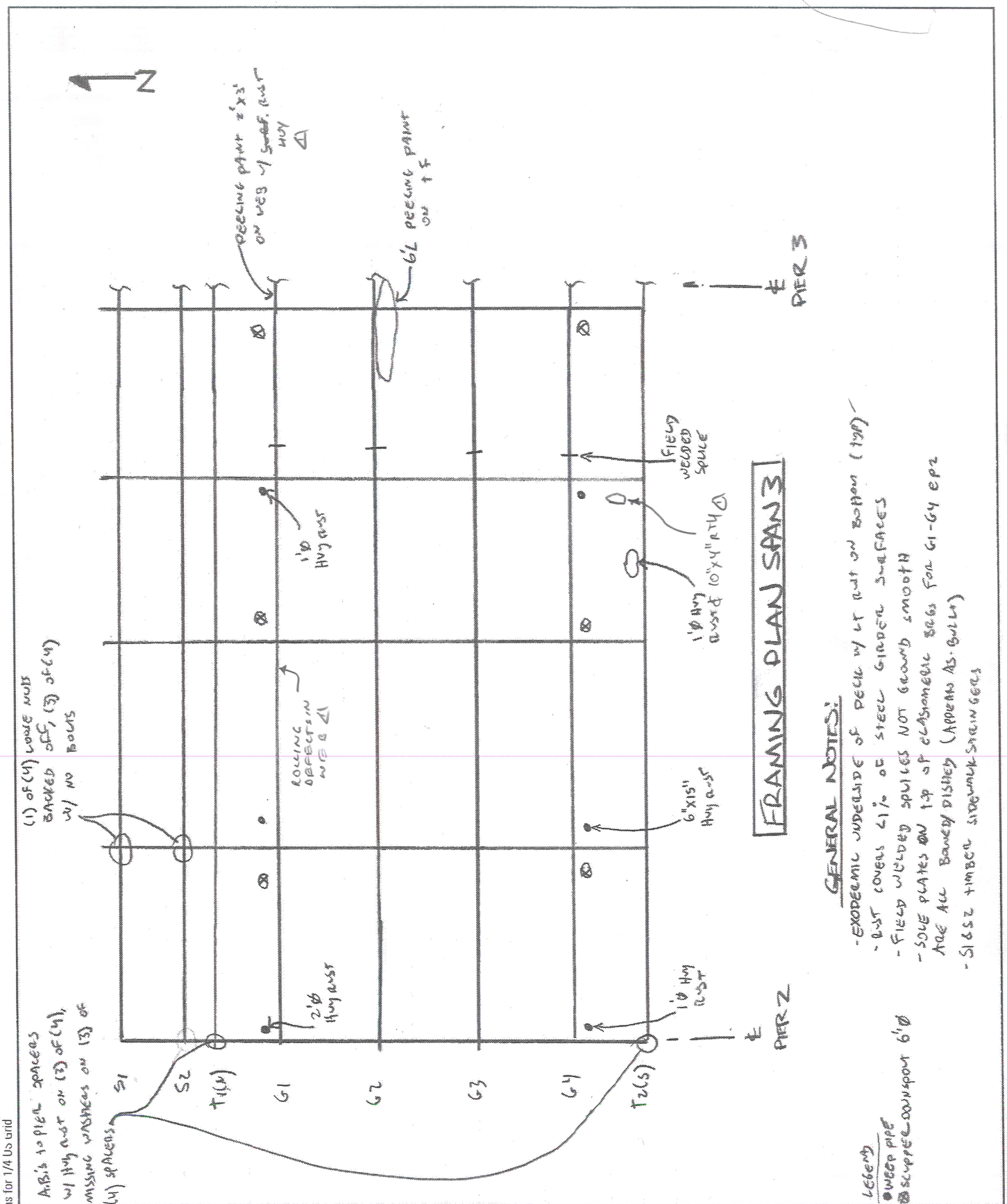
TranSystems

Field Notes

PROJECT NO P712100021 BRIDGE NO 01349

DATE 11/9/12 SHEET 9

CREW MDW/ASW/GMH



REVISION 1	DATE 1/14/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

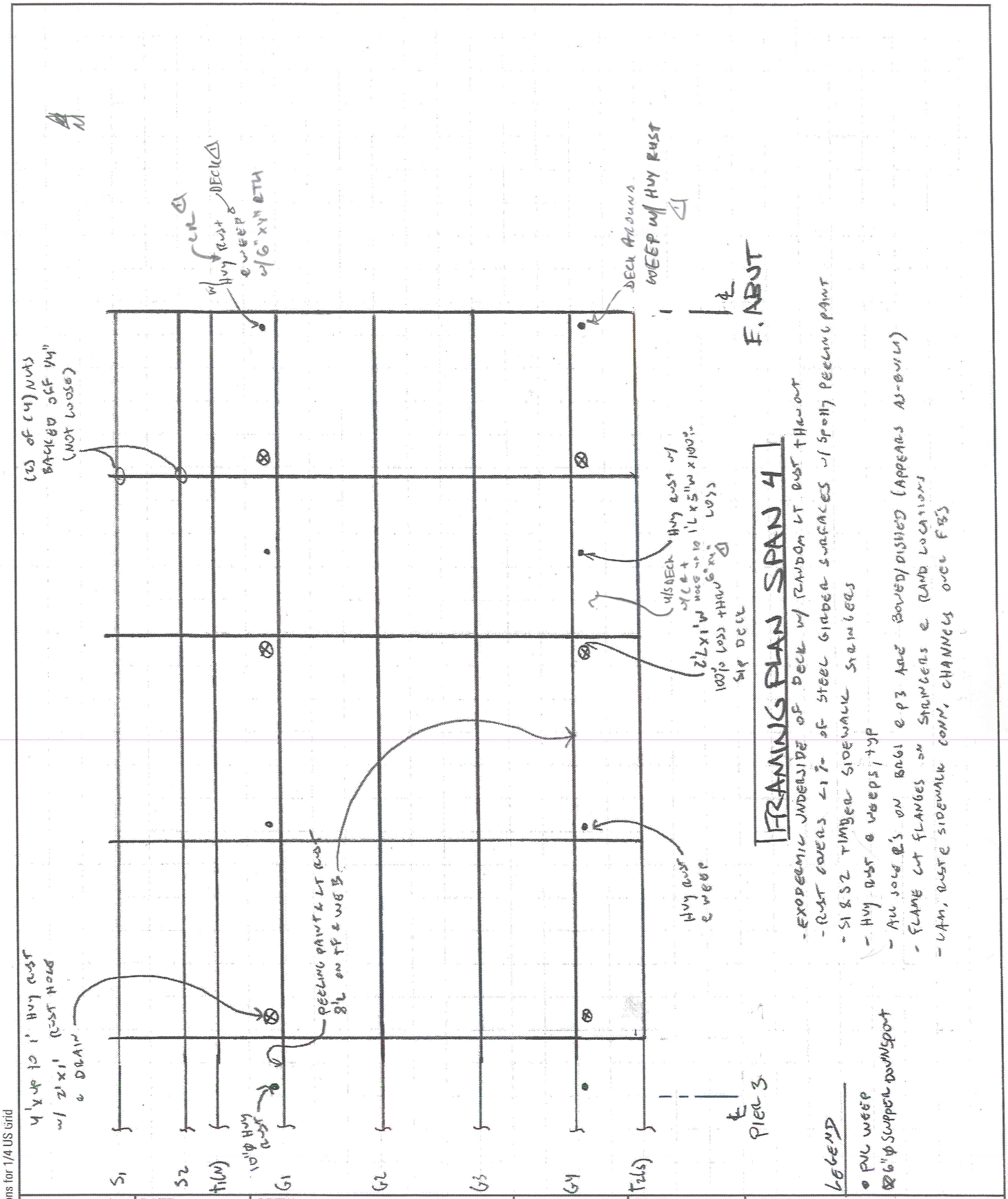
Calculations for 1/4 Us grid

TranSystems

Field Notes

PROJECT NO P12 10 0021
DATE 12/7/2012
CREW NPH/AJW

BRIDGE NO 01349-
SHEET 9



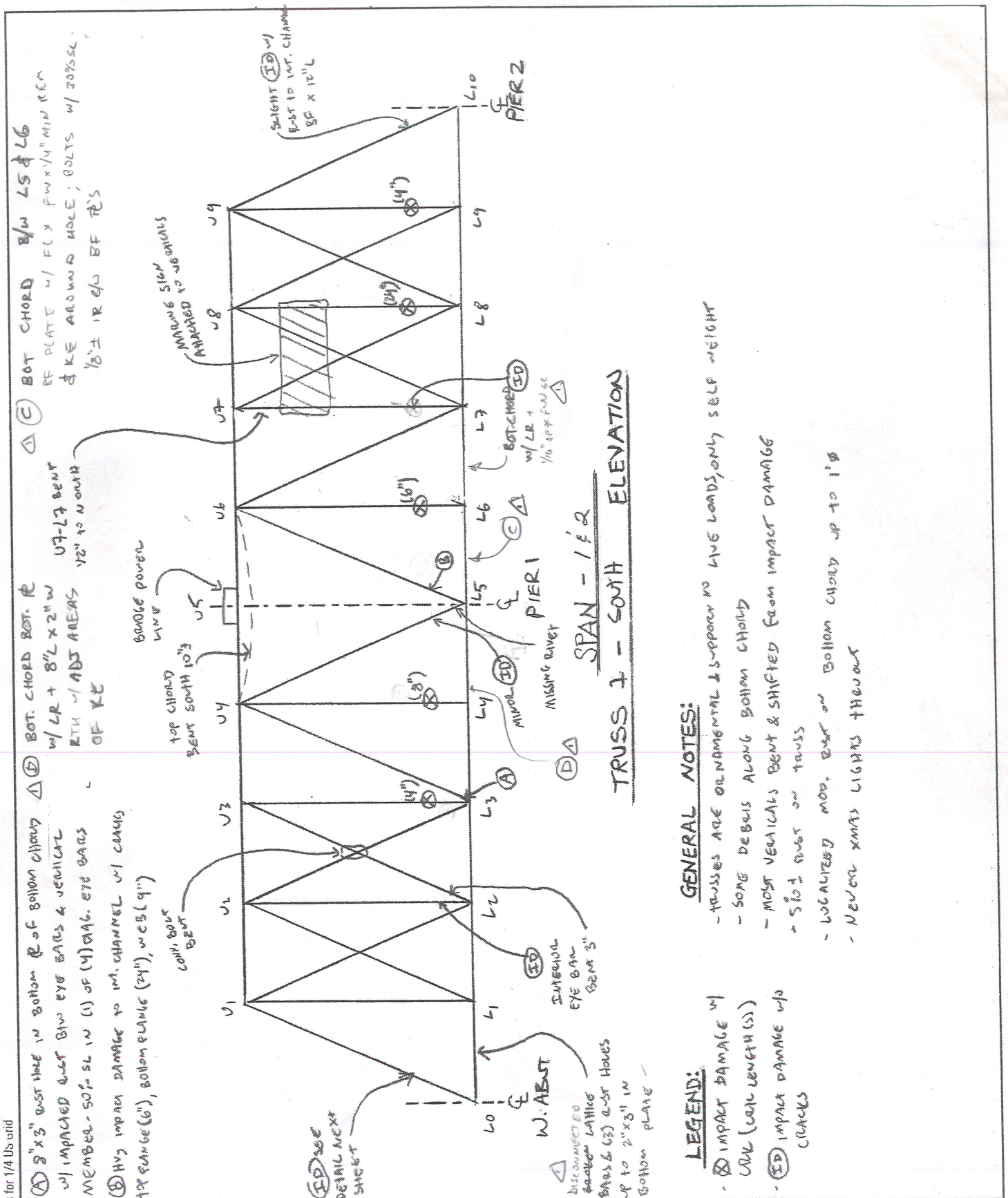
REVISION 1	DATE 10/4/14	CREW YS, JAM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

Field Notes

TranSystems

PROJECT NO P712100021 BRIDGE NO 01349
DATE 11/9/2012 SHEET 10
CREW NPH / GAH / ASW



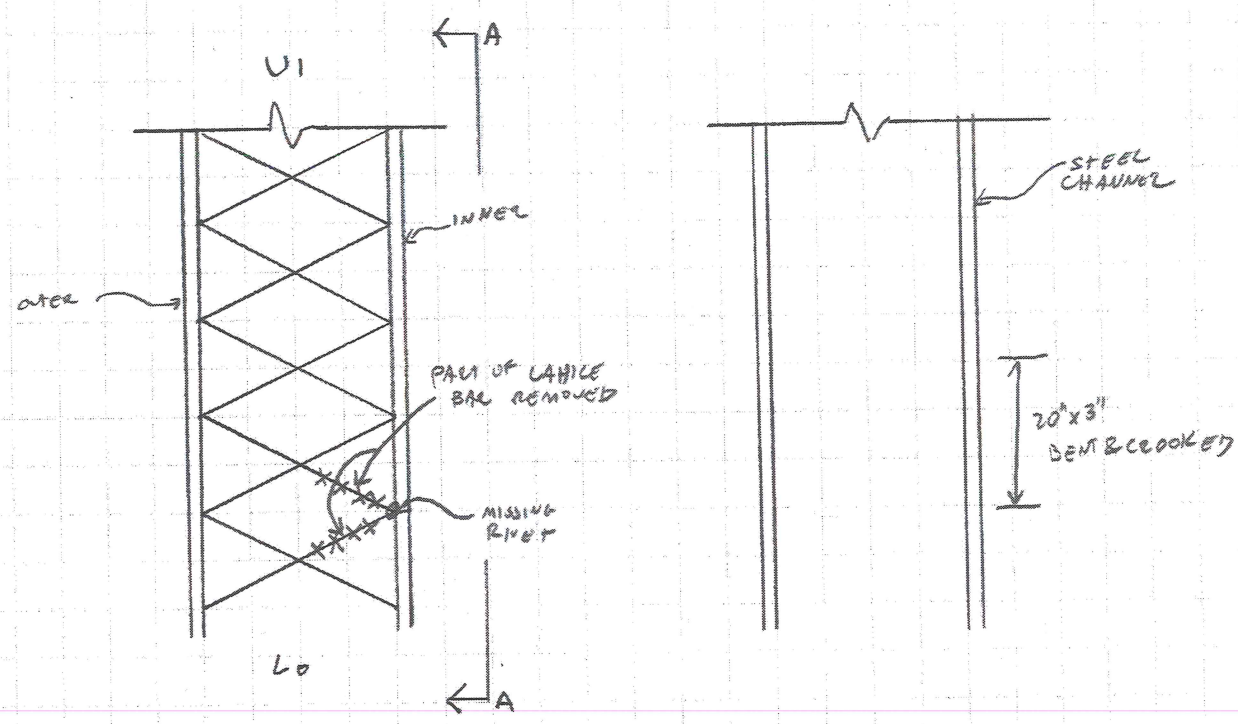
REVISION 1	DATE 11/8/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 Us grid

TranSystems

Field Notes

PROJECT NO. PTR 100021
DATE 11/9/2012
CREW NPH/ASW/GAH
BRIDGE NO. 01349
SHEET 11



PLAN VIEW

SECTION A-A

L0-U1, TRUSS 1, SPAN 1

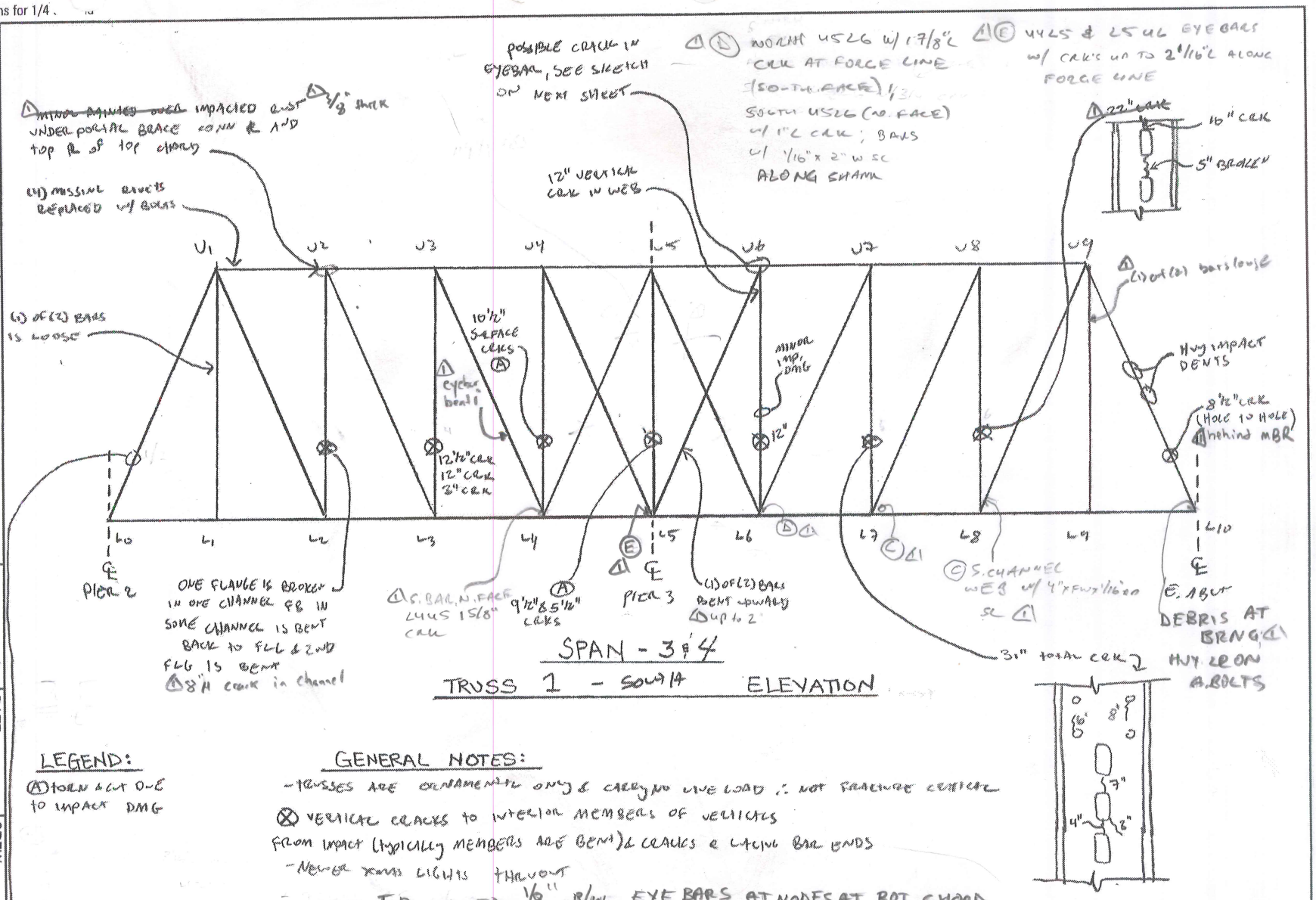
(1) No Change

REVISION 1	DATE 11/18/14	CREW ABB (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

Calculations for 1/4 ...

REVISION 3 | DATE | CREW
REVISION 1 | DATE 11/3/14 | CREW MS, JTM (TIC)
REVISION 4 | DATE | CREW
REVISION 2 | DATE | CREW



SPAN - 3 @ 4

TRUSS 1 - SOUTH ELEVATION

LEGEND:

(A) torn & cut O-E to impact DMG

35" total crack (BF), S. side of web is cracked (checked in same detail as span 1, & one flange of one channel is broken

GENERAL NOTES:

- trusses are ornamental only & carry no live load ∴ not fracture critical
- ⊗ vertical cracks to interior members of verticals from impact (typically members are bent) & cracks @ lacing bar ends
- Never xmas lights thereon
- IR up to 1/8" b/w eye bars at nodes at bot. chord

Trans Systems

Field Notes

PROJECT NO P317610 0051
DATE 11/3/14
CREW MPB / CAB / ASW

BRIDGE NO 01349
SHEET 12

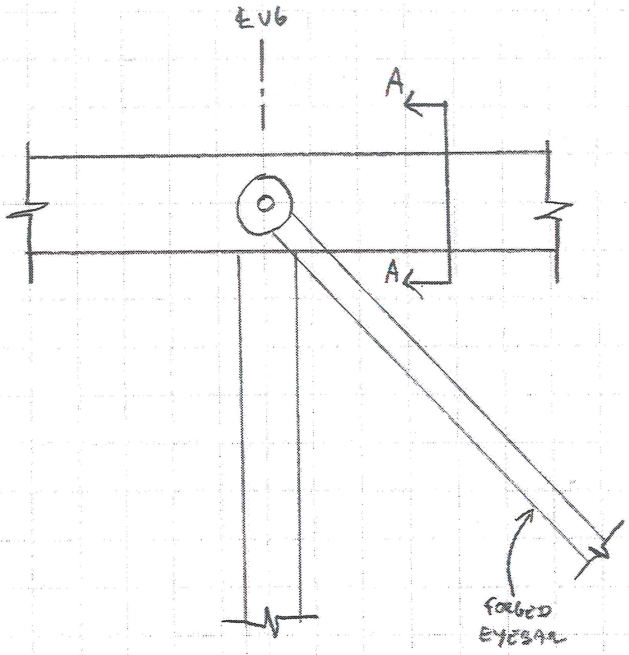
TranSystems

Field Notes

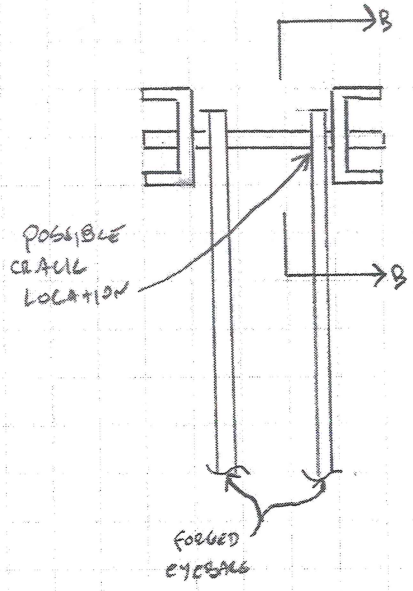
PROJECT NO P7121000821 BRIDGE NO 01349

DATE 11/9/12 SHEET 13

CREW NDH / ISM / GAH

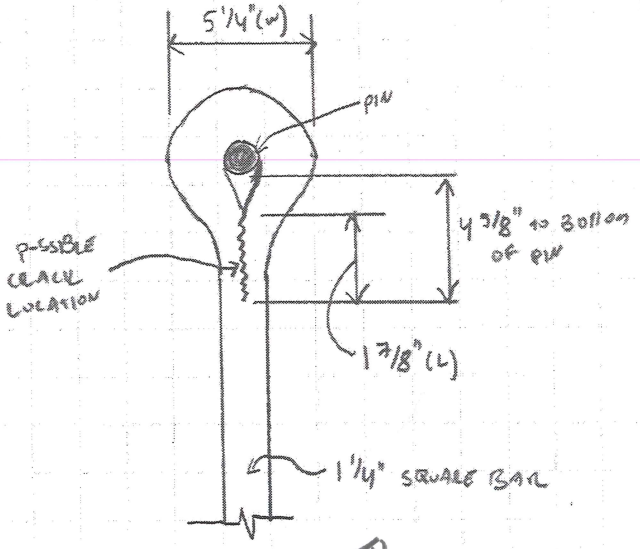


SPAN 4, NORTH TRUSS, NORTH ELEVATION



SECTION A-A

NOTE: EYEBAR DOES NOT CARRY LIVE LOAD, ONLY HAS TO SUPPORT ITS OWN WEIGHT ∴ THIS CONDITION IS NOT CONSIDERED SERIOUS



SECTION B-B (~~NORTH~~ SOUTH EYEBAR)

REVISION 1	DATE 11/18/14	CREW ASB (CTSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

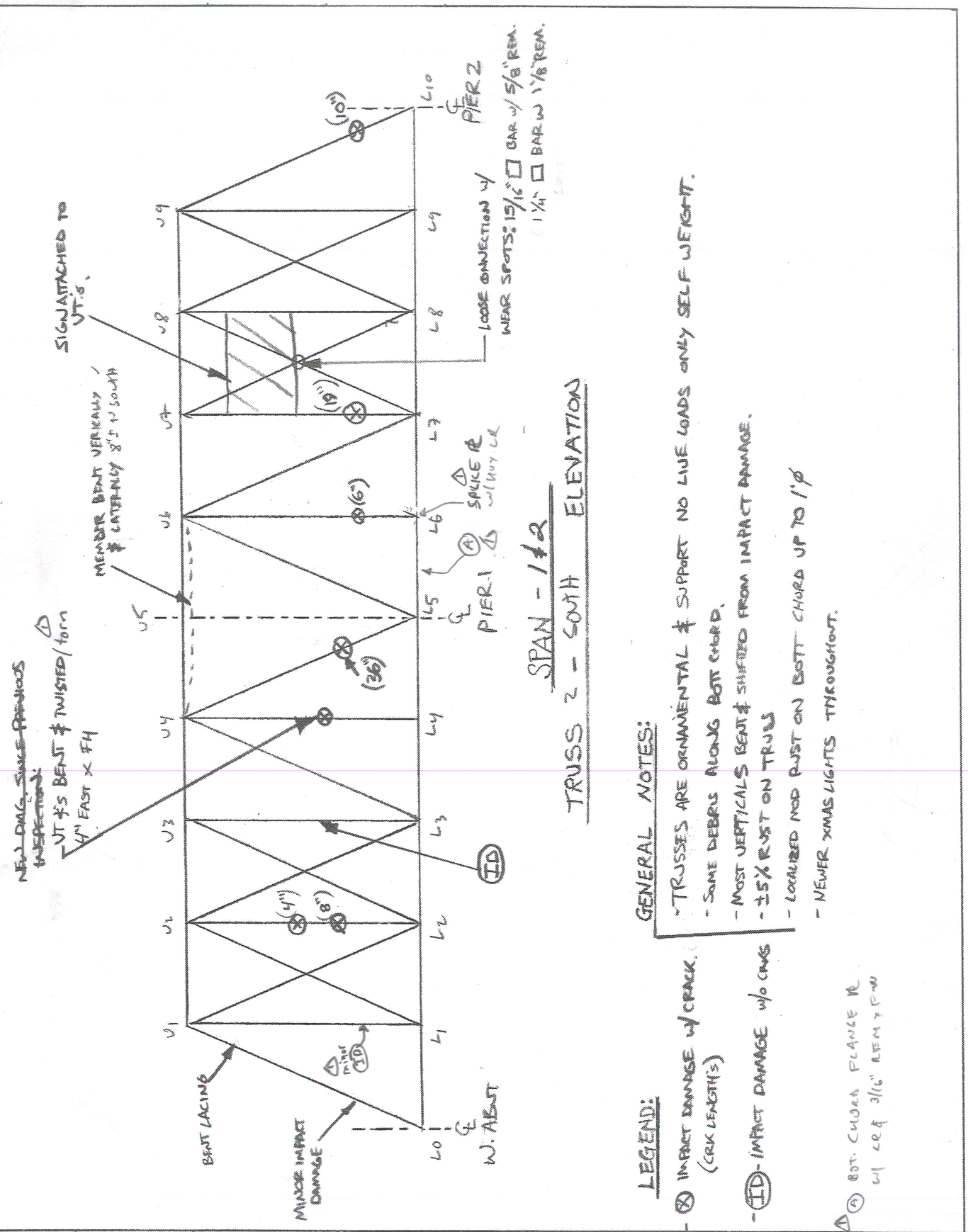
TranSystems

Field Notes

PROJECT NO P12100021 BRIDGE NO 01349

DATE 12/7/12 SHEET 14

CREW NJPH/AEJ

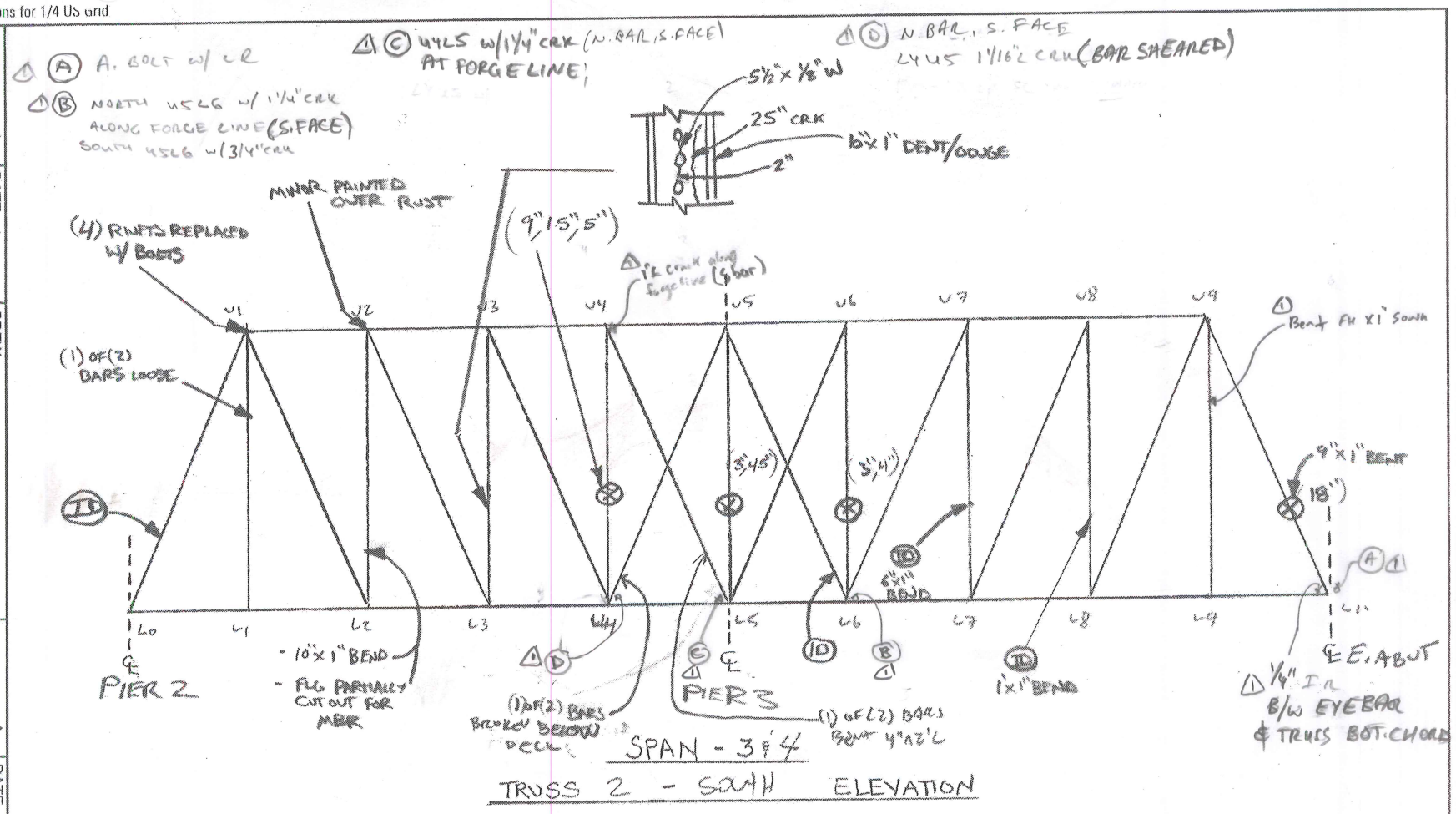


REVISION 1	DATE 12/18/14	CREW ABB CTSC	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 U.S. mile

Calculations for 1/4 US Grid

REVISION 1	DATE 11/4/14	CREW VS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW



LEGEND:

(X) IMPACT DAMAGE w/ CRK. (TOTAL LENGTH)

(ID) IMPACT DAMAGE w/o CRK

GENERAL NOTES:

- TRUSSES ARE ORNAMENTAL & SUPPORT NO LIVE LOADS ONLY SELF WEIGHT
- ~~SOME DEBRIS @ BOTT CHORD~~ NF (1)
- MOST VERTICALS HAVE MINOR IMPACT DAMAGE
- 5% RUST ON TRUSS
- NEWER XMAS LIGHTS THROUGHOUT.
- IR UP TO 1/8" THICK B/W EYEBARS AT BOT CHORD (1)

TranSystems

PROJECT NO P7121000021
DATE 12/7/12
CREW NPH/ASW

Field Notes

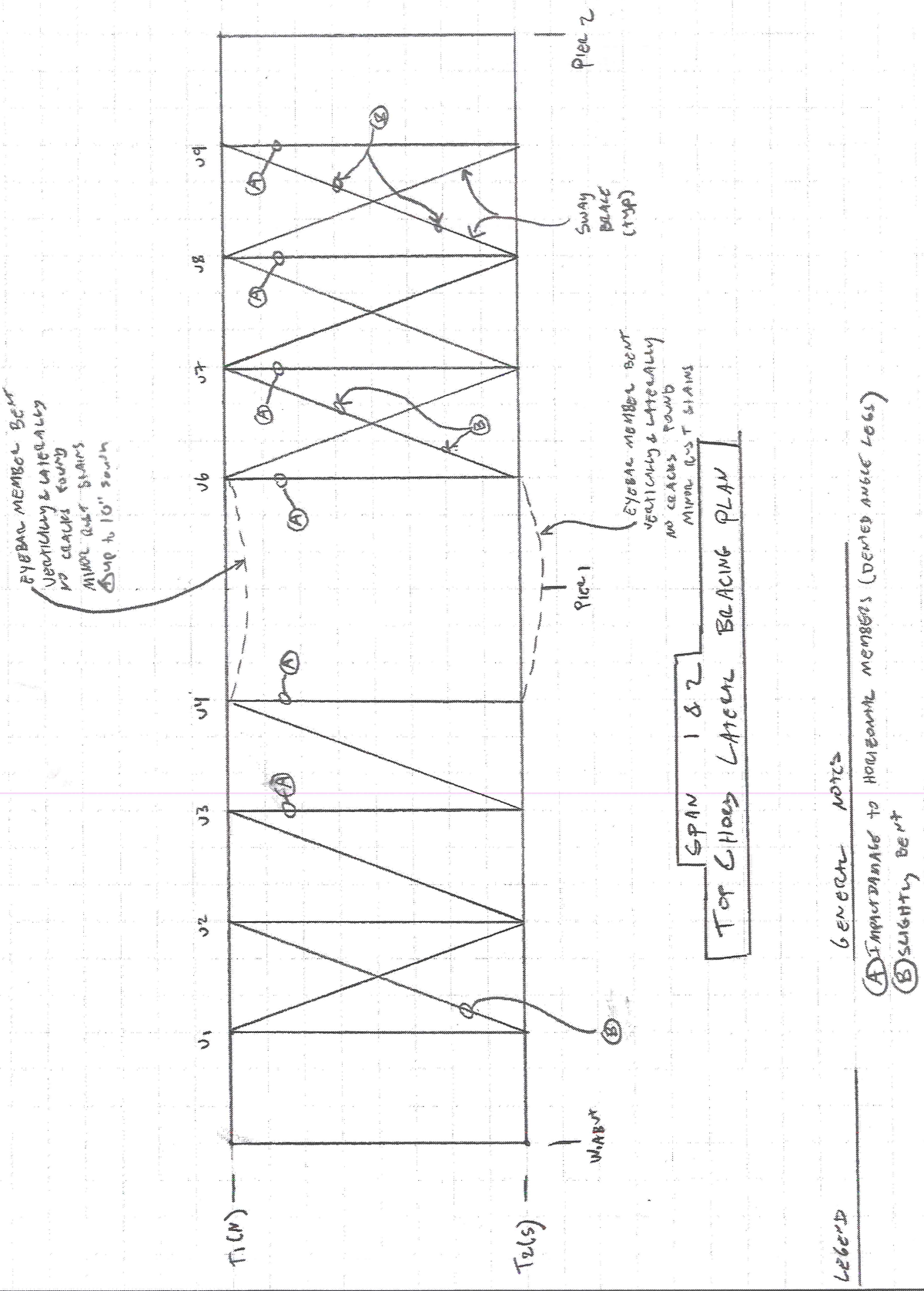
BRIDGE NO 01349
SHEET 15

Field Notes

TranSystems

PROJECT NO. P712100021
DATE 11/9/2012
CREW NPH/ASW/GAH

BRIDGE NO. 01349
SHEET 16



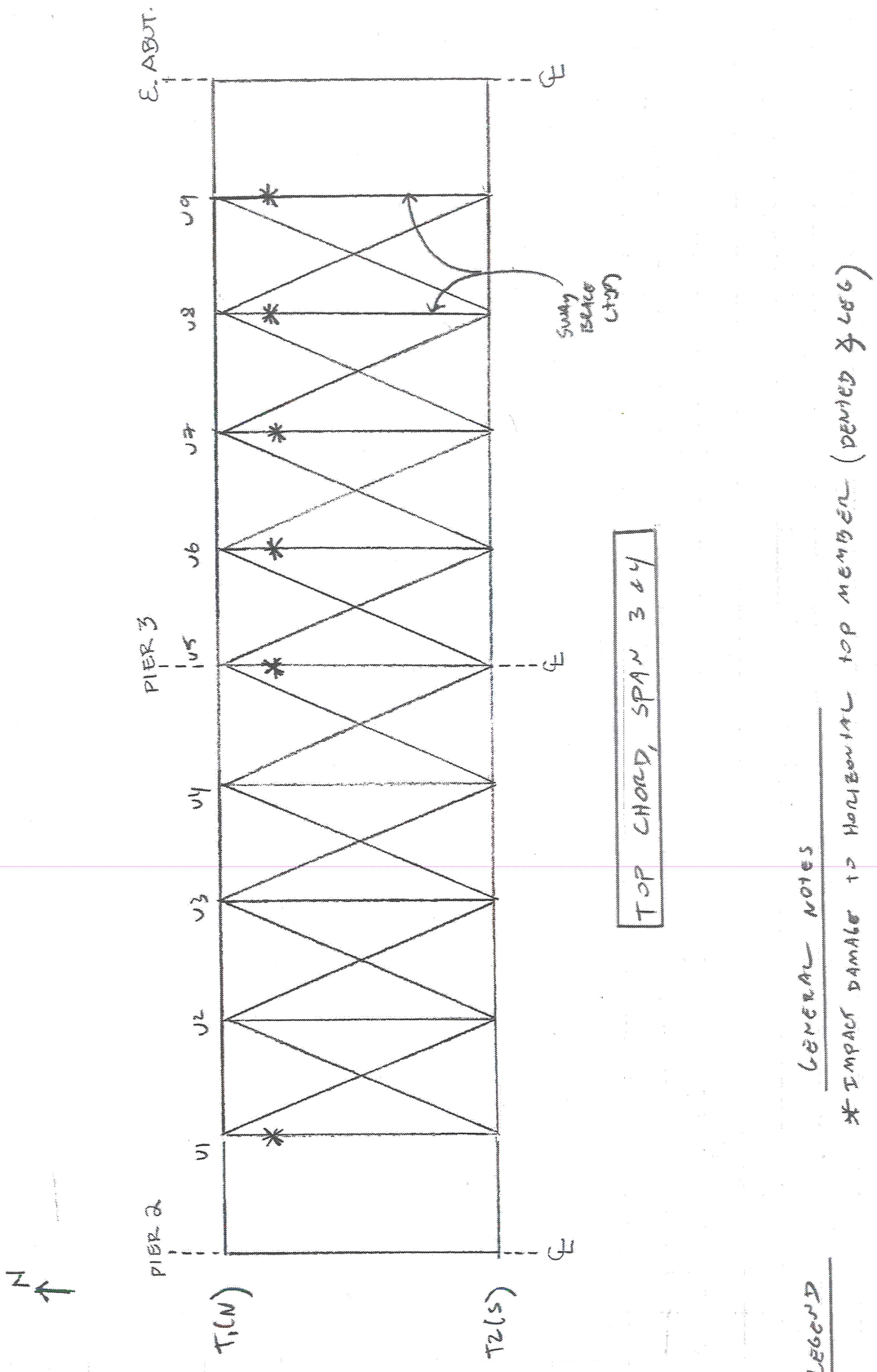
REVISION 1	DATE 11/8/14	CREW ABB CTSC	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems

Field Notes

PROJECT NO. P7R100021
DATE 11/9/2012
CREW NPH/ASW/GAH
BRIDGE NO. 01349
SHEET 17



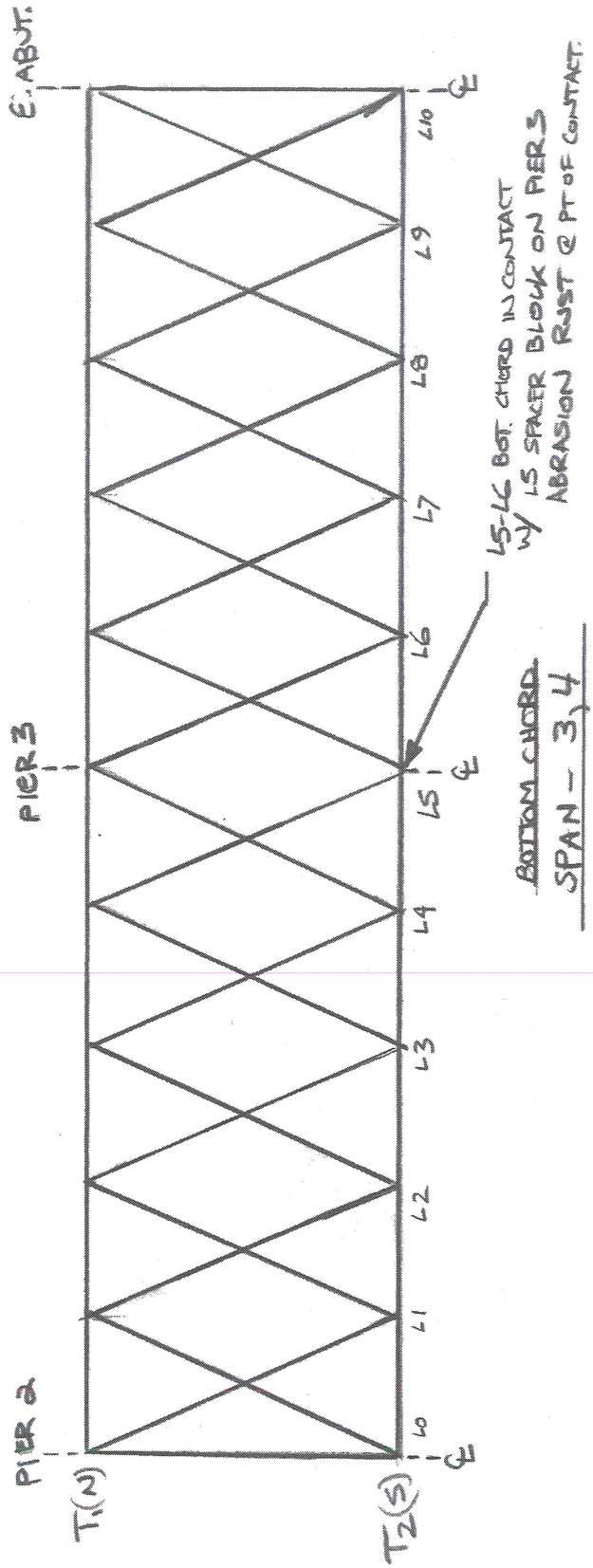
REVISION 1	DATE 11/18/14	CREW ABB (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems

Field Notes

PROJECT NO P712100021 BRIDGE NO 01349
DATE 12/7/12 SHEET 1-8
CREW ASW/NPH



BOTTOM CHORD
SPAN - 3,4

GENERAL NOTES:
- FEW DIAGONAL CABLES LOOSE
- LT RUST ON CABLES

LEGEND:

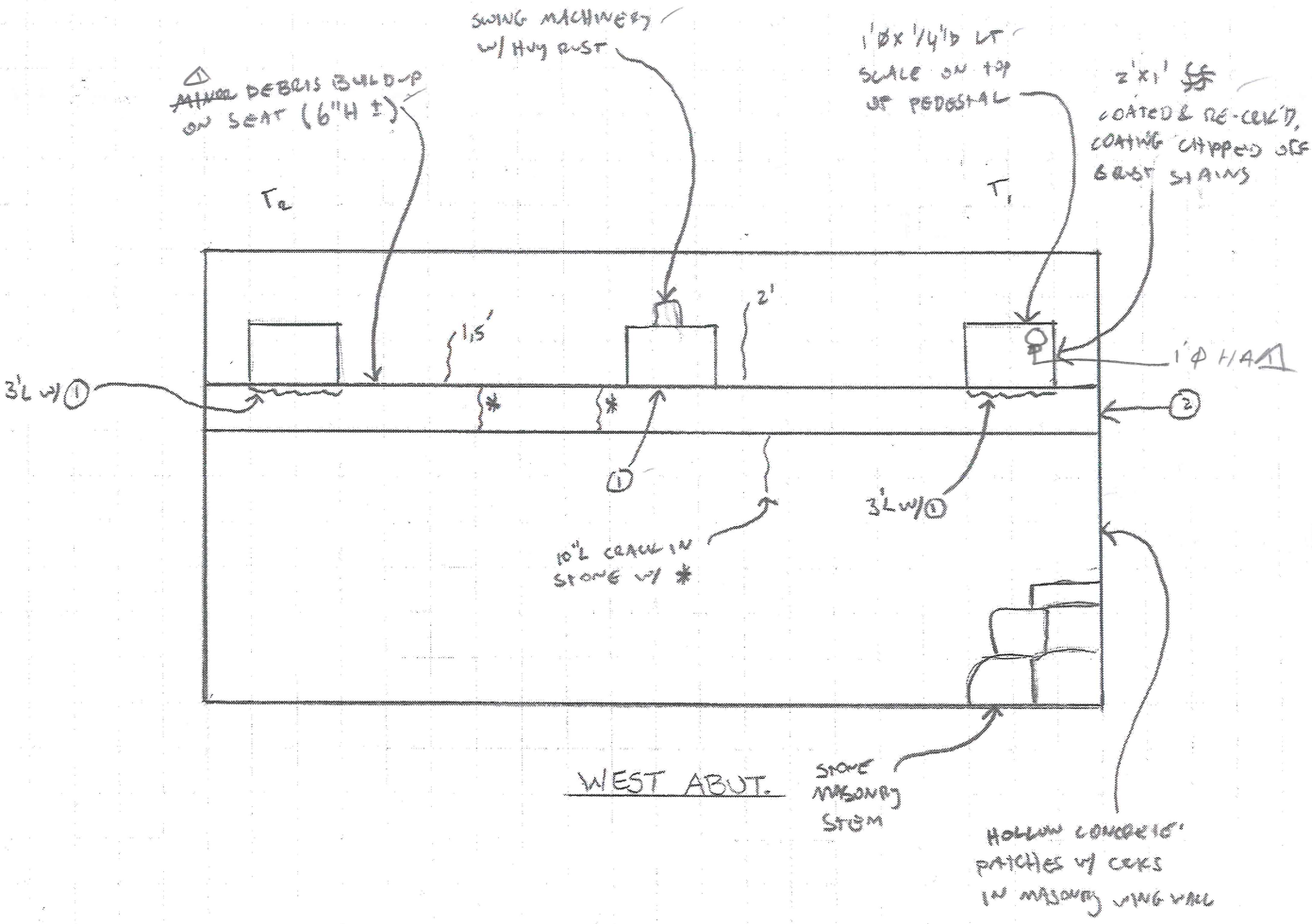
REVISION 1	DATE 11/4/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems

Field Notes

PROJECT NO. P712100021
DATE 12/7/2012
CREW NPH/ASW
BRIDGE NO. 01349
SHEET 19



① EFFLO STAINING ALONG CONST. JOINT BTW PEDESTAL & SEAT
② 5'Ø x 2 1/2' DP MISSING STONES @ TOP OF WINGWALL @ WEST END

LEGEND

~ CRACK / HLCR
# MAP CRACK / HLMPCR
☐ HOLLOW AREA
▨ SPALL
* EFFLORESCENCE

GENERAL NOTES

- MORTAR JOINTS W/ PATCH MATERIAL SEPARATED FROM STONE @ RANDOM LOCATIONS
- 50% OF MORTAR POINTING MISSING
- VOIDS BETWEEN STONES UP TO 4' DEEP
- BARNACLES/MOSS GROWTH/STAINING IN TIDAL ZONE, TYPICAL

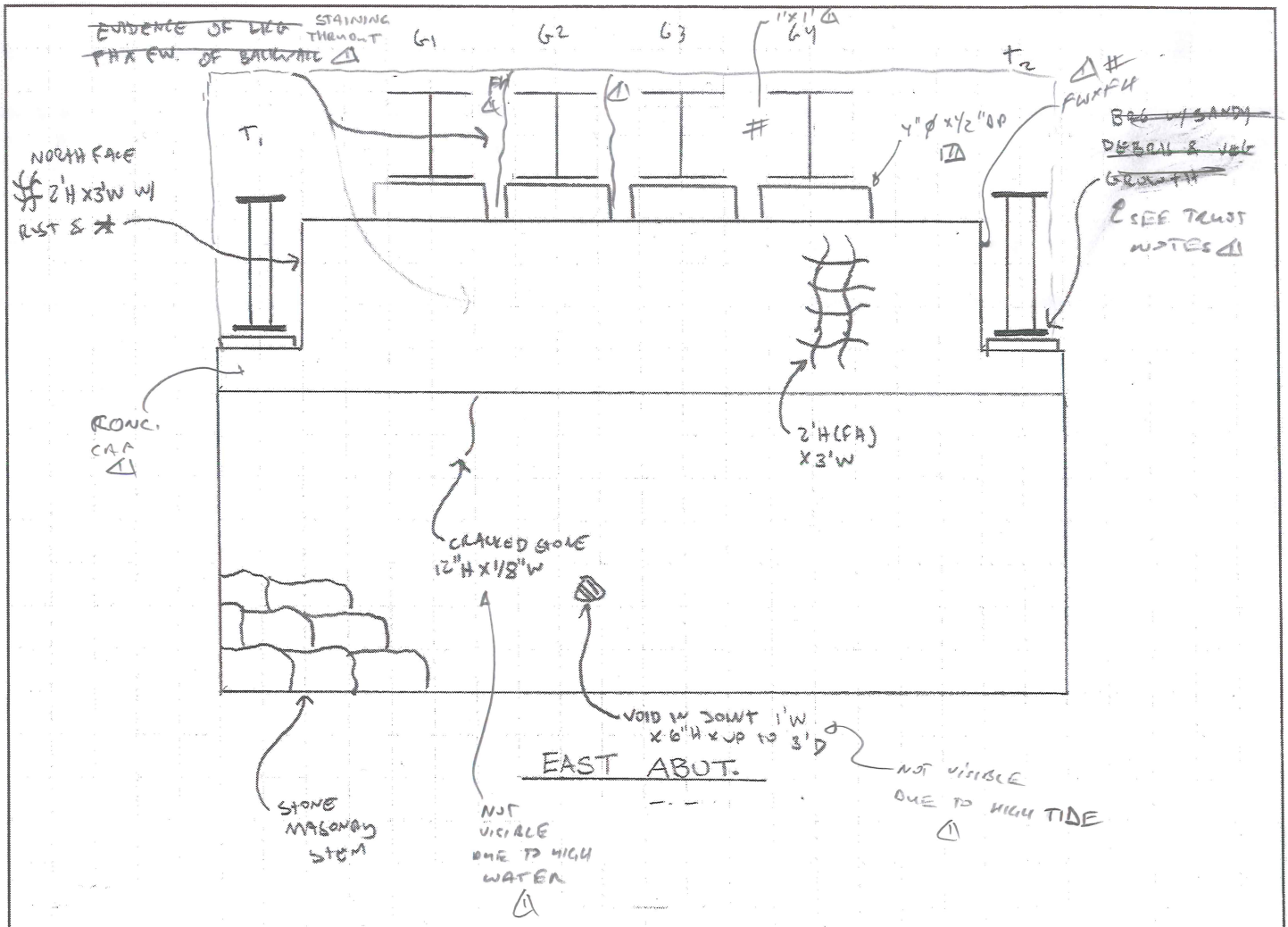
REVISION △1	DATE 11/3/14	CREW JPM, YS (TSC)	REVISION △2	DATE	CREW
REVISION △3	DATE	CREW	REVISION △4	DATE	CREW

Calculations for 1/4 US Grid

Field Notes

TranSystems

PROJECT NO. P712100021
DATE 12/7/12
CREW NDH/ASW
BRIDGE NO. 01349
SHEET 20



LEGEND

- ~ CRACK/HLCR
- MAP CRACK/MPCR
- HOLLOW AREA
- SPALL
- * EFFLORESCENCE

GENERAL NOTES

- MORTAR JOINTS W/ PATCH MATERIAL SEPARATED FROM STONE @ RANDOM LOCATIONS
- 50% ± OF MORTAR POINTING MISSING
- BARNACLES/MOSS GROWTH/STAINING IN TIDAL ZONE, TYPICAL
- ~~EVIDENCE OF LEAKAGE OF FHxFW OF BACKWALL FROM JOINT ABOVE~~ ℄ SEE NOTE ABOVE △1

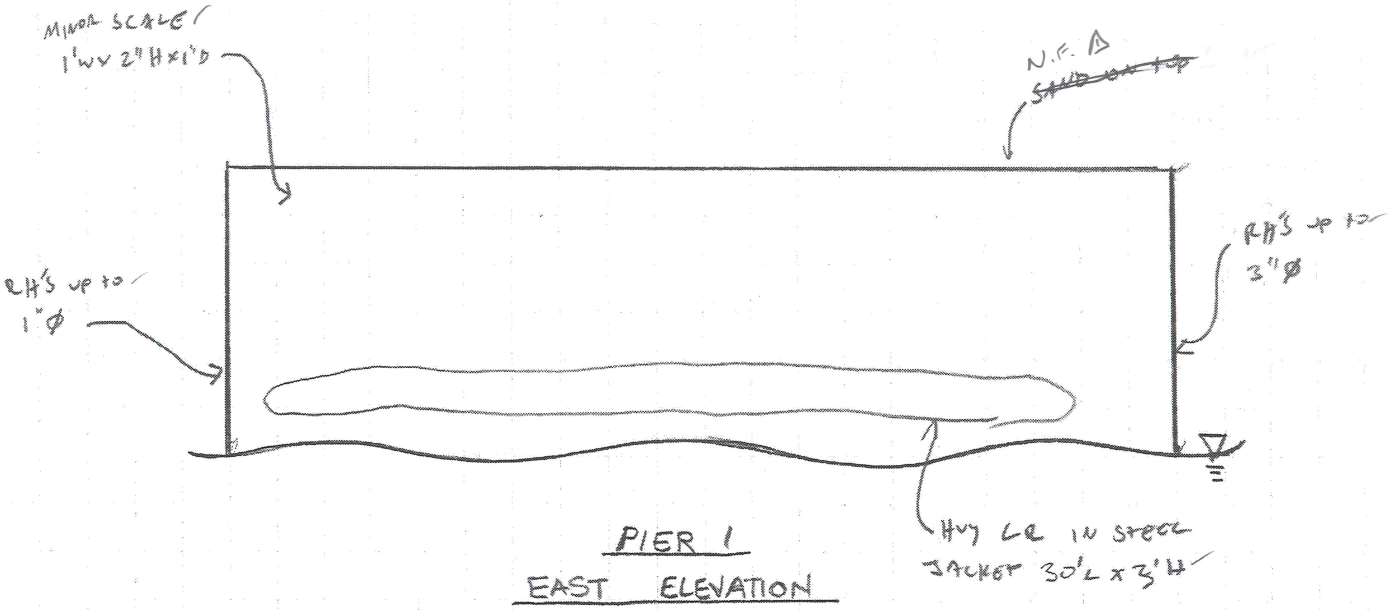
REVISION △1	DATE 11/4/14	CREW YS, JPM (TSC)	REVISION △2	DATE	CREW
REVISION △3	DATE	CREW	REVISION △4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems®

Field Notes

PROJECT NO P712100021 BRIDGE NO 01349
DATE 11/9/12 SHEET 21
CREW MPH/ASW/GAH



PIER 1
EAST ELEVATION

LEGEND:

RH: RUST HOLE IN STEEL JACKET

LR: LAMINAR RUST

GENERAL NOTES:

- SWING MACHINERY & CAP GIRDER ON TOP
- FENDER SYSTEM NOT SHOWN FOR CLARITY
- STEEL ENCASEMENT OF CONCRETE PIER IS SEVERELY CORRODED BELOW HIGH WATER LINE (HEAVY LAM. RUST x 3'H x FULL PERIMETER) ~~PER THE U/W REPORTS~~ THERE ~~ARE AREAS OF~~ 100% SECTION LOSS W/SPALLED CONCRETE. ~~COULD NOT BE CONFIRMED DURING STRUCTURAL INSPECTION.~~

REVISION 1	DATE 11/3/14	CREW JPM, VS (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

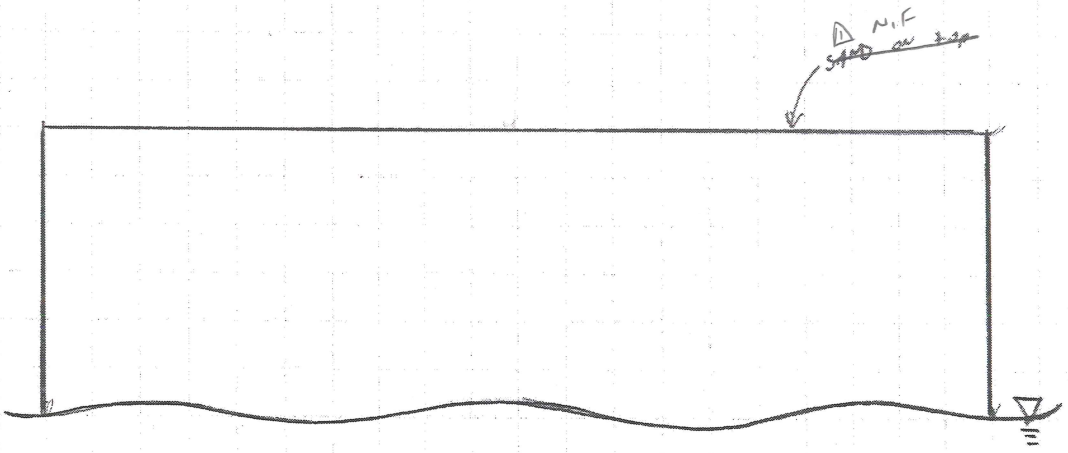
TranSystems

Field Notes

PROJECT NO F712 10 0021 BRIDGE NO 0134 9

DATE 11/9/12 SHEET 22

CREW MPH/ASW/GAO



PIER 1
WEST ELEVATION

LEGEND:

GENERAL NOTES:

SEE PIER 1, EAST ELEVATION

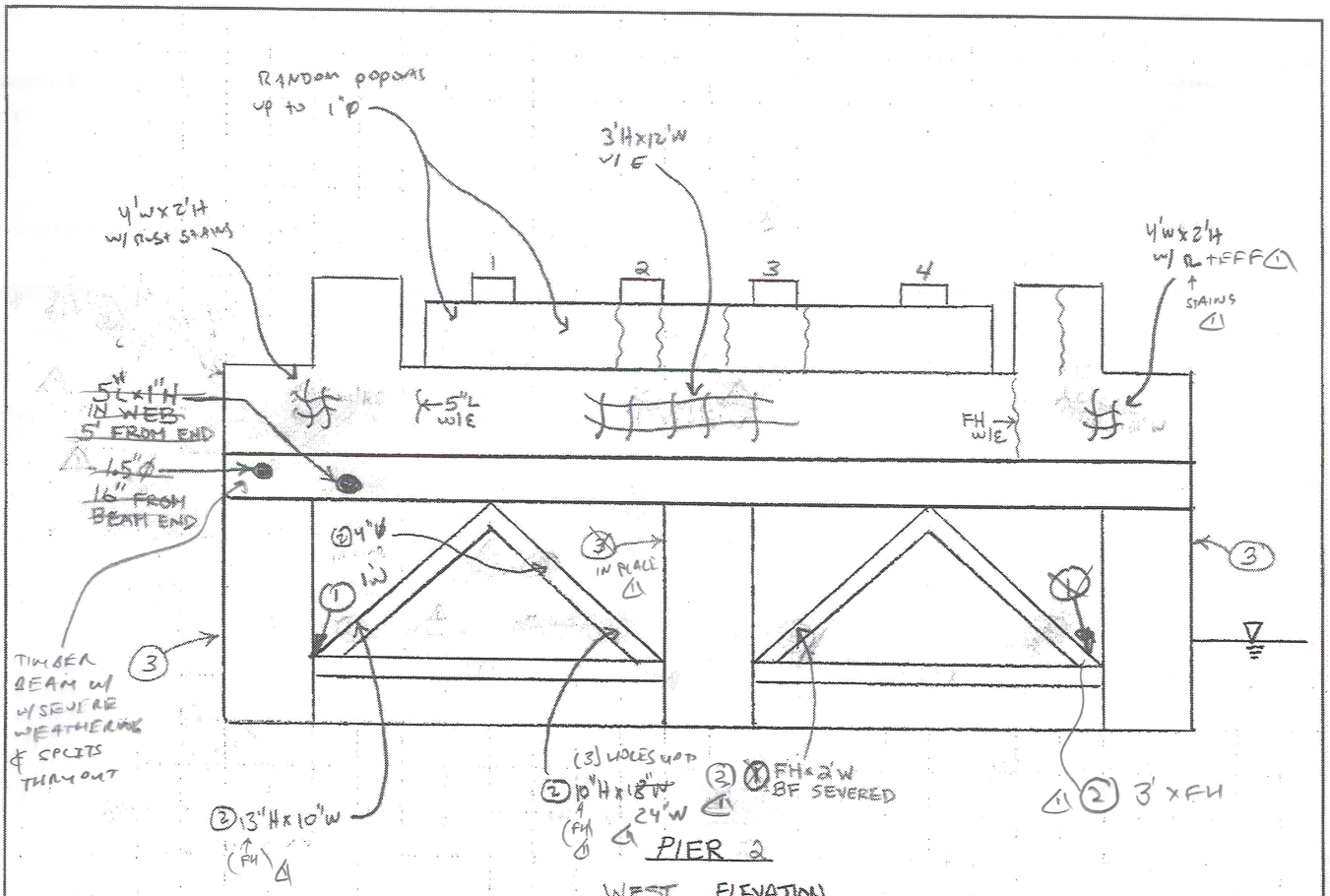
REVISION 1	DATE 11/3/14	CREW JPM, VS (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems

Field Notes

PROJECT NO P7121000021 BRIDGE NO 01349
DATE 11/9/2012 SHEET 23
CREW GAH / NPH / ASW



LEGEND:

- MAPCRACKING
- HAIRLINE CRACK / CRK
- HOLE
- W/E W/EFFD
- W/R W/RUST
- W/RS W/RUST STAINS
- BF BOTTOM FLANGE
- FH FULL HEIGHT

GENERAL NOTES:

SEE NOTE (2) (1)

(1) ~~STEEL CROSS BRACING HAS SEVERAL LOCATIONS OF 100% SECTION LOSS x UP TO 2'W @ THE ENDS. (UN CONNECTED TO PILES @ THESE LOCATIONS~~

(2) RUSTED THROUGH HOLE IN WEB

(3) FIBERGLASS SHELL MISSING EXPOSED CONC. PILE W/ HEAVY SCALING & SPALLING, FULL PERIMETER x 3'H x UP TO 4"D W/EXP. REBAR (1)

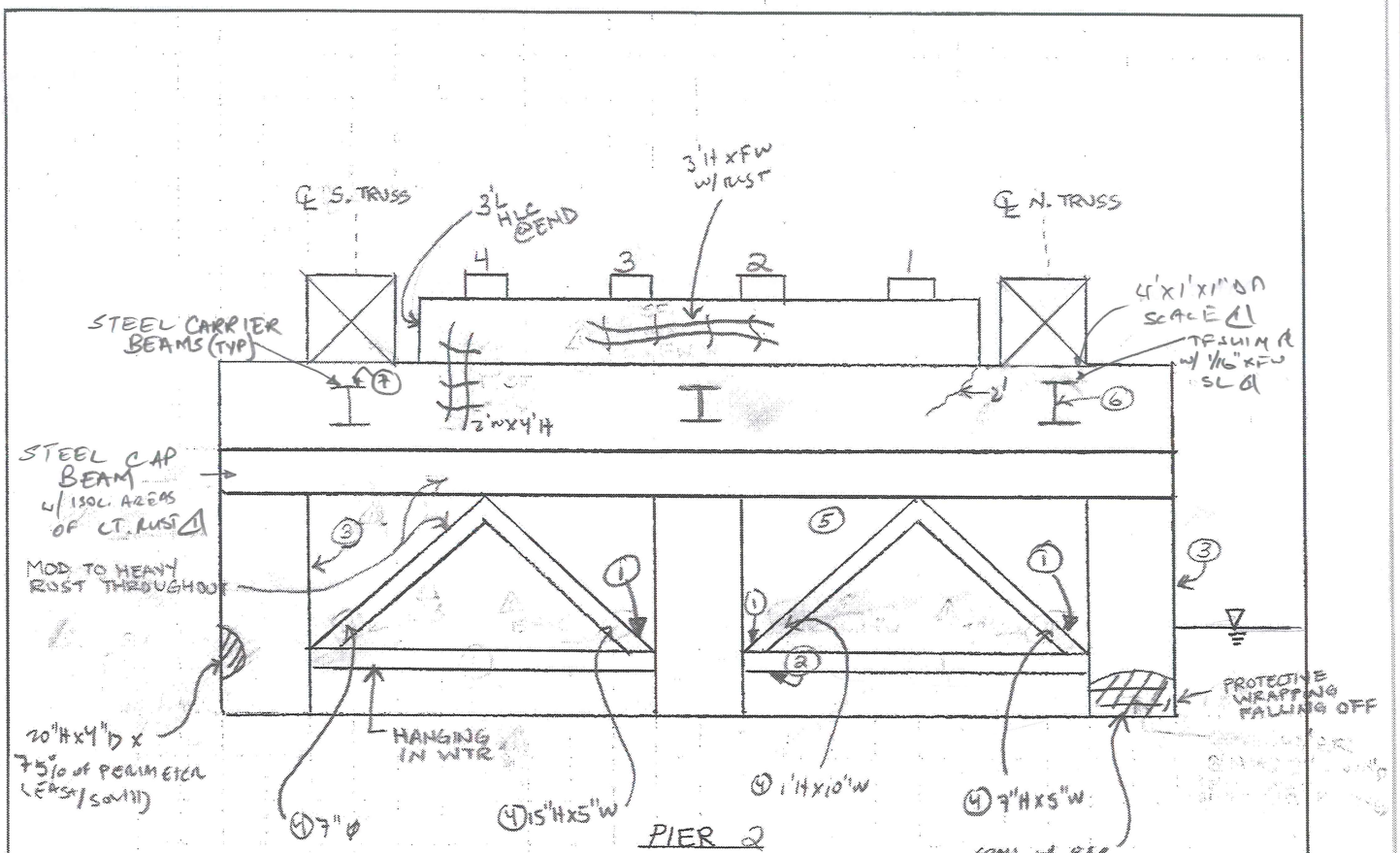
- HEAVY BARNACLE GROWTH IN TIDAL ZONE
- LT SAND ACCUMULATION ON PIER CAP
- CONCRETE SKIMCOAT PEELING @ RANDOM LOCATIONS

REVISION 1	DATE 11/3/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

Field Notes

PROJECT NO P712100021 BRIDGE NO 01349
DATE 11/9/2012 SHEET 24
CREW GAH / NPH / ASW



PIER 2
EAST ELEVATION

NOT VISIBLE DUE TO HIGH WATER 1

1 (7) SHIM R w/ 2'L x 3"W x 1/8" REM.

LEGEND:
- ~ CRACK / HLCR
- MAP CRACK / HLMCR
- HOLLOW AREA / HA
- SPALL
- SPALL w/ EXPOSED REBAR
- W/E : EFFLORESCENCE

GENERAL NOTES:
1. STEEL CROSS BRACING HAS SEVERAL LOCATIONS OF 100% SECTION LOSS x UP TO 2'W @ THE ENDS. (UNCONNECTED TO PILES @ THESE LOCATIONS)
2. 100% BOTTOM FLG LOSS x 2'L
3. FIBERGLASS SHELL MISSING, EXPOSED CONC. PILE w/ HEAVY SCALING UP TO FULL PERIMETER x 3'H x UP TO 4"D
4. RUSTED THROUGH HOLE IN WEB
5. 3'L x 1.5'W x 5"D CHIP STONE & 15"D MORTAR VOID (-CARLIFL 1)
6. STEEL BEAMS ~~ENCASED IN PIER CAP~~ 1 w/ ~~HVY LAM. RUST~~ AREAS OF RUST; CR IN TF SHIM. FR (TYP.) 1

- HEAVY BARNACLE GROWTH IN TIDAL ZONE
- CONCRETE SKIMCOAT PEELING @ RANDOM LOCATIONS
- LT SAND ACCUMULATION ON PIER CAP

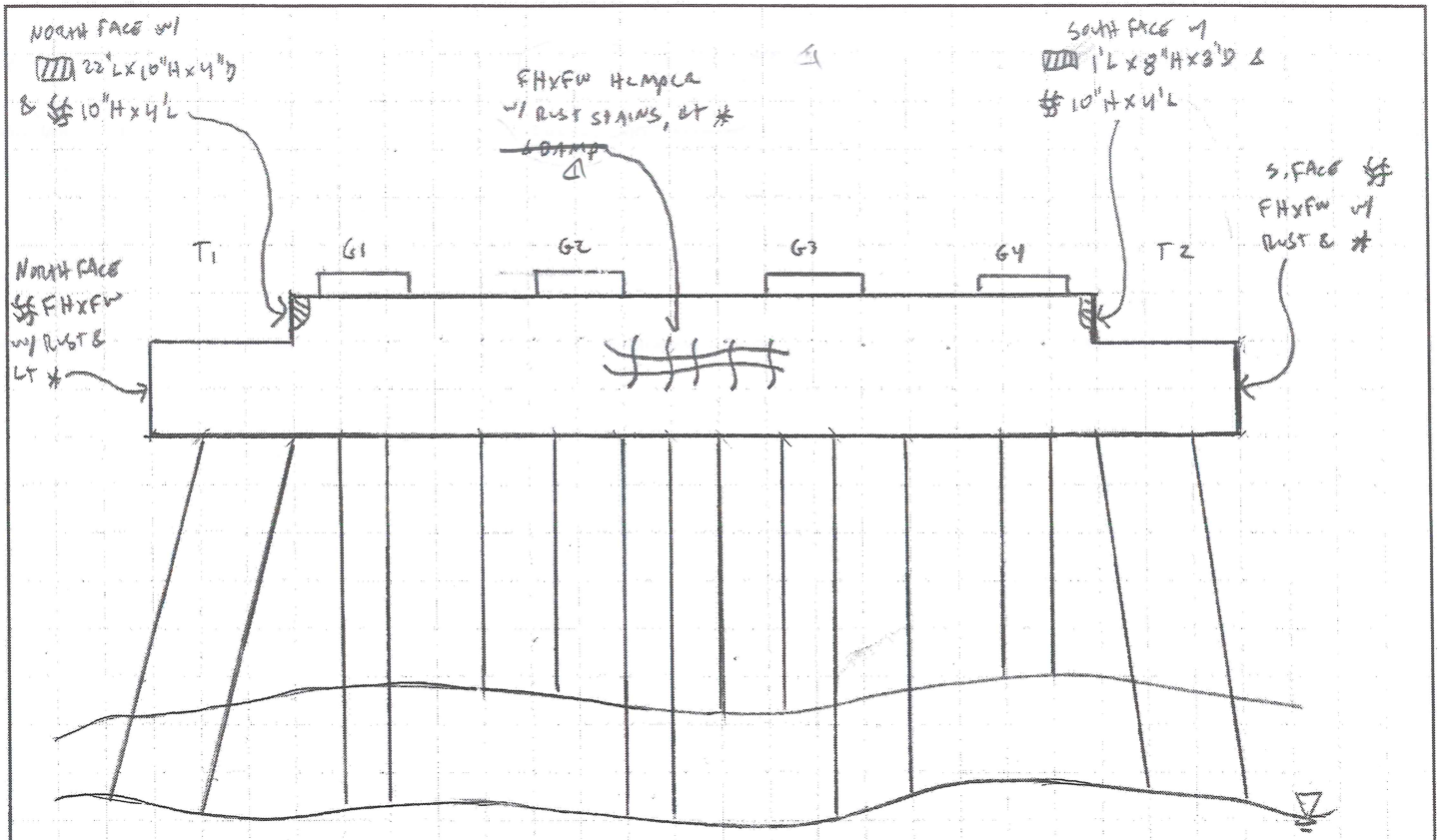
REVISION 1	DATE 11/4/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems®

Field Notes

PROJECT NO P712100021 BRIDGE NO 01349
DATE 12/7/12 SHEET 25
CREW NPM/ASW



PIER 3
WEST ELEVATION

LEGEND:

~ CRACK / HAIRLINE
CRACK / HUMPS
SPALL
* EFFLORESCENCE

GENERAL NOTES:

- HEAVY BARNACLE & ALGAE GROWTH ON PILES IN TIDAL ZONE
- HEAVY SILT/ALGAE/STAINING FH UNDER TRUSSES & FW x 6" H ON BOTTOM OF CAP
- ~~TRUSSES CONTINUOUS OVER P3, NO BEARINGS FOR T1/T2~~ 2 SEE TRUSS
- PILES WRAPPED IN FIBERGLASS JACKET

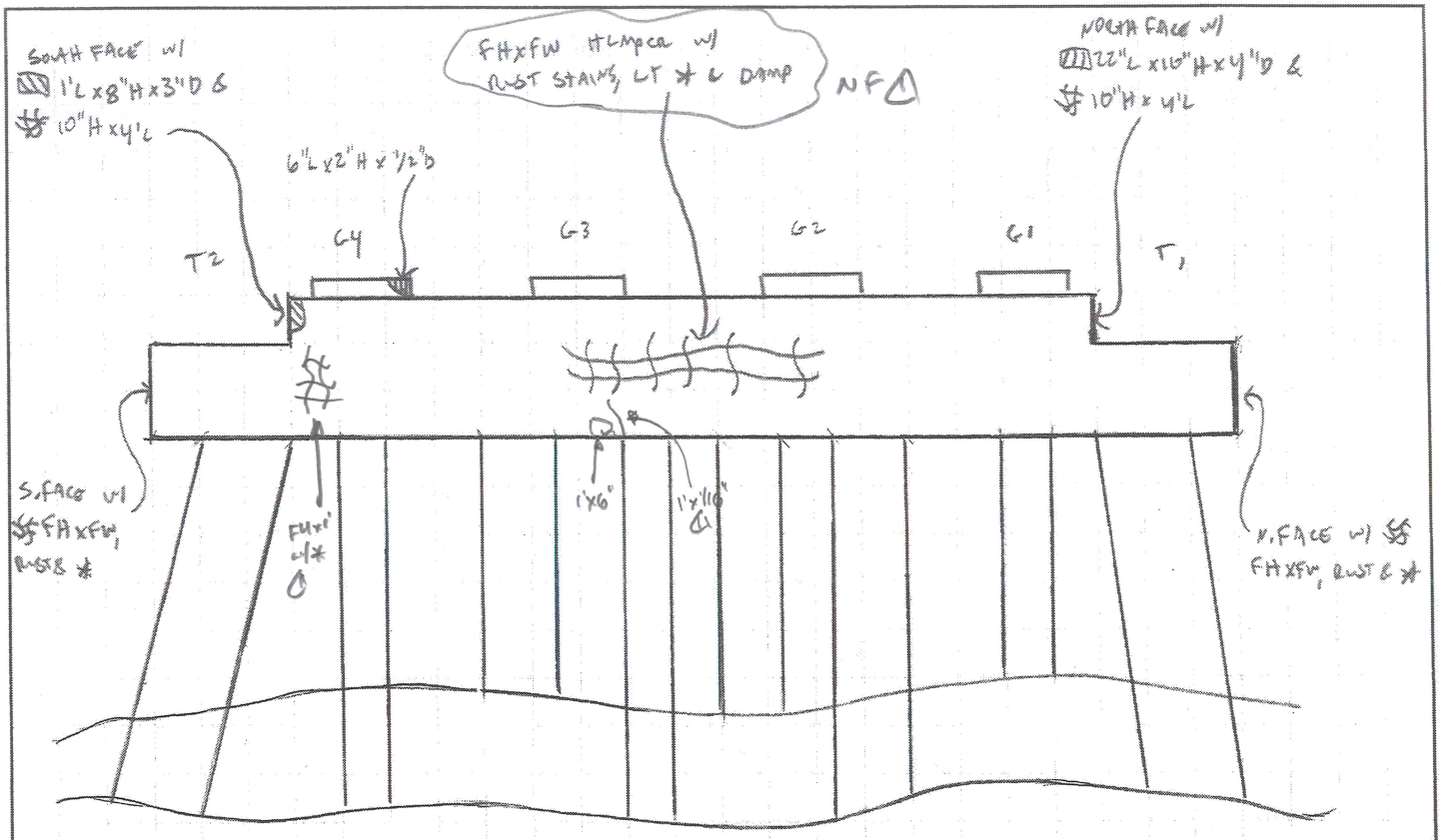
REVISION 1	DATE 11/4/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems®

Field Notes

PROJECT NO P712U0024 BRIDGE NO 01349
DATE 12/7/12 SHEET 26
CREW NPH/AS



PIER 3
EAST ELEVATION

LEGEND:

~ CRACK/HLCAC
MAP CRACK/HLMpca
SPALL
* EFFLORESCENCE

GENERAL NOTES:

- SEE PIER 3, WEST ELEVATION

Calculations for 1/4 US Grid

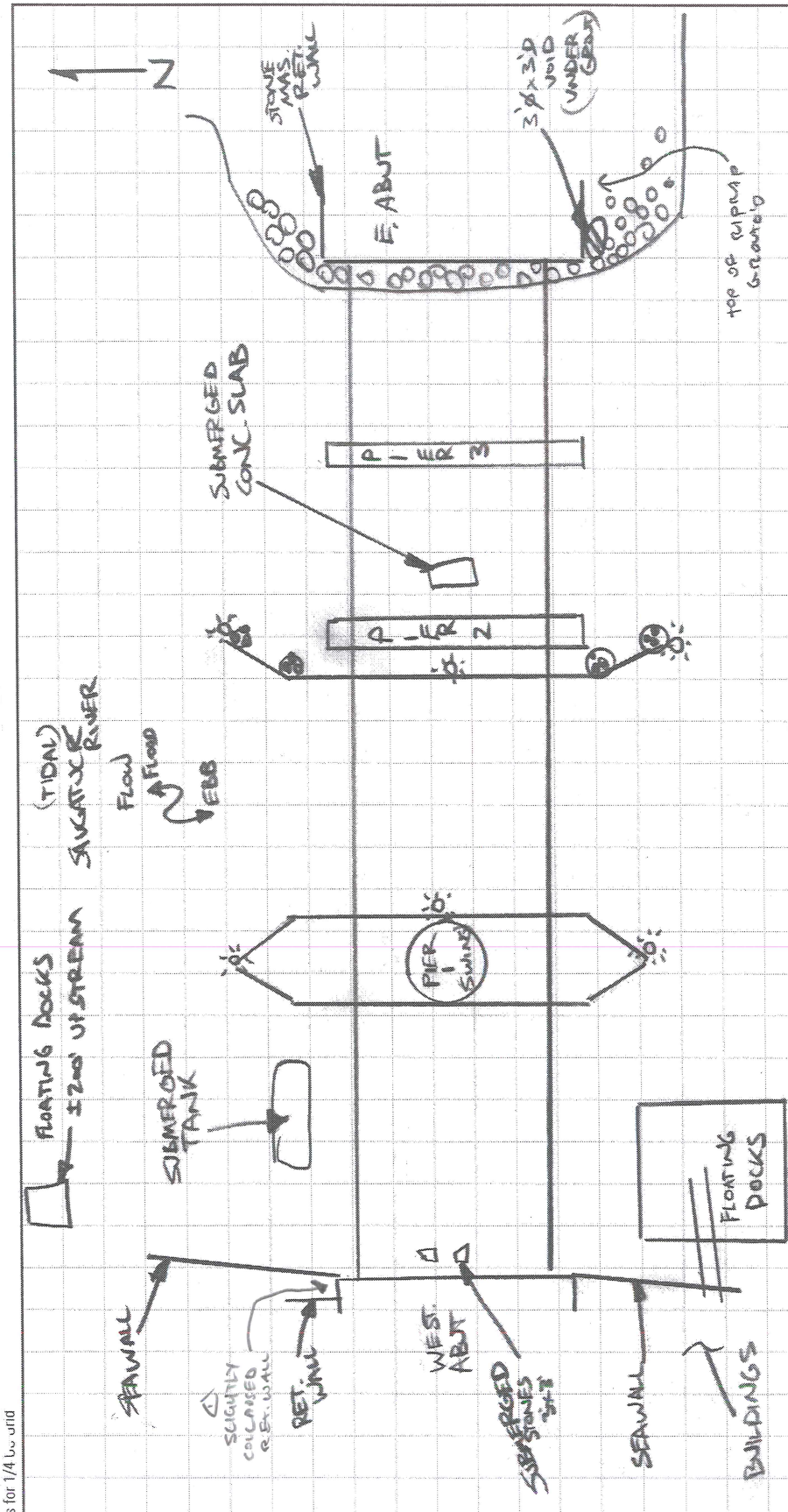
REVISION 1	DATE 11/4/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Field Notes

TranSystems

PROJECT NO P712100021
DATE 11/19/12
CREW ASW / NPH / GAH

BRIDGE NO 01349
SHEET 27



CHANNEL DIAGRAM

GENERAL NOTES:

- ALL NAV LIGHTS FUNCTIONAL DURING INSPECTION ~~(AFTER REPAIRS)~~ 1
- CHANNEL IS TIDAL @ BRIDGE
- SEVERAL LOCATIONS OF HUY DEBRIS FROM RECENT HURRICANE (SEA WALLS & LOWER TRUSS CHORDS. 1
- FEW LOCATIONS OF DISPLACED/SCATTERED RIP RAP.

LEGEND:

- NAV. LIGHTS
- PILES/DOLPHIN
- RIP RAP

REVISION 1	DATE 11/3/2014	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

PHOTO LOG

Form BRI-13, Rev. 9/97

Bridge Information System

Image Inventory

TranSystems

Bridge No. 01349 Date: 11/3/14

Town Westport Photographer: J S / JPM

Carried / Crossed: Bridge Street / Saugatuck River

Photo #	Image Description
1 (32)	South ELEV.
2 (33)	G3 CONN. TO END FR @ W. ABUT. BACKER BAR IN PLACE
3 (34)	W. ABUT S. BEARING / LL SHOE
4 (35)	G1 @ W. ABUT WELDED SPLICE (N. EL)
5 (36)	END GIRDER @ W. ABUT W. ELEV MOD RUST @ BF
6 (37)	N. END FACE OF W. ABUT PARTIAL LL COLLAPSE
7 (38)	INT. OF END GIRDER AT W. ABUT LOOKING NORTH
8 (39)	" " " " " " " SOUTH
9 (40)	END DIAPH AT W. END GIRDER AT WEST ABUT, HOLE + DEBRIS
10 (41)	NORTH TRUSS AT W. ABUT, DISCONN. LACING BAR
(42,43) 11-12	G3 AT W. ABUT COVED WEB AT SPLICE (NORTH EL)
(44) 13	SP1 G7 S. ELEV TYP WEEP & LAM RUST IN WEB
(45) 14	SP1 G7 S. ELEV WEEP ATTACHMENT WELD CAT E
(46) 15	SP1 N. ELEV OF G1 TYP TRUSS CONN TO GIRDER WEB
(47) 16	SP1 N. TRUSS @ L3 RTN IN PLATE @ BOT CHORD
(48) 17	SP.1 TYP LONG SPLICE ON U/S E/W G4 + G5
(49) 18	SP 1, G7 N. ELEV PLATE W/ INTERMIT WELDED TO WEB
(50) 19	S. TRUSS @ L4 U4 W/ IMPACT DAMAGE
(51,52) 20-21	S. TRUSS U/S BOT CHORD BTWN L5 + L6 HVY LAM RUST
(53) 22	BOX GIRDER @ PIER 1 SL @ BF + LAM RUST LOOKING N (INT)
(54) 23	BOX GIRDER @ PIER 1 BACKER BAR @ BF (INT)
(55) 24	BOX GIRDER @ PIER 1 N. END LAM RUST + MOISTURE (INT)
(56) 25	BOX GIRDER @ PIER 1 100% SL IN BOLTS @ BF (INT)

PHOTO LOG

Form BRI-13, Rev. 9/97

Bridge Information System

Image Inventory

TranSystems

Bridge No. 01349 Date: 11/4/14

Town WESTPORT Photographer: YS/JPM

Carried / Crossed: BRIDGE ST / SAUGATUCK RIVER

Photo #	Image Description
26-27	SP1 G7 TYP CONNECTION TO BOX HEADER @ PIER 1 (S. EL)
28	N. TRUSS BOT CHORD RTH IN BOT. PLATE AT P1
29	N. FASCIA @ PIER 1 WEEP of WOODEN PLATFORM
30	W. ABUT
31	DOWNSTREAM
32	UPSTREAM
33	W. ABUT
34	TYP U/S SP1
35	NW UW
36	P2, W. EL.
37	T1, AT P1, BOT CHORD B/W CS + LG SC's
38	SP2, G4, N. EL MISDRILLED HOLES
39	P1, RTH AT STEEL ENCASEMENT W/ LR
40	P2, W. EL.
41	U/S SP 2.
43	SP2, TYP INT. DIAPH B/W G5 + G6 NEAR P1
44	SP2, U/S of SIDEWALK
45	P2, W. EL., N. END TIMBER BEAM WEATHERED
46	SP2, G4, CONN. TO PIVOT GIRDER AT P2
47	P1, E. EL.
48	PIVOT GIRDER IN SP 2 AT P2 DEBRIS
49	I. BRNG AT P2, SP 2
50	PIVOT GIRDER IN SP 2 AT P2, HATCH

PHOTO LOG

Form BRI-13, Rev. 9/97

Bridge Information System

Image Inventory

TranSystems

Bridge No. 01349 Date: 11/4/14

Town WESTPORT Photographer: YS/JPM

Carried / Crossed: RT 136/SAUGATUCK RIVER

Photo #	Image Description
51	TYP SCUPPER, S. FASCIA, SP 2 AT P2
52	P2, W. ELEV., RTH AT X-BRACING
53	PIVOT GIRDER AT P2, SP2
54,55	P2, W. EL. PILE 1 W/ EXP. CONC W/ SPALLING
56	CENTER BRNG AT P1
57	MACHINERY AT P1
58	SP 1, U/S TF B/W GUYS AT P1
59	P2, E. EL
60	U/S SP 2, E.
61	E. ABUT

PHOTO LOG

Form BRI-13, Rev. 9/97

Bridge Information System

Image Inventory

TranSystems

Bridge No. 01349 Date: 11/4/14

Town WESTPORT Photographer: YS

Carried / Crossed: RT 136/SAUGATUCK RIVER

Photo #	Image Description
1,2	NORTH EL.
3	E. ABUT
4	NE WW
5	T1, BRNG AT E. ABUT
6	T2, BRNG AT E. ABUT
7	T2, AT E. ABUT, IR S/C EYE BAR + TRUSS BOT CHORD
8	BRNG ~~4~~ AT E. ABUT
9	N. FASCIA, AT E. ABUT RTH AT SID AT WEEP
10	T1, TYP EYE BAR AT L9, BOT. CHORD
11	SIDEWALK AT C1, BACKED OFF NUTS
12	N. TRUSS, AT L9, EYE BAR
13	S. FASCIA B/W L8 + L9, SID'S W/ LR + RTH'S
14	T1, L8, BOT. CHORD, IR AT EYE BARS
15	L8U8, SLIN WEB AT T1, AT BOT. CHORD
16	L5, U4 DIAG. AT T2
17,18	~~T8~~ T2 AT L6, U5L6 W/ CRK AT FORGE LINE
19,20	T1, U5L6, EYE BAR W/ CRK ALONG FORGE LINE
21	T1, U5L6, (SOUTH) W/ CRK
22	P3, N. END FACE
23	L5, N. TRUSS, CRACKED EYE BARS
24	SP 4, G2, BRNG AT P3
25	TYP U/S SP 4
26	U4L5, S. TRUSS, CRK AT FORGE LINE
27	L4U5, S. TRUSS, SHEARED

PHOTO LOG

Form BRI-13, Rev. 9/97

Bridge Information System

Image Inventory

TranSystems

Bridge No. 01349 Date: 11/4/14

Town WESTPORT Photographer: YS

Carried / Crossed: RT 136 / SAUGATUCK RIVER

Photo #	Image Description
28	SP3, G3, S.ELEV, TYP. SPLICE
29	SP3, G3 BRNG AT P2
30	P3, W. EL.
31	SP3 U/S

PHOTO LOG

Form BRI-13, Rev. 9/97

Bridge Information System

Image Inventory

TranSystems

Bridge No. 01349 Date: 11/18/14

Town Westport Photographer: ABB

Carried / Crossed: Rt 136 / Saugatuck River

Photo #	Image Description
116-117	damage to L0U1 T1, span 1 (2 photos)
118	L2U3 eyebar bent, T1 span 1
119	L3U3 rust hole, T1 span 1
120	crack L4U3, T1 span 1
121-122	damage/cracks L5U6, T1 span 2 (2 photos)
123	crack L8U8, T1 span 2
124-125	damage/cracks L0U1, T1 span 3 (2 photos)
126	cracks L2U2, T1 span 3
127	cracks L3U3, T1 span 3
128	cracks L7U7, T1 span 4
129	cracks L8U8, T1 span 4
130-132	bent/torn L4U4, T2 span 1 (3 photos)
133	crack L5U4, T2 span 1
134	SL L7U8, T2 span 2
135	SL L8U7, T2 span 2 136. L8U7 lower conn, T2 span 2
137-138	U4U6 bent, T1 @ pier 1 (2 photos)
139	U6/U7 sway bracing, T1, span 2
140	U8 U8 ID, T1/T2 span 2
141	L7U8 upper pin conn. T1 span 2
142	L5U6 upper pin conn. T2 span 2
143	U4U6 bent. T2 @ pier 1
144	flange cut L2U2, T2 span 3
145	cracks L3U3, T2 span 3
146	MBR disconn from post stop U3/exp T2 span 3

PHOTO LOG

Form BRI-13, Rev. 9/97

Bridge Information System

Image Inventory

TranSystems

Bridge No. 01349 Date: 11/18/14

Town Westport Photographer: ABB

Carried / Crossed: Rt 136/ Saugatuck River

Photo #	Image Description
147	cracks L4 U4 , T2 span 3
148	bent bar L5 U4, T2 span 3
149	bent bar L4 U4 , T2 span 4
150	broken bar L4 U5, T2 span 3
151	L0 U1 upper runn T2 span 3
152	crack eyebar L5 U4 @ top, T2 span 3
153	top chord span 4 looking W
154	north truss span 4 looking W
155-156	crack eyebar L5 L6, T1 span 4 (2 photos)
157	clogged grate midspan north span 4
158	IR under portal @ U2 T1 span 3
159	clearance @ east app
160	missing terminal @ NW app rail
161	advanced waring @ east app

PHOTO LOG

Form BRI-13, Rev. 9/97

Bridge Information System

Image Inventory

TranSystems

Bridge No. 01349 Date: 11/18/14

Town Westport Photographer: ABB

Carried / Crossed: Rt 136 / Saugatuck River

Photo #	Image Description
92	clearance @ west app
93	bridge from west app
94	ID
95	w. abut joint, looking N
96	damage @ SW corner span 1
97	span 1 overlay, looking E
98	west app from bridge
99	hatch in overlay, span 2 looking E
100	south MBR midspan span 2 looking E
101	joint @ pier 2, looking N
102	east app from bridge
103	east abut joint, looking N
104	bridge from east app
105	east app fair
106	potholes @ east app fair
107	north sidewalk, looking N, span 4
108	NE app sidewalk @ bridge
109	NE rail @ bridge damage
110	SE app rail
111	MBR @ control house
112	pair @ NW corner, looking E
113	NW app sidewalk
114	turnbuckles on west app gate
115	NW app rail, looking W

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 1: **Bridge ID.**



Photo 2: **South elevation.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 3: **North elevation.**



Photo 4: **Bridge from the west approach.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 5: **Bridge from the east approach.**



Photo 6: **Typical underside of deck and steel multi girder superstructure (span 1 shown).**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 7: **Typical underside of deck and steel multi girder superstructure (span 3 shown).**

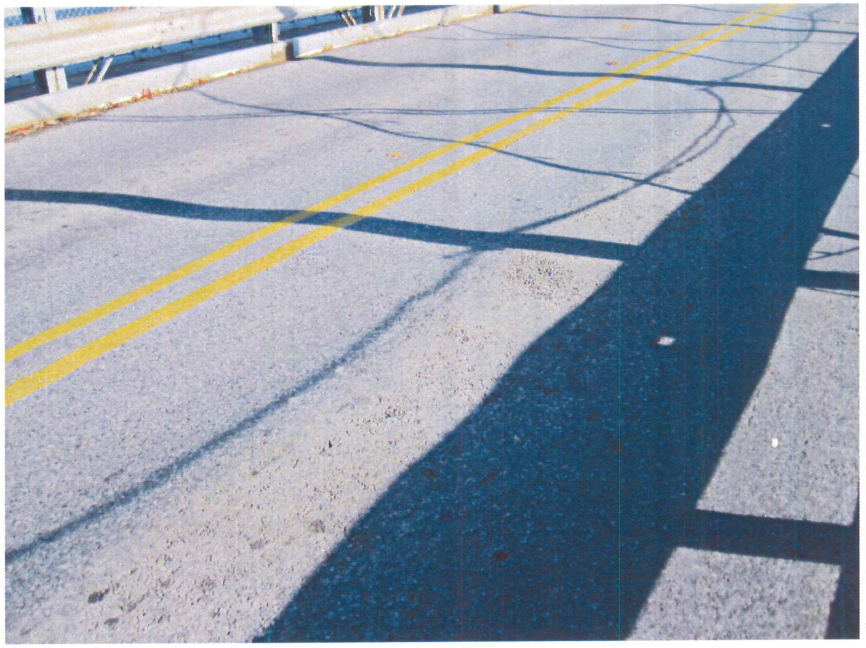


Photo 8: **Typical top of deck (span 1 shown).**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 9: **Bridge overlay in span 1 with raveling.**



Photo 10: **Underside of exodermic deck at the south fascia in span 4 with perforations and heavy rust.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 11: **Typical sidewalk, metal beam rail and fence (span 1 shown).**



Photo 12: **Backed off connection bolts at the sidewalk beam at L1 in span 4.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 13: **Metal beam rail at the southwest corner of the bridge 1 span 1 with impact damage.**



Photo 14: **Partially clogged scupper grate in span 4.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

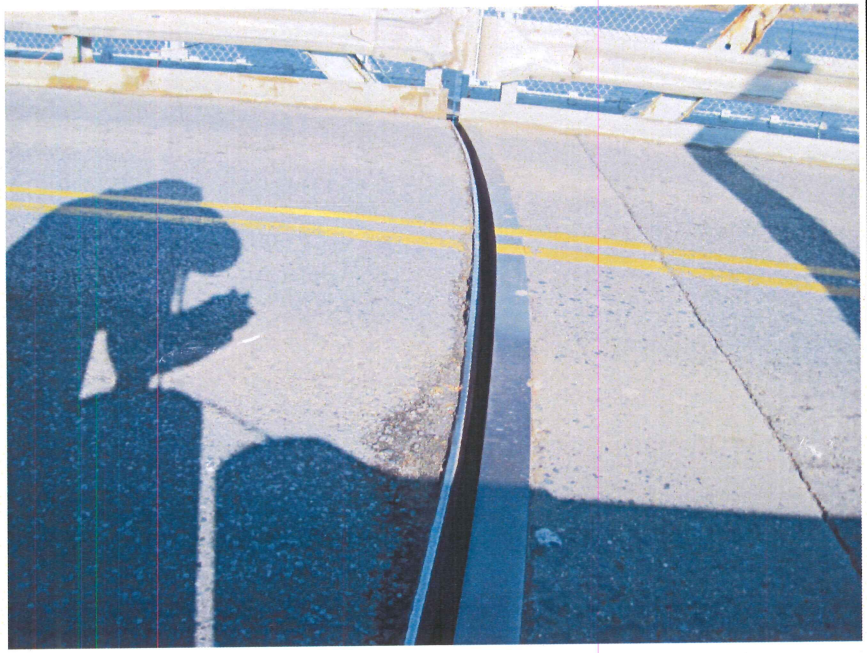


Photo 15: **Open deck joint at pier 2.**



Photo 16: **Deck joint at the east abutment. Note the patched areas in the header.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 17: South screw jack bearing at the west abutment.



Photo 18: Bearing for truss 2 at the east abutment. Note the debris.

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 19: **Bearing 2 in span 4 at pier 3.**



Photo 20: **Bearing 4 at the east abutment.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 21: **Typical girder connection to cross girder at pier 2 in span 2.**



Photo 22: **End floorbeam at the west abutment with heavy rust and debris accumulation at the bottom flange.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 23: **Interior of cross girder at the west abutment. Note the debris on the bottom flange and the hole in the diaphragm.**



Photo 24: **Pivot girder at pier 1 with laminated rust and negligible loss on the bottom flange.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 25: Typical condition of the truss 1 (north).



Photo 26: Typical condition of the south truss 2 (south). Note the areas of impact damage.

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 27: **Truss 1 in span 1, member L0U1 with impact damage.**



Photo 28: **Span 1, truss 2, L4U4 with impact damage.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 29: **Span 3, truss 1 L2U2 with cracks due to previous impact.**



Photo 30: **Span 4, truss 1 L8U8 with cracks.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 31: **Span 3, truss 2, member L4U5 sheared.**



Photo 32: **Truss 1 at pier 1 with a perforation in the bottom chord.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 33: **Truss 1, bottom chord between L5 and L6 with laminated rust and section loss.**



Photo 34: **Typical sway bracing and lateral bracing (span 4 shown).**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

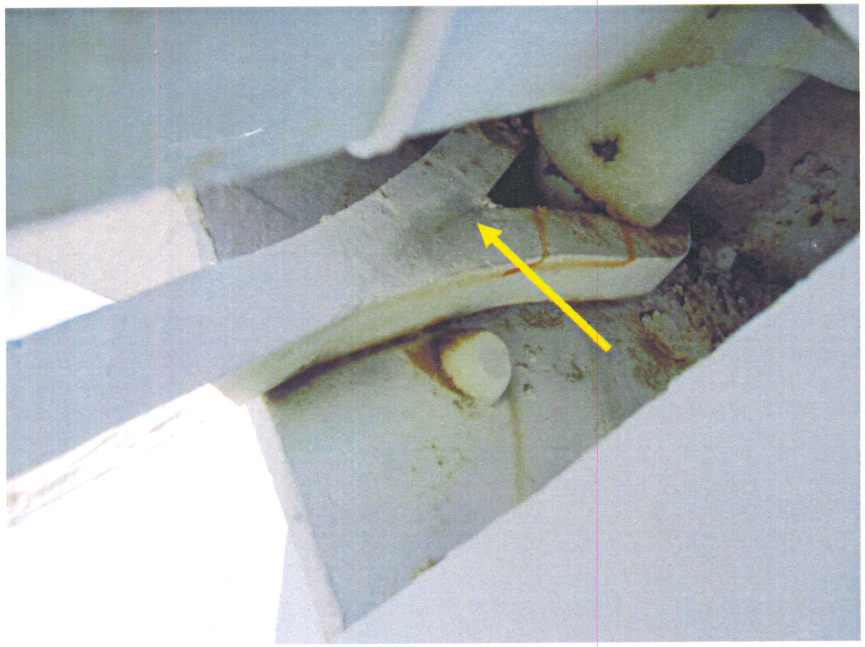


Photo 35: **Span 3, truss 2, L5U4 with a crack along the forge line.**

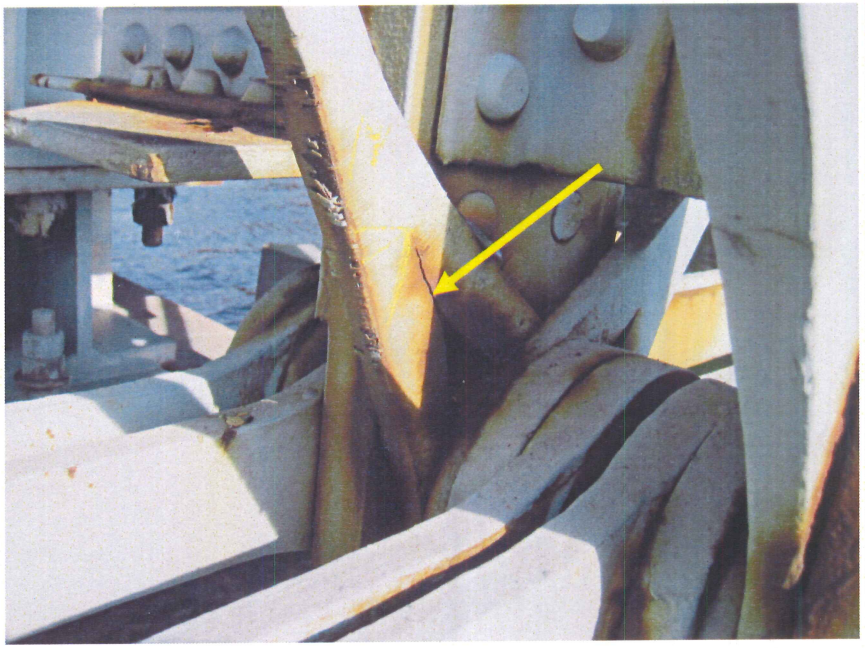


Photo 36: **Span 3, truss 2, U4L5 with a crack along the forge line.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

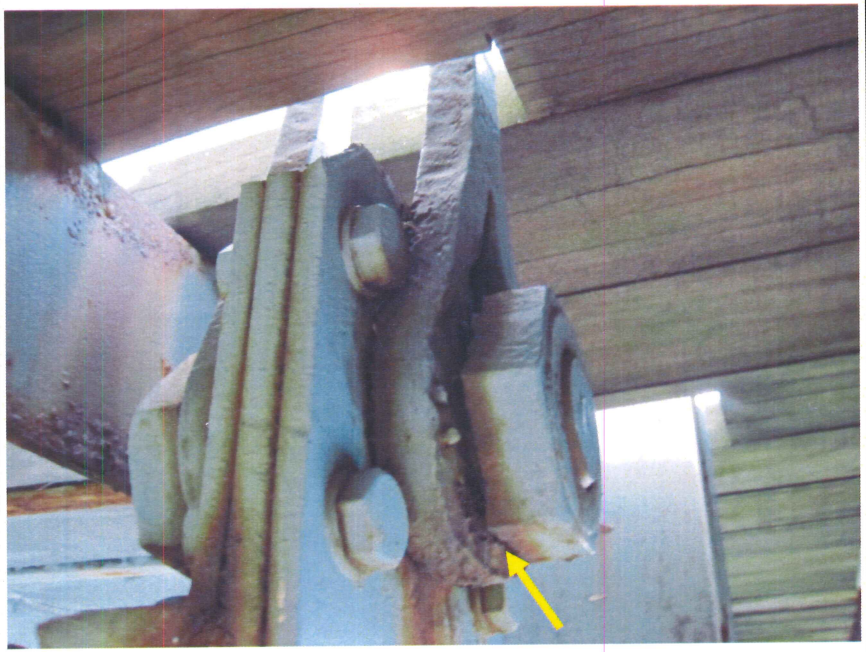


Photo 37: **Span 4, truss 1 at L9 with impact rust between the eye bar and the nut.**



Photo 38: **East abutment.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 39: **Pier 1, east elevation. Note the fender system.**



Photo 40: **Pier 2, east elevation.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 41: **Pier 3, west elevation.**

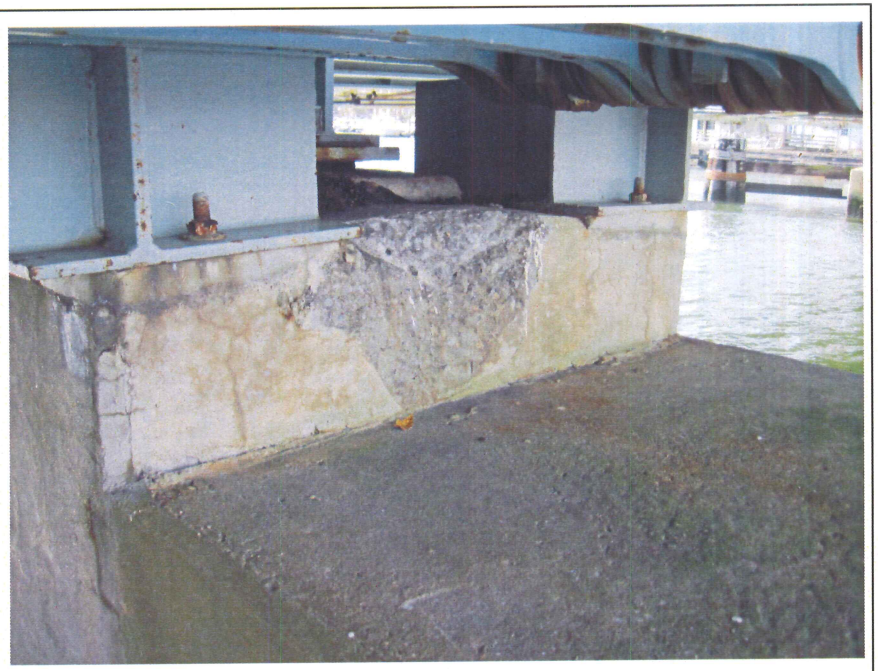


Photo 42: **Pier 3, north end face with a large spall.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 43: **Pier 2, west elevation, pile 1 with detached fiberglass jacket and spalling.**



Photo 44: **Rusted out cross bracing at the west elevation of pier 2.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

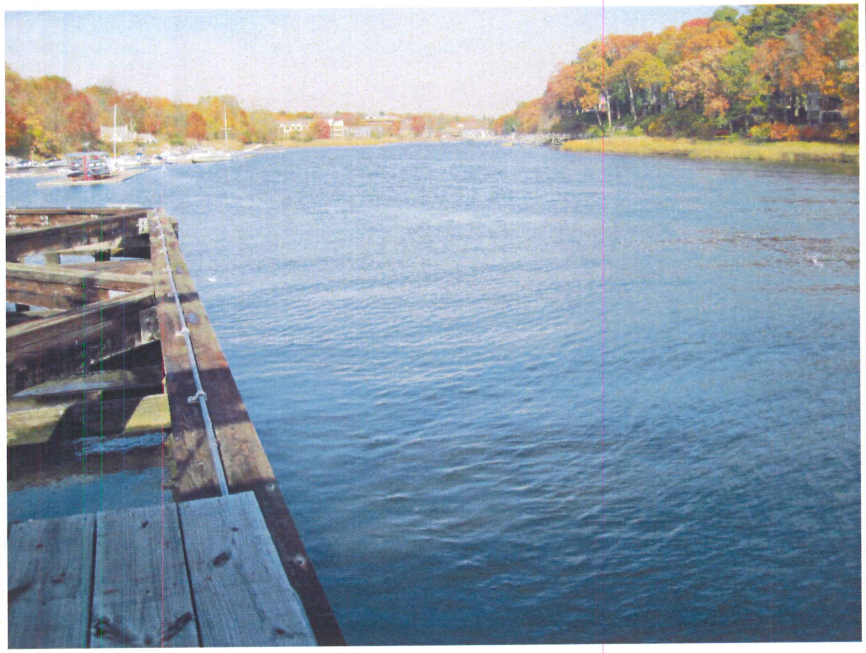


Photo 45: **Channel looking north.**



Photo 46: **Channel looking south.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 47: **Vertical clearance sign at the west approach.**



Photo 48: **Advanced warning sign at the east approach.**

Your Agency Name

Your Office Name
Your Department Name

Structure Inventory and Appraisal Sheet (English Units)

Bridge Key: 01349 Agency ID: 01349 SR: 57.9 SD/FO: FO

IDENTIFICATION

State 1:	09 Connecticut	Struc Num 8:	01349
Facility Carried 7:	ROUTE 136	Location 9:	BETWEEN I-95 EXIT 17 & 18
Rte.(On/Under) 5A:	Route On Structure	Rte. Signing Prefix 5B:	3 State Hwy
Level of Service 5C:	1 Mainline	Route Number 5D:	00136
Directional Suffix 5E:	0 N/A (NBI)	% Responsibility:	0.00
SHD District 2:	03	County Code 3:	Fairfield
Place Code 4:	WESTPORT	Mile Post 11:	8.648 mi
Feature Intersected 6:	SAUGATUCK RIVER		
Latitude 16:	41° 07' 48"	Longitude 17	073° 22' 12"
Border Bridge Code 98	Unknown (P)		
Border Bridge Number 99	NA		

STRUCTURE TYPE AND MATERIALS

Number of Approach Spans 46	2	Number of Spans Main Unit 45:	2
Main Span Material Design 43 A/B:			
4 Steel Continuous		17 Movable-Swing	
Approach Span Material Design 44 A/B:			
4 Steel Continuous			
Deck Type 107:	5 Steel Plate		
Wearing Surface 108A:	6 Bituminous		
Membrane 108B:	1 Built-up		
Deck protection 108C	None		

AGE AND SERVICE

Year Built 27:	1884	Year Reconstructed 106:	1993		
Type of Service on 42A	1 Highway				
Type of Service under 42B	5 Waterway				
Lanes on 28A:	2	Lanes under 28B:	0	Detour Length 19:	1.2 mi
ADT 29:	13,500	Truck ADT 109:	5%	Year of ADT 30:	2013

GEOMETRIC DATA

Length Max Span 48:	69.88 ft	Structure Length 49:	287.07 ft
Curb/Sdwlk Width L 50A	3.61 ft	Curb/Sidewalk Width R 50B	0.00 ft
Width Curb to Curb 51:	19.36 ft	Width Out to Out 52:	20.01 ft
Approach Roadway width 32: (w/ shoulders)	21.00 ft	Median 33:	0 No median
Deck Area:	5,737.16 sq. ft		
Skew 34:	0.00°	Structure Flared 35	0 No flare
Vertical Clearance 10	13.75 ft	Horizontal Clearance 47:	19.36 ft
Minimum Vertical Clearance Over Bridge 53:		12.83 ft	
Minimum Vertical Underclearance Reference 54A		N Feature not hwy or RR	
Minimum Vertical Underclearance 54B:		0.00 ft	
Minimum Lateral Underclearance Reference R 55A:		N Feature not hwy or RR	
Minimum Lateral Underclearance R 55:		327.76 ft	
Minimum Lateral Underclearance L 56:		0.00 ft	

INSPECTION

Frequency 91:	24 months	Inspection Date 90:	11/3/2014	Next Inspection:	11/3/2016
FC Frequency 92A:	24 months	FC Inspection Date 93A:	11/3/2014	Next FC Inspection:	11/3/2016
UW Frequency 92B:	24 months	UW Inspection Date 93B:	12/7/2012	Next UW Inspection	12/7/2014
SI Frequency 92C:	NA	SI Date 93C:	NA	Next SI:	NA
Element Frequency:	24 months	Element Insp. Date:	11/3/2014	Next Elem. Insp.:	11/3/2016

CLASSIFICATION

Defense Highway 100:	0 Not a STRAHNET hwy	Parallel Structure 101:	No || bridge exists
Direction of Traffic 102:	2 2-way traffic	Temporary Structure 103:	Unknown (NBI)
Highway System 104:	0 Not on NHS	NBIS Length 112:	Long Enough
Toll Facility 20:	3 On free road	Functional Class 26:	16 Urban Minor Arterial
Defense Hwy 110:	0 Not a STRAHNET hwy	Historical Significance 37	1 Br on Natl Reg Hist Pl
Owner 22:	01 State Highway Agency		
Custodian 21:	01 State Highway Agency		

CONDITION

Deck 58:	6 Satisfactory	Super 59:	6 Satisfactory	Sub 60:	5 Fair
Culvert 62:	N N/A (NBI)	Channel/Channel Protection 61:		5 Bank Prot Eroded	

LOAD RATING AND POSTING

Inventory Rating Method 65:	1 LF Load Factor	Operating Rating Method 63:	1 LF Load Factor
Inventory Rating 66:	HS32.6	Operating Rating 64:	HS54.3
Design Load 31:	5 MS 18 (HS 20)	Posting 70:	5 At/Above Legal Loads
Posting Status 41:	A Open, no restriction		

APPRAISAL

Bridge Rail 36A:	0 Substandard	Approach Rail 36C:	0 Substandard
Transition 36B:	0 Substandard	Approach Rail Ends 36D:	0 Substandard
Str Evaluation 67:	5 Above Min Tolerable	Deck Geometry 68:	2 Intolerable - Replace
Underclearance, Vertical and Horizontal 69:		N Not applicable (NBI)	
Waterway Adequacy 71:	8 Equal Desirable	Approach Alignment 72:	6 Equal Min Criteria
Scour Critical 113:	8 Stable Above Footing		

PROPOSED IMPROVEMENTS

Bridge Cost 94:	$1,000	Type of Work 75:	38 Other Structural
Roadway Cost 95:	$1,000	Length of Improvement 76	0.3 ft
Total Cost 96:	$2,000	Future ADT 114:	8,000
Year of Cost Estimate 97	2000	Year of Future ADT 115:	2029

NAVIGATION DATA

Navigation Control 38	Permit Required		
Vertical Clearance 39	6.9 ft	Horizontal Clearance 40:	49.9 ft
Pier Protection 111:	2 In-Place, Functionir	Lift Bridge Vertical Clearance 116	0.0 ft

Structure Inventory and Appraisal Sheet (English Units)

ELEMENT CONDITION STATE DATA

Str Unit	Elm/Env	Description	Units	Total Qty	% in 1	Qty. St. 1	% in 2	Qty. St. 2	% in 3	Qty. St. 3	% in 4	Qty. St. 4
0	30/3	Steel Deck - Orthotropic	sq.ft	2,820	95%	2,670	5%	135	1%	15	0%	0
0	1,000/3	Corrosion	sq.ft	150	0%	0	90%	135	10%	15	0%	0
0	107/3	Steel Opn Girder/Beam	ft	1,538	99%	1,528	1%	10	0%	0	0%	0
0	1,000/3	Corrosion	ft	10	0%	0	100%	10	0%	0	0%	0
0	111/3	Timber Open Girder	ft	574	99%	566	1%	8	0%	0	0%	0
0	1,170/3	Split/Delamination (Timber)	ft	8	0%	0	100%	8	0%	0	0%	0
0	120/3	Steel Tuss	ft	574	82%	470	7%	42	4%	21	7%	41
0	1,000/3	Corrosion	ft	48	0%	0	56%	27	44%	21	0%	0
0	1,010/3	Cracking	ft	10	0%	0	100%	10	0%	0	0%	0
0	1,020/3	Connection	ft	5	0%	0	80%	4	0%	0	20%	1
0	7,000/3	Damage	ft	40	0%	0	0%	0	0%	0	100%	40
0	152/3	Steel Floor Beam	ft	66	0%	0	100%	66	0%	0	0%	0
0	1,000/3	Corrosion	ft	66	0%	0	100%	66	0%	0	0%	0
0	161/3	Stl Pin Pin/Han both	each	76	80%	61	20%	15	0%	0	0%	0
0	1,020/3	Connection	each	15	0%	0	100%	15	0%	0	0%	0
0	205/3	Re Conc Column	each	9	0%	0	0%	0	100%	9	0%	0
0	1,080/3	Delamination/Spall/Patched Area	each	9	0%	0	0%	0	100%	9	0%	0
0	210/3	Re Conc Pier Wall	ft	26	69%	18	0%	0	31%	8	0%	0
0	1,080/3	Delamination/Spall/Patched Area	ft	8	0%	0	0%	0	100%	8	0%	0
0	217/3	Masonry Abutment	ft	52	71%	37	29%	15	0%	0	0%	0
0	1,130/3	Cracking (RC and Other)	ft	7	0%	0	100%	7	0%	0	0%	0
0	1,610/3	Mortar Breakdown (Masonry)	ft	8	0%	0	100%	8	0%	0	0%	0
0	220/3	Re Conc Pile Cap/Ftg	ft	26	0%	0	100%	26	0%	0	0%	0
0	1,130/3	Cracking (RC and Other)	ft	26	0%	0	100%	26	0%	0	0%	0
0	225/3	Steel Pile	(EA)	8	100%	8	0%	0	0%	0	0%	0
0	310/3	Elastomeric Bearing	each	16	100%	16	0%	0	0%	0	0%	0
0	316/3	Other Bearing	each	7	100%	7	0%	0	0%	0	0%	0
0	330/3	Metal Bridge Railing	ft	574	98%	564	2%	10	0%	0	0%	0
0	7,000/3	Damage	ft	10	0%	0	100%	10	0%	0	0%	0

BRIDGE SAFETY INSPECTION
STATE PROJECT NO. 170-3225

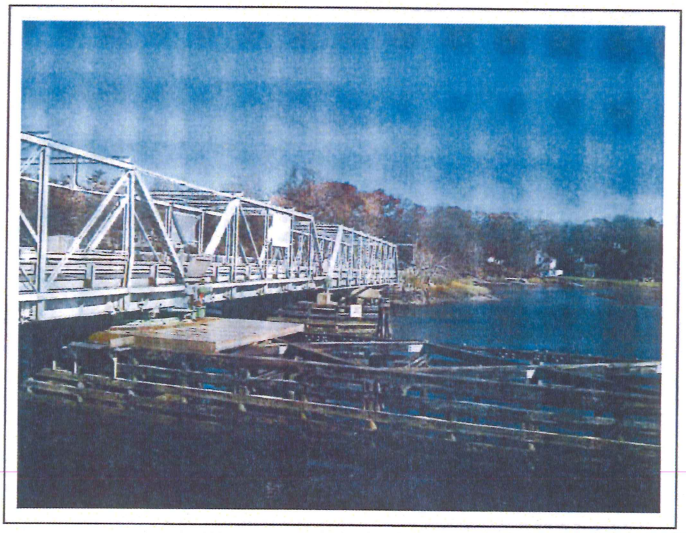
ConnDOT BRIDGE NO. 01349

ROUTE 136
OVER
THE SAUGATUCK RIVER
WESTPORT, CT

Bridge Type: Steel Movable - Swing

Inspection Type: Routine Mechanical

Inspection Date: November 18, 2014



Report Written By: JEREMY DAVIS 12/9/2014
(Name)
Report Reviewed: Sergei Kupchenko 12/9/14
(Name) Sergei Kupchenko

Prepared By
TranSystems Corporation
530 Preston Avenue, Suite 100
Meriden, CT 06450

TranSystems

Table of Contents

Page

Executive Summary....2
Introduction....3
General Description....4
Scope of Inspection....6
Existing Conditions....7
- General Conditions....7
- Span Drive Machinery....7
- Center Screw Jack Machinery....7
- End Screw Jack Machinery....8
- Center Bearing....8
- Balance Wheels and Span Balance....8
- Centering Device....8
- Rigid Stops....8
- Traffic and Barrier Gates....8
- Recommendations....10

Appendices
- Appendix I – Mechanical Figures
- Appendix II – Field Notes
- Appendix III – Inspection Photos
- Appendix IV – Numerical Condition Inspection Report

Executive Summary

TranSystems performed a routine inspection of the mechanical machinery systems on ConnDOT Bridge No. 01349 on November 18, 2014. All machinery components were visually inspected to the extent possible, and measurements were taken and recorded to assess wear of fundamental components. This report is based on the observations and measurements taken during the most recent inspection. Reference is made to the prior inspection report(s) where conditions warrant.

The general condition of the machinery as defined by the Numerical Condition Inspection Report which accompanies this report is Good (Overall Rating = "7"). This indicates that the bridge components exhibit very early wear/deterioration and perform with high degree of reliability and/or effectiveness. This rating is warranted based recent rehabilitation of machinery.

Several safety related deficiencies were noted as well:

- The motor shaft extensions intended for manual operation of the screw jack are unguarded and without limit switches to disable the motors when a hand crank is installed, posing a safety hazard to maintenance and inspection personnel.
- There is only one set of traffic control barrier gates at each approach to the movable span. While the single set of gates satisfies MUTCD requirements, AASHTO recommends the use of two sets of traffic control gates: warning gates and barrier gates. Failure to provide and use traffic warning gates may result in an increased likelihood of a vehicle impacting a resistance barrier.

All recommendations provided in this report should be sequenced into the maintenance program to ensure long term integrity and reliability of the machinery.

Introduction

ConnDOT Bridge No. 01349 is a center bearing swing span which carries Route 136 over the Saugatuck River in Westport, Connecticut. The swing span is 141'-2" long and 21'-3" wide, center to center of end screw jacks. The bridge, which is oriented east-west, supports one lane of vehicular traffic in each direction, and a pedestrian sidewalk on the north side of the roadway. The bridge operator's control console is located at roadway level, center span on the north side of the roadway. The bridge was rehabilitated in 1992/1993 as per Contract Drawings dated 1989. Machinery was rehabilitated in 2013 under Emergency Declaration Project 158-210.

On November 18, 2014, TranSystems performed a detailed field inspection of the mechanical machinery systems on the subject bridge. As part of the inspection, all machinery components were visually inspected to the extent possible, and some measurements were taken and recorded to assess condition of fundamental components. The inspected mechanical systems include the span drive machinery, span support machinery, fully open and fully closed rigid stops, fully closed center latch, barrier gates and traffic gates. This report is based on the observations made during the current inspection; however, reference is made to the prior report(s) as relevant. The ensuing sections present a brief description of the mechanical systems, the scope of inspection, significant conditions which existed at the time of the inspection, and recommendations for corrective action. All designations used in this report attempt to comply with those used in the 1989 Contract Drawings.

Figures of the Span Drive Machinery and Span Support Machinery are presented in Appendix I.

Field notes containing field data and measurements are presented in Appendix II.

Color photographs were taken of conditions of interest during the inspection. Color copies of the photographs with detailed captions are presented in Appendix III.

A Numerical Condition Inspection Report is presented in Appendix IV.

General Description

The span drive machinery for the movable span comprises an electric motor with integral brake, couplings, shafting, speed reducer and open gearing. The span drive machinery is located below roadway level and is accessed from Pier 1.

The normal power for the drive is obtained from a single 3 HP, 900 RPM electric motor with an integral disc brake. The non-driven end of the double extended motor shaft is coupling connected to a span position limit switch through a gear box. The driven end of the motor is coupling connected to the input shaft of a right angle speed reducer. The vertical down output shaft of the speed reducer is connected to the rack pinion shaft with a double engagement vertical gear coupling. The rack pinion shaft is supported by two spherical roller bearings mounted in pillow block housings. One of the bearings is located immediately below the coupling and the other just above the rack pinion. The rack pinion is integral with the rack pinion shaft and mates with a rack composed of two 54 degree sections each anchored to the center pier. Rotation of the motor causes rotation of the span about its center pivot assembly as the main pinion travels about the rack. Full opening of the span is 83 1/2 degrees. The utilization of the partial rack in this design necessitates that the span can only be opened in one direction. Figures 1 and 2, Appendix I provide schematic diagrams of the span drive machinery.

The support machinery for the movable span consists of the center pivot assembly, balance wheels and track, center screw jack machinery and end screw jack machinery. See Figure 3, Appendix I.

During operation the entire dead load of the span is supported by the center pivot assembly. The center pivot assembly consists of a spherical roller thrust bearing mounted between the upper pivot casting, which is fastened to the bottom of the pivot girder, and the lower pivot casting, which is anchored to the pier. Eight balance wheels are spaced about the center pivot assembly on an 8'-10 ½" radius. The balance wheels support forces resulting from imbalance conditions which may exist with the jacks withdrawn. The balance wheels provide stability and prevent the span from tilting during uneven loading of the span due to wind, snow, ice and loads which result from operation of the span drive machinery. The balance wheels are not intended to carry any live load.

When in the closed position, the swing span is supported by the center pivot assembly and the screw jacks. The span is equipped with a total of six screw jacks: one at each end of the pivot girder at mid span and one at each end of the end floor beams. The screw jack machinery is mounted on the movable span. When driven the screw jacks contact bases which are anchored at the West Abutment, Pier 1 and Pier 2. The dead load of the swing span is supported by the center pivot assembly and the end screw jacks. Live load is supported by the center pivot assembly, the end screw jacks and the center screw jacks. The center screw jacks are intended to carry the live load only, and are driven to produce contact but do not support any appreciable dead load. The driven screw jacks give the swing span all of the characteristics of a fixed span supported at the center and both ends.

The center and end screw jacks are driven by similar independent systems. Each jack is powered by a 3.3 HP, 1800 RPM electric motor with an integral disc brake. The motor shaft is coupling connected to a horizontal right angle reducer. The vertical down output shaft of the reducer is coupled to the input shaft of a second right angle reducer. The first difference between the center and end screw jack drive systems is that the center screw jacks utilize a floating shaft between the upper and lower right angle reducers; in the end screw jack drive, the upper reducer is coupled directly to the lower reducer. The horizontal output shaft from each lower reducer is coupling connected to a screw jack actuator. The second difference between the center and end screw jack drive systems is the capacity of the screw jacks: the center screw jacks are rated at 50 tons and 3" travel, while the end screw jacks are rated at

150 tons and 5" travel. A limit switch connected to the screw jacks through a linkage indicates the position of the screw jacks. Non-contact limit switch is also present. See Figure 3, Appendix I.

The span is equipped with fully closed and fully open rigid stops. The rigid stop for the fully open position consists of a spring bumper mounted to the center pier and a strike plate mounted to the bridge. The spring bumper is intended to prevent an over travel condition in the opening direction. The rigid stop for the fully closed position consists of a synthetic bumper block mounted to the west end pier and a strike plate mounted to the west end of the bridge. The synthetic bumper block is intended to prevent an over travel condition in the closing direction.

The span is equipped with a manual centering device at the west end of the span. The centering device consists of a vertical steel rod which extends through the deck of the swing span and engages a receiver mounted on the West Abutment. Operation of the centering device entails raising or lowering the rod by hand to engage or disengage the socket.

The span has one manually operated energy absorbing barrier gate on the south side of each approach. Each barrier gate has one arm which when lowered spans the roadway and engages a receiver on the north side of the roadway. Each receiver pedestal has an arm that is manually lowered to block the pedestrian sidewalk.

Scope of Inspection

During the present inspection, all accessible components of the span drive machinery, center screw jack machinery, end screw jack machinery, span support machinery, rigid stops, centering device, barrier gates and traffic gates were visually inspected. Measurements were taken on some of the wearing components, including bearings. Areas of high stress and stress risers, such as keyways in components, were carefully inspected. An area was cleaned at the ends of many of the keyways to check for cracks.

All accessible bearings associated with the span drive, center jack and end jack machinery are either tapered or spherical roller bearings. All accessible bearings were externally inspected for integrity. Housings, cap bolts and mounting bolts were evaluated for corrosion and integrity. Clearances were not measured. Clearances in roller bearings are inaccessible for measurement due to construction. No bearings were opened for internal inspection of the wearing components.

Couplings were externally inspected. Couplings hubs were checked for relative movement between halves and with the mating shaft. The integrity of the coupling seals was evaluated. The exposed end of keyways was checked for cracks. Flange bolts were inspected for corrosion and integrity. Lubrication holes were checked for proper fittings. No couplings were opened for internal inspection of the wearing components or to check for proper alignment.

The brakes for the span drive, center jack and end jack machinery are integral with the motor. Wearing components of these brakes are not visible without disassembly. No disassembly of the brakes was performed as part of this inspection. Manual release mechanisms were checked for proper function.

Reducers were externally inspected. Housings and mounting bolts were evaluated for corrosion and integrity. Reducer inspection plates were not removed due to lack of access. Reducers were checked for adequate oil level where possible. No oil samples were taken to determine the presence of contaminants.

The center screw jack and end screw jack machinery were inspected. Mounting bolts were evaluated for corrosion and integrity. Bearing surfaces of the jacks and jack bases were evaluated for contact and wear. No disassembly of these components for internal inspection was conducted as part of this inspection. All screw jack motors, reducers and couplings were inspected as indicated above.

Various measurements were taken to evaluate the span balance and proper functioning of the balance wheel system. Measurements were taken to determine clearances between the balance wheels and track with the screw jacks driven and retracted.

The center pivot assembly was externally inspected. The pivot, pivot base, pivot box, dirt guard, fasteners, mounting bolts and anchor bolts were inspected for corrosion and evaluated for integrity. The center pivot assembly was not disassembled to inspect the spherical roller thrust bearing.

The barrier gates were externally inspected. While it is beyond our scope to evaluate the energy absorbing ability of these gates, the barrier arms, housings and anchor bolts were inspected for corrosion and integrity.

The mechanical systems were operated several times during the course of the inspection. During each operation selected components were subjected to a visual and audio check for unusual noise, vibration and movement. All of the mechanical components were observed during operation over the course of the inspection.

Existing Conditions

GENERAL CONDITIONS

- The condition of the paint varies throughout the span drive, span lock and screw jack machinery. The paint on most of the components is in good condition and appears recent, however, a few other components are either unpainted, or exhibit substantial paint deterioration and corrosion. Most of the unpainted and deteriorated areas are difficult to access. Examples of items that warrant corrective action are as follows:
    - The B1 and B2 bearing mounting bolt heads are not painted at the back side of the support. See Photo M1, Appendix III.
    - Coupling C1bolts are not painted and exhibits surface corrosion. See Photo M2, Appendix III.
    - The reducer base bolts exhibit moderate paint deterioration and corrosion. See Photo M3, Appendix III.
    - It was reported in previous report that the center bearing mounting bolts and upper pivot casting mounting bolts are not painted and exhibit corrosion. During this inspection maintenance personnel did not remove the covers to access the bolts. Bolts still could be in the same condition.

SPAN DRIVE MACHINERY

A. Motor
- No significant defects observed.

B. Bearings
- No significant defects observed.

C. Brake
- The sole brake for the span drive machinery is a Stearns disc brake that is integral with the motor. The working components of this brake are not accessible for inspection. No external or operational deficiencies were noted.

D. Couplings
- This coupling exhibits paint and lubrication issues as noted above in the "General Conditions" section.

E. Shafting
- No significant defects observed.

F. Open Gearing
- Lubrication of the rack and pinion teeth appears light and surface corrosion is evident. See Photo M4 and M5, Appendix III.

G. Reducer

The internal components are inaccessible for inspection due to the limited access above and around the reducer housing.
- The reducer manual crank shaft exhibits paint deterioration and top of the reducer is covered with dirt. See Photo M6, Appendix III.

CENTER SCREW JACK MACHINERY

- The motor shaft extensions intended for manual operation of the screw jack machinery rotate at motor speed during normal operation and are not covered or provided with limit switches to disable the motors when a hand crank is installed. This condition poses a safety hazard to inspection and maintenance personnel. See Photo M7, Appendix III.

END SCREW JACK MACHINERY

All end jacks operated during the inspection, however the internal condition of the mechanical components are inaccessible for inspection.

It was previously noted that the end lifts deflect the movable span less than 1". Section 6.8.2.4 of the 2007 AASHTO LRFD Movable Highway Bridge Design Specifications states that the end lifts shall produce of force large enough to deflect the span no less than 1". The deflection has changed since the previous report and is 1" at the west and 1.75" at the east side of the bridge.

- The motor shaft extensions intended for manual operation of the screw jack machinery rotate at motor speed during normal operation and are not covered or provided with limit switches to disable the motors when a hand crank is installed. This condition jeopardizes the safety of inspection and maintenance personnel. The condition is similar to that depicted for the center screw jacks in Photo M7, Appendix III.
- The lubrication level in the lower right angle speed reducers was not verified during the inspection as the lower reducers do not have a sight gage or other means of readily verifying the oil level.
- At multiple end lift locations there is a light buildup of hardened debris between the jack and the strike plate. As a result, large gaps were noted between all jacks and the strike plates, and the bearing area of the jacks is reduced. See Photo M8, Appendix III.
- Limit switch gears of all jacks are making ringing noise. See Photo M9, Appendix III.
- Reducers have desiccant filters that are at the end of useful life span. See Photo M10, Appendix III.
- Reducers have oil leaks at the screw jack actuators. See Photo M11, Appendix III.

CENTER BEARING

- The upper pivot casting mounting bolts were reported in previous report as corroded at the outside of the box girder. CT DOT maintenance did not open box girder during this inspection and bolts could not be inspected.

BALANCE WHEELS AND SPAN BALANCE

- The 1989 rehabilitation plans call for 1/16" clearance between all balance wheels and the balance track with the screw jacks fully driven. Measurements taken with the span in the closed position differ considerably from the design clearances, up to 0.139".
- Outside balance wheel bearing clearances were measured and compared to a maximum clearance of an ANSI RC9 fit (0.024"). The original design fit specified an ANSI RC6 fit (0.009). The maximum clearance of 0.035 in at balance wheel #2, outboard bearing clearance is in excess of an ANSI RC9 fit.

CENTERING DEVICE

- The centering device exhibits paint deterioration and corrosion. See Photo M12, Appendix III.

RIGID STOPS

- No significant defects observed.

TRAFFIC AND BARRIER GATES

A. Traffic Warning Gates
   - AASHTO recommends using traffic gates in conjunction with barrier gates. Failure to provide and use acceptable traffic warning gates may result in an increased risk of a vehicle impacting a resistance gates.

B. Barrier Gates
   - West Barrier Gate: The current operating procedure does not include latching or locking the barrier gates, relying solely on the mechanical advantage of the gate arm to hold the barrier in the closed position.
   - East Barrier Gate: The arrestor cables do not engage the receiver at southeast end of the gate arm. See Photo M13, Appendix III.
   - Both barrier gates contain isolated spots of corrosion.
   - West Barrier Gate: The north gate arm end socket mounting bolts are corroded and are loose. See Photo M14, Appendix III.

Recommendations

GENERAL

1. There are isolated areas of machinery components that have not been painted and exhibit corrosion. These conditions were found within the span drive machinery, barrier gates, and center bearing. D
   Spot clean the machinery to remove all corrosion and then paint the subject areas. Take care to paint those areas that are not readily accessible including heads of mounting bolts and backsides of components. Paint color should preferably be in accordance with OSHA color codes (i.e., green for fixed components, orange for moving components).

SPAN DRIVE MACHINERY

2. The coupling C1 bolts exhibit surface corrosion and are not painted. D
   Clean and paint coupling C1bolts.
3. Lubrication of the rack and pinion teeth appears light and surface corrosion is evident. D
   Remove old or contaminated lube from the rack teeth and provide fresh open gear lubrication and increase lube application frequency.
4. The reducer manual crank shaft exhibits paint deterioration and top of the reducer is covered with dirt. D
   Clean and paint top of main reducer.

CENTER SCREW JACK MACHINERY

5. The motor shaft extensions for the hand cranks are not covered or provided with limit switches to disable the motors when a hand crank is installed. This condition poses a safety hazard to inspection and maintenance personnel. D
   Install covers over the shaft extensions. Install limit switches and controls to indicate when the cover is removed and to prevent the motors from energizing or post placards directing personnel to disable the motor via the local disconnect prior to removing the cover.

END SCREW JACK MACHINERY

6. The motor shaft extensions for the hand cranks are not covered or provided with limit switches to disable the motors when a hand crank is installed. This condition poses a safety hazard to inspection and maintenance personnel. D
   Install covers over the shaft extensions. Install limit switches and controls to indicate when the cover is removed and to prevent the motors from energizing or post placards directing personnel to disable the motor via the local disconnect prior to removing the cover.
7. At all end lifts there is a light buildup of hardened debris between the jack and strike plate. D
   Clean the strike plates to bare metal and paint.
8. Limit switch gears of all jacks are making a ringing noise. D
   Remove gears and limit switches if they are not used for operation.
9. Reducers have desiccant filters that are at the end of useful life span. C
   Replace jack reducer desiccant filters.
10. Reducers have oil leaks at the screw jack actuators. C
    Clean screw jack actuator and repair source of oil leak.

CENTER BEARING

11. The upper pivot casting mounting bolts were reported in previous report as corroded at the outside of the box girder. D
    Clean the corroded bolts to bare metal and paint.

BALANCE WHEELS AND SPAN BALANCE

12. The clearance at the balance wheels with the screw jacks driven varies from hard contact to a maximum gap of 0.139". D
    Adjust the balance wheels so that all wheels have equal clearance with the screw jacks withdrawn. Determine appropriate clearance based on span geometry, span balance and clearance at jacks during the adjustment process. Ensure that with the jacks driven, the balance wheels do not contact the track in order to eliminate and live loading of the balance wheels.
13. Balance Wheel #2: The inboard bearing clearance is in 0.035" exceeds ANSI RC9 fit of 0.024". Reduce the bearing clearance to within the original design fit of an ANSI RC6 fit. D

CENTERING DEVICE

14. The centering device exhibits paint deterioration and corrosion. D
    Clean and paint the centering device.

TRAFFIC AND BARRIER GATES

15. There is currently only one set of traffic control gates used at each approach to the movable span. While this arrangement satisfies MUTCD requirements, AASHTO recommends the use of both traffic gates and barrier gates at each approach to the movable span. Failure to provide and use acceptable traffic warning gates may result in an increased risk of a vehicle impacting a resistance gate. This condition poses a safety risk to motorists. D
    Provide new traffic warning gates and include their use in the normal operating procedure for the bridge for enhanced safety.
16. East Barrier Gate: The arrestor cables do not engage the receiver at each end of the gate arm. C
    Repair the barrier gate arrestor cable to engage the receivers.
17. West Barrier Gate: The north gate arm end socket mounting bolts are corroded and are loose. D
    Tighten the loose bolts and clean and paint the corroded components.

PRIORITY KEY

A Critical – IMMEDIATE response by Bridge Maintenance utilizing Bridge Safety and Evaluation's traffic pattern still in place, where they are using one.
B Urgent, but not critical – Response within 1 WEEK.
C Important, but not urgent – Response within 2 MONTHS.
D Of lesser importance, but needing attention – Response within 6 MONTHS.
E Routine repairs – scheduled by Bridge Maintenance to coincide with other commitments of the same type or within the same general area – Response within 2 YEARS.

APPENDIX I
MECHANICAL DRAWINGS

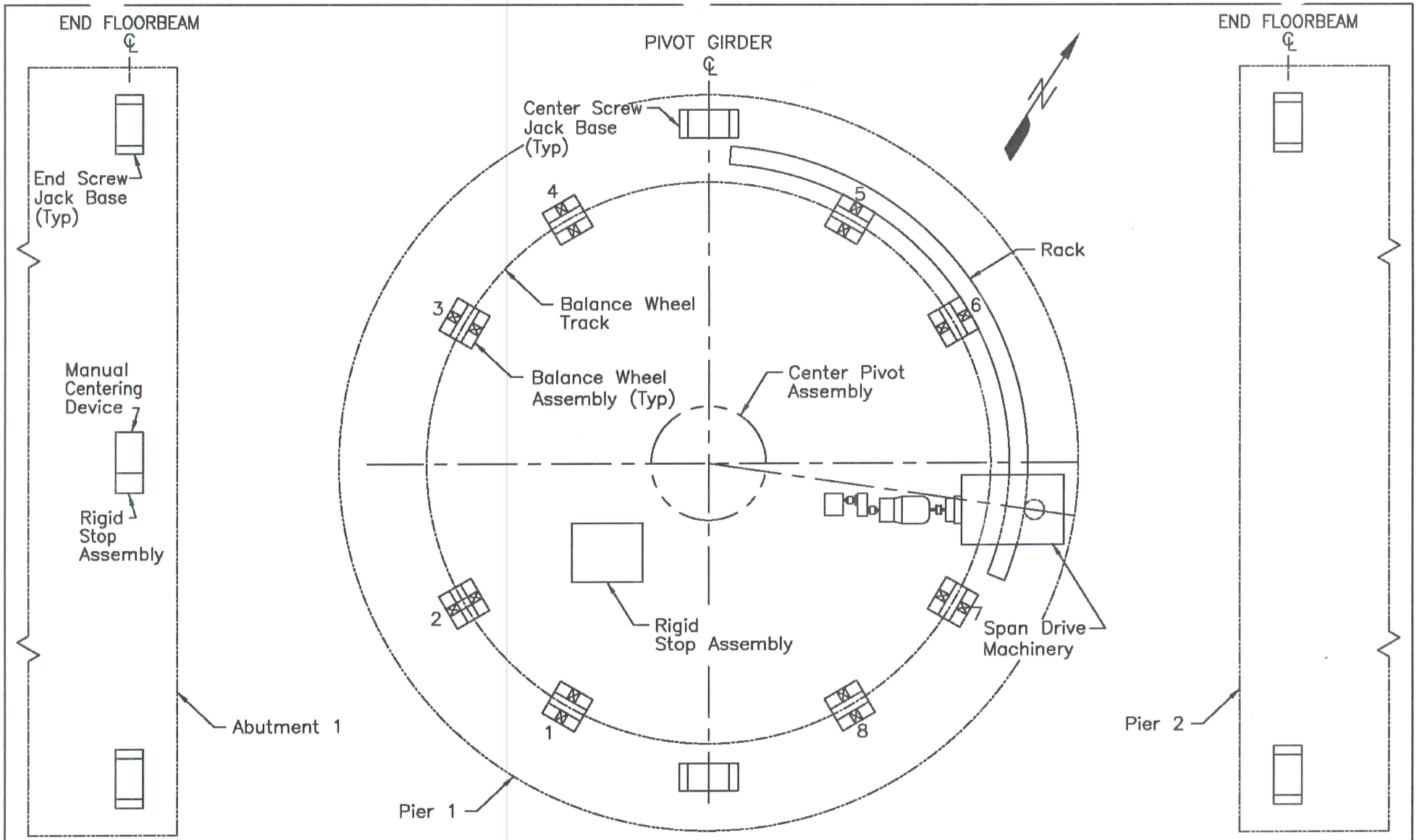


Figure 1. Plan View of Span Drive Machinery and Span Support Machinery

Project:
Saugatuck Swing Bridge (01349)
Westport, Connecticut
Biennial Inspection

Prepared by: TranSystems

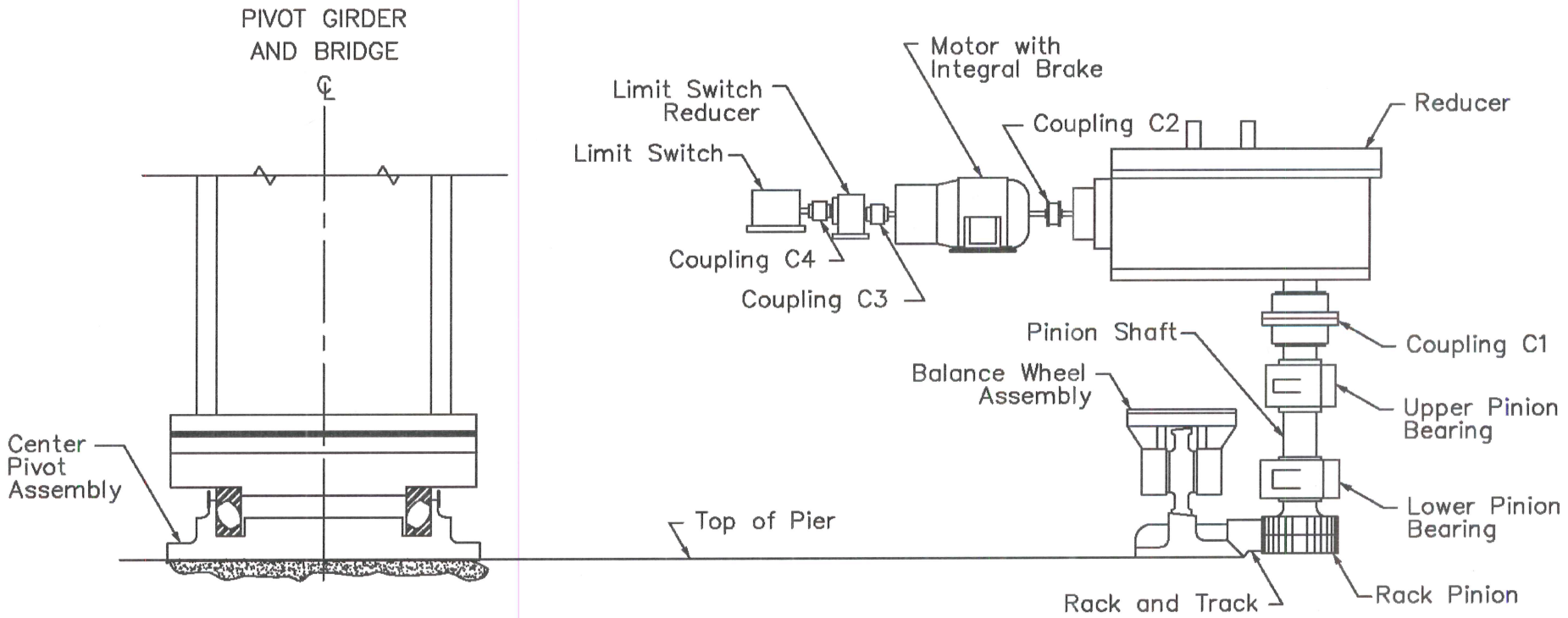


Figure 2. Span Drive Machinery

Project:
Saugatuck Swing Bridge (01349)
Westport, Connecticut
Biennial Inspection

Prepared by: TranSystems

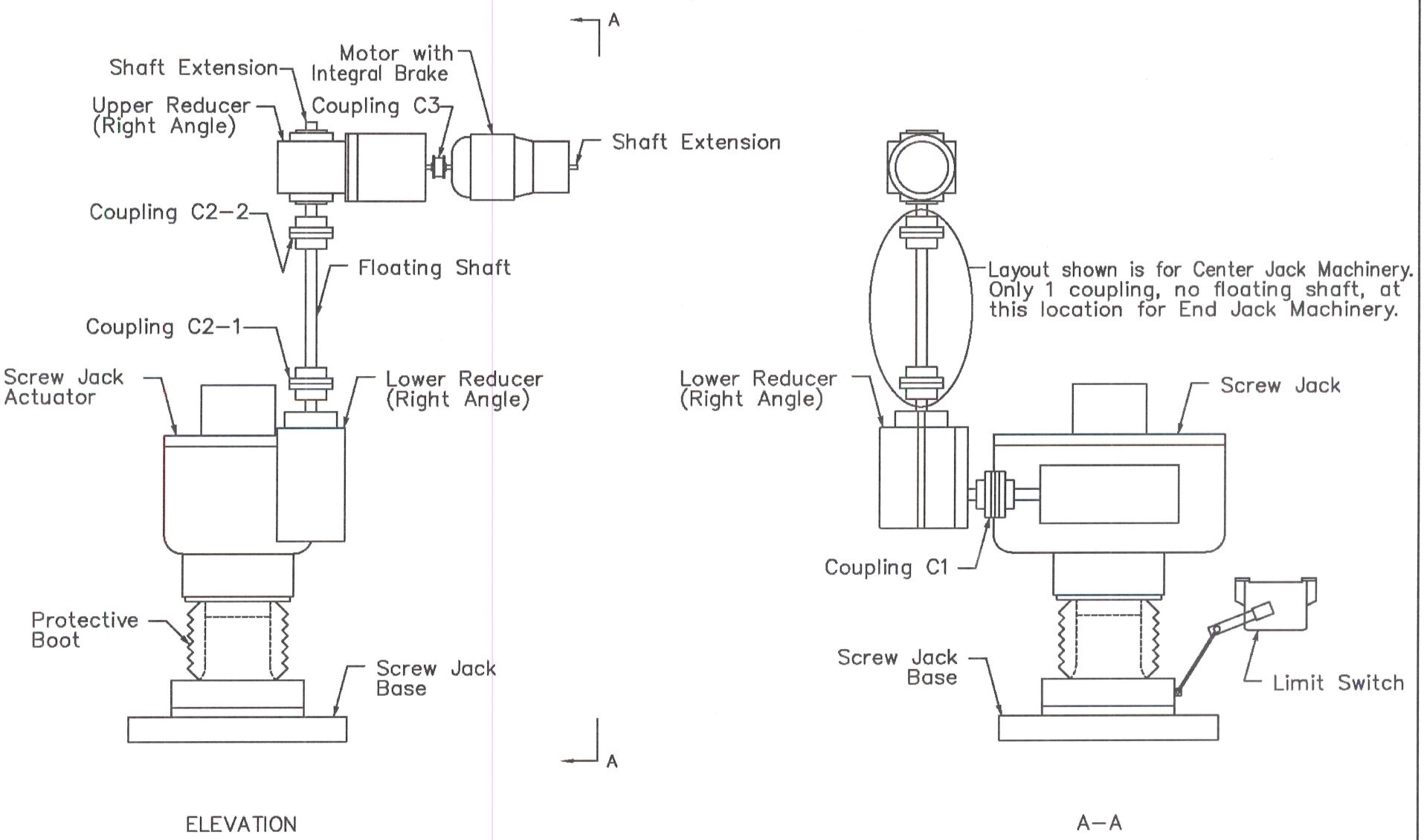


Figure 3. Screw Jack Machinery Typical Arrangement

Project:
Saugatuck Swing Bridge (01349)
Westport, Connecticut
Biennial Inspection

Prepared by: TranSystems

APPENDIX II
MECHANICAL FIELD NOTES

No.	Date	Description
1	18-Nov	SK/JPD

REVISIONS



EXECUTIVE SUMMARY - MECHANICAL INSPECTION REPORT
CTDOT BR. NO. 01349

Stafford Bandlow Engineering performed an emergency inspection and a detailed field inspection of the mechanical machinery systems on CTDOT Bridge No. 01349 on November 15, 2012, December 14, 2012 and January 12, 2013. All machinery components were visually inspected to the extent possible, and measurements were taken and recorded to assess wear of fundamental components. Engineering personnel with Stafford Bandlow Engineering have performed six prior biennial mechanical inspections at this bridge, most recently in November, 2010. This report is based on the observations and measurements taken during the most recent inspection. Reference is made to the prior inspection report(s) where conditions warrant.

Hurricane Sandy produced multiple high tide cycles that submerged elements of the mechanical and electrical machinery for the swing span. This caused the failure of the north center jack. It is possible that the other components that were submerged were also damaged and an emergency contract has been awarded to clean, inspect, rehabilitate, flush and/or replace these components as deemed appropriate once the internal condition can be confirmed.

[Changed after rehab] 1

The general condition of the machinery as defined by the Numerical Condition Inspection Report which accompanies this report is POOR (Overall Rating = "3"). This indicates that the bridge components exhibit severe wear and/or deterioration and that the bridge is unreliable. This rating is warranted based on the non-functional status of the center jack machinery and the likelihood of significant defects in the other jack equipment.

The most notable deficiencies being addressed by current on-going emergency contract include:

1. Replacement of the center and end lift jack screws. ✓
1. Provision of access platforms to facilitate the repairs. ✓
1. Evaluation of the internal condition of the span driver reducer by removing the reducer from site and rehabilitating components as necessary.
1. Evaluating the alignment of coupling C1, that connects the reducer with the rack pinion shaft.
1. Cleaning, evaluation and flushing of the internal components of the following bearings:
    - Center Bearing
    - Span Balance Wheel Shaft Bearings
    - Span Drive Rack Pinion Shaft Bearings

No.	Date	Description
1	18-Nov	SK/JPD

REVISIONS

1 Replacement of the screw jack limit switches and modifications to the control system, such that repeatable indication is achieved and a recurrence of the center jack failure is avoided.

The most significant deficiencies that are not covered by the emergency rehabilitation contract are as follows:

1 Two balance wheels remain in contact with the lower track when the end jacks are driven. This subjects the wheels and track to live loads which they are not designed for.

Several safety related deficiencies were noted as well:

- The motor shaft extensions intended for manual operation of the screw jack are unguarded and without limit switches to disable the motors when a hand crank is installed, posing a safety hazard to maintenance and inspection personnel.
- There is only one set of traffic control barrier gates at each approach to the movable span. While the single set of gates satisfies MUTCD requirements, AASHTO recommends the use of two sets of traffic control gates: warning gates and barrier gates. Failure to provide and use traffic warning gates may result in an increased likelihood of a vehicle impacting a resistance barrier.

All recommendations provided in this report should be coordinated with the on-going emergency repair contract and sequenced into the maintenance program to ensure long term integrity and reliability of the machinery.

1	18-Nov	SK/JPD
No.	Date	Description
REVISIONS		

EXISTING CONDITIONS

GENERAL CONDITIONS

1. During the recent storm surge a significant portion of the mechanical and electrical machinery was submerged resulting in damage due to water infiltration. An immediate consequence of this infiltration was a failure of the north center lift machinery which occurred during an attempt to operate the span shortly after the storm. On November 15, 2012 SBE personnel were present with CTDOT personnel as they attempted to restore operation of the failed north center lift machinery. It was determined that due to an electrical failure the machinery was overloaded, resulting in breakage of the motor shaft and failure of the screw jack comprising the lift machinery.

1. There is no permanent access from the swing span to Pier 1 (the center pier). Maintenance personnel indicate they access the center pier via a boat which is not stored at site. There is limited access to Abutment 1 and Pier 2. The lack of readily available access hinders maintenance and inspection and can lead to unsafe conditions.

1. The lubrication fittings vary between components and some fittings appear to be receiving lubricant while other fittings are painted over. Examples of items that warrant corrective action are as follows:

   - There is no evidence of lubrication at the span drive B1 and B2 bearings.
   - There is no evidence of lubrication at the span drive motor grease fittings. The grease fittings are covered with paint.
   - There is no evidence of recent lubrication at span drive couplings C1, C2, C3, and C4.
   - A majority of the center and end screw jack motors, couplings, and bearings are not equipped with uniform fittings and do not appear to be receiving consistent lubrication.

1. The condition of the paint varies throughout the span drive, span lock and screw jack machinery. The paint on some components is in good condition and appears recent, however many other components are either unpainted, or exhibit substantial paint deterioration and corrosion. Many of the unpainted and deteriorated areas are difficult to access. The recent tidal surges associated with Hurricane Sandy submerged many components, contributing to the deterioration. Examples of items that warrant corrective action are as follows:

   - The B1 and B2 bearing mounting bolt heads are not painted at the back side of the support. See Photo M1, Appendix M-III.
   - 1 Coupling C1 is not painted and exhibits surface corrosion. See Photo M2, Appendix M-III.
   - The interior sides of the motor mounting blocks are not painted.

No.	Date	Description
1	18-Nov	SK/JPD

REVISIONS

1 The reducer housing exhibits moderate paint deterioration and corrosion, a coating of oil, and impacted corrosion at the shims and support. The scope of the emergency repairs includes removing the reducer from the bridge and assessing the internal condition at a shop. During this work the corroded housing and supports are to be addressed. See Photos M3 and M4, Appendix M-III.

1 The screw jack machinery, supports, and mounting bolts exhibit varying degrees of paint coverage and corrosion. The center jack support mounting bolts at the interior of the main girder exhibit the most extensive corrosion with section loss. See Photo M5, Appendix M-III.

1 The center bearing mounting bolts and upper pivot casting mounting bolts are not painted and exhibit corrosion. See Photo M6 and M7, Appendix M-III.

1 Article 1.4.4.8 of the 2007 AASHTO LRFD Movable Highway Bridge Design Specifications requires that all moving machinery parts be painted Federal Safety orange. The majority of the movable machinery is not painted safety orange.

SPAN DRIVE MACHINERY

A) Motor

1 No significant defects observed aside from the comments regarding the painted over lubrication fittings and corrosion at the motor supports and welds.

B) Bearings

1 The rack pinion bearings should be periodically lubricated to purge old lubricant past the seals to prevent infiltration of water and contaminants into the bearings. No signs of lubrication were found at either bearing.

1 There are no lubrication fittings installed at the lower rack pinion bearing. The plug in the lubrication port is painted over, and another hole in the bearing cap is left open. See Photo M8, Appendix M-III. there are

1 Exposure of the bearings to the tidal surges during the storm may have resulted in water infiltration. The bearings were not disassembled as part of the inspection. Evaluation of the condition of the internal components is included in the emergency repair scope of work.

C) Brake

- The sole brake for the span drive machinery is a Stearns disc brake that is integral with the motor. The working components of this brake are not accessible for inspection. No external or operational deficiencies were noted.

1	18-Nov	SK/JPD
No.	Date	Description
REVISIONS		

D) Couplings

1 Coupling C4: The previously noted missing coupling cover bolt was replaced.

1 Coupling C2: The previously noted lack of lube fittings is not a deficiency and does not warrant correct action. Two plugs are present at the lube ports and are to be removed to facilitate lubrication.

1 Coupling C1: The coupling is accommodating visibly excessive misalignment. See Photo M2, Appendix M-III. One of the eight coupling bolts is loose. See Photo M2, Appendix M-III. This coupling exhibits paint and lubrication issues as noted above in the "General Conditions" section. These deficiencies will be addressed during the emergency repair work.

1 Coupling C3: The seal is damaged. See Photo M9, Appendix M-III.

1 Coupling C4: No seals are present and the cover is loose on the hubs. No lubrication was leaking from between the hubs and the cover, indicating that this coupling is not being lubricated. See Photo M10, Appendix M-III.

E) Shafting

- No significant defects observed.

F) Open Gearing

- Lubrication of the rack teeth appears light and surface corrosion is evident.

1 One rack mounting bolt at the north end of the rack is broken. See Photo M11, Appendix M-III.

G) Reducer

1 The reducer internal components may be damaged due to water infiltration as a result of the recent storm. The internal components are inaccessible for inspection due to the limited access above and around the reducer housing. As part of the emergency repair work due to the recent storm, the reducer is to be removed from the bridge and rehabilitated as needed. The following previously noted deficiencies are to be addressed during the emergency repair work:

1 The reducer housing exhibits paint deterioration, corrosion, contaminated oil and a film of oil. See Photo M3, Appendix M-III.

1 The shims beneath the reducer exhibit deformation due to impacted rust. The deformed shims are located above coupling C1, between the two support beams for the reducer. See Photo M4, Appendix M-III.

CENTER SCREW JACK MACHINERY

1 The north center jack machinery failed to operate the span shortly after the storm. On November 15, 2012 SBE personnel were present with CTDOT personnel as they attempted to restore operation of the failed north center lift machinery. It was

No.	Date	Description
1	18-Nov	SK/JPD

REVISIONS

determined that due to an electrical failure the machinery was overloaded, resulting in breakage of the motor shaft and failure of the screw jack comprising the lift machinery. The failed north center jack was replaced with two manually operated jacks as a temporary measurement to support span at the jack location. See Photo M12, Appendix M-III. South jack makes noise at coupling or at first reducer. Possible misalign ment 1

While the south center jack did operate following the storm, the integrity of the internal components due to water infiltration from the tidal surges leaves the reliability in question. North & south make ringing noise at the limit switch gears need lubricant. 1

Replacement of the center jacks and motors is included in the emergency repair work, as well as a complete rehabilitation of the remaining mechanical components to verify the integrity of the internal components. The following previously noted deficiencies are to be addressed during the emergency repair work: Limit switch box is corroded 1

- The motor shaft extensions intended for manual operation of the screw jack machinery rotate at motor speed during normal operation and are not covered or provided with limit switches to disable the motors when a hand crank is installed. This condition poses a safety hazard to inspection and maintenance personnel.

Breathers need replacement 1

1 The paint on the center screw jacks and operating machinery is in fair to poor condition. The most significant corrosion was noted the north screw jack where some of the operating machinery is obscured by the sidewalk. Components that exhibit significant corrosion include the motor and reducer feet and shims, the C2, C3 and C4 couplings, the floating shaft, and the screw jack mounting bolts. See Photo M5, Appendix M-III.

1 The shims for the north and south lower reducers are deformed due to impacted corrosion; however the shims do not appear to be deformed in the areas directly between the reducer feet and the support.

- The lubrication level in the lower right angle speed reducers was not verified during the inspection, as there is no sight gage or other means to readily verify the oil level. The south lower reducer exhibits an oil leak at the reducer output shaft. In addition, the oil leaked is milky. See Photo M13, Appendix M-III.

END SCREW JACK MACHINERY

1 All end jacks operated following the storm and during the inspection, however the internal condition of the mechanical components are inaccessible for inspection. It was noted during prior reports that the jacks are susceptible to water intrusion due to deteriorated or failed rod boots. During the tidal surges from the recent storm, the jacks and some portions of the drive train were submerged in water. The recent exposure of the components exacerbates any existing deterioration, leaving the operational reliability in question.

Replacement of the end jacks and motors is included in the emergency repair work, as well as a complete rehabilitation of the remaining mechanical components to verify the integrity of the internal components.

No.	Date	Description
1	18-Nov	SK/JPD

REVISIONS

It was previously noted that the end lifts deflect the movable span less than 1". Section 6.8.2.4 of the 2007 AASHTO LRFD Movable Highway Bridge Design Specifications states that the end lifts shall produce of force large enough to deflect the span no less than 1". The deflection has not changed since the previous report. While the deflection does not meet the AASHTO design recommendation, the current amount of deflection does not result in movement between the span and approach. The reactions at the end jacks will be measured and documented as part of the emergency contract. w/ raised 1" East raised 1 3/4 in 1

The following previously noted deficiencies are to be addressed during the emergency repair work:

1 The paint and lubrication at the end lifts and operating machinery is fair to poor. See the "General Conditions" section above. The most significant corrosion was noted at the shims for the lower reducers and at the screw jack mounting bolts at the interior of the supports. See Photo M14, Appendix M-III.

- The motor shaft extensions intended for manual operation of the screw jack machinery rotate at motor speed during normal operation and are not covered or provided with limit switches to disable the motors when a hand crank is installed. This condition jeopardizes the safety of inspection and maintenance personnel. The condition is similar to that depicted for the center screw jacks in Photo M15, Appendix M-III.

1 The linkage for the limit switches at the end screw jacks can result in false indication of the screw jack position. With the screw jacks fully driven, the linkage can be moved as much as 1/2" without changing the location of the screw. This is the result of a linkage arrangement that has too many degrees of freedom and is inherently unstable. This could result in overloading of the screw jack machinery or inadequate support of the structure.

- The lubrication level in the lower right angle speed reducers was not verified during the inspection as the lower reducers do not have a sight gage or other means of readily verifying the oil level. ✓

- At multiple end lift locations there is a light buildup of hardened debris between the jack and the strike plate. As a result, large gaps were noted between all jacks and the strike plates, and the bearing area of the jacks is reduced. See Photo M16, Appendix M-III. ✓

1 The upper and lower end lift reducers are mounted vertically, which results in a cavity being formed on the top surface of the reducers. These cavities collect debris and trap water. Photo M17, Appendix M-III. Pack rust and exfoliation are prevalent behind the reducer housing.

1 The backside of the motor support collects debris and the support and mounting bolts are corroded.

- End Screw Jack, Southwest (SW). The following deficiencies were noted:
  - The lower reducer exhibits a light leak at the split line of the housing. See Photo M18, Appendix M-III.

Operation is good. Makes ringing noise at limit switch gears 1

No.	Date	Description
1	18-Nov	SK/JPD

REVISIONS

1 The coupling between the two reducers (C2) is leaking lubricant at the split line and at the top. Breather needs repl.

1 There is a light lubricant leak at the bottom of the screw jack input shaft bearing cover plate. Lubricant leak

- End Screw Jack, Northwest (NW). The following deficiencies were noted:

1 Access for inspection of the NW screw jack is very limited as there is no support outboard of the girder. Operation is good. Makes ringing noise in lim. switch gears

- End Screw Jack, Southeast (SE). The following deficiencies were noted:

1 The coupling between the upper and lower reducers (C2) is accommodating visibly excessive misalignment. Jack is leaking some oil traces

1 The boot for the jack is torn. There is light corrosion on the extended portion of the screw. See Photo M19, Appendix M-III.

1 The oil for the upper reducer appears cloudy and foamy, unlike the oil in the remaining upper reducers. C1 coupling & reducer shaft are not painted. Breather needs replacement

- End Screw Jack, Northeast (NE). The following deficiencies were noted:

1 The coupling between the upper and lower reducers (C2) is accommodating visibly excessive misalignment. See Photo M20, Appendix M-III.

1 The motor brake hand release is nonfunctional. Leaking ball valves on lower reducer

1 The drain valve handle for the upper reducer is corroded away. See Photo M21, Appendix M-III. Jack shims have minor corrosion

  - Standing water was present under the rod boot.

CENTER BEARING

1 Due to the center bearing being submerged in water during the recent storm, the integrity of the lubrication is questionable. In addition, the center bearing seal is worn and does not retain the grease when new grease is installed. See Photo M7, Appendix III. Complete purging of the grease and replacement of the seal is included in the emergency rehabilitation work.

1 The center bearing mounting bolt heads are corroded at the interior of the box girder. See Photo M6, Appendix M-III. Debris accumulation at this location hinders inspection.

- The upper pivot casting mounting bolts are corroded at the outside of the box girder. See Photo M7, Appendix M-III. can not be accessed

BALANCE WHEELS AND SPAN BALANCE

1 The balance wheels and support bearings were submerged during the tidal surges in the recent storm. The extent of water infiltration and lubrication contamination

No.	Date	Description
1	18-Nov	SK/JPD

REVISIONS

could not be determined during the inspection due to the internal components being inaccessible. Disassembly, evaluating the balance wheel journals and replacing all lubrication is included in the emergency repair work.

- Balance Wheel #8, the inboard bearing is missing a lube fitting. See Photo M22, Appendix M-III.

1 The track for the rollers exhibits paint deterioration and corrosion at the inboard side near the interface with the pier. See Photo M23, Appendix M-III.

- The 1989 rehabilitation plans call for 1/16" clearance between all balance wheels and the balance track with the screw jacks fully driven. Measurements taken with the span in the closed position differ considerably from the design clearances. The actual measurements indicate a taper from a maximum of 25/64" at the south side of the track to hard contact at the north side of the track.

1 Balance wheels #3, #4, and #5 are in contact with the balance wheel track with all screw jacks driven. Contact between the balance wheels and the track with the jacks driven may result in live loads being supported by the wheels. The balance wheels are not designed to support live loads.

- Balance wheel bearing clearances were measured and compared to a maximum clearance of an ANSI RC9 fit (0.024"). The original design fit specified an ANSI RC6 fit (0.009"). Our basis for recommending bearing clearance adjustment by removing liners to compensate for wear or replacing the worn bushing is an ANSI RC9 fit. The maximum clearance at balance wheel #4, inboard bearing clearance is in excess of an ANSI RC9 fit.

Bush

CENTERING DEVICE

- The centering device exhibits paint deterioration and heavy corrosion of the components below the roadway. See Photo M24, Appendix M-III. v P

RIGID STOPS

1 The closed rigid stop weldment, anchor bolts and mounting bolts exhibit paint deterioration and moderate corrosion. See Photo M24, Appendix M-III.

1 The fully open rigid stop exhibits light paint deterioration and corrosion on the weldment and anchor bolts.

TRAFFIC AND BARRIER GATES

A) Traffic Warning Gates

1 The traffic warning gate is no longer being used and has been abandoned in place. The traffic gate should therefore be dismantled and remove from the premises.

1 The 2009 report noted that the old traffic gates, which have been abandoned, did not meet MUTCD requirements. While the statement was true, the new

No.	Date	Description
1	18-Nov	SK/JPD

REVISIONS

barrier gates which are currently in use do fulfill the MUTCD requirements regarding traffic control devices.

- AASHTO recommends using traffic gates in conjunction with barrier gates. Failure to provide and use acceptable traffic warning gates may result in an increased risk of a vehicle impacting a resistance gates.

B) Barrier Gates

1 ~~The previously noted loose barrier gate state wires were corrected.~~

- West Barrier Gate: The current operating procedure does not include latching or locking the barrier gates, relying solely on the mechanical advantage of the gate arm to hold the barrier in the closed position. See Photo M25, Appendix M-III.

1 East Barrier Gate: The arrestor cables do not engage the receiver at SE each end of the gate arm. See Photos M26 & M27, Appendix M-III.

- Both barrier gates contain isolated spots of corrosion.
- West Barrier Gate: The north gate arm end socket mounting bolts are corroded and are loose. See Photo M25, Appendix M-III.

D

Balance wheels and track clearance measurements

No	4	5	6	7	8	1	2	3
Closed	71	78	111	139	121	91	53	52
Open	180	180	5/8"	25	0	105	0	68
Bearing	9@7	10@10	0	24@11	15@8	9@11	35@12	14@7

No. 1 near span bumper block
After clockwise

APPENDIX III
MECHANICAL PHOTOS

Bridge No.	01349	**Inspected by 1:**	S. Kupchenko
Town:	Westport, Connecticut	**Inspected by 2:**	J. Davis
Feature Carried:	US Route 136 (Bridge Street)	**Date Inspected:**	11/18/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo M-1: Bearing B1 Mounting Bolt Heads.
The bearing mounting bolts are not painted at the backside of the support.

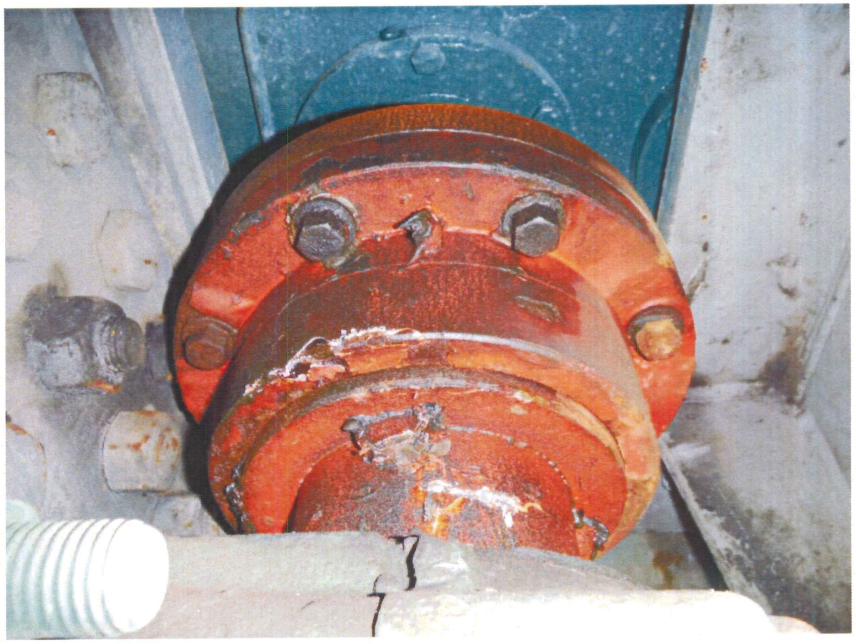


Photo M-2: Coupling C1, Span Drive Machinery.
The coupling bolts exhibit surface corrosion and is not painted.

Bridge No.	01349	**Inspected by 1:**	S. Kupchenko
Town:	Westport, Connecticut	**Inspected by 2:**	J. Davis
Feature Carried:	US Route 136 (Bridge Street)	**Date Inspected:**	11/18/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo M-3: Span Drive Machinery Speed Reducer.
The reducer base bolts exhibit moderate paint deterioration and corrosion.



Photo M-4: Rack.
Lubrication of the rack teeth appears light and surface corrosion is evident.

Bridge No.	01349	**Inspected by 1:**	S. Kupchenko
Town:	Westport, Connecticut	**Inspected by 2:**	J. Davis
Feature Carried:	US Route 136 (Bridge Street)	**Date Inspected:**	11/18/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo M-5: Pinion.
Lubrication of the pinion teeth appears light and surface corrosion is evident.



Photo M-6: Main Reducer.
The reducer manual crank shaft exhibits paint deterioration and top of the reducer is covered with dirt.

Bridge No.	01349	**Inspected by 1:**	S. Kupchenko
Town:	Westport, Connecticut	**Inspected by 2:**	J. Davis
Feature Carried:	US Route 136 (Bridge Street)	**Date Inspected:**	11/18/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

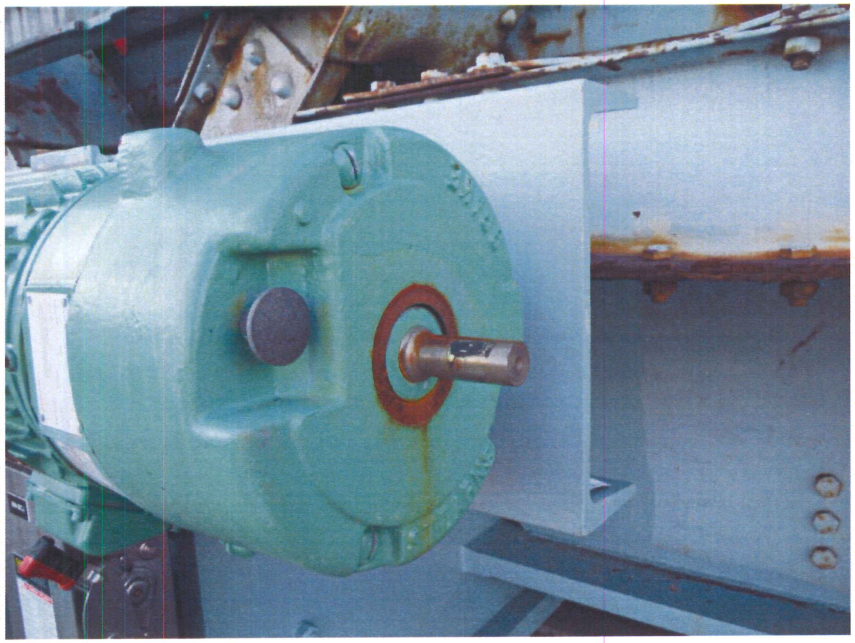


Photo M-7: Center Screw Jack.
The motor shaft extensions for manual operation of the screw jack are not covered or provided with limit switches to disable the motors when a hand crank is installed.



Photo M-8: SW Jack.
At multiple end lift locations there is a light buildup of hardened debris between the jack and the strike plate.

Bridge No.	01349	**Inspected by 1:**	S. Kupchenko
Town:	Westport, Connecticut	**Inspected by 2:**	J. Davis
Feature Carried:	US Route 136 (Bridge Street)	**Date Inspected:**	11/18/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

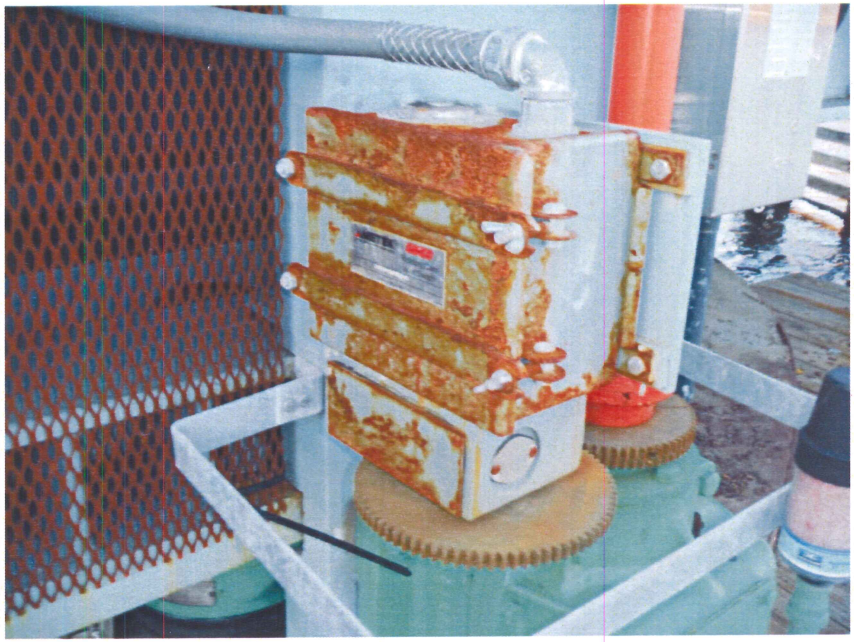


Photo M-9: Limit switch gears.
Limit switch gears of all jacks are making ringing noise.

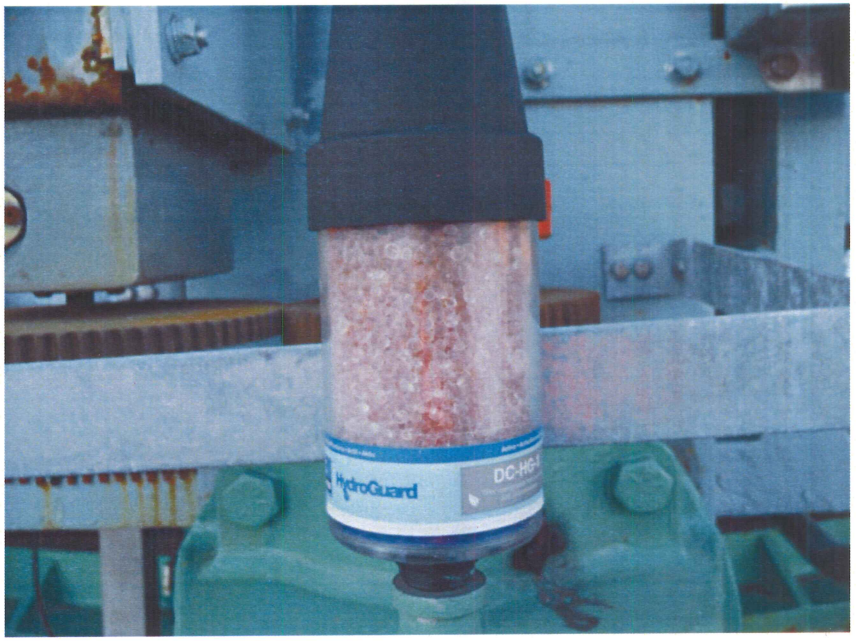


Photo M-10: Jack Reducer Desiccant Filters.
Reducers have desiccant filters that are at the end of useful life span.

Bridge No.	01349	**Inspected by 1:**	S. Kupchenko
Town:	Westport, Connecticut	**Inspected by 2:**	J. Davis
Feature Carried:	US Route 136 (Bridge Street)	**Date Inspected:**	11/18/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

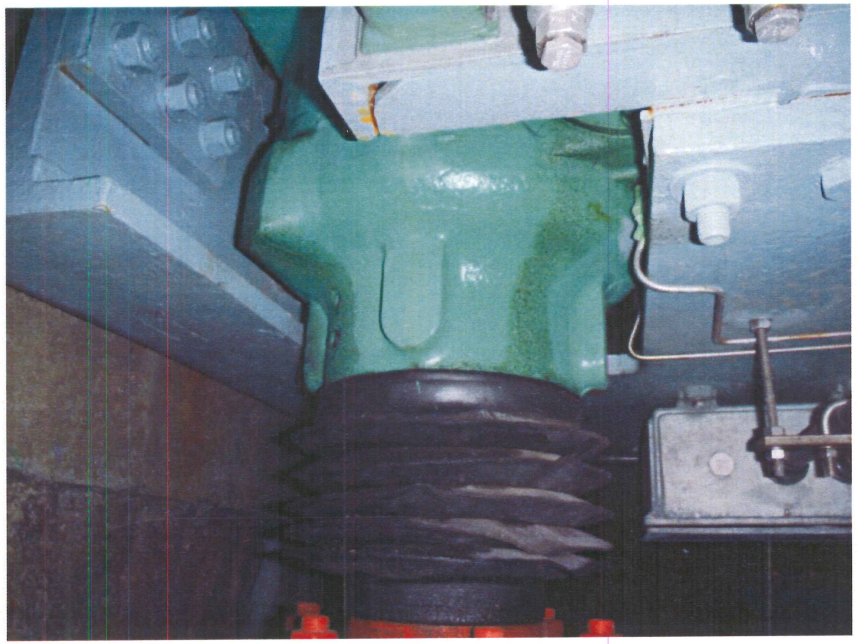


Photo M-11: Jack Reducer Oil Leak.
Reducers have oil leaks at the screw jack actuators.



Photo M-12: Centering Device
The centering device exhibits paint deterioration and corrosion.

Bridge No.	01349	**Inspected by 1:**	S. Kupchenko
Town:	Westport, Connecticut	**Inspected by 2:**	J. Davis
Feature Carried:	US Route 136 (Bridge Street)	**Date Inspected:**	11/18/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

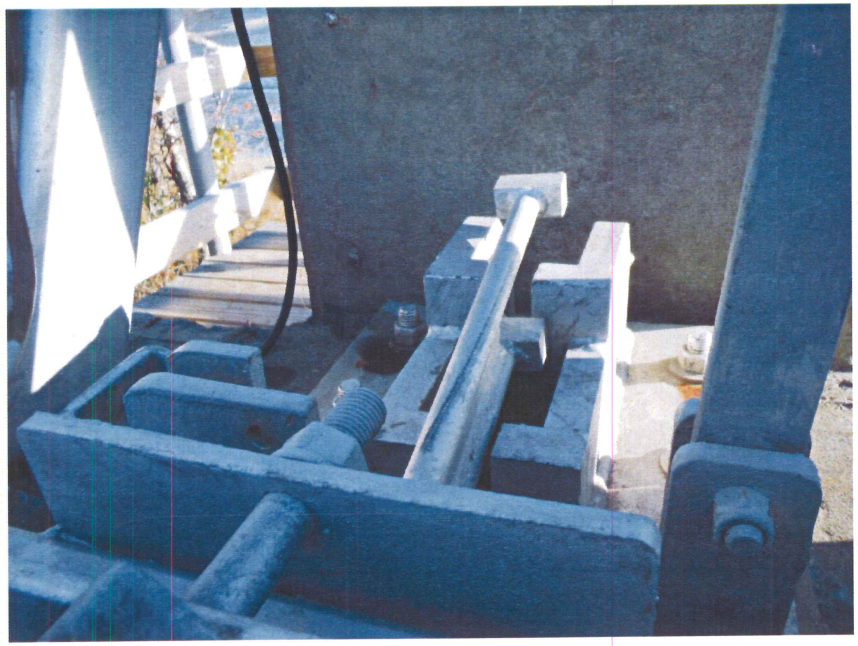


Photo M-13: East Barrier Gate
The arrestor cables do not engage the receiver at SE end of the gate arm.



Photo M-14: West Barrier Gate
The north gate arm end socket mounting bolts are corroded and are loose.

APPENDIX IV
NUMERICAL CONDITION REPORT

MOVABLE SPANS
NUMERICAL CONDITION INSPECTION REPORT
MECHANICAL COMPONENTS

BRIDGE NUMBER: 01349 **INSPECTION DATE: November 18, 2014**

COMMON COMPONENTS		BASCULE SPANS		LIFT SPANS	
COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*
OPEN GEARING	6	RACK & RACK PINION	N	RING GEARS	N
REDUCERS	8	TRUNNION ASSY.	N	SHEAVES	N
SHAFTS	8	SPAN LOCKS	N	DRUMS	N
BEARINGS	7	TAIL LOCKS	N	SHEAVE TRUNION ASSY.	N
COUPLINGS	8	CURVED TREAD PLATES	N	DRUM BEARING ASSY.	N
FASTENERS	6	STRAIGHT TREAD PLATES	N	WIRE ROPES & FITTINGS	N
MACHINERY SUPPORTS	7	**SWING SPANS**		SPAN GUIDES	N
CENTERING DEVICE ASSY.	6	CENTER BEARING ASSY.	7	BALANCE CHAINS	N
BUFFER CYLINDERS	N	CIRCULAR RACK	6	**MISC. COMPONENTS**	
STRIKE PLATES	N	BALANCE WHEEL ASSY.	7	End Screw Jacks	7
EMERGENCY DRIVES	8	CIRCULAR TRACK	8	Center Screw Jacks	7
LIVE LOAD SHOES	N	RIM-BEARING ASSY.	N	Traffic Barriers	5
BRAKES	8	CENTER WEDGE ASSY.	N	Rigid Stops	7
		END WEDGE ASSY.	N		

MECHANICAL CONDITION OVERALL RATING: 7

***NCR IS AN ACRONYM FOR NUMERICAL CONDITION RATING; SEE BELOW:**

NUMERICAL CONDITION RATING INFORMATION

9	NEW: Displays no wear and/or deterioration: excellent functional performance.	5	ADEQUATE: Moderate wear/deterioration: performs with moderate reduction in reliability and/or effectiveness.	1	CRITICAL: Movable span operation prohibited pending replacement or repair
8	EXCELLENT: Displays insignificant wear and/or deterioration: performs intended function with very high degree of reliability and effectiveness.	4	MARGINAL: Advanced wear/deterioration: performance marginal: corrective action required within one year.	0	FAILURE: Movable span will not operate without replacement or repair
7	GOOD: Very early wear/deterioration: performs with high degree of reliability and/or effectiveness.	3	POOR: Severe wear/deterioration: performance poor and/or unreliable: corrective actions required within six months.	N	Not Applicable
6	FAIR: Early measurable wear/deterioration: performs with little reduction in reliability and/or effectiveness.	2	URGENT: Movable span operation highly unreliable or dangerous and should be restricted: corrective action required as soon as possible.		

BRIDGE SAFETY INSPECTION
STATE PROJECT NO. 170-3225

ConnDOT BRIDGE NO. 01349

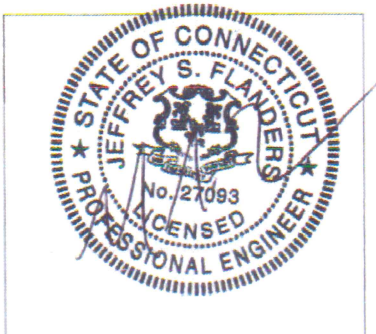
ROUTE 136
OVER
SAUGATUCK RIVER
WESTPORT, CT

Bridge Type: Steel Movable - Swing

Inspection Type: Routine Electrical

Inspection Date: November 18, 2014

Prepared By
TranSystems Corporation
530 Preston Ave, Suite 100
Meriden, CT 06450



12/17/2014

TranSystems

TABLE OF CONTENTS
ConnDOT Bridge No. 01349

Page

EXECUTIVE SUMMARY 1

INTRODUCTION 2

GENERAL DESCRIPTION 3

OBSERVATIONS AND FINDINGS 4

CONCLUSIONS 15

RECOMMENDATIONS 16

APPENDICES

APPENDIX I PHOTOS
APPENDIX II NUMERICAL CONDITION INSPECTION REPORT
APPENDIX III FIELD NOTES

EXECUTIVE SUMMARY

ConnDOT Bridge No. 01349

TranSystems performed a routine inspection of the electrical systems on Bridge No. 01349, which carries Route 136 over the Saugatuck River in Westport, Connecticut. This inspection work was carried out on November 18th, 2014. The inspection was conducted as part of ConnDOT's biennial inspection program.

The electrical systems have been rehabilitated in the recent past. This has resulted in an overall good condition (Rated – 7) of the bridge's electrical components in both their physical conditions and the operation. Additionally, electrical equipment below the roadway level has been recently replaced due to storm damage in 2012. Deficiencies pointed out in the report are generally minor and primarily relate to maintenance issues.

Previously discussed traffic gates for the span have been completely removed since the last inspection cycle. MUTCD 4J.01 states "movable bridge resistance gates are considered a design feature and not a traffic control device." As such, the remaining barrier gates cannot be considered an adequate replacement for the traffic gates.

The bridge is designed with a limited number of safety interlocks. Traffic control devices, span lock and span drive motor are not interlocked to control the sequence of operation. Although this appears to be the intent of the past rehabilitation of the bridge, this lack of safety interlocking does not meet the current AASHTO Specifications and is not considered safe for this type of structure.

There is a new BMM associated with this report. Previously issued BMM items have not been addressed. Those items have been updated and re-issued on the new BMM as well as any new items found during the 2014 inspection.

INTRODUCTION

Bridge No. 01349 carries Route 136 (Bridge Street) over the Saugatuck River in Westport, Connecticut. The overall length of the bridge is 287 ft. and consists of two fixed spans and one movable swing span.

The scope of this inspection involved the review of previous electrical reports prior to the current inspection. Also, a visual routine inspection of all electrical equipment sufficient to highlight problem areas that could affect the safety and reliability of the bridge was performed. The inspection also consisted of insulation resistance testing of all motor and feeder cables as well data collection for all motors.

The following codes and standards were considered for this inspection and report:

American Association of State Highway and Transportation Officials (AASHTO)
NFPA 70, National Electric Code (NEC)
NFPA 101, Life Safety Code (LSC)
National Electrical Manufacturers Association (NEMA)
Manual on Uniform Traffic Control Devices (MUTCD)
Code of Federal Regulation, Title 33 (CFR)

Nicholas G. Sprankle, PE carried out the electrical inspection on November 18, 2014.

GENERAL DESCRIPTION

The Saugatuck Swing Span carries Route 136 (Bridge Street) and spans the Saugatuck River in Westport, Connecticut. The bridge is provided with a center lock, traffic lights, and barrier gates, which all are manually controlled and not provided with any form of electrical drive, or centralized controls. The barrier gates do not have any type of interlock with the control system of the span. The center pin is equipped with a limit switch that prevents span operation before it is manually pulled. The barrier gates are supplemented with arm lights to increase their visibility. These are manually activated and controlled via a limit switch at each gate arm receiver.

Automated controls for bridge operation (jacks and span drive) are relay logic based. The system provides no interlocking between traffic control devices and the movable span. Motor speed control is conducted with an Allen-Bradley soft start motor drive unit. This unit provides reduced motor inrush current but provides little control for centering the span.

OBSERVATIONS AND FINDINGS

This report is based on a visual routine inspection of the bridge. The following sections describe the bridge and focus on the electrical installation and electrical equipment to assure the safety and reliability of the bridge.

Bridge Electrical Service

The bridge is provided with two electric utility services. The electric utility service at the west bridge approach consists of a 208/120 VAC, 3-phase, 4-wire, solidly grounded overhead service provided by a bank of three pole mounted transformers (see photo E1). This service terminates in a weatherproof, freestanding enclosure. The enclosure contains the electrical distribution equipment for the west bridge approach electrical service and a 3-phase, 50 Amp, 208 VAC feeder for the movable span. An electric utility meter is mounted on the side of the enclosure, which is the utility service entrance point for this service (see photo E2).

The electrical installation associated with the west service is operational and in good condition. The enclosure is provided with a space heater, but this device was found to be inoperable at the time of inspection. The enclosure also contains control relays and switches for the control of the west bridge approach traffic signals (see photo E3), however, the west traffic signals and gong, along with their pole, have been removed.

A second electrical utility meter is provided at the bridge northwest approach and is used to feed an auxiliary power panel for bridge auxiliary power, such as lighting and receptacles (see photo E4). All equipment for the auxiliary service appears to be in good condition.

The electric utility service at the east bridge approach consists of a 240 VAC, single phase, 3-wire service. This service terminates in a weatherproof, freestanding enclosure mounted on a concrete pad at the southeast corner of the bridge approach (see photo E5). The enclosure contains the electrical distribution equipment for the east bridge approach electrical service. An electric utility meter is mounted on the side of the enclosure, which is the utility service entrance point for this service. The electrical installation associated with the service is operational and in fair condition. The enclosure is provided with a space heater, but this device was found to be inoperable at the time of inspection. As with the west electric utility service enclosure, the east service enclosure contains the control logic for the east approach traffic signals. The operation and status of this system is identical to that at the west bridge approach. In addition to the conventional traffic signal control system, the enclosure also contains a Westport Fire Department control cabinet used to preempt the traffic signals.

To determine the adequacy and stability of the bridge electric utility service, the phase-to-phase and phase-to-ground voltages were measured at the main power and control enclosure. The results are tabulated in Table E1 below:

	Phase A to B/ Phase A to Gnd. (Volts)	Phase B to C/ Phase B to Gnd. (Volts)	Phase A to C/ Phase C to Gnd. (Volts)	Frequency (Hz)
Normal Service	211/122	208/121	210/126	59.98

Table E1
480 VAC Service Voltages and Frequency

The measurements of voltage were taken with all bridge auxiliaries operational, but the bridge drive system switched off and not drawing current.
From the above table, it can be seen that the no-load phase-to-phase voltages are balanced within 1.0% of the nominal or generator service voltage of 208/120 Volts (worst case being 211 Volts Phase A to Phase B on utility service).

Deficiencies regarding the electric utility service were recorded as follows:

- As noted in the previous Electrical Inspection Reports, the west main electric utility metering cabinet exhibits signs of corrosion (see photo E6).
- As noted in the previous Electrical Inspection Reports, space heaters for the east and west electric service enclosures are inoperable.
- As noted in the previous Electrical Inspection Reports, there is moderate corrosion on several interior terminals within the east and west electric service enclosures. This is likely due to the inoperable space heaters. These heaters aid in preventing condensation within the enclosure (see photo E7).
- The traffic signals and gong at the west approach have been removed. As a result, the equipment within the west service enclosure is abandoned in place.
- The door gasket for the west electric service enclosure has failed (see photo E8).

Bridge Controls & Control Panels

Electrical controls for the movable span are housed within three weatherproof enclosures located on the north side of the structure at the center of the movable span. The three enclosures are of NEMA 4X design and they are in fair condition. The internal control system components were also found to be in good condition.

The main power and control enclosure consists of all electrical controls and electrical starters for the movable span. The electrical starters for the jacking system are housed within the remaining two enclosures (see photos E9 and E10).

The electrical control system consists of the electrical starters for the span drive motor, brake, jacks, distribution equipment, relay logic, control switches, pushbuttons, and

indicator lights. The control system provides the operator with status indication for the span drive, jack position, and power availability.

The control logic for bridge operation consists of control relays manufactured by Allen Bradley (Type P). The relays are properly installed within the main bridge enclosure and are clearly identified with all wiring labeled.

The electrical motor starter for the span drive motor consists of a soft-start unit manufactured by Allen-Bradley. The electrical starter equipment is properly installed within the main bridge control enclosure and clearly identified with all wiring labeled.

Each jacking system enclosure consists of motor controllers for three jack actuators; one enclosure serving the northeast jack and both center jacks system and one enclosure serving the southeast and both west jacks. Each jack actuator motor controller consists of a circuit breaker and reversing starter with properly sized thermal overload relays all manufactured by Square D. The electrical starter equipment is properly installed within the three enclosures and clearly identified with all wiring labeled.

Previous reports indicated that span centering was achieved using an automated system that jogged the span into place in one-second intervals. Over the course of several openings of the span, there was no automatic centering of the span observed. The span stopped reliably on command without any unnecessary jogging.

In general, the bridge controls functioned as designed and were found to be in satisfactory condition at the time of inspection. Although the control relays are in fair condition, they appear to have a significant portion of their useful lives remaining.

Deficiencies regarding the bridge controls and control panels were recorded as follows:

- There is minor corrosion within the interior of the main power and control enclosure at center span (see photo E11).
- There are combustible materials stored within the interior of the main power and control enclosure at center span (see photo E11).
- The space heater within the interior of the main power and control enclosure did not appear to function during testing. Additionally, the heater has melted the plastic cable tray within the enclosure at some point (see photo E12).
- As noted in the previous Electrical Inspection Reports, the span jacks can be driven when the span is not fully centered or locked, creating a potential for equipment damage.

Movable Span Drive Motor

The movable span drive system consists of one main drive induction motor with an associated shaft-mounted, solenoid-operated brake. The motor is provided with a double extension shaft. One shaft is connected to the brake and a speed reducer,

which in turn drives a rotary cam type limit switch. The second motor shaft extension is coupled to reducer that is coupled to the bridge machinery. The main drive motor, brake, and motor disconnects have been replaced since the previous inspection and are in excellent condition.

Span Drive Motor Nameplate:

Manufacturer:	Reuland
Horsepower:	3 HP
Volts:	208V
Amperes:	12.4A
Hertz:	60 Hz
Phase:	3
Enclosure:	TENV
Serial No.	13-1103A-1
RPM:	900

The main drive-reducing gearbox is provided with an auxiliary drive shaft for manual operation that can be used by hand cranking from the roadway above. This hand cranking arrangement is not provided with limit switches to prevent electrical operation of the bridge with the hand crank inserted.

The main span drive motor was found to be in excellent external condition, having being recently installed, and the internal winding resistance is in excellent condition.

In an effort to determine the quality and life expectancy of the main span drive motor, the motor electrical insulation resistance levels were measured with respect to ground using a 500 Volt "megger." The results are tabulated in Table E2 below:

	Motor and Feeders Phase to Ground (meg Ohms)
Span Drive Motor	>200

Table E2
Span Drive Motor Insulation Resistance Measurement

The weather conditions during the measurements were dry and the temperature was approximately 46°F.

The insulation resistance level of the main span drive motor indicates that the motor winding insulation levels are acceptable.

In an effort to determine the operating characteristics of the main span motor and to determine its operating loads, its stator load currents were measured during opening and closing operating cycles as shown in Table E3 below:

	Phase A (Amps)	Phase B (Amps)	Phase C (Amps)
Main Span Drive Motor Open	11-13	11-13	11-13
Main Span Drive Motor Close	10-13	10-13	10-13

Table E3
Main Span Drive Motor Currents

From the above results, it can be seen that the load currents of the main span drive motors are all well within the nameplate rating of the motors.

The motor and associated equipment is located directly below the deck of the bridge in a confined space with little room to carry out maintenance or replacement. Additionally, there is no lighting in this area.

Deficiencies regarding the movable span drive motor were recorded as follows:

- As noted in the previous Electrical Inspection Reports, the main drive-reducing gearbox is provided with an auxiliary drive shaft for manual operation via hand cranking from the roadway. This hand cranking arrangement is not provided with limit switches to prevent electrical operation of the bridge with the hand crank inserted. This presents a hazardous situation for operators with the possibility of electric operation while hand cranking and subsequent potential of injury to the operator.
- As noted in the previous Electrical Inspection Reports, lighting for the span drive motor area is non-existent and creates a hazardous situation for maintenance personnel at night.

Motor Brake

The single motor brake in the drive system is of the solenoid type and is provided with a hand release mechanism to enable bridge operation in the event of brake or electric power failure. The hand release mechanism is furnished with a limit switch that is interlocked with the bridge control logic to prevent operation of the bridge drive system with the brake hand-released. No brake "Set" or brake "Released" limit switches are provided with the brake for indication of status of the brake and for interlocking with the bridge drive system.

The motor brake is in good condition and is installed with a safety disconnect switch. This disconnect switch is housed in a NEMA 4X stainless steel enclosure and mounted in close proximity to the main drive motor.

Field Feedback Devices

For the barrier gates, the arm position of each gate is monitored by one lever arm limit switch located under the gate arm. This switch provides control for the arm lights and warning gongs.

The jack positions are monitored by limit switches in order to provide interlocks to prevent operation of the drive motor unless all jacks are fully raised. Each jack is provided with a "Pulled" and "Driven" limit switch at the jack, as well as a rotary cam limit switch located near the jack motor after the right-angle reducer. Rotary cam limit switches at each jack location exhibit severe corrosion and water intrusion. These switches appear to be in NEMA 4 enclosures and are not suitable for the location at which they are installed. The jack limit switches appear to have been installed since the 2012 inspection as part of the contract to repair storm damage.

A single rotary cam limit switch associated with the span drive provides span position data for the bridge control logic system (fully centered, nearly closed, nearly open and span fully open). The rotary cam limit switch is housed in a NEMA 4 enclosure and has been properly installed with all conductors well terminated and labeled. The limit switch exhibits light corrosion. A separate end-of-travel lever arm limit switch is provided as backup in the event of rotary cam limit switch failure and is used to prevent over-travel of the span. This over-travel limit switch is a sealed lever-arm type unit. Both the span position rotary cam limit switch and the over-travel limit switch have been installed since the 2012 inspection as part of the contract to repair the bridge.

A sealed lever-arm type limit switch has been recently installed at the centering pin. This switch prevents the span from operating when the centering pin is in place. This limit switch is well installed and is well integrated into the bridge control system (see photo E13).

Deficiencies regarding the field feedback devices were recorded as follows:

- There is severe corrosion and evidence of water intrusion at each span jack rotary cam limit switch enclosure (see photos E14 and E15).

Jacks

The movable span is provided with six span lifting jacks. The actuators are squirrel cage induction type motors equipped with 50 Watt space heaters and shaft mounted Stearns type brakes. Each jack motor is provided with a NEMA 4X stainless steel disconnect switch within reach. The jack motors have been replaced since the 2012 inspection and are in excellent condition (see photo E16).

Jack Motor Nameplate:		Jack Brake Nameplate:	
Manufacturer:	Reuland	Manufacturer:	Stearns
Horsepower:	3.3	Model:	108701200111
Volts:	208V	Torque:	10 lb-ft
Amperes:	10.6A	Amps Inrush:	4.3A
Hertz:	60Hz	Amps Holding:	0.3A
Phase:	3	Volts:	200V
Enclosure:	TENV		
RPM:	1800		

In an effort to determine the quality and life expectancy of the span jack electrical installation, span jack motor windings and motor feeder insulation resistance levels were measured with respect to ground using a 500 Volt "megger." The results are tabulated in Table E4 below:

	Motor and Feeders Phase to Ground (meg Ohms)
North Center Jack Motor	>200
South Center Jack Motor	>200
Northeast Jack Motor	>200
Northwest Jack Motor	>200
Southeast Jack Motor	>200
Southwest Jack Motor	>200

Table E4
Span Lock Motor Insulation Resistance Measurements

The weather condition during the measurements was dry and the temperature was approximately 46°F.

The span jack motor load currents were measured for each of the six jack motors to determine their loading and operating characteristics. The measured values are presented in Table E5 below:

	Phase A (Amps)	Phase B (Amps)	Phase C (Amps)
N. Center Jack Motor Pull	6.0	6.6	7.1
N. Center Jack Motor Drive	7.0	6.4	6.6
S. Center Jack Motor Pull	5.5	5.8	5.6
S. Center Jack Motor Drive	6.2	5.5	5.7
Northeast Jack Motor Pull	7.3	7.5	7.9
Northeast Jack Motor Drive	7.0	6.7	6.6
Southeast Jack Motor Pull	6.9	6.8	7.4
Southeast Jack Motor Drive	6.6	6.1	6.0
Northwest Jack Motor Pull	6.4	6.9	7.3
Northwest Jack Motor Drive	7.2	7.1	6.8
Southwest Jack Motor Pull	6.0	6.3	6.9
Southwest Jack Motor Drive	6.6	6.3	6.2

Table E5
Span Jack Motor Currents

From the above results, it can be seen that the load currents of each span jack drive motors are well within the nameplate rating of the motors.

All motors and brakes are in excellent external condition with motor winding insulation that is in excellent condition. Each actuator is provided with a means of hand cranking, but no electrical interlocks are provided to prevent electrical operation of the jacks while they are being hand-cranked.

Deficiencies regarding the jacks were recorded as follows:

- As noted in previous Electrical Inspection Reports, the grating for accessing the span center jacks creates an operating hazard when in the lowered position. The operator is not provided with any feedback (indicator light driven off of a strategically located limit switch) indicating the position of this grating nor is the span drive motor prevented from operating when the grating is in the lowered position.
- As noted in previous Electrical Inspection Reports, there are no electrical interlocks to prevent electrical operation of the jacks while they are being hand-cranked.
- Conductor color coding is inconsistent between the line and load sides of the North Center Jack, South Center Jack, Northeast Jack, and the Southwest Jack disconnect switches (see photo E17).

Span Lock

A span lock is provided at the west end of the movable span and is used to lock the span in the centered position (see photo E18). This lock is manually operated and is provided with a limit switch to prevent operation of the span when the lock is inserted.

General Electrical Installation

PVC coated Rigid Galvanized Steel (RGS) is the primary conduit type used throughout the structure. Conductors are copper stranded with insulations suitable for the application.

The electrical system of the bridge was found to be in good overall general condition.

Deficiencies regarding the bridge electrical installation were recorded as follows:

- As noted in previous Electrical Inspection Reports, the PVC coated galvanized steel conduits leading into the main power and control enclosure exhibit signs of aging and deterioration.
- There is minor corrosion on the conduit supports located throughout the bridge.
- There is severe corrosion on the underground conduits feeding the east utility service enclosure (see photo E19).

Navigation Lighting and Horn

Each fender system facing the navigable channel is provided with three pedestal type 180-degree red navigation lights. The lights are fed by a conduit installation and controlled via a photo-controller and contactor housed in the operator's control panel. The navigation lights appear to have been well installed and appear to have recently been replaced.

Four navigation lights consisting of alternate 90-degree red and green lenses are located on the movable span and are used to signal marine traffic. Span mounted navigation lights appear to have been properly installed and exhibit only minor signs of corrosion.

A separate navigation horn is mounted on the bridge truss, on the north side of the span with trumpets facing both the north and south channels. The horn warns the approaching marine traffic that the bridge is about to be operated. The horn was operated at the time of the inspection and performed adequately (see photo E20).

Traffic Signals

The east bridge approach is provided with two sets of traffic signals. The traffic signals are of the three-aspect type and are suspended over the roadway from a pole-mounted cantilevered arm (see photo E21). The traffic signals are manually operated from a switch at the bridge approach and timed switching is achieved via timing devices located in the electric utility enclosure. The west bridge approach was previously equipped similarly to the east approach; however, the lights and the pole have been removed and capped with a PVC junction box. MUTCD section 4J.02 states that "Traffic control at movable bridges shall include both signals and gates." The current configuration at the west approach provides neither, and is not considered an exception.

Deficiencies regarding the traffic signals were recorded as follows:

- The traffic signals at the west bridge approach have been removed. MUTCD Section 4J.02 requires the use of signals at each bridge approach.

Traffic Gates

The bridge had previously been provided with one manually operated traffic gate at each approach. These gates have been completely removed.

Traffic Barriers

The bridge is provided with one traffic barrier gate at each approach. Each traffic barrier is provided with 3 arm lights for increased visibility and safety. The three arm lights are automatically turned on only when the limit switch under the arm is triggered. During the inspection the limit switch for each barrier gate was tested for functionality and found to be operating as designed (see photo E22).

These barrier gates are not provided with interlock limit switches to prevent operation of the movable span.

Deficiencies regarding the traffic barriers were recorded as follows:

- As noted in the previous Electrical Inspection Reports, the traffic barriers are not provided with interlock limit switches to prevent operation of the movable span unless the barriers are in the down position.

- The SO cord for the west approach barrier gate arm lights is beginning to deteriorate (see photo E23).
- Cable clamps for the SO cable feeding the warning lights on each barrier gate are typically corroded (see photo E24).
- The innermost warning light fixture at the east barrier gate has standing water and connections within are severely corroded (see photo E25).
- There are wire nut splices within each barrier gate junction box.
- The latching mechanisms at both the east and west barrier gates do not engage their receivers, reducing the ability of the barriers to arrest an errant vehicle (see photo E26).

General, Utility, and Emergency Lighting

A lighting panel is located on the Northwest approach of the bridge with photocell sensors to automatically turn 'on' and 'off' the bridge west approach street lights. The roadway lighting has been provided and is operational on both bridge approaches.

No lighting has been provided at the main drive machinery space, jack machinery spaces and at the main power and control enclosure areas. This is considered inappropriate according to the work place safety code.

Holiday decoration lights have been installed throughout the entire bridge structure. Although it is acceptable to use extension cords for the temporarily power, the connections that have been made from extension cords are not weather proof, therefore are considered inappropriate for such application (see photo E27).

Deficiencies regarding the lighting recorded as follows:

- No lighting for maintenance or emergency lighting has been provided at the bridge.
- The use of non-weatherproof connections for the holiday decoration lights contravene code.

CONCLUSION

Several bridge openings were performed during this inspection. The bridge operated efficiently and without any major incidents. The subject bridge is generally in good condition (Rated – 7). Operation of the traffic signals, span drive controllers, and span drive motor appears to be reliable and safe except as noted within this report.

RECOMMENDATIONS

Based on this inspection, the following recommendations are made to ensure long-term safe and reliable operation of the bridge. These recommendations have been prioritized based on the priority code provided at the end of this section.

Item	Description	Priority
1.	Clean and paint the west main electric utility metering cabinet.	E
2.	Repair the space heaters for the east and west electric service enclosures.	E
3.	Clean and protect the terminals within the east and west electric service enclosures.	E
4.	Replace the traffic signals and gong at the west approach.	E
5.	Replace the door gasket for the west electric service enclosure.	E
6.	Clean and paint the corrosion within the interior of the main power and control enclosure at center span.	E
7.	Remove the combustible materials stored within the interior of the main power and control enclosure at center span.	E
8.	Repair the space heater within the interior of the main power and control enclosure.	E
9.	Install an interlock limit switch at the main drive-reducing gearbox auxiliary drive shaft such that the drive motor is disabled while hand cranking.	E
10.	Install work lighting for the span drive motor area.	D
11.	Replace each span jack rotary cam limit switch with a NEMA 4X type unit.	D
12.	Install a limit switch at the grating for accessing the span center jacks such that the span cannot be operated when the grating is lowered.	E
13.	Install an interlock switch at the hand crank mechanism for the jack motors such that the jack motor is disabled while hand cranking.	E
14.	Correct the conductor color coding at the North Center Jack, South Center Jack, Northeast Jack, and the Southwest Jack disconnect switches such that it is consistent between the line and load sides of the switch.	E
15.	Clean and protect the PVC coated galvanized steel conduits leading into the main power and control enclosures where necessary.	E
16.	Clean and paint the minor corrosion on the conduit supports located throughout the bridge.	E
17.	Clean and paint the underground conduit stubs feeding the east utility service enclosure.	E
18.	Replace the traffic signals at the west bridge approach.	E
19.	Install interlocking switches at the traffic barriers such that operation of the span is prevented when the barrier gates are not lowered.	E
20.	Replace the SO cord for the west approach barrier gate arm lights.	E
21.	Clean and paint the cable clamps for the SO cable feeding the warning lights on each barrier gate.	E
22.	Repair the innermost warning light fixture at the east barrier gate.	D
23.	Replace the wire nut splices within each barrier gate junction box with mechanical crimps.	E

24.	Install lighting for maintenance work and safe nighttime operation.	D
25.	Install weatherproof connections for the holiday decoration lights.	E

Priority Key

A Critical - IMMEDIATE response by Bridge Maintenance utilizing Bridge Safety and Evaluation's traffic pattern still in place, where they are using one.

B Urgent, but not critical – Response within 1 WEEK.

C Important, but not urgent - Response within 2 MONTHS.

D Of lesser importance, but needing attention - Response within 6 MONTHS.

E Routine repairs - scheduled by Bridge Maintenance to coincide with other commitments of the same type or within the same general area. - Response within 2 YEARS.

PHOTOS
APPENDIX I

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

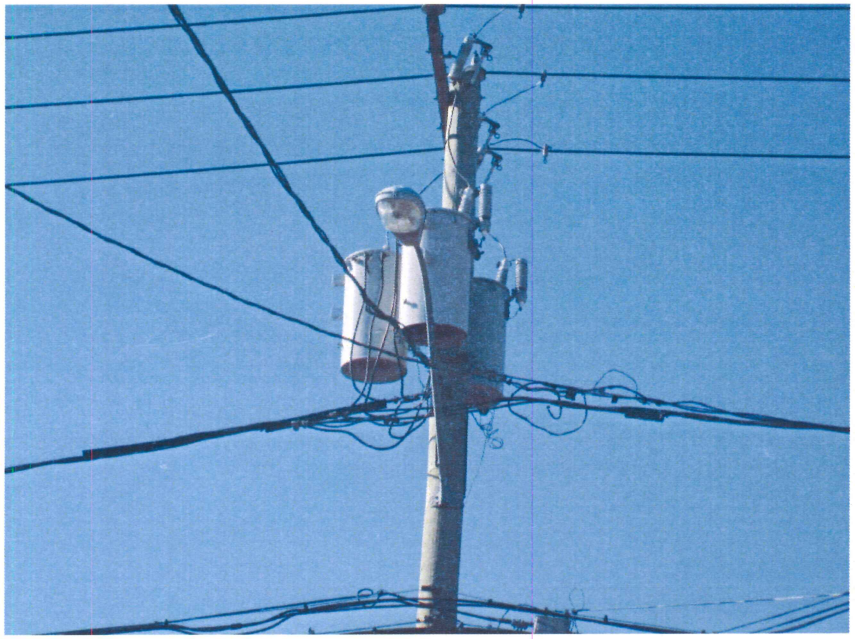


Photo E1: **Utility Service Transformers, West Approach.**

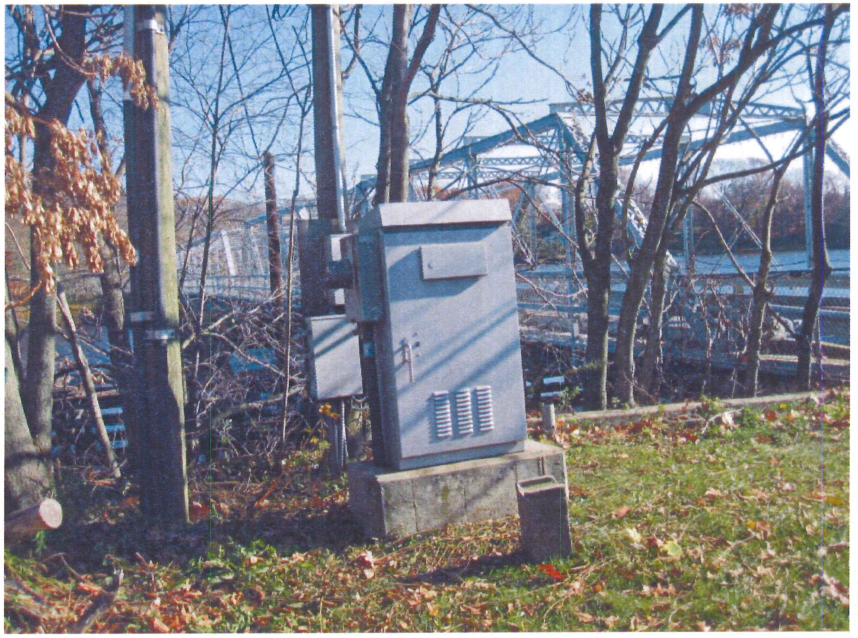


Photo E2: **West Utility Service/Traffic Control Enclosure.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

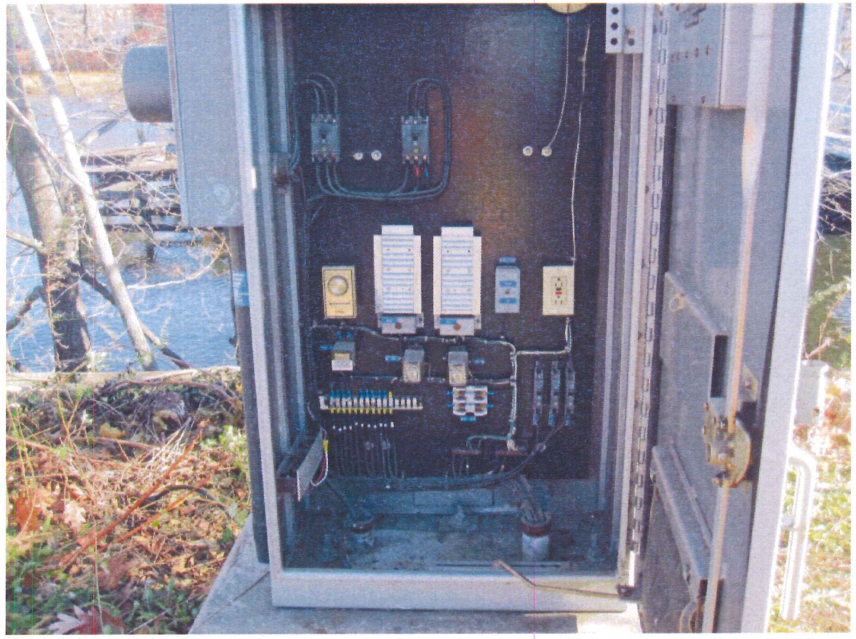


Photo E3: **West Utility Service/Traffic Control Enclosure Interior.**

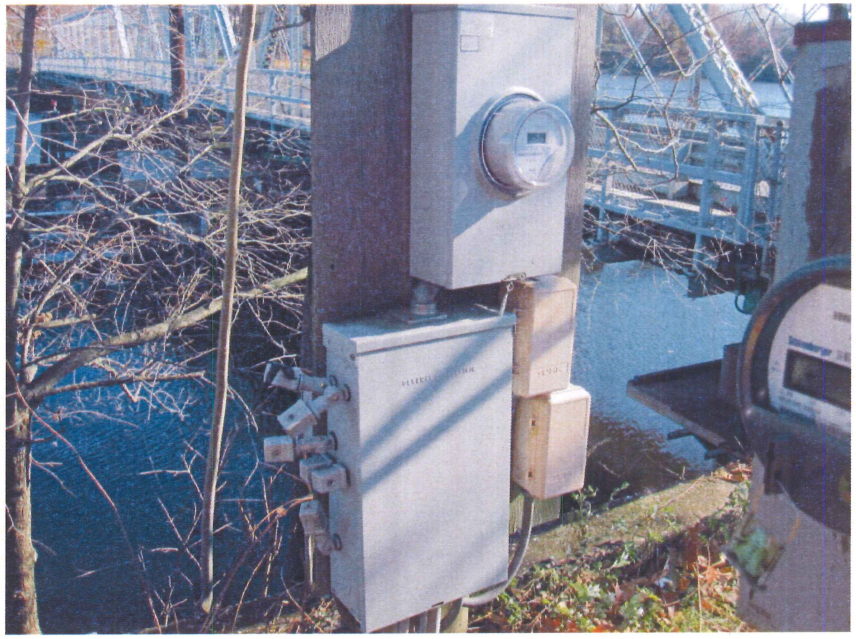


Photo E4: **West Auxiliary Service/Panelboard.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo E5: East Utility Service/Traffic Control Enclosure.



Photo E6: West Utility Meter Enclosure. Note the corrosion.

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

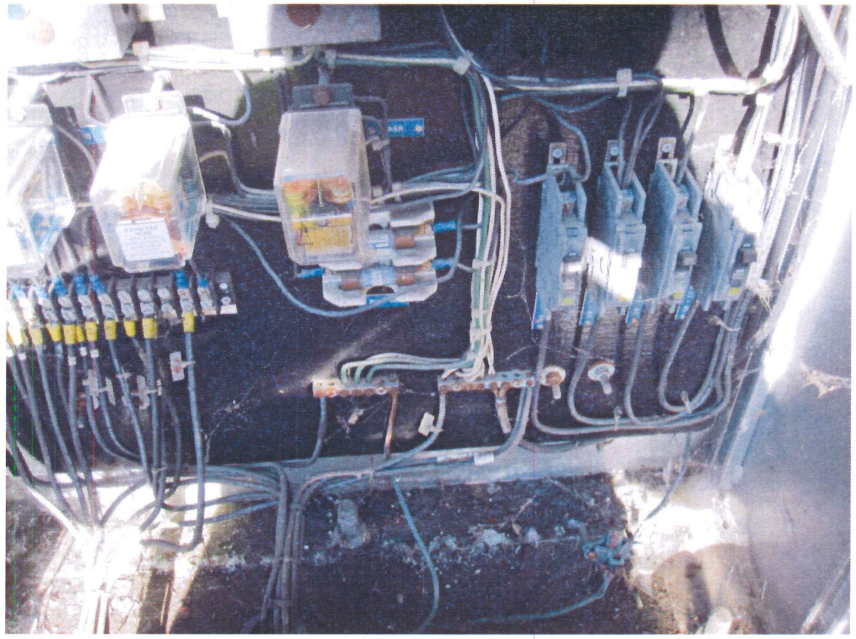


Photo E7: **West Utility Service/Traffic Control Enclosure. Note the corroded terminal fasteners.**

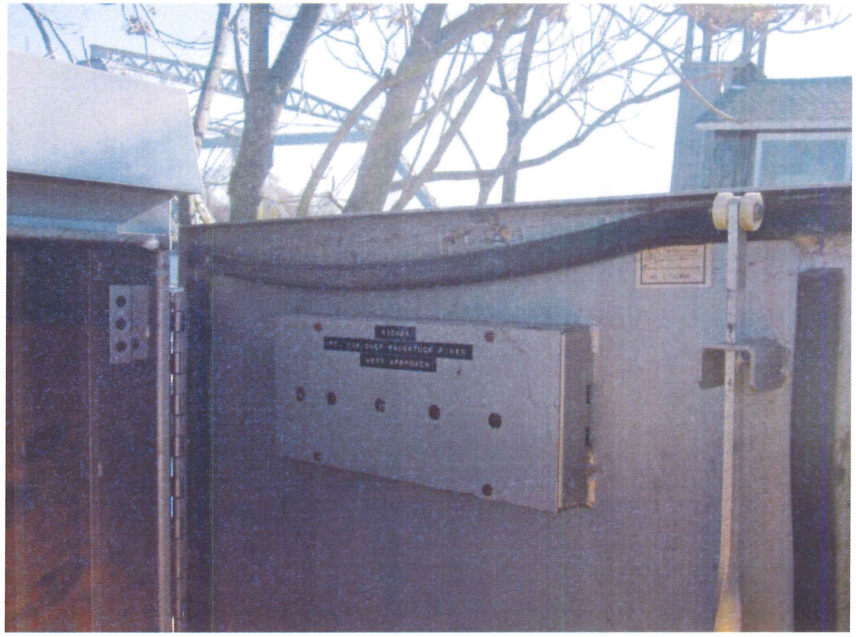


Photo E8: **West Utility Service/Traffic Control Enclosure. Note the failed gasket.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

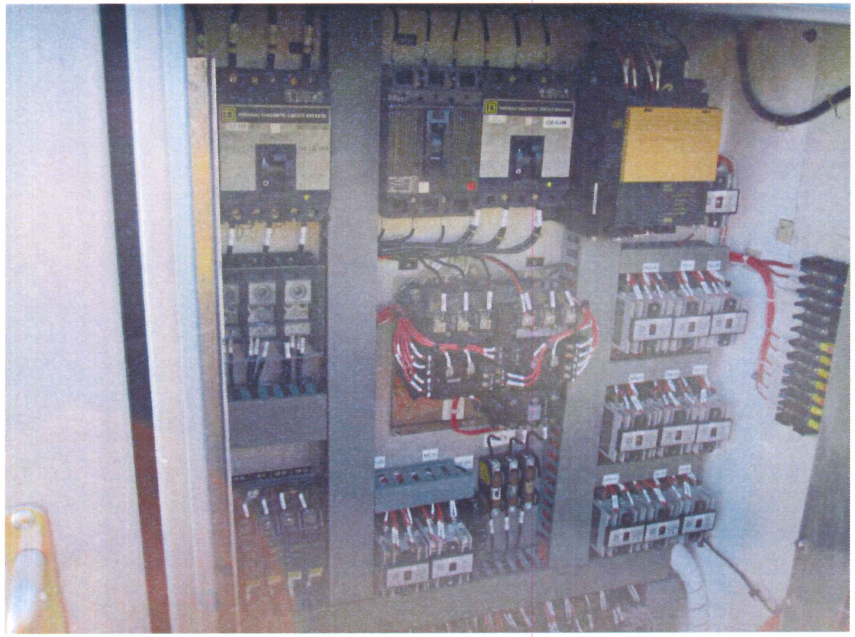


Photo E9: **Main Power and Control Enclosure.**

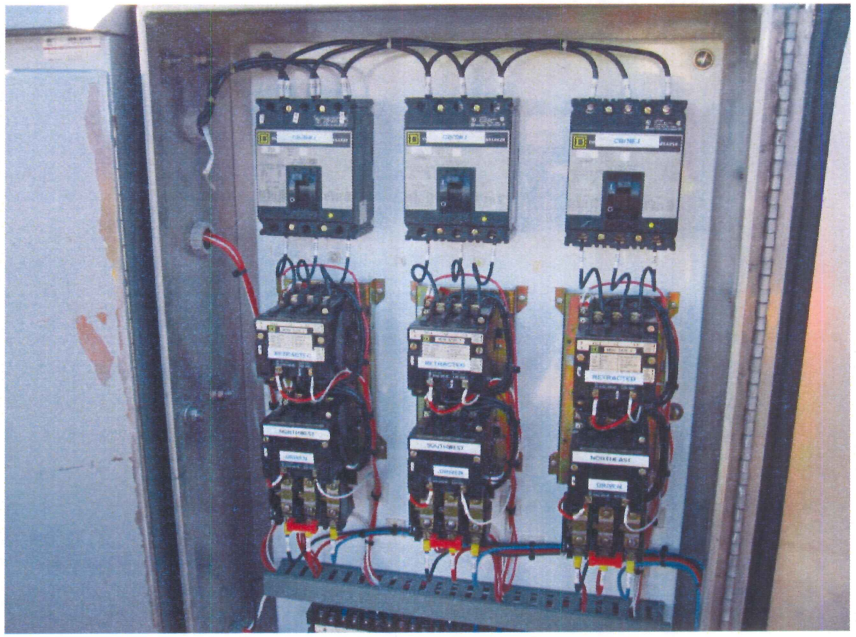


Photo E10: **Right Control Enclosure. Left enclosure is typical.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

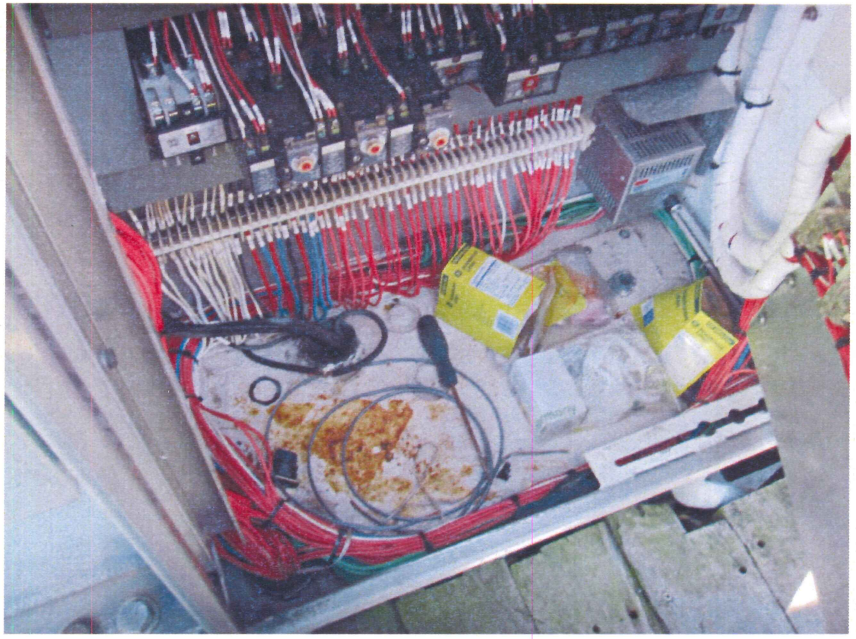


Photo E11: **Main Power and Control Enclosure. Note the corrosion within the enclosure and the combustible materials stored within.**



Photo E12: **Main Power and Control Enclosure. The space heater did not appear to function when tested. Also, note the charred plastic wireway.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo E13: **Centering Pin Limit Switch**



Photo E14: **Typical Jack Limit Switch Enclosure. Note the severe corrosion.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

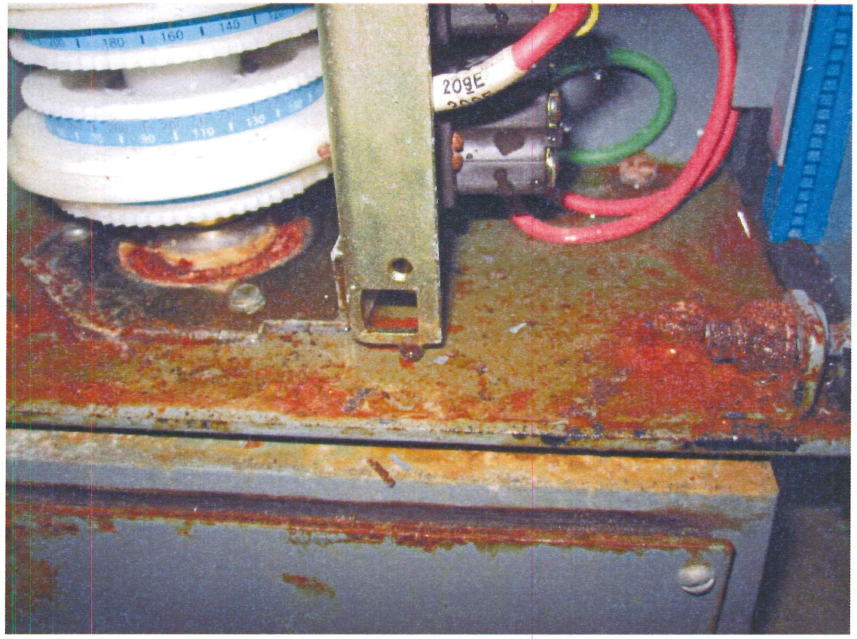


Photo E15: **Typical Jack Limit Switch Interior. Note the water intrusion and severe corrosion.**

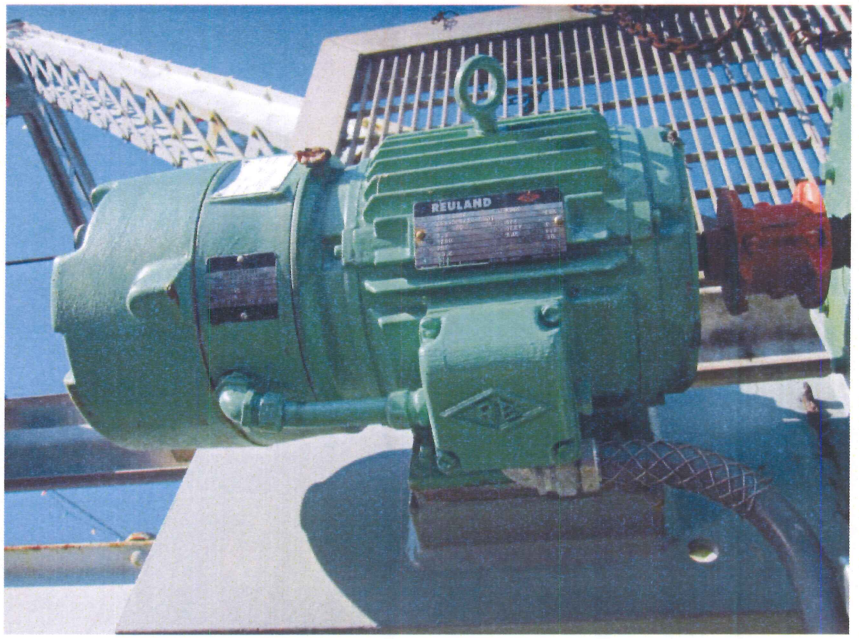


Photo E16: **Typical Newly Installed Jack Motor and Brake.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

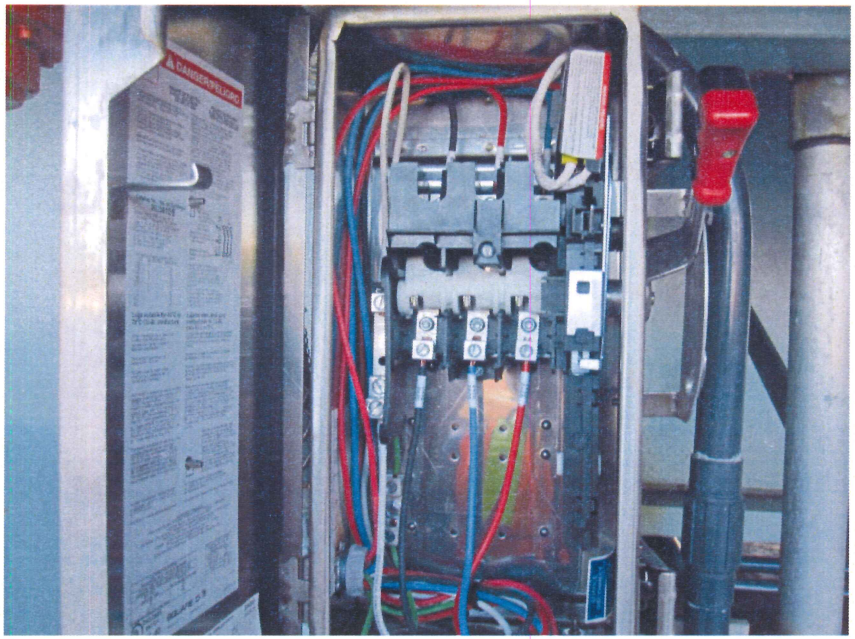


Photo E17: **Jack Motor Disconnect Switch. Note the color coding is inconsistent between the line and load sides. This is typical in several locations.**



Photo E18: **Span Centering Pin. West end of span 1.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo E19: **East Utility Service Enclosure. Note the severe corrosion on the conduit stubs.**

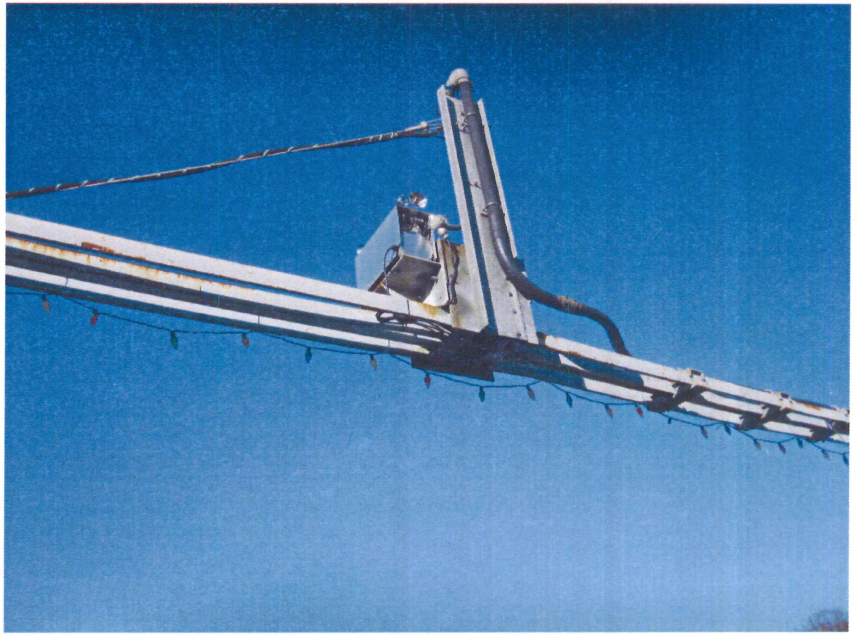


Photo E20: **Navigation Air Horn.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo E21: **East Approach Traffic Signals.**

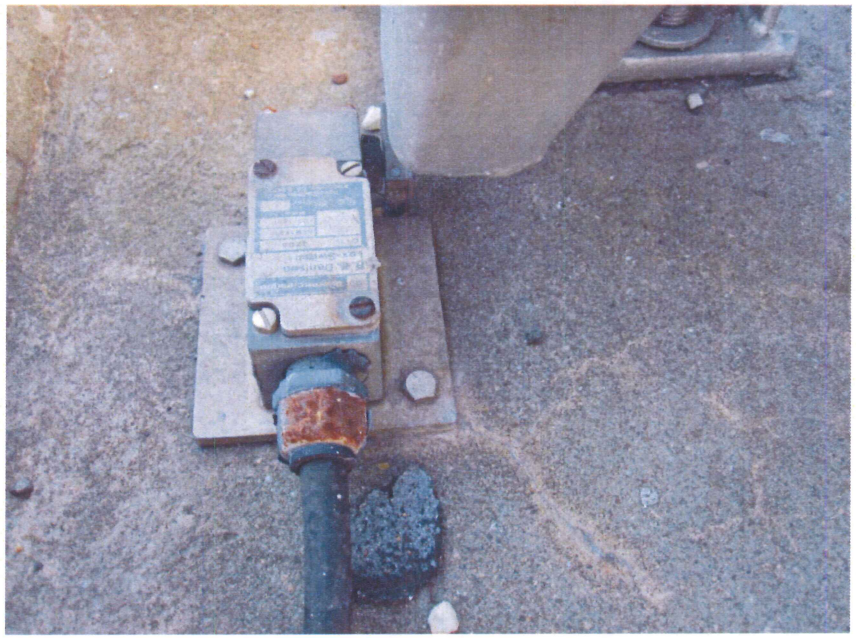


Photo E22: **Typical Barrier Gate Limit Switch.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo E23: **West Barrier Gate. The SO cable covering is deteriorating.**

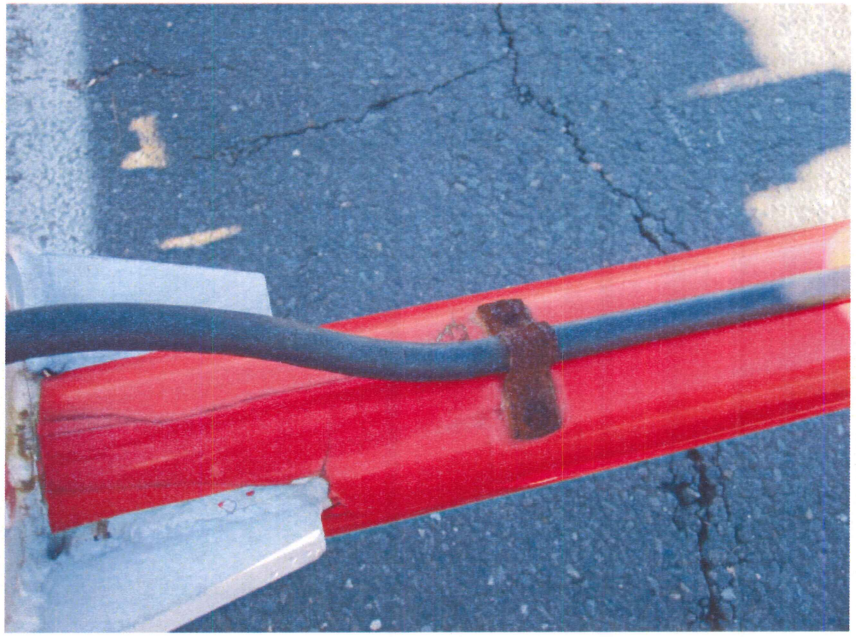


Photo E24: **Typical Barrier Gate. Note the corrosion on the SO cable clamp.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

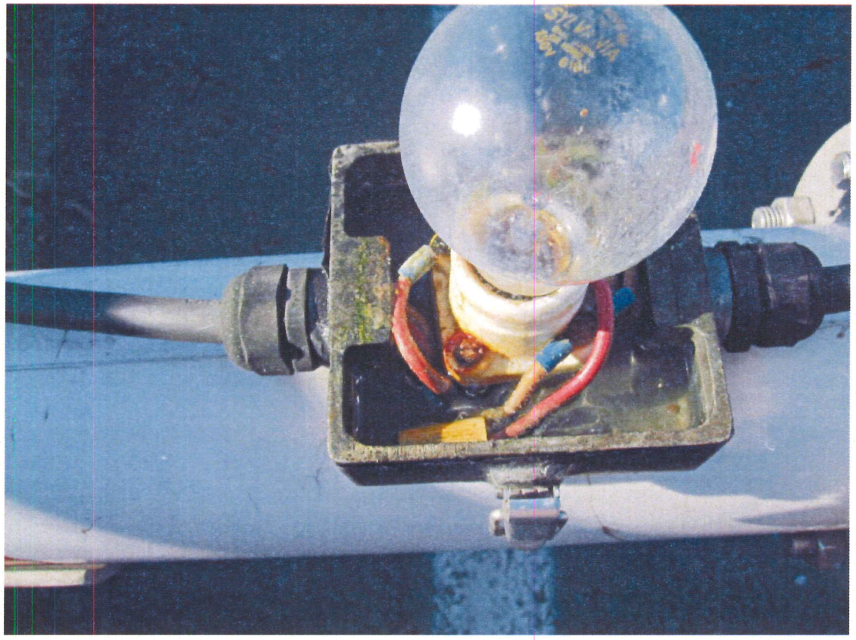


Photo E25: **East Barrier Gate, Innermost Warning Lamp. Note the corrosion on the socket base and the standing water within the warning light enclosure.**

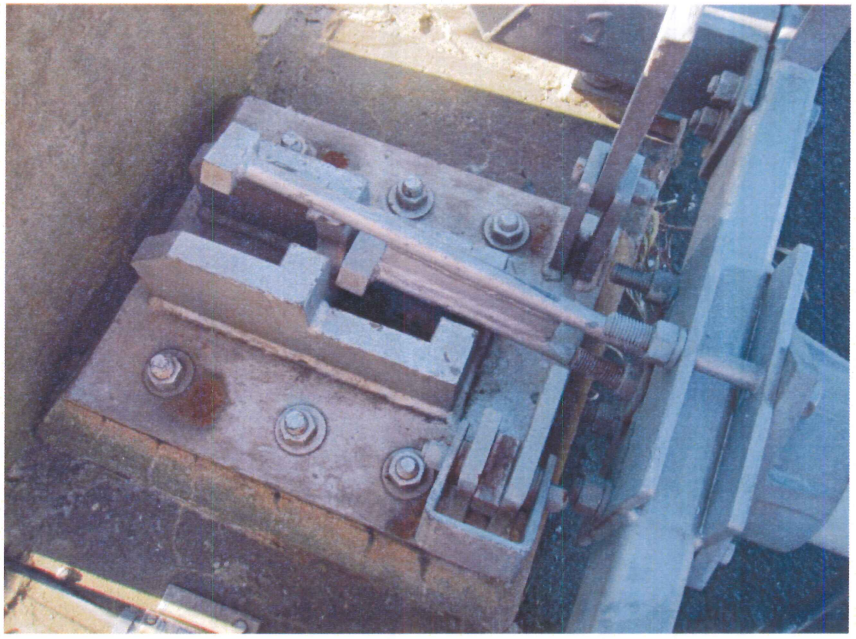
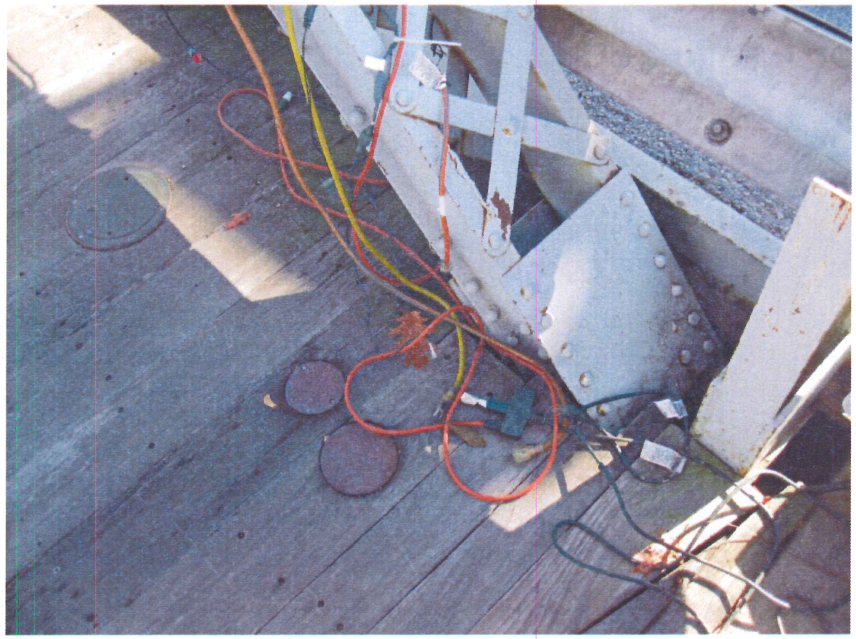


Photo E26: **Typical Barrier Gate. Note the gate latching mechanisms do not properly latch into their receiver.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
Town:	Westport	**Inspected by 2:**	NGS
Feature Carried:	Route 136	**Date Inspected:**	November 18, 2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



INTENTIONALLY BLANK

Photo E27: **Cables for holiday decorations are not weatherproof and are considered inappropriate for this application.**

Prepared by TranSystems

NUMERICAL CONDITION INSPECTION REPORT
APPENDIX II

MOVABLE SPANS
NUMERICAL CONDITION INSPECTION REPORT
ELECTRICAL COMPONENTS

BRIDGE NUMBER: 01349 **INSPECTION DATE:** 11-18-2014

COMMON COMPONENTS		BASCULE SPANS		LIFT SPANS	
COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*
WIRING AND CABLE	5	SPAN SEATED LIMIT SWITCH	NA	FESTOONED CABLE	NA
CONDUIT AND RACEWAY	5	TOE LOCK MOTORS	NA	SPAN SEATED LIMIT SWITCH	NA
UTILITY SERVICE	7	HEEL LOCK MOTORS	NA	SPAN LOCKS	NA
SPAN DRIVE MOTORS	8			WEDGE MOTORS	NA
SWITCHGEAR	6			DRIVE SYNC. SYSTEM	NA
MOTOR CONTROLS	7				
CONTROL DESK	6	**SWING SPANS**			
PLC CONTROLS	NA	END OF TRAVEL LIMIT			
ROTARY CAM LIMIT SWITCH	7	SWITCH	8	**MISC. COMPONENTS**	
SPAN POSITION INDICATOR	NA	CENTERING DEVICE	4	CONTROL LOGIC/	
SUBMARINE CABLE	NA	WEDGE MOTORS	NA	INTERLOCKS	3
DISCONNECT SWITCHES	7	JACK MOTORS	7		
GENERAL LIGHTING	3				
ROADWAY LIGHTING	7				
TRAFFIC SIGNS	5				
TRAFFIC GATES	NA				
RESISTANCE BARRIERS	6				
NAVIGATION LIGHTS	7				
STANDBY GENERATOR	N/A				

ELECTRICAL CONDITION OVERALL RATING: 7

***NCR IS AN ABBREVIATION FOR NUMERICAL CONDITION RATING; SEE BELOW:**

NUMERICAL CONDITION RATING INFORMATION

9	NEW: Excellent functional performance.	5	ADEQUATE: Performs with moderate reduction in reliability and/or effectiveness.	1	CRITICAL: Movable span operation prohibited pending replacement or repair.
8	EXCELLENT: Performs intended function with very high degree of reliability and effectiveness.	4	MARGINAL: Performance marginal: corrective action required within one year.	0	FAILURE: Movable span will not operate without replacement or repair.
7	GOOD: Performs with high degree of reliability and/or effectiveness.	3	POOR: Performance poor and/or unreliable: corrective actions required within six months.	NA	Not Applicable.
6	FAIR: Performs with little reduction in reliability and/or effectiveness.	2	URGENT: Movable span operation highly unreliable or dangerous and should be restricted: corrective action required as soon as possible.		

FIELD NOTES
APPENDIX III

EXECUTIVE SUMMARY – ELECTRICAL INSPECTION REPORT

CTDOT BR.NO. 01349

Transystems performed a detailed field inspection of the electrical systems on Bridge No. 01349, which carries Route 136 over the Saugatuck River in Westport, Connecticut. This inspection work was carried out on December 14, 2012. The inspection was conducted as part of CTDOT's biennial inspection program.

The electrical systems on the bridge were installed during the 1992 rehabilitation and very little to no change has been made since this rehabilitation. Hurricane Sandy flooded the bridge affecting the center jacks and submerged much of the electrical equipment. Many of the submerged electrical items of equipment were found to be operational at the time of the inspection with the exception of the center jacks. However, to ensure long term reliable operation of the bridge, a "Hurricane Sandy" emergency repair program is put in place to replace or refurbish all electrical equipment that was submerged under water during Hurricane Sandy.

The general condition of the electrical power and control system as defined by the Numerical Condition Inspection Report which accompanies this report is URGENT (Overall Rating = "2"). This indicates that the bridge electrical equipment exhibit severe damage and/or deterioration and that the bridge is unreliable. This rating is warranted based on the damages of the electrical equipment caused by Hurricane Sandy.

The most notable deficiencies being addressed by current on-going emergency contract include:

- Replacement of span rotary cam limit switch
- Replacement of Span drive motor and its associated disconnect switch and electrical installation
- Replacement of the center and end lift jack motors, disconnect switches, limit switches and their associated electrical installation
- Replace span end of travel limit switches
- Replace fender navigation lighting system
- Replace navigation horn

A significant deficiency that is not covered by the "Hurricane Sandy" emergency repair work and noted in the previous reports and again in this report involves the configuration of the traffic gates, MUTCD 8D.04 states that "gates should cover the approaching highway to block all motor vehicles from being driven around the gate without crossing the centerline." Modification or replacement of the existing traffic gate arms to straddle the full width of the roadway should be made to provide adequate protection for the traveling public and prevent vehicular traffic from driving around the traffic gates.

As previously reported the bridge is designed with a limited number of safety interlocks. Traffic control devices, centering device and span drive motor are not interlocked to control the sequence of operation of the bridge. Although this appears to be the intent of the past rehabilitation of the bridge, this lack of safety interlocking does not meet the current

EXISTING CONDITIONS

Bridge Electrical Service

The bridge is provided with two electric utility services. The incoming service from the west bridge approach consists of a 208/120 VAC, 3-phase, 4-wire, solidly grounded overhead service provided via a bank of three single-phase pole mounted transformers (See Photo E1). The pole mounted transformers are adequately protected with fused cut-outs and lightning arrestors. The electric service pole is located on the opposite side of Riverside Ave. to the bridge at the bridge northwest approach. The utility service is routed from the transformers, overhead across the Riverside Ave. down the pole on the northwest side of the bridge and underground to the electrical metering equipment and west traffic control enclosure. This service terminates in a weatherproof, freestanding enclosure. The enclosure contains the main service feeder breaker for the span operating equipment and the west traffic control equipment. The main service feeder is rated at 3-phase, 50 Amp, 208 VAC (See Photos E3 and E5). The bridge service feeder runs underground from the west traffic control cabinet onto a utility pole. The cable is then delivered aerially to the center of the span where the bridge power and control equipment is located. The feeder cable is in good condition and is supported with a messenger wire (See Photo E7).

The electrical installation associated with the west traffic control cabinet is operational and in fair condition. The enclosure is provided with a space heater, but this device is inoperable. The enclosure also contains control relays and switches for the control of the west bridge approach traffic signals (See Photo E5). This traffic signal control logic is "Stand Alone" and operates independently from the movable bridge control system. The control logic is operational and has been well installed with all relays and switches identified and conductors labeled.

A second electrical utility meter is provided at the bridge northwest approach and is used to feed an auxiliary power panel for bridge auxiliary power such as lighting and receptacle power. Both the metering and the panelboard appear to be in good serviceable condition (See Photo E4).

The electric utility service at the east bridge approach consists of a 240 VAC, single phase, 3-wire service. The east utility service is provided to the bridge via a pole mounted single phase transformer. This pole mounted transformer is adequately protected with a fused cut-out and lightning arrestor (See Photo E2). This service terminates in a weatherproof, freestanding enclosure mounted on a concrete pad below roadway level. The enclosure contains the electrical distribution equipment for the east bridge approach electrical service. An electric utility meter is mounted on the side of the enclosure, which is the utility service entrance point for this service. The electrical installation associated with the service is operational and in fair condition, although does exhibit signs of aging with dust and debris inside the enclosure. The enclosure is provided with a space heater, but this device is inoperable. As with the west electric utility service enclosure, the east service enclosure contains the control logic for the east approach traffic signals that are unrelated to the bridge operation (See Photo E6). The operation and status of this system is identical to that at the west bridge approach. In addition to the conventional traffic signal control

system, the enclosure also contains a Westport Fire Department control cabinet used to preempt the traffic signals in the event of emergencies.

The condition of utility electrical service is unchanged from the previous reports and considered a reliable source of electric power with the following exceptions.

Deficiencies regarding the electric utility service were recorded as follows:

- West main electric utility metering cabinet exhibit signs of corrosion (See Photo E3). (07/67) NC
- As noted in the previous Electrical Inspection Reports, space heaters for the east and west electric service enclosures are inoperable. NO CHG
- As noted in the previous Electrical Inspection Reports, interior terminals were found to be heavily corroded within the east and west electric service enclosures. This is likely due to the inoperable space heaters. These heaters aid in preventing condensation within the enclosure (See Photos E5 and E6). NO CHG WEST (07/59)

Motor Control Equipment

Electrical controls for the movable span are housed within three weatherproof enclosures located on the north side of the structure at the center of the movable span. The three enclosures are of NEMA 4X design and are in good physical condition. The internal control system components are also in good physical and serviceable condition. ✓ NC

The main bridge control enclosures consist of all electrical controls and electrical starters for the span operating equipment (See Photos E8, E10, E11 and E12). The electrical starters for the jacking system are housed within the two associated enclosures. ✓

The electrical motor starter for the span drive motor consists of a soft-start unit manufactured by Allen-Bradley. The electrical starter equipment is properly installed within the main bridge control enclosure and clearly identified with all wires labeled (See Photo E10). ✓

Each jacking system enclosure consists of motor starters for three of the six jack actuators. Each motor starter consists of a motor circuit protector, starter contactors (reversing), and a set of three-phase thermal overloads. The electrical starter equipment has been appropriately sized with respect to the jack actuator ratings and operating duty, and has been properly installed and clearly identified with respect to functionality with all wiring labeled (See Photos E11 and E12). ✓

Deficiencies regarding the bridge controls and control panels were recorded as follows:

- All the center jack limit switch wiring has been disconnected from their terminal blocks in the east starter enclosure. The disconnected wires are not properly terminated and are considered to be a potential source of hazard (See Photo E11). - CORRECTED
- As noted in the previous Electrical Inspection Reports, the existing motor control for centering the span uses an automatic system that pulses the motor on and off (jogs the motor) with a time cycling period of approximately one second. This is causing

duress on the motor, brake, and drive machinery. A more practical system for this type of structure would use an automated speed controller that would provide ramped acceleration and deceleration and would provide a reduced or "creep" speed for centering the span.

- As noted in the previous Electrical Inspection Reports, the interior of the main power and control enclosure at center span is heavily corroded at its interior base. Furthermore, the space heaters within the panels are not functioning, which permits condensation to form within the enclosures and jeopardize the operating integrity of the system (See Photo E14). PAINTED / STILL CORROSION COMING THRU
- As noted in the previous Electrical Inspection Reports, the span jacks can be driven when the span is not fully centered or locked, creating a potential for equipment damage.
- Improperly spliced conductors (wire-nut splices) are prevalent within the main power and control enclosure. This is a violation of AASHTO Article 8.9.2. and contravenes good and safety electrical installation practice. ONLY ON RECEP.

Movable Span Drive Motor and Machinery

The bridge operating machinery is powered by a span drive motor located in the center pier below the roadway level. The span drive motor is of the squirrel cage induction type motor and is controller from a soft starter located in the main power and control enclosure (See Photos E10 and E20).

Span Drive Motor Nameplate:

Manufacturer:	Reuland
Horsepower:	3 HP
Speed:	900 RPM
Voltage:	208 V
Current:	12.4 A
Hertz:	60 Hz
Phase:	3 – Phase
Enclosure:	TENV
Serial No.	9066B1A-A

The span drive motor is in fair condition externally and the internal winding resistance is in good condition with high electrical insulation resistance level. See "Insulation Resistance Test" section in this report for Megger test results.

Refer to Appendix E2 for drive motor operating load measurements and analysis.

The movable span drive system consists of one drive motor with an associated shaft-mounted, solenoid-operated brake. The motor is provided with a double extension shaft. One shaft extension is connected to the brake and a speed reducer, which in turn drives a rotary cam type limit switch. The second motor shaft extension is coupled to a gearbox that is connected to the bridge machinery. Local disconnect switch is provided for the drive motor in accordance with NEC (See Photo E20).

mounted navigation lights appear to have been properly installed and exhibit only minor signs of corrosion.

A separate navigation horn is mounted on the bridge truss, on the center of the span and is facing the north channel. The horn warns the approaching marine traffic that the bridge is about to be operated. The horn was operated at the time of the inspection. Although operational the sound volume is too low to provide any meaningful warning to marine traffic and will be replaced as part of the "Hurricane Sandy" emergency repairs (See Photo E32).

Fender navigation lights will be replaced under the "Hurricane Sandy" emergency repair work. All other deficiencies regarding the Navigation Lighting were recorded as follows:

- Span navigation lights exhibit signs of minor corrosion.
- As noted in the previous Electrical Inspection Reports, the bridge is not equipped with a VHF radio for communications with marine traffic.

Traffic Signals NO SIGNALS @ WEST (BRIDGE CONTROLLED)

Each bridge approach is provided with two sets of traffic signals. The traffic signals are of the three-aspect type and are suspended over the roadway from a pole-mounted cantilevered arm (See Photo E28). The traffic signals are manually operated from a switch at the bridge approaches and timed switching is achieved via timing devices located in the electric utility enclosures. A warning gong is located on the east traffic signal pole to provide warning signal to the approaching vehicular traffic (See Photo E29). (0732)

E. SIGNALS (0729)

Deficiencies regarding the traffic signals were recorded as follows:

- One of east traffic flashing yellow signal lights is not working. OK - BOTH

Traffic Gates – REMOVED

The bridge is provided with one manually operated traffic gate at each approach (See Photo E25). Traffic gates are provided with arm lights for increased visibility, safety and in accordance with the requirements of AASHTO.

The traffic gates are not provided with limit switches or interlocks to prevent operation of the movable span when one or both of the traffic gates are raised. Furthermore, general configuration of the traffic gates is in contravention of the MUTCD as the code applies to movable bridges. MUTCD Code 4I.02 states that "Movable bridge warning gates, if used, shall extend at least across the full width of the approach lanes if movable bridge resistance gates are used". The current configuration for the east approach traffic gate only blocks the off-going traffic (See Photo E25). Although not in conformance with code east approach oncoming traffic is blocked when the bridge is being operated by the closed barrier.

The traffic gates are in poor condition. Both traffic gates were not operated at the time of inspection and appear to be abandoned.

Deficiencies regarding the traffic gates were recorded as follows:

- The current configuration of the traffic gates is in contravention of the MUTCD. The east approach traffic gate only blocks the off-going traffic.
- The traffic gates are not being used to stop traffic.

Traffic Barriers

The bridge is provided with one traffic barrier gate at each approach. Each traffic barrier is provided with 3 arm lights for increased visibility and safety. The three arm lights are automatically turned on only when the limit switch under the arm is triggered. During the inspection the limit switch for each barrier gate was tested for functionality and found to be operating as designed (See Photo E24). MUST BE CONTROLLED @ PANEL FIRST)

These barrier gates are not provided with interlock limit switches to prevent operation of the movable span.

Deficiencies regarding the traffic barriers were recorded as follows:

- As noted in the previous Electrical Inspection Reports, the traffic barriers are not provided with interlock limit switches to prevent operation of the movable span unless the barriers are in the down position. NOTED
- Minor corrosion is evident on the SO cord seal tight connector located at the east approach barrier gate. PAINTED - OK
- As noted in the previous Electrical Inspection Report, the SO cord for the east approach barrier gate arm lights is damaged (See Photo E27). REPLACED - OK

General, Utility, and Emergency Lighting

A lighting panel is located on the Northwest approach of the bridge with photocell sensors to automatically turn 'on' and 'off' the bridge west approach street lights (See Photo E4). The roadway lighting has been provided and is operational on both bridge approaches.

No lighting has been provided at the main drive machinery space, jack machinery spaces and at the main power and control enclosure areas. This is considered inappropriate according to the work place safety code.

Holiday decoration lights have been installed throughout the entire bridge structure. Although it is acceptable to use extension cords for the temporarily power, the connections that have been made from extension cords are not weather proof, therefore are considered inappropriate for such application. NO CHG

Deficiencies regarding the lighting recorded as follows:

- No lighting for maintenance or emergency lighting has been provided at the bridge. NO CHG

Project 1349			Page
Project #			Sheet
Designer NCS	Date 11/18/14	Checker	Date

TABLES:

N. CTR JACK
P 60 66 71
D 70 64 66
Ω >2.2

S. CTR JACK
P 55 58 56
D 62 55 57
Ω >2.2

SW
P 60 63 69
D 66 63 62
Ω >2.2

NW
P 64 69 73
D 72 71 68
Ω >2.2

SE
P 69 68 74
D 66 61 60
Ω >2.2

NE
P 73 75 77
D 70 67 66
Ω >2.2

MTR
O 11-13A
C 10-13A
Ω >2.2

VAB	VBC	VAC	f
211/122	208/121	210/126	59.98

Flinders Engineering Group — Electrical & Mechanical Movable Bridge Specialists	Project 1349			Page
	Project #			Sheet
	Designer NBS	Date 11/18	Checker	Date

GATES

WEST BG

LITES & LS GOOD TO ON REAR (0722)

SO CABLE CRACKED FOR LITES (0723)

~~LITES NOT FUNCTIONING - BULBS LOOK OK~~ LITES OK

WIRENUTS TYP @ ALL LITES (0729)

TYP CORROSION @ CONDUIT CLAMPS (0726)

SCHEMATIC (0727)

GATE WAS NOT FULLY PROPPED INTO RECEIVER INITIALLY

ADD LS 2.

NO GONG

REAR RECIEVER NOT LATCHED (0763)

EAST

~~NO LITES (0734)~~

RECIEVER DAMAGED (0735)

TYP FLAKING PAINT @ LITES (0736)

TYP CORROSION @ SO CLAMPS (0737)

WATER INTRUSION @ OUTER (0739) AND INNER (0740) LAMPS

TYP CORROSION @ LS (0742)

MISSING FASTENERS @ JB (0743)

CORROSION IN JB (0745)

WIRENUT IN JB (0746)

CORROSION ON TERM. STRIP (0747)

SIGNALS

SIGNALS @ E APPROACH - DOES NOT CHANGE FROM FLASHING Y (0729)

KEYSWITCH @ MAST ARM POLE (0731) EAST

GONG @ EAST POLE (0732) NOT WORKING - STILL TIED

CABINET @ E APPROACH CONTROLS SIGNALS - ALL OK

& PED LITES

W. CONTROL CABINET (0754)

BAD GASKET (0760)

TYP CORROSION (0761)

Project			Page
Project #			Sheet
Designer	Date	Checker	Date

ENGINEERING FLANDERS GROUP
Electrical & Mechanical Movable Bridge Specialists

SPAN MTR
NAMEPLATE (0789)
2x DISC MTR/BRK & HEATERS/LS (0790)
RGUS OK, CLEAN
PRETTY TOUGH TO GET TO. ZERO NEC CLEARANCES

CTRL BOX
CORRODED INSIDE / MATERIALS (0794)
SOFT STARTER (0800)
WIRENUTS FOR RECEPT. (0801)
HEATER DID NOT WARM UP. DID MELT WIREWAY AT SOME POINT (0805)
(0807 - 811) TYP INTERIOR
RIGHT STARTERS (0462)

CONDUIT
ALL PVC COATED RGS & RGS
EPST AL J BOXES W/ GASKET @ ALL LOC.
BRAIDED COPPER FLEX CONDUITS @ FENDER LEVEL (0823)

LS'ES
FC LS (0846)
SAFETY PINS @ W. END (0848)
W. BG LS (0858) CORROSION

Project			Page
Project #			Sheet
Designer	Date	Checker	Date

Electrical & Mechanical Movable Bridge Specialists

RACKS

N. CENTER

NAMEPLATE (0774)
BRK N/P (0775)
MISMATCHED COLOR CODING (0776)
CORRODED RCLS (0777)
TYP WATER INTRUSION (0779)
TYP PROX SWITCHES (0781)

S. CENTER

NAMEPLATE (0783)
MTR NAMEPLATE (0784)
BRAKE N/P (0785)
MISMATCHED COLORS (0786)
CORRODED RCLS (0787)
TYP WATER INTRUSION (0788)

SE JACK

CORRODED RCLS (0815)
STILL DRY INSIDE
LITE CORROSION ON FLEX FITTING @ DISC (0818)
MTR N/P (0820)
BRK N/P (0821)

NE JACK

TYP PROX SWITCHES (0826)
MTR N/P (0827)
BRK N/P (0828)
ALL MTRS W/ GREASABLE BEARINGS. DOT INDICATED THEY WERE INSTRUCTED TO NOT LUBE THESE
MISMATCHED COLOR CODING (0832)
CORRODED LS (0834)
STILL DRY INSIDE

SW JACK

CORRODED LS (0837)
VERY WET INSIDE (0840)
MISMATCHED COLOR CODING (0842)
MTR N/P (0843) BRK N/P (0844)

NW JACK

MTR N/P (0851) BRK N/P 0852)
CORRODED RCLS (0854)
RCLS INTERIOR (0855)

STRUCTURE NO. 01349

ROUTE 136

over

SAUGATUCK RIVER

WESTPORT

Underwater Only Inspection

on

12/29/2014

Inspected by Collins - 52

for Area 9

TEAM:	Forwarded to TE3 Krys Kowalski	Date	1/30/2015
TE3:	Reviewed by TE3 Krys Kowalski	Date	2/4/2015
	BMM Required	No	
	Town Bridge	No	
	Rating <= 5 (Items 58,59,60 or 62)	Yes	
	Rating Change 2 or More Values	No	
	Forwarded to Supervisor Leo Cain Jr.	Date	2/4/2015
	Forwarded to "To Be Copied Drawer" ☐	Date	
	Date BRI-19 Entered	2/4/2015	
SUPERVISOR:	Reviewed by Supervisor Leo Cain Jr.	Date	2/10/2015
SUPPORT:	Date Copies Made	BMM N	
	Scanned By:	Date Scanned	PDF Box No

NBI: Yes

NHS: No

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

STATE PROJECT NO. 170-3163
BRIDGE SAFETY INSPECTION

BRIDGE NO. 01349
ROUTE 136
OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

RECEIVED
JAN 29 2015
CONNECTICUT - DOT
BRIDGE SAFETY & EVALUATION

UNDERWATER INSPECTION
DECEMBER 29, 2014



Prepared By:
COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067

STATE OF CONNECTICUT
RALPH A. PHILLIPS, JR.
No.0023005
LICENSED PROFESSIONAL ENGINEER

01/29/2015

Bridge Number **01349**

Inspected By: J. Karalekas & R. Snelgrove

Sufficiency Rating 58.36

Previous Inspection Date 11/9/2012

BS&E Received ☐ Data Entry By: K. [signature]

Copies Made ☐ Data Entry Date: 2/4/15

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BRIDGE SAFETY & EVALUATION

STRUCTURE EVALUATION

SHEET 1 OF 2 FORM BRI-19 REV 10/00

SHEET 1 OF 2

90) Inspection Date	Inspection Team	91) Frequency	Class:
	21	24	03
Indepth Insp	Deck Survey	Access	Flagman
11/9/2012	1/1/1900	40	

CRITICAL FEATURE INSPECTIONS

	Type	Frequency	Team	Date
Fracture:	E	24	21	11/9/2012
Uwater:		24 2 4	19 5 2	12/7/2012 12/29/2014
Special:				

RED FLAG

IDENTIFICATION

Bridge Name SAUGATUCK RIVER

Town Name WESTPORT Town Code 83500

5) Inventory Route:

A) Record Type 1 D) Route Number 00136

B) Signing Prefix 3 State Highway E) Directional Suffix 0 NA

C) Level of Service 1 Mainline

6) Feature Intersected SAUGATUCK RIVER

7) Facility Carried: ROUTE 136

9) Location BETWEEN I-95 EXIT 17 & 18

11) Milepoint 8.65 Miles

16) Latitude 41deg 7 min 48.00 sec deg min sec

17) Longitude 73deg 22 min 12.00 sec deg min sec

98) Border Bridge:

A) State Code B) Percent Responsibility %

C) Border Town Name

99) Border Bridge Structure No

STRUCTURE TYPE AND MATERIAL

43) Structure Type, Main:

A) Material 4 Steel continuous B) Design Type 17 Movable - Swing

44) Structure Type, Approach:

A) Material 4 Steel continuous B) Design Type 2 Stringer/Multi-beam o

45) Number of Spans, Main Unit 2

46) Number of Approach Spans 2

107) Deck Structure Type 5 Steel Plate (includes orthotropic)

108) Wearing Surface/Protective System:

A) Type of Wearing Surface 6 Bituminous

B) Type of Membrane 1 Built-up

C) Type of Deck Protection 0 None

AGE AND SERVICE

27) Year Built 1870 106) Year Reconstructed 1993

42) Type of Service:

A) On 1 Highway B) Under 5 WATERWAY

28) Number of Lanes:

A) On 2 B) Under

29) Average Daily Traffic 13600 Half ADT?: No

109) Percent Truck 5%

30) Year of ADT 2012

19) Bypass, Detour Length 1miles

GEOMETRIC DATA

48) Length of Max Span 70ft

49) Structure Length 287ft

50) Curb or Sidewalk Widths:

A) Left 3.7ft B) Right 0.0ft ft

51) Brg Rdwy width,curb-curb 19.5ft ft

52) Deck Width, Out-Out 20.0ft ft

32) Approach Roadway Width 21ft ft

33) Bridge Median 0 No Median

Deck Area 7653 sqft sqft

34) Skew Angle 0deg

35) Structure Flared 0

10)Inv. Rte. Min. Vert Clearance 13ft 9in ft in

47) Log Inv. Rte. Total Horiz Clr.: 19.5ft ft

47) RLog Inv. Rte. Total Horiz. Clr.: ft ft

53) Min Vert Clearance Over Bridge 12ft 10in ft in

54) Min Vert Under Clearance N Ref 0ft 0in Ref ft in

55) Min Lat Under Clearance on Right N Ref 99.9ft Ref ft

56) Min Lat Under Clearance on Left 0.0ft ft

BRIDGE COMMENTS

Machinery disabled by Storm Sandy, Oct 2012. Repair by Emergency Declaration Proj 158-210. reopened for river traffic May 2013. RDJ 5/19/14

STRUCTURE EVALUATION

SHEET 2 OF 2 FORM BRI-19 REV 10/00

SHEET 2 OF 2

Bridge Number	01349
Town Name	WESTPORT
Facility Carried	ROUTE 136
Feature Crossed	SAUGATUCK RIVER
NBIS Length	Yes 287

Inspected By: J. KANALERAS & R. SNELGROVE

CLASSIFICATION

112) NBIS Bridge Length	Yes	
104) Highway System	0	Off System
26) Functional Class	16	Urban Minor Arterial
100) Defense Highway	0	Route is not a STRAHNET Route
101) Parallel Structure	N	No parallel structure exists
102) Direction of Traffic	2	2-way traffic
103) Temporary Structure		
110) Designated National Network	0	Not on national network
20) Toll	3	On Free Road
21) Maintain	1	State Highway Agency
22) Owner	1	State Highway Agency
Report Class	S	STATE
37) Historical Significance	1	On National Register

WATERWAY

DrainageBasinCode	7200	
38) Navigation Control	1	Navigation control on waterway
39) Navigation Vert Clr.	7	40) Navigation Horiz Clr. 50
116) Vert-Lift Brg Nav Min		
111) Pier Abutment Protection	2	In place and functioning

PROPOSED IMPROVEMENTS

75A) Type of Work Proposed		
75B) Work Done By		
76) Length of Struct. Improvement		ft
94) Bridge Improvement Cost	$	
95) Roadway Improvement Cost	$	
96) Total Project Cost	$	
97) Year of Improvement Cost Est.		
114) Future ADT		115) Year Future ADT

List No. 99 Project No. Advertised

POSTED SIGNS & UTILITIES

Other Posted Signs 1	8	Other warning signs			
Other Posted Signs 2					
Actual P.L. Single Unit Truck		tons	Actual P.L. 4Axle Truck		tons
Rec. P.L. Single Unit Truck		tons	Rec. P.L. 4Axle Truck		tons
Actual P.L. Semi-TrailerTruck		tons	Actual P.L. 3S2 Truck		tons
Rec. P.L. Semi-TrailerTruck		tons	Rec. P.L. 3S2 Truck		tons
Rec. P.L. All Vehicles		tons	Actual P.L. All Vehicles		tons
Posted Vert Clearance On Bridge	13 ft	in			ft in
Posted Vert UnderClearance	ft	in			ft in
Posted Speed Limit	25	mph			mph
Utility					

LOAD RATING AND POSTING

31) Design Load	5	Evaluation Code	L
63) Operating Rating Type	1	Year of Evaluation	2000
64) Operating Rating	98.6	70) Bridge Posting	5
65) Inventory Rating Type	1	41) Structure Status	A
66) Inventory Rating	59.2		

CONDITION

		Rating	By
58) Deck	6		
59) Superstructure	6		
60) Substructure	5	5	JK
61) Channel & Chan. Protection	5	5	JK
62) Culverts	N	N	JK

APPRAISALS

		Rating	By
67) Structure Evaluation	5	5	RP
68) Deck Geometry	2		
69) Under Clear Vert & Horiz	N		
71) Waterway Adequacy	8	8	JK
72) Approach Rdwy Alignment	6		
113) Scour Critical	8		

Items 58 Thru 72 Checked By:

36) Traffic Safety Features:

A) Bridge Railings	0
B) Transitions	0
C) Approach Guardrail	0
D) Approach Guardrail End	0

OTHER FEATURES

Fence Required	No		Barrel Ladder	No	
Fence Present	Yes		Stand Pipes	No	
Fence Height	4.3	ft	Cat Walks	No	
Fence Type	2	Chain Link	Movable Inspection System	No	
Fence Material	2	Steel	Loose Concrete Checked?	No	
Fence Top Type	1	Vertical			

INSPECTION COMMENTS

Proposed Next Indepth Insp Year 2022

Senior MAJOR: Kowalsk

Supervisor MAJOR: Keedy/B

REVIEWED BY: #23005 Date 01/29/2015

2/4/2015

RECEIVED

Structure Inventory and Appraisal Sheet (English Units)

Bridge Key: 01349 **Agency ID:** 01349 **SR:** 58.0 **SD/FO:** FO

IDENTIFICATION

State 1:	09 Connecticut	Struc Num 8:	01349
Facility Carried 7:	ROUTE 136	Location 9:	BETWEEN I-95 EXIT 17 &amp
Rte (On/Under) 5A:	Route On Structure	Rte. Signing Prefix 5B:	3 State Hwy
Level of Service 5C:	1 Mainline	Route Number 5D:	00136
Directional Suffix 5E:	0 N/A (NBI)	% Responsibility:	0.00
SHD District 2:	03	County Code 3:	Fairfield
Place Code 4:	WESTPORT	Mile Post 11:	8.650 mi
Feature Intersected 6:	SAUGATUCK RIVER		
Latitude 16:	41° 07' 48"	Longitude 17:	073° 22' 12"
Border Bridge Code 98:	Not Applicable (P)		
Border Bridge Number 99:	NA		

STRUCTURE TYPE AND MATERIALS

Number of Approach Spans 46:	2	Number of Spans Main Unit 45:	2
Main Span Material Design 43 A/B:			
4 Steel Continuous		17 Movable-Swing	
Approach Span Material Design 44 A/B:			
4 Steel Continuous			
Deck Type 107:	5 Steel Plate		
Wearing Surface 108A:	6 Bituminous		
Membrane 108B:	1 Built-up		
Deck protection 108C:	None		

AGE AND SERVICE

Year Built 27:	1884	Year Reconstructed 106:	1993		
Type of Service on 42A:	1 Highway				
Type of Service under 42B:	5 Waterway				
Lanes on 28A:	2	Lanes under 28B:	0	Detour Length 19:	1.3 mi
ADT 29:	13,500	Truck ADT 109:	5%	Year of ADT 30:	2013

GEOMETRIC DATA

Length Max Span 48:	70.00 ft	Structure Length 49:	287.00 ft
Curb/Sdwlk Width L 50A:	3.70 ft	Curb/Sidewalk Width R 50B:	0.00 ft
Width Curb to Curb 51:	19.50 ft	Width Out to Out 52:	20.00 ft
Approach Roadway width 32: (w/ shoulders)	21.00 ft	Median 33:	0 No median
Deck Area:	7,653.00 sq ft		
Skew 34:	0.00°	Structure Flared 35:	0 No flare
Vertical Clearance 10:	13.75 ft	Horizontal Clearance 47:	19.50 ft
Minimum Vertical Clearance Over Bridge 53:		12.83 ft	
Minimum Vertical Underclearance Reference 54A:		N Feature not hwy or RR	
Minimum Vertical Underclearance 54B:		0.00 ft	
Minimum Lateral Underclearance Reference R 55A:		N Feature not hwy or RR	
Minimum Lateral Underclearance R 55:		327.76 ft	
Minimum Lateral Underclearance L 56:		0.00 ft	

INSPECTION

Frequency 91:	24 months	Inspection Date 90:	11/3/2014	Next Inspection:	11/3/2016
FC Frequency 92A:	24 months	FC Inspection Date 93A:	11/3/2014	Next FC Inspection:	11/3/2016
UW Frequency 92B:	24 months	UW Inspection Date 93B:	12/29/2014	Next UW Inspection:	12/29/2016
SI Frequency 92C:	NA	SI Date 93C:	NA	Next SI:	NA
Element Frequency:	24 months	Element Insp. Date:	12/29/2014	Next Elem. Insp.:	11/3/2016

CLASSIFICATION

Defense Highway 100:	0 Not a STRAHNET hwy	Parallel Structure 101:	No || bridge exists
Direction of Traffic 102:	2 2-way traffic	Temporary Structure 103:	Not Applicable (P)
Highway System 104:	0 Not on NHS	NBIS Length 112:	Long Enough
Toll Facility 20:	3 On free road	Functional Class 26:	16 Urban Minor Arterial
Defense Hwy 110:	0 Not a STRAHNET hwy	Historical Significance 37:	1 Br on Natl Reg Hist Pl
Owner 22:	01 State Highway Agency		
Custodian 21:	01 State Highway Agency		

CONDITION

Deck 58:	6 Satisfactory	Super 59:	5 Fair	Sub 60:	5 Fair
Culvert 62:	N N/A (NBI)	Channel/Channel Protection 61:		5 Bank Prot Eroded	

LOAD RATING AND POSTING

Inventory Rating Method 65:	1 LF Load Factor	Operating Rating Method 63:	1 LF Load Factor
Inventory Rating 66:	HS32.6	Operating Rating 64:	HS54.3
Design Load 31:	5 MS 18 (HS 20)	Posting 70:	5 At/Above Legal Loads
Posting Status 41:	A Open, no restriction		

APPRAISAL

Bridge Rail 36A:	0 Substandard	Approach Rail 36C:	0 Substandard
Transition 36B:	0 Substandard	Approach Rail Ends 36D:	0 Substandard
Str Evaluation 67:	5 Above Min Tolerable	Deck Geometry 68:	2 Intolerable - Replace
Underclearance, Vertical and Horizontal 69:		N Not applicable (NBI)	
Waterway Adequacy 71:	8 Equal Desirable	Approach Alignment 72:	6 Equal Min Criteria
Scour Critical 113:	8 Stable Above Footing		

PROPOSED IMPROVEMENTS

Bridge Cost 94:	$1,000	Type of Work 75:	38 Other Structural
Roadway Cost 95:	$1,000	Length of Improvement 76:	0.3 ft
Total Cost 96:	$2,000	Future ADT 114:	8,000
Year of Cost Estimate 97:	2000	Year of Future ADT 115:	2029

NAVIGATION DATA

Navigation Control 38:	Permit Required		
Vertical Clearance 39:	6.9 ft	Horizontal Clearance 40:	49.9 ft
Pier Protection 111:	2 In-Place, Functioni	Lift Bridge Vertical Clearance 116:	0.0 ft

Structure Inventory and Appraisal Sheet (English Units)

ELEMENT CONDITION STATE DATA

Str Unit	Elm/Env	Description	Units	Total Qty	% in 1	Qty. St. 1	% in 2	Qty. St. 2	% in 3	Qty. St. 3	% in 4	Qty. St. 4
0	30/3	Steel Deck - Orthotropic	sq.ft	2,820	95%	2,670	5%	135	1%	15	0%	0
0	1,000/3	Corrosion	sq ft	150	0%	0	90%	135	10%	15	0%	0
0	107/3	Steel Opn Girder/Beam	ft	1,538	99%	1,528	1%	10	0%	0	0%	0
0	1,000/3	Corrosion	ft	10	0%	0	100%	10	0%	0	0%	0
0	111/3	Timber Open Girder	ft	574	99%	566	1%	8	0%	0	0%	0
0	1,170/3	Split/Delamination (Timber)	ft	8	0%	0	100%	8	0%	0	0%	0
0	120/3	Steel Tuss	ft	574	82%	470	7%	42	4%	21	7%	41
0	1,000/3	Corrosion	ft	48	0%	0	56%	27	44%	21	0%	0
0	1,010/3	Cracking	ft	10	0%	0	100%	10	0%	0	0%	0
0	1,020/3	Connection	ft	5	0%	0	80%	4	0%	0	20%	1
0	7,000/3	Damage	ft	40	0%	0	0%	0	0%	0	100%	40
0	152/3	Steel Floor Beam	ft	66	0%	0	100%	66	0%	0	0%	0
0	1,000/3	Corrosion	ft	66	0%	0	100%	66	0%	0	0%	0
0	161/3	Stl Pin Pin/Han both	each	76	80%	61	20%	15	0%	0	0%	0
0	1,020/3	Connection	each	15	0%	0	100%	15	0%	0	0%	0
0	210/3	Re Conc Pier Wall	ft	26	0%	0	50%	13	50%	13	0%	0
0	1,080/3	Delamination/Spall/Patched Area	ft	13	0%	0	0%	0	100%	13	0%	0
0	1,190/3	Abrasion(PSC/RC)	ft	13	0%	0	100%	13	0%	0	0%	0
0	213/3	Masonry Pier Wall	ft	26	50%	13	0%	0	50%	13	0%	0
0	1,610/3	Mortar Breakdown (Masonry)	ft	13	0%	0	0%	0	100%	13	0%	0
0	217/3	Masonry Abutment	ft	52	48%	25	13%	7	38%	20	0%	0
0	1,130/3	Cracking (RC and Other)	ft	7	0%	0	100%	7	0%	0	0%	0
0	1,610/3	Mortar Breakdown (Masonry)	ft	20	0%	0	0%	0	100%	20	0%	0
0	220/3	Re Conc Pile Cap/Ftg	ft	26	77%	20	0%	0	23%	6	0%	0
0	6,000/3	Scour	ft	6	0%	0	0%	0	100%	6	0%	0
0	225/3	Steel Pile	(EA)	14	93%	13	0%	0	7%	1	0%	0
0	1,000/3	Corrosion	(EA)	1	0%	0	0%	0	100%	1	0%	0
0	310/3	Elastomeric Bearing	each	16	100%	16	0%	0	0%	0	0%	0
0	316/3	Other Bearing	each	7	100%	7	0%	0	0%	0	0%	0
0	330/3	Metal Bridge Railing	ft	574	98%	564	2%	10	0%	0	0%	0
0	7,000/3	Damage	ft	10	0%	0	100%	10	0%	0	0%	0

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

INSPECTION REPORT TRANSMITTAL FORM
FORM BRI-27, REV. 9/97

Structure No.: 01349 Town: Westport

Inspectors: J. Karalekas, P.E., R. Snelgrove, J. Figueroa Date: 12/29/2014

TABLE OF CONTENTS

LOOSE FORMS (not bound in report) — No. of Sheets Enclosed

Maintenance Memo ..... --

Flagging Memos ..... --

BRI-11, Seismic Screening Data Sheet ..... --

BRI-12, Fracture Critical Inspection Data Sheet ..... --

BRI-19, HWY Bridge SI&A Form 2

BRI-25, Under Entry SI&A Form .....

BRI-39, RR Bridge SI&A Form ..... --

BRI-49, Sign Structure SI&A Form ..... --

National Bridge Element Data Collection Form 2

RECEIVED
JAN 29 2015
CONNECTICUT - DOT
BRIDGE SAFETY & EVALUATION

Plan Sheets: Project No. 158-150 Check here if already on file: [X]

Bound Report Pages — Sheet Numbers

Title Cover Sheet 1

Table of Contents 2

Location Map 3

Executive Summary 4-5

BRI-59, Underwater Inspection Form 6

BRI-58, Underwater Inspection Form 7-10

Field Notes (Include Forms ~~BRI-10~~, BRI-13, ~~BRI-14, BRI-15~~, ~~BRI-16, BRI-17, BRI-29, BRI-30~~) 11-24

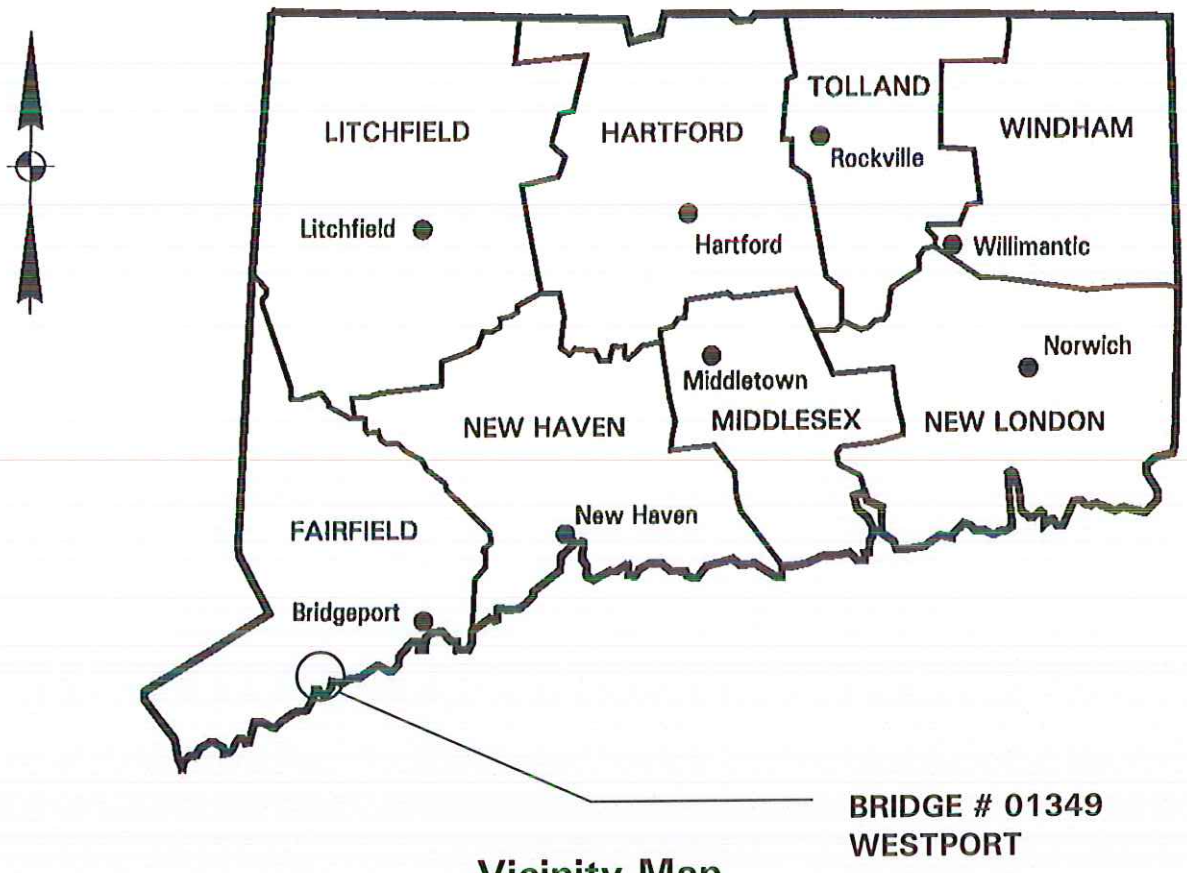
Calculations:

Load Rating Evaluation ..... --

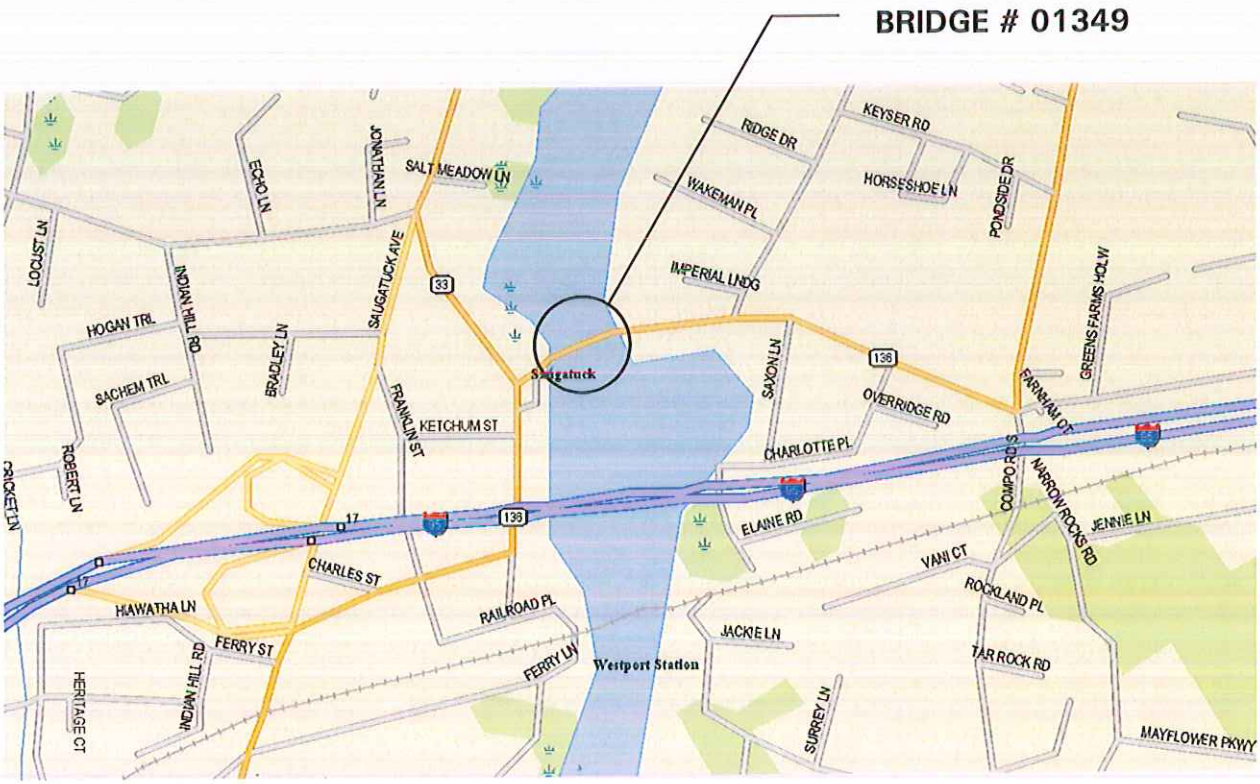
Quantities & Cost Estimate ..... --

Photo Sheets (Includes Thumbnails) 25-41

Back-up Material ..... 17 Sheets



Vicinity Map



Location Map

EXECUTIVE SUMMARY
12/29/2014

Bridge No. 01349 carries Route 136 over the Saugatuck River in Westport, Connecticut. This four (4) span steel truss swing bridge was originally built in 1870 and reconstructed in 1993. The structure is 287' long with a 20.0' out-to-out width. The bridge superstructure is supported by various types of piers. According to information on file at ConnDOT, this structure has an inventory rating capacity of 58.36 tons.

An underwater inspection completed on December 29, 2014 found the structure to be in fair condition (Overall Rating = 5). The deficiencies found and the recommendations for repairs are as follows:

Item 60 - Substructure

The substructure is in fair condition (Overall Rating = 5) due to the following:

1. The stone masonry stems for the Abutments exhibits up to 50% deteriorated / missing mortar with penetrations up to 4' between stones, and grout repair / epoxy coating on stone masonry has failed up to 90% in the tidal zone. There is a 1' wide x 10" high broken stone at the south end of Abutment 1. The stone masonry stem for Pier 2 has approximately 50% deteriorated / missing mortar with penetrations up to 2.5' between stones. The masonry stem has missing chinking stones and intermittent cracked stones within the tidal zone. There is a 3' wide x 2' high x 6" deep broken stone on the east face of the pier between Piles 3 and 4. Repoint mortar on the masonry abutments and Pier 2 (250 LF).

2. The steel jacket at Pier 1 has moderate to severe corrosion with intermittent areas of section loss up to 100%. There is a 4' high band of missing steel from 0.5' above the water surface to 3.5' below the water surface. The areas of exposed concrete have moderate to severe scaling with exposed / loose aggregate, and spalls up to 22' long x 1.5' high x 1' deep. Repair spalls and scaling on Pier 1. (1.25 CY).

3. At Pier 2, the fiberglass jackets on the piles are loose with some sections missing throughout. The concrete encasement has scaling up to 1/2" deep with exposed aggregate and random spalls up to 3.5' wide x 3' high x 10" deep with exposed steel reinforcement with moderate to heavy corrosion. The spall / delamination in Pile 4 at the northeast corner of the pier has exposed steel reinforcement that has up to 100% section loss and has exposed the southeast flange of the H-Pile up to 1.4' high x 7" wide. The H-pile also has corrosion and pitting. The steel cross-bracing between the piles has severe corrosion with up to 100% section loss with knife edging and perforations. At the bracing connection to the piles, there are up to 3' long areas of 100% section loss. The lower cross-brace on the south and east faces of the pier is missing. The steel beams bearing on the piles have moderate to heavy corrosion with up to 1/8" section loss on the flanges. The top flange of the upper most steel beams have areas of laminated rust. Repair the reinforced concrete encasements, replace deteriorated cross bracing and clean and paint steel beams.

4. The Pier 2 stem is founded on a stone masonry footing with timber cribbing beneath the footing. The footing is exposed up to full-height (1.5' high). The footing is undermined at the northwest corner 1.8' long x 1.3' high x 4' penetration with the timber cribbing exposed. The footing is undermined at the southwest corner 1.5' long x 8" high x 2' penetration with the timber cribbing exposed. The timber cribbing is split and exhibits evidence of marine borer activity. Design and install scour countermeasures for Pier 2. (2 CY).

5. At Pier 3, the fiberglass forms on the piles exhibit no significant deficiencies. No repair recommendations requested at this time.

Item 61 - Channel & Channel Protection

The channel and channel protection are in fair condition (Overall Rating = 5) due to the following:

1. As compared to the 2012 Inspections, channel bottom elevations along the upstream (north) fascia, the abutments, Pier 1, and Pier 3 have remained relatively unchanged (variations up to 1.9') with an areas of localized degradation up to 2.4' high at Span 3 at the north fascia and at the northwest corner of Pier 2. No repair recommendations requested at this time.

2. At Pier 2, the previously observed scour has exposed the footing up to full-height (1.5' high). The footing is undermined at the northwest corner 1.8' long x 1.3' high x 4' penetration (previously noted as 2.1' penetration) with the timber cribbing exposed. The footing is undermined at the southwest corner 1.5' long x 8" high x 2' penetration (previously noted as 2.5' long x 5" high x 4" penetration) with the timber cribbing exposed. Design and install scour countermeasures for Pier 2. (2 CY).

3. The dry-laid stone channel walls along the west side of the channel have penetrations up to 3' between stones. The Northwest Channel Wall has a 2.5' wide x 1.5' high x 1.5' deep stone void. No repair recommendations requested at this time.

4. The dry-laid stone Southeast Retaining Wall has stone voids up to 4' wide x 2.5' high x 2' deep. No repair recommendations requested at this time.

5. There is a timber fender system in place around the perimeter of Pier 1 and the west side of Pier 2. The fender piles and wales have splits and checks up to 1/2" wide. The wales have random minor abrasion / collision damage. The hardware has moderate to heavy corrosion within the tidal zone. There are several piles that were part of the old abandoned fender system that have up to 30% section loss along the channel bottom. No repair recommendations requested at this time.

Connecticut Department of Transportation
UNDERWATER INSPECTION
BRI-59 Form

Bridge No: 01349 **Date Inspected:** 12/29/2014

Job Number: 170-3163
Client: Connecticut D.O.T.
Route: 136 **Mile point:** 8.65
City: Westport
FeatureCrossed: Saugatuck River
State: CT
Inspector: J. Karalekas
Assistants: J. Figueroa, C. Sorensen
Time Arrived: 10:00 AM
Time Departed: 3:30 PM
Time In Water: 11:00 AM
Time Out of Water: 2:30 PM
Type of Inspection: Underwater Only
Year built: 1870 **Total Length:** 287.0' **No. Spans:** 4
Bridge Type: Steel truss swing bridge
Total Number of Piers: 3
Piers in the Water: 3
Type of Piers: Concrete encased steel piles
Abutments: Stone masonry with concrete cap
Bottom Composition: Intermittent rip rap up to 3' diameter, sand, silt and natural debris with penetrations up to 2.0' into the channel bottom.
Previous U/W Insp: 12/7/2012
Marine Growth: Barnacles, oysters and mussels up to 3" thick
Max. Water Depth: 9.4' (at low tide)
Max. Depth at Pier: 7.1' (at low tide)
Current Strength: Less than 1 fps
U/W Visibility: 4'
Type of Water: Salt (tidal)
Access to Bridge: Boat
Remarks: Boat ramp located on Elaine Road

RECEIVED
JAN 29 2015
CONNECTICUT - DOT
BRIDGE SAFETY & EVALUATION

Inspection Equipment

Number of Boats: 1
RR Protection: No
Boat Size: 21
Equipment Comments:
Dive Station: Yes

Inspected by: [signature] **Date:** 1/23/2015

Inspected by: Elias R. Nonjain for J. Figueroa **Date:** 1/23/2015

D.O.T. reviewed by: [signature] **Date:** 2/4/2015

Connecticut Department of Transportation

UNDERWATER INSPECTION

BRI-58 Form

Bridge No: 01349
Inspection Date: 12/29/2014

Town: Westport
Route Carried: 136
Feature Crossed: Saugatuck River

ITEM	RATING	REMARKS
60. SUBSTRUCTURE	5	Stone masonry abutments and various types of piers. Substructure repair recommendations from BMM's 06-091 and 09-530 have not been addressed.
ABUTMENT 1:	6	West Abutment: Stone masonry stem with reinforced concrete cap.
STEM	6	The stone masonry stem exhibits 50% deteriorated / missing mortar with penetrations up to 3' between stones (previously noted as 30%), and grout repair / epoxy coating on stone masonry has failed up to 90% in the tidal zone. There is a 1' wide x 10" high broken stone at the south end of the abutment. See Sheet 13 and Photo 6.
FOOTING	N	Not visible.
EROSION	7	
SETTLEMENT	7	The stone blocks appear to slightly tilted to the east.
SCOUR	7	Channel bottom elevations along the abutment have remained relatively unchanged (less than 0.3' variations) as compared to the 2012 Inspections. See Sheets 11 - 13.
WINGWALLS	6	The stone masonry return walls exhibit 30% deteriorated / missing mortar with penetrations up to 3' between stones. See Sheet 13.
General remarks:		
ABUTMENT 2:	6	East Abutment: Stone masonry stem with reinforced concrete cap.
STEM	6	The stone masonry stem exhibits 35% deteriorated / missing mortar with penetrations up to 4' between stones (previously noted as 30% and 2.5' penetration), and grout repair / epoxy coating on stone masonry has failed up to 90% in the tidal zone. See Sheet 21 and Photos 7 & 8.
FOOTING	N	Not visible.
EROSION	7	
SETTLEMENT	8	No evidence of settlement observed.
SCOUR	7	Channel bottom elevations along the abutment have remained relatively unchanged (less than 0.7' variations) as compared to the 2012 Inspections. See Sheets 11, 12 & 21.
WINGWALLS	6	The stone masonry return walls exhibit 35% deteriorated / missing mortar with penetrations up to 4' between stones. See Sheet 21.
General remarks:		

Connecticut Department of Transportation

UNDERWATER INSPECTION

BRI-58 Form

Bridge No: 01349

Inspection Date: 12/29/2014

Town: Westport

Route Carried: 136

Feature Crossed: Saugatuck River

ITEM	RATING	REMARKS
PIER NO. 1	5	Reinforced concrete pier with a steel jacket.
PILES	N	
STEM	5	The steel jacket has moderate to severe corrosion with intermittent areas of section loss up to 100%. There is a 4' high band of missing steel from 0.5' above the water surface to 3.5' below the water surface. The areas of exposed concrete have moderate to severe scaling with exposed / loose aggregate, and spalls up to 22' long x 1.5' high x 1' deep (previously noted as 52' long x 2' high x 10" deep). See Sheets 14 & 15 and Photos 9 - 13.
FOOTING	N	Not visible.
SCOUR	7	Channel bottom elevations around the perimeter of the pier have remained relatively unchanged (less than 0.9' variations) as compared to the 2012 Inspection. See Sheets 14 & 15.
SETTLEMENT	8	No evidence of settlement observed.
General remarks:		
PIER NO. 2	5	Stone masonry pier stem on stone masonry footing. Retrofit repairs has been made on the masonry pier including: a reinforced concrete cap encasing steel beams / framing which is supported by six (6) reinforced concrete encased steel H-piles (HP12x74) with fiberglass forms and steel C-shape bracing.
PILES	5	Piles: The fiberglass forms on the piles are loose / missing throughout. The reinforced concrete encasement has scaling up to 1/2" deep with exposed aggregate. Pile 1 at the southwest corner of the pier has spalls at the top of the encasement up to 1.6' high x 1.6' wide x 4" deep with exposed steel reinforcement that has moderate to heavy corrosion. Pile 2 at the southeast corner of the pier has a 4' wide x 2.3' high x 5" deep spall with exposed steel reinforcement that has corrosion and section loss up to 75%. Pile 4 at the northeast corner of the pier has spalls / delaminations up to 3.5' wide x 3' high x 10" deep (previously noted as 7" deep) with exposed steel reinforcement that has up to 100% section loss. This deterioration has exposed the flanges of the steel H-pile up to 1.4' high x 7" wide. The exposed H-pile has moderate corrosion and minor pitting. Pile 5 at the northwest corner of the pier has a full perimeter spall 2.4' high x 4" deep with exposed reinforcement at the top of the pile. Pile 5 has a void 7" diameter x 1" deep near the channel bottom. Steel Bracing: The steel cross-bracing between piles has severe corrosion with up to 3' long of 100% section loss adjacent to the piles. The lower cross-braces on the south and east faces of the pier are missing. Steel Beams: The steel beams bearing on the piles have moderate to heavy corrosion with up to 1/8" section loss on the bottom flanges. The steel beams bearing on the above steel beams have areas of laminated rust on the top flange. See Sheets 16 - 19 and Photos 14 - 20.
STEM	5	The stone masonry stem has approximately 50% deteriorated / missing mortar with penetrations up to 2.5' between stones (previously noted as 25%). The masonry stem has missing chinking stones and intermittent cracked stones within the tidal zone. There is a 3' wide x 2' high x 6" deep broken stone on the east face of the pier between Piles 3 and 4. See Sheets 16 - 18 and Photos 14 & 15.
FOOTING	4	The pier stem is founded on a stone masonry footing on timber cribbing. The footing is exposed up t

Connecticut Department of Transportation

UNDERWATER INSPECTION

BRI-58 Form

Bridge No: 01349
Inspection Date: 12/29/2014

Town: Westport
Route Carried: 136
Feature Crossed: Saugatuck River

ITEM	RATING	REMARKS
		full-height (1.5' high). The footing is undermined at the northwest corner 1.8' long x 1.3' high x 4' penetration (previously noted as 2.1' penetration) with the timber cribbing exposed. The footing is undermined at the southwest corner 1.5' long x 8" high x 2' penetration (previously noted as 2.5' long : 5" high x 4" penetration) with the timber cribbing exposed. The timber cribbing is split and exhibits evidence of marine borer activity. The previously noted statement "The footing is no longer bearing the live load since the installation of the concrete encased H piles" cannot be confirmed. See Sheets 16 - 18 and Photos 21 & 22.
SCOUR	5	Channel bottom elevations around the perimeter of the pier have remained relatively unchanged (less than 1.3' variations) with a localized area of degradation up to 2.1' high at the northwest corner as compared to the 2012 Inspection. At Pier 2, the previously observed scour has exposed the footing up to full-height (1.5' high). The footing is undermined at the northwest corner 1.8' long x 1.3' high x 4' penetration (previously noted a 2.1' penetration) with the timber cribbing exposed. The footing is undermined at the southwest corner 1.5' long x 8" high x 2' penetration (previously noted as 2.5' long x 5" high x 4" penetration) with the timber cribbing exposed. See Sheets 11, 12, 16, 17 & 18 and Photos 21 & 22.
SETTLEMENT	7	No significant settlement observed.
General remarks:		
PIER NO. 3	7	Reinforced concrete cap supported by eight (8) reinforced concrete encased steel H-piles with fiberglass forms.
PILES	7	The reinforced concrete encasements are covered by fiberglass forms and do not have any significant deficiencies. See Sheets 20 & 21 and Photos 23 & 24.
STEM	N	
FOOTING	N	
SCOUR	7	Channel bottom elevations have remained relatively unchanged (less than 1.9' variations) around the perimeter of the piles as compared to the 2012 Inspection. See Sheets 11, 12, 20 & 21.
SETTLEMENT	8	No evidence of settlement observed.
General remarks:		
61. CHANNEL& CHANNEL PROTECTION:	5	Saugatuck River is a saltwater (tidal) body of water.
CHANNEL SCOUR	5	As compared to the 2012 Inspections, channel bottom elevations along the upstream (north) fascia, the abutments, Pier 1, and Pier 3 have remained relatively unchanged (variations up to 1.9') with an areas of localized degradation up to 2.4' high at Span 3 at the north fascia and at the northwest corner of Pier 2. At Pier 2, the previously observed scour has exposed the footing up to full-height (1.5' high). The footing is undermined at the northwest corner 1.8' long x 1.3' high x 4' penetration (previously noted as 2.1' penetration) with the timber cribbing exposed. The footing is undermined at the southwest corner 1.5' long x 8" high x 2' penetration (previously noted as 2.5' long x 5" high x 4" penetration) with the timber cribbing exposed.

Connecticut Department of Transportation

UNDERWATER INSPECTION

BRI-58 Form

Bridge No: 01349
Inspection Date: 12/29/2014

Town: Westport
Route Carried: 136
Feature Crossed: Saugatuck River

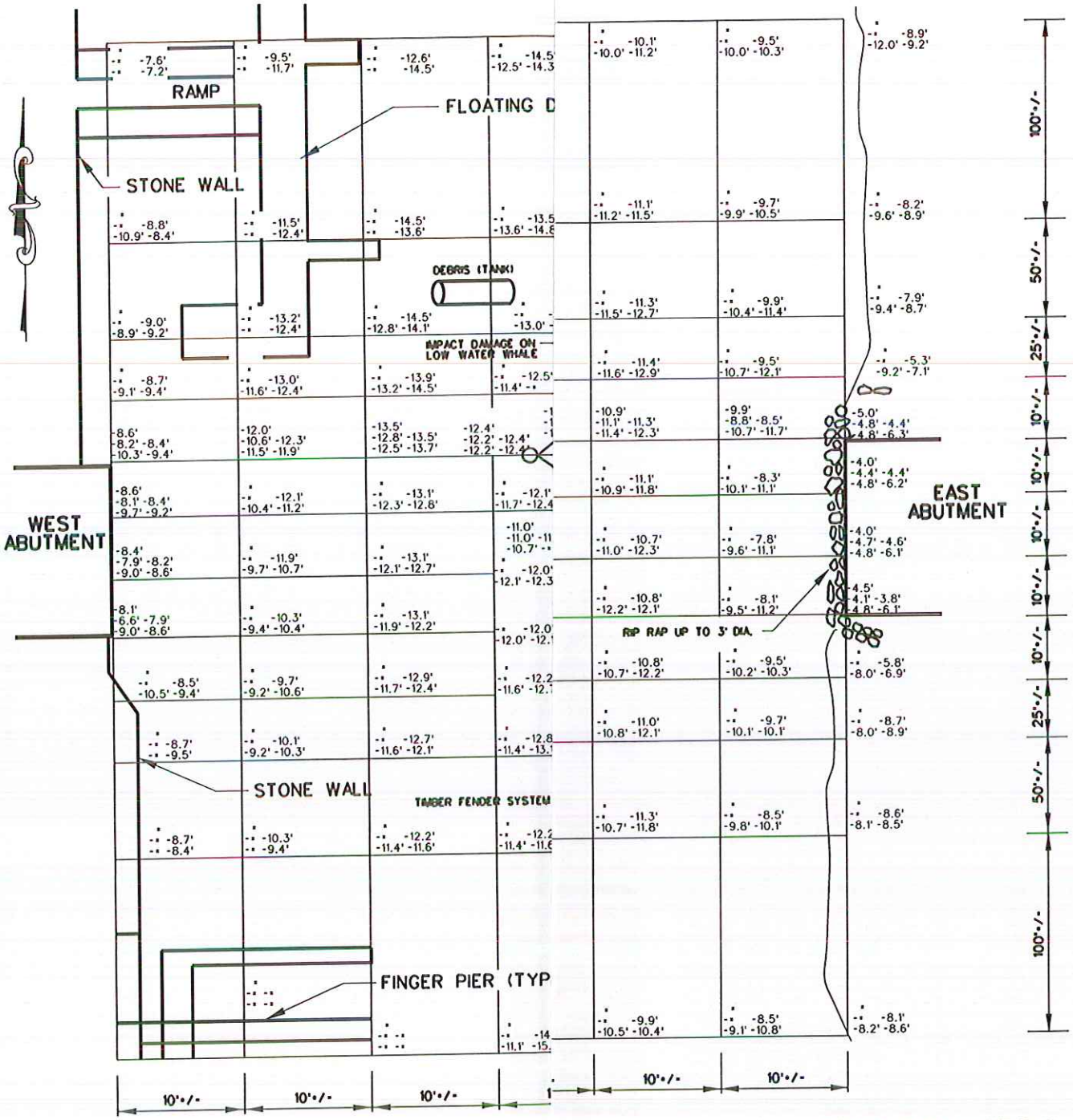
ITEM	RATING	REMARKS
		See Sheets 11 - 22 and Photos 21 & 22.
EMBANKMENT EROSIO	7	There are dry-laid stone channel walls in place along the west side of the channel, and dry-laid stone retaining walls at the ends of the East Abutment. Channel Embankments: There is no significant erosion observed. Retaining / Channel Walls: The channel walls along the west side of the channel have penetrations up to 3' between stones. The Northwest Channel Wall has a 2.5' wide x 1.5' high x 1.5' deep stone void. The Southeast Retaining Wall has stone voids up to 4' wide x 2.5' high x 2' deep. See Sheet 11 and Photos 25 - 30.
DEBRIS	6	There is scattered debris throughout the channel including an old pier in Span 3 and a tank located northwest of Pier 1. Debris do not impede the navigable channel. See Sheet 11.
VEGETATION	8	
CHANNEL CHANGE	7	There is evidence of scour as described under the "Channel Scour" item above. There is no apparent change to the channel orientation. See Photos 4 & 5.
FENDER SYSTEM	5	There is a timber fender system in place around the perimeter of Pier 1 and the west side of Pier 2. The fender piles and wales have splits and checks up to 1/2" wide. The wales have areas of minor abrasion / collision damage. The hardware has moderate to heavy corrosion within the tidal zone. There are several piles that were part of the old abandoned fender system along the channel bottom but do not impede the navigable channel. See Sheet 11 and Photos 9, 10 & 14.
SPUR DIKES & JETTIE	N	
RIP RAP	7	There is rip rap up to 3' diameter along the East Abutment, and rip rap near the northeast corner of Pier 3.
General remarks:		

Inspected by: [signature] **Date:** 1/23/15

Inspected by: Ethan R Nazjani for J. Figueroa **Date:** 1/23/15

D.O.T. reviewed by: [signature] **Date:** 2/4/2015

RECEIVED
JAN 29 2015
CONNECTICUT - DOT
BRIDGE SAFETY & EVALUATION



LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -5.5'
-3.5' -6.3'
-6.8' -1.7'

NOT
1.
2.
3.

LEGEND FOR BOTTOM ELEVATIONS

DEC, 2014 → -0.0'
DEC, 2010 → -0.0' -0.0' ← DEC, 2012
DEC, 2008 → -0.0' -0.0' ← DEC, 2006

• INDICATES NO INFORMATION

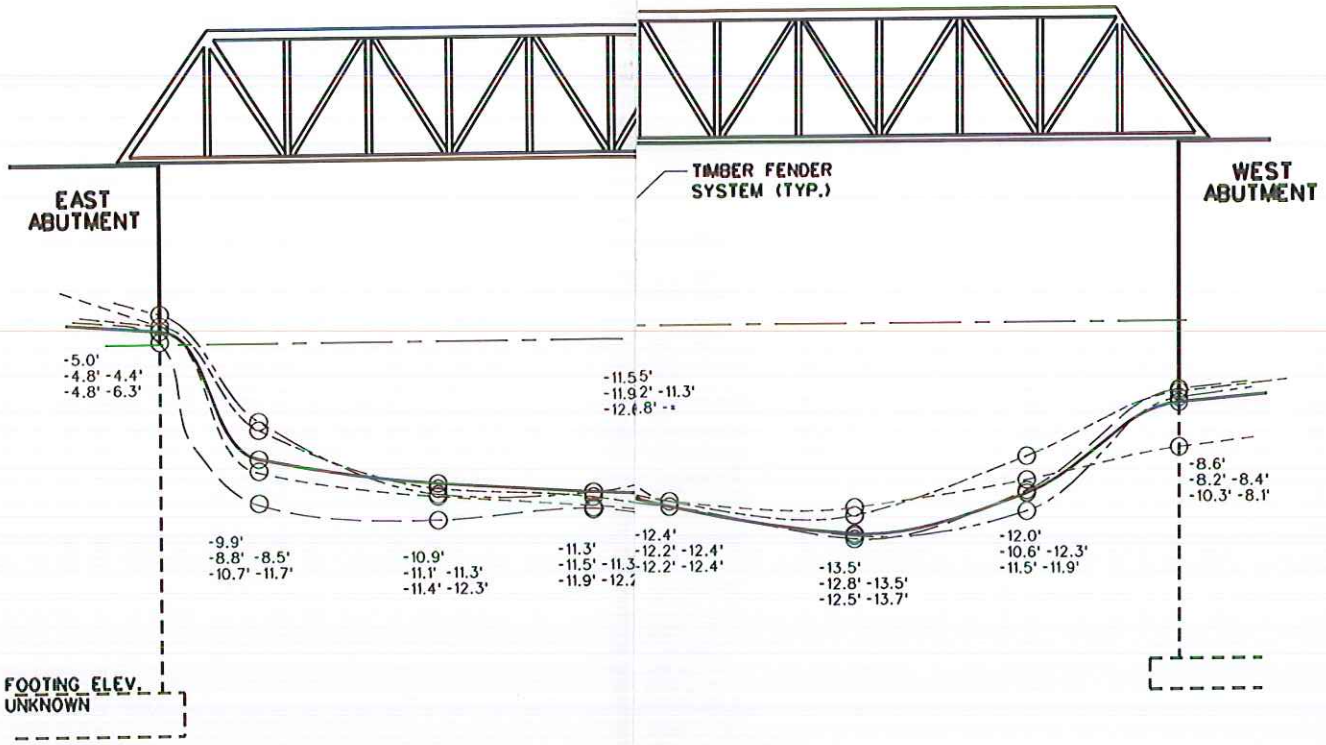
S INC.

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PLAN

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349A



LEGEND FOR SYMBOLS

⊕ DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

▽ W.S. ELEV. -5.5'
-3.5' -6.3'
-6.8' -1.7'

LEGEND FOR BOTTOM ELEVATIONS

DEC, 2014 → -0.0'
DEC, 2010 → -0.0' -0.0' ← DEC, 2012
DEC, 2008 → -0.0' -0.0' ← DEC, 2006

• INDICATES NO INFORMATION

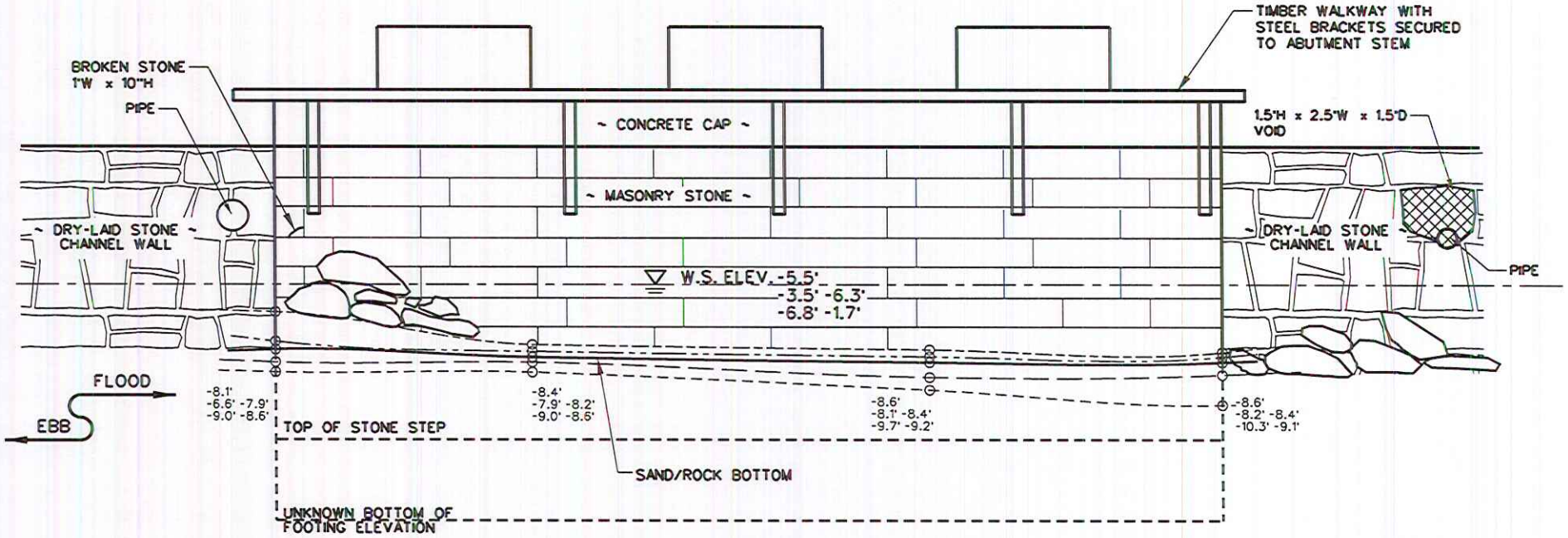
S INC.

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

UPSTREAM (NORTH) PROFILE

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349B



WEST ABUTMENT

N.T.S.

NOTES:

1. GROUT-REPAIR / EPOXY COATING ON STONE MASONRY STEM HAS FAILED UP TO 90% IN TIDAL ZONE.
2. STONE MASONRY STEM HAS 50% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 3" BETWEEN STONES.
3. STONE MASONRY RETURN WALL HAS 30% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 3" BETWEEN STONES.
4. DRY-LAID STONE CHANNEL WALLS HAVE PENETRATIONS UP TO 3" BETWEEN STONES.

LEGEND FOR MUDLINE PROFILES

- DEC. 2014
- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -5.5' -3.5' -6.3' -6.8' -1.7'

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2014 → -0.0'
DEC. 2010 → -0.0' -0.0' ← DEC. 2012
DEC. 2008 → -0.0' -0.0' ← DEC. 2006

• INDICATES NO INFORMATION

COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

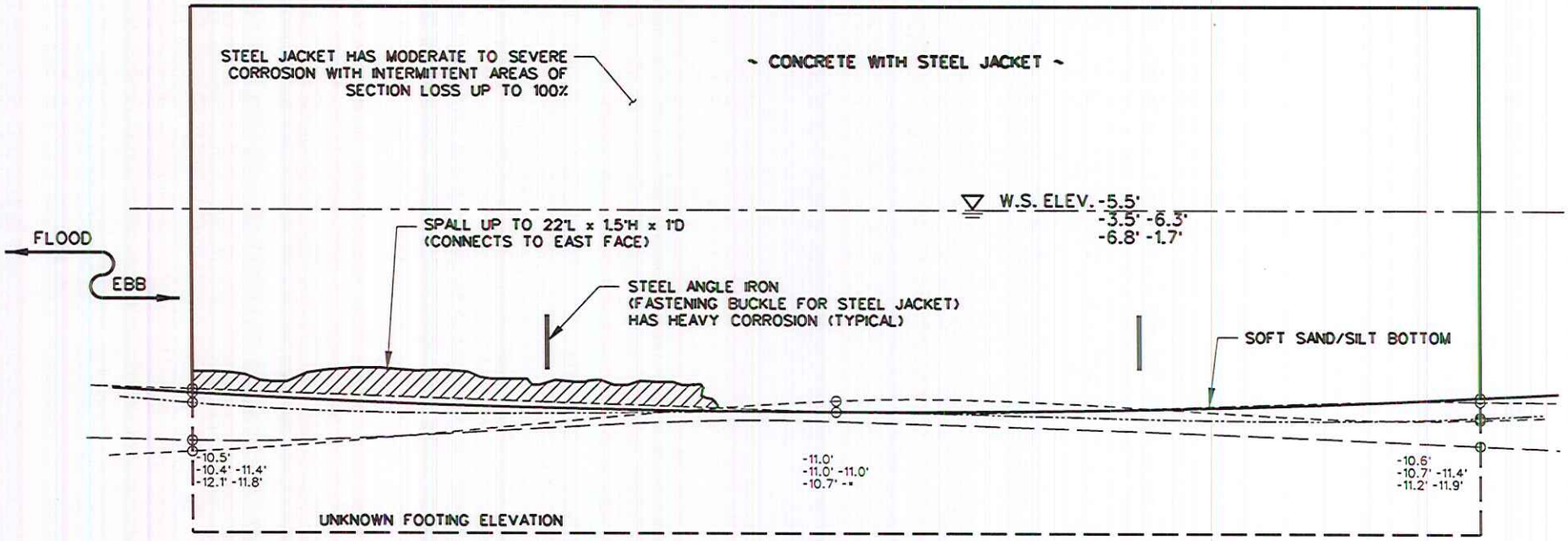
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

WEST ABUTMENT

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349C

13/14



PIER 1 (WEST ELEVATION)

N.T.S.

NOTES:

1. THERE IS A 4' HIGH BAND OF MISSING STEEL JACKET FROM 0.5' ABOVE WATER SURFACE TO 3.5' BELOW WATER SURFACE. AREAS OF EXPOSED CONCRETE HAVE MODERATE TO SEVERE SCALING WITH EXPOSED / LOOSE AGGREGATE.
2. CONCRETE OVERPOUR NOTED AT CHANNEL BOTTOM.

LEGEND FOR MUDLINE PROFILES

- DEC. 2014
- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -5.5' -3.5' -6.3' -6.8' -1.7'

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2014 → -0.0'
DEC. 2010 → -0.0' -0.0' ← DEC. 2012
DEC. 2008 → -0.0' -0.0' ← DEC. 2006

• INDICATES NO INFORMATION

COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

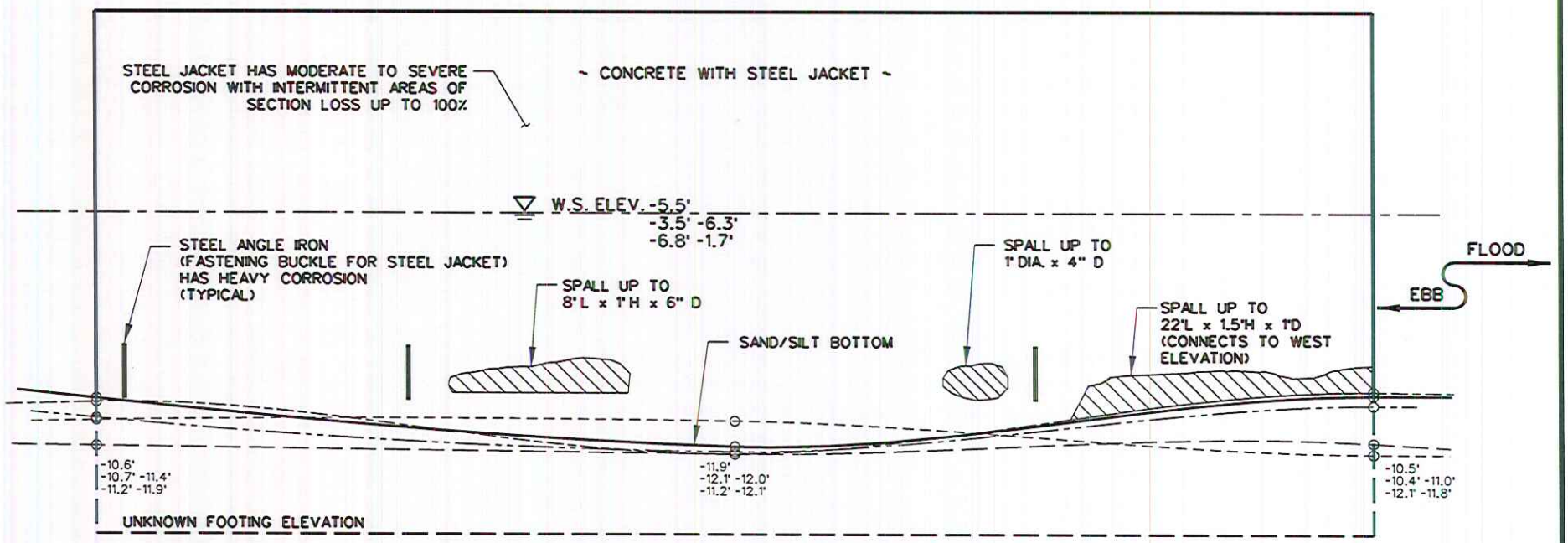
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 1 (WEST ELEVATION)

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 013490

14/41



PIER 1 (EAST ELEVATION)

N.T.S.

NOTES:

1. THERE IS A 4" HIGH BAND OF MISSING STEEL JACKET FROM 0.5' ABOVE WATER SURFACE TO 3.5' BELOW WATER SURFACE. AREAS OF EXPOSED CONCRETE HAVE MODERATE TO SEVERE SCALING WITH EXPOSED / LOOSE AGGREGATE.
2. CONCRETE OVERPOUR NOTED AT CHANNEL BOTTOM.

LEGEND FOR MUDLINE PROFILES

- DEC. 2014
- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -5.5' -3.5' -6.3' -6.8' -1.7'

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2014 — -0.0'
DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

• INDICATES NO INFORMATION

COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

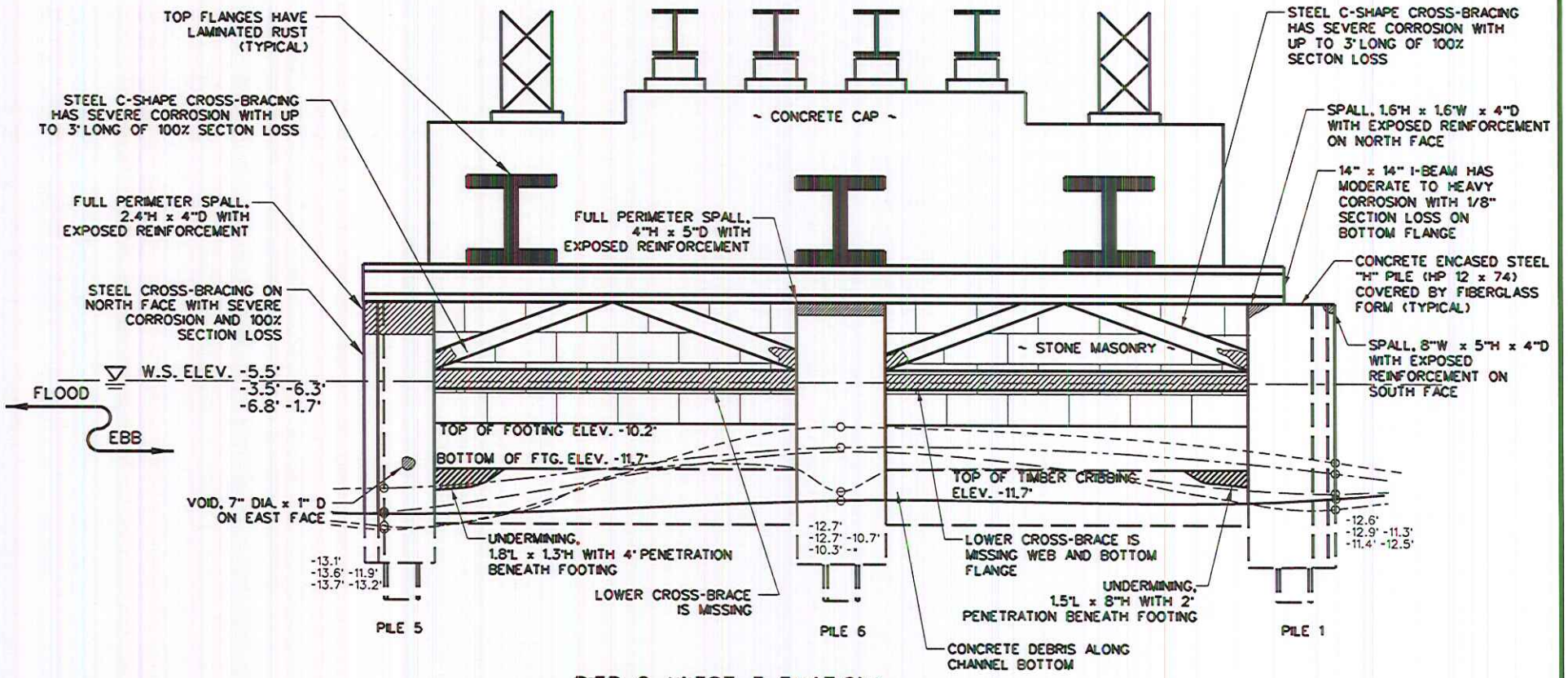
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

PIER 1 (EAST ELEVATION)

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349E

15/51



PIER 2 (WEST ELEVATION)

N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. TIMBER CRIBBING WAS EXPOSED AT AREAS OF UNDERMINING AND HAS EVIDENCE OF MARINE BORER ACTIVITY.
3. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS SCALING UP TO 1/2" DEEP WITH EXPOSED AGGREGATE.
4. STONE MASONRY PIER FACE HAS 50% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES, MISSING CHINKING STONES, AND INTERMITTENT CRACKED STONES.

LEGEND FOR MUDLINE PROFILES

- DEC. 2014
- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -5.5' -3.5' -6.3' -6.8' -1.7'

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2014 → -0.0'
DEC. 2010 → -0.0' -0.0' → DEC. 2012
DEC. 2008 → -0.0' -0.0' → DEC. 2006

• INDICATES NO INFORMATION

COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

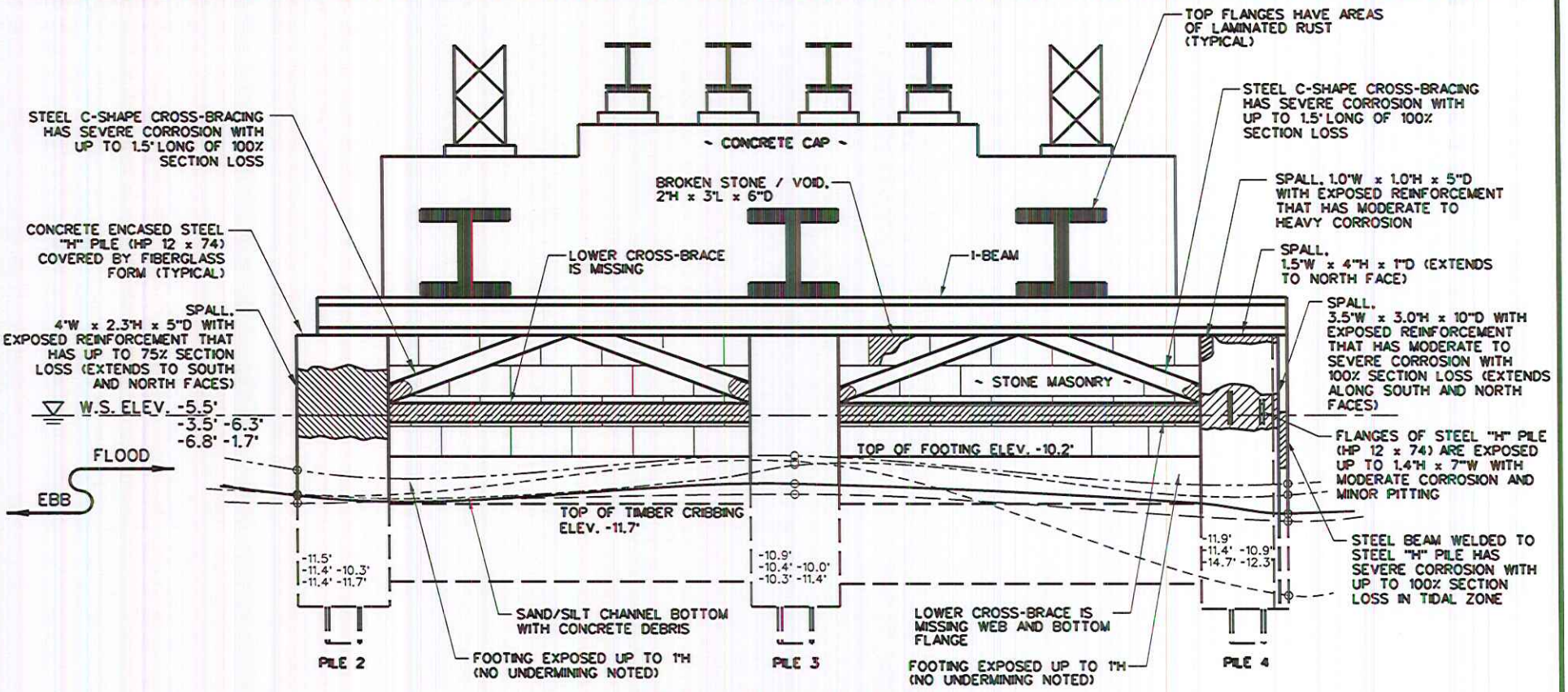
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 2 (WEST ELEVATION)

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349F

16/41



PIER 2 (EAST ELEVATION)

N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS SCALING UP TO 1/2" DEEP WITH EXPOSED AGGREGATE.
3. STONE MASONRY PIER FACE HAS 50% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES, MISSING CHINKING STONES, AND INTERMITTENT CRACKED STONES.

LEGEND FOR MUDLINE PROFILES

- DEC. 2014
- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -5.5' -3.5' -6.3' -6.8' -1.7'

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2014 — -0.0'
DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

• INDICATES NO INFORMATION

COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

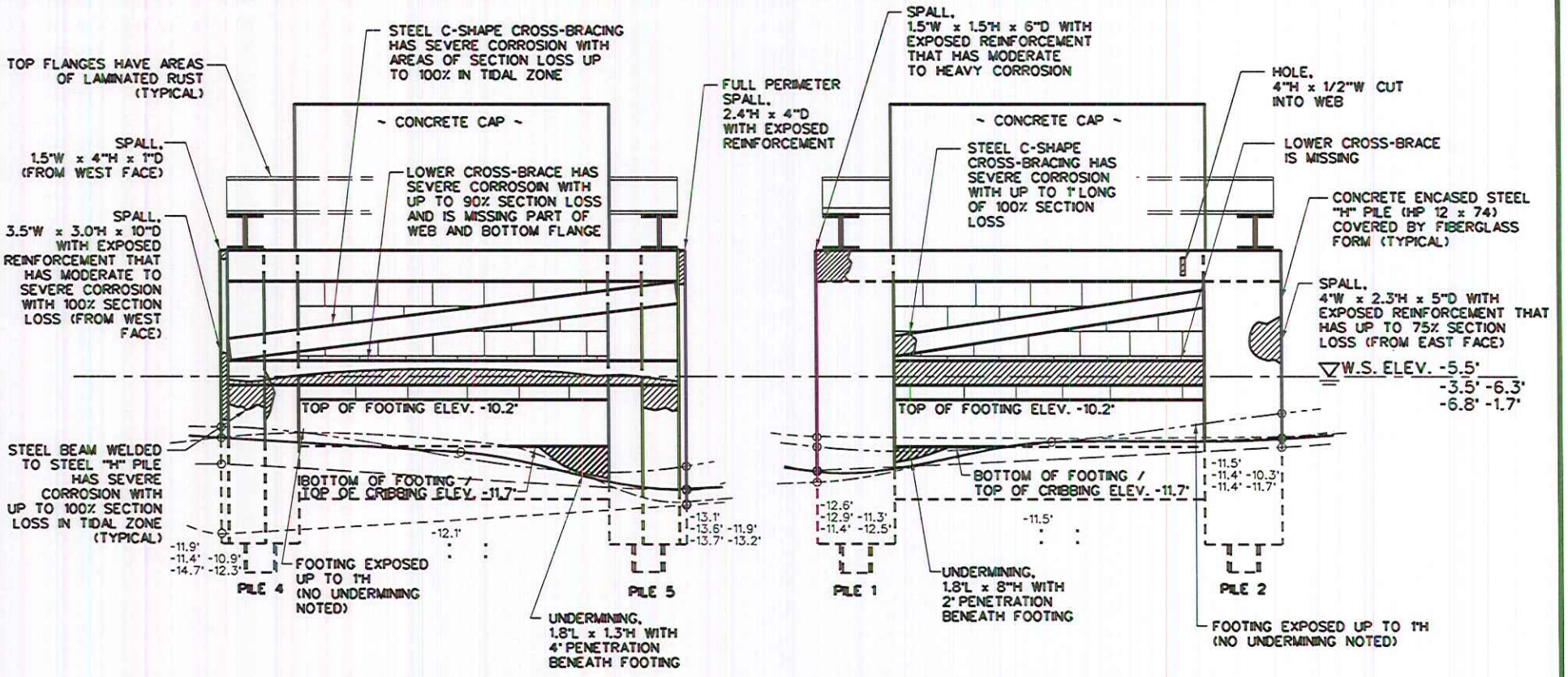
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

PIER 2 (EAST ELEVATION)

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349G

17/41



PIER 2 (NORTH ELEVATION)

N.T.S.

PIER 2 (SOUTH ELEVATION)

N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. TIMBER CRIBBING WAS EXPOSED AT AREAS OF UNDERMINING AND HAS EVIDENCE OF MARINE BORER ACTIVITY.
3. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS SCALING UP TO 1/2" DEEP WITH EXPOSED AGGREGATE.
4. STONE MASONRY PIER FACE HAS 50% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES, MISSING CHINKING STONES, AND INTERMITTENT CRACKED STONES.

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2014 → -0.0'
DEC. 2010 → -0.0' -0.0' → DEC. 2012
DEC. 2008 → -0.0' -0.0' → DEC. 2006

• INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES

DEC. 2014
DEC. 2012
DEC. 2010
DEC. 2008
DEC. 2006

LEGEND FOR SYMBOLS

⊕ DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

▽ W.S. ELEV. -5.5' -3.5' -6.3' -6.8' -1.7'

COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

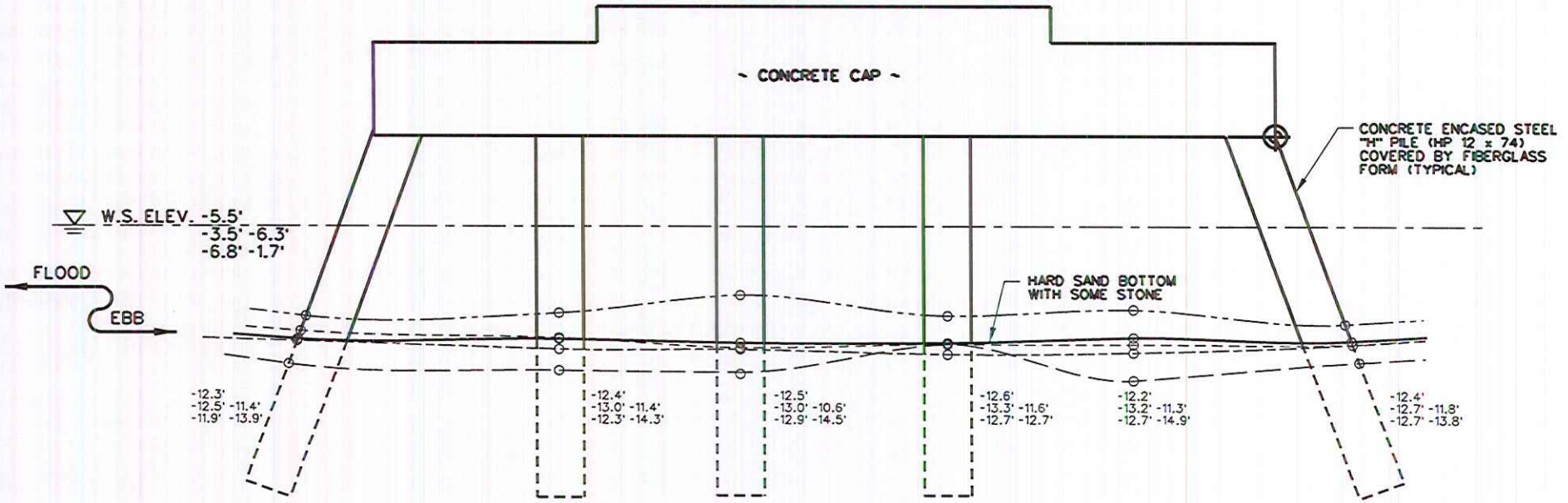
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 2 NORTH AND SOUTH ELEVATIONS

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349H

11/8/11



PIER 3 (WEST ELEVATION)

N.T.S.

NOTES:

1. FIBERGLASS FORMS HAVE HEAVY MARINE GROWTH (BARNACLES, OYSTERS, AND MUSSELS) UP TO 3" THICK.

LEGEND FOR MUDLINE PROFILES

- DEC. 2014
- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -5.5' -3.5' -6.3' -6.8' -1.7'

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2014 → -0.0'
DEC. 2010 → -0.0' -0.0' → DEC. 2012
DEC. 2008 → -0.0' -0.0' → DEC. 2006

• INDICATES NO INFORMATION

COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

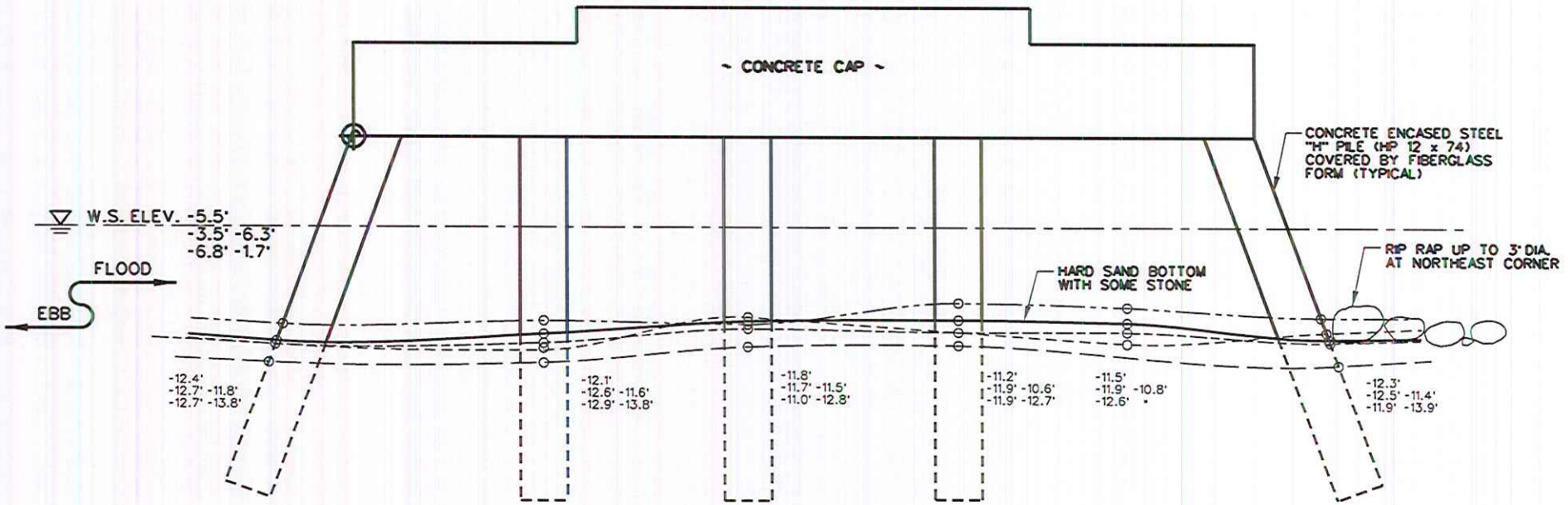
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

PIER 3 (WEST ELEVATION)

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349

11/61



PIER 3 (EAST ELEVATION)

N.T.S.

NOTES:

1. FIBERGLASS FORMS HAVE HEAVY MARINE GROWTH (BARNACLES, OYSTERS, AND MUSSELS) UP TO 3" THICK.

LEGEND FOR MUDLINE PROFILES

- DEC. 2014
- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -5.5' -3.5' -6.3' -6.8' -1.7'

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2014 — -0.0'
DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

• INDICATES NO INFORMATION

COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

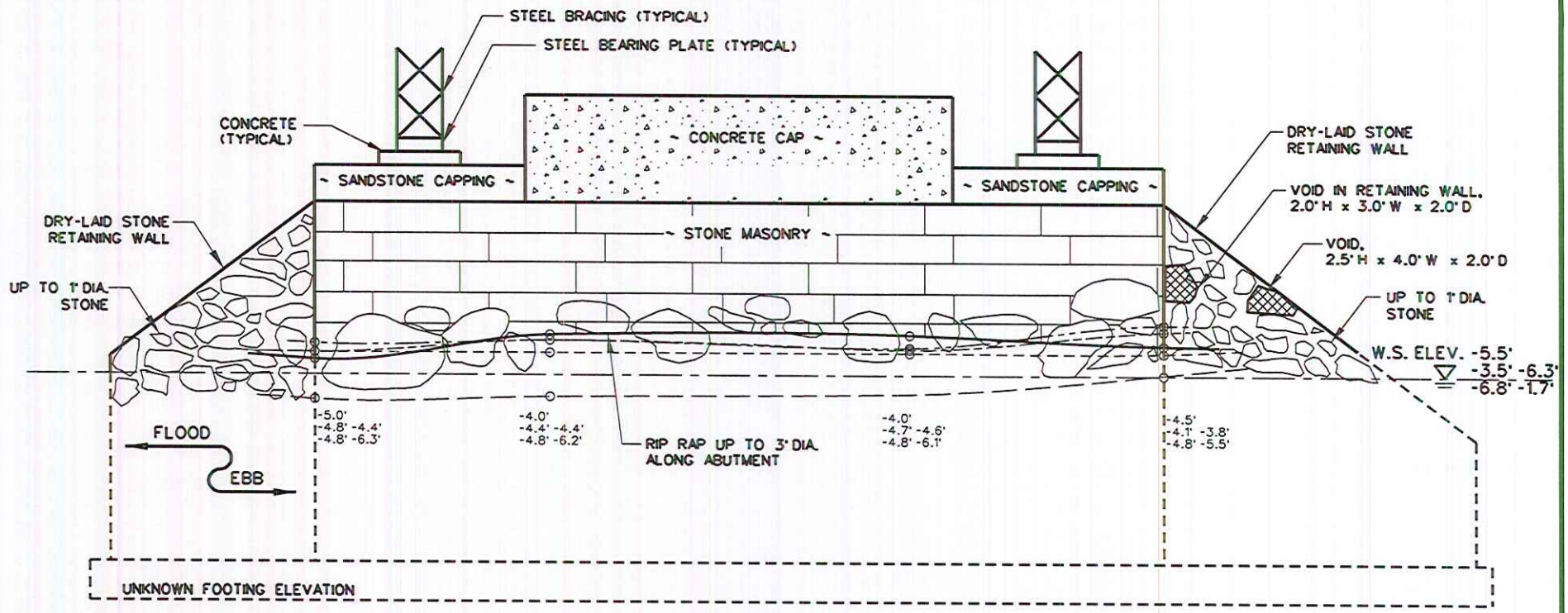
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 3 (EAST ELEVATION)

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349J

11/02



EAST ABUTMENT

N.T.S.

NOTES:

1. GROUT-REPAIR / EPOXY COATING ON STONE MASONRY HAS FAILED UP TO 90% IN TIDAL ZONE.
2. STONE MASONRY STEM AND RETURN WALLS HAVE 35% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 4' BETWEEN STONES.
3. DRY-LAID STONE RETAINING WALLS HAVE PENETRATIONS UP TO 3' BETWEEN STONES.

LEGEND FOR MUDLINE PROFILES

- DEC. 2014
- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -5.5' -3.5' -6.3' -6.8' -1.7'

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2014 — -0.0'
DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

• INDICATES NO INFORMATION

COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

EAST ABUTMENT

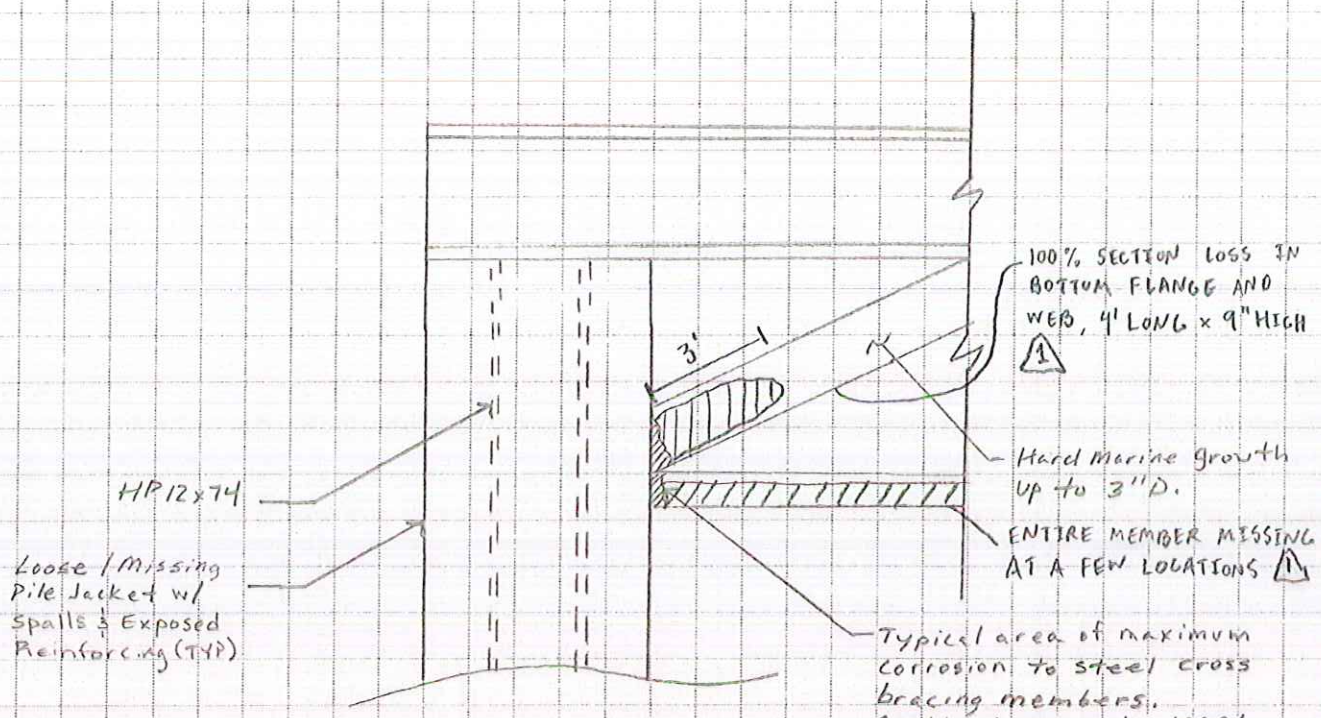
INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349K

11/2/18

A. DiCesare Associates, P.C.
690 Clinton Avenue
Bridgeport, Connecticut 06604
(203) 696-0444 • dicesare@adicesarepc.com

JOB BR No. 01349
SHEET NO. ~~14~~ OF ~~28~~
CALCULATED BY BM DATE 12/7/2012
CHECKED BY DATE
SCALE NTS

1 12/29/14 JK, JF, RS (COLLINS)



Pier 2 Typical Section Loss to Steel Cross Brace Members

NTS

PHOTO LOG

Form BRI-13, Rev. 9/97

Bridge Information System

Image Inventory

Bridge No. 01349 **Date** 12/29/14

Town: WESTPORT **Photographer:** JF/JK

Carried / Crossed: RT 136 / SAUGATUCK RIVER.

Film Frame #	Image Description
1	S BRIDGE ELEV ↑ N
2	SW EMBANK ↑ NW
3	SE " " NE
4	NE " " NE
5	CHANNEL LOOKING NORTH (FLOOD)
6	NW EMBANK ↑ W
7	N BRIDGE ELEV ↑ S
8-9	CHANNEL LOOKING SOUTH (EBB)
10	PIER 1 EAST FACE & FENDER ↑ NW
11	PIER 2 WEST FACE ↑ SE
12	WEST ABUTMENT ↑ W
13	PIER 1 EAST FACE ↑ W
14	PIER 3 WES FACE ↑ SE
15	PIER 2 EAST FACE ↑ W
16-17	EAST ABUTMENT ELEV. ↑ SE
18	PIER 3 EAST ELEV ↑ SW
19	PIER 1 WEST FACE & FENDER ↑ SE
20	NW RETURN WALL ↑ SW
21	NW CHANNEL WALL ↑ NW
22	PIER 1 NORTH FACE ↑ S
23	PIER 1 NORTH FACE ↑ S NOTE SPALL BELOW WATER LINE.
24	TYP. COND. OF STEEL ENCASEMENT @ WATER LINE
25	INTERIOR OF FENDER SYSTEM @ PIER 1 ↑ S
26	PIER 1 SOUTH ELEV ↑ N

PHOTO LOG

Form BRI-13, Rev. 9/97

Bridge Information System

Image Inventory

Bridge No. 01349 **Date** 12/29

Town: WESTPORT **Photographer:** JF/JK

Carried / Crossed: ROUTE 136/SAUGATUCK RIVER

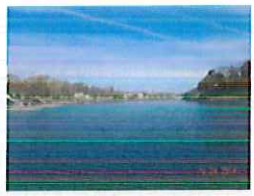
Film Frame #	Image Description
27	PIER 2 SOUTH FACE ↑ NW NOTE: MISSING BOTTOM CROSS BRACE
28	PILE 2 @ PIER 2 EXP REBAR W/ SECTION LOSS.
29	PIER 2 PILE 2 ↑ NW NOTE: SPALL.
30	PIER 2 PILE 1 CROSS BRACE CONNECTION NOTE: SECTION LOSS
31	PIER 2 PILE 4 SPALL ALONG WATER LINE NOTE: EXP. REBAR W ↑
32	PIER 2 PILE 4 ↑ NW NOTE: EXP. PILE
33	PIER 2 NORTH FACE ↑ SW
34	TYP. COND OF PIER 2 PILE 4 ↑ SW.
35	SE RETURN WALL ↑ NE
36	NE " " SE
37	TYP. PEN. BETWEEN STONE MASONRY @ EAST ABUT.
38-39	UNDERMINING @ NW CORNER OF PIER 2
40	EXP. CRIBBING @ NW CORNER OF PIER 2 NOTE: MARINE BORER ACTIVITY
41	UNDERMINING @ NW CORNER OF PIER 2
42-43	NORTH BRIDGE ELEV. ↑ S
44	CHANNEL LOOKING SOUTH (RBB).


01349 - 01.JPG


01349 - 02.JPG


01349 - 03.JPG


01349 - 04.JPG


01349 - 05.JPG


01349 - 06.JPG


01349 - 07.JPG


01349 - 08.JPG

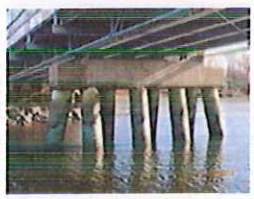

01349 - 09.JPG


01349 - 10.JPG


01349 - 11.JPG


01349 - 12.JPG


01349 - 13.JPG


01349 - 14.JPG


01349 - 15.JPG


01349 - 16.JPG


01349 - 17.JPG


01349 - 18.JPG

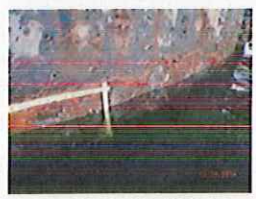

01349 - 19.JPG


01349 - 20.JPG

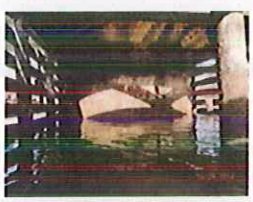

01349 - 21.JPG

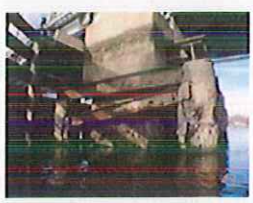

01349 - 22.JPG

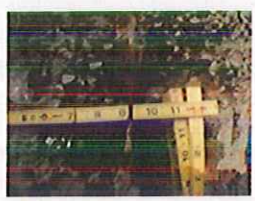

01349 - 23.JPG

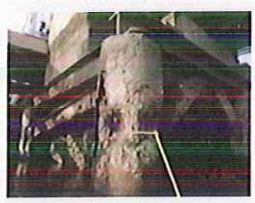

01349 - 24.JPG


01349 - 25.JPG


01349 - 26.JPG


01349 - 27.JPG


01349 - 28.JPG


01349 - 29.JPG


01349 - 30.JPG


01349 - 31.JPG


01349 - 32.JPG


01349 - 33.JPG


01349 - 34.JPG


01349 - 35.JPG



01349 - 36.JPG



01349 - 37.JPG



01349 - 38.JPG



01349 - 39.JPG



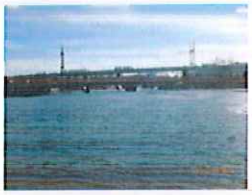
01349 - 40.JPG



01349 - 41.JPG



01349 - 42.JPG



01349 - 43.JPG



01349 - 44.JPG

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163

01349	
Photo # 1: Bridge Identification Number	**Photo # 2: North Bridge Elevation, Looking South** **Note: Bridge in foreground.**

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163

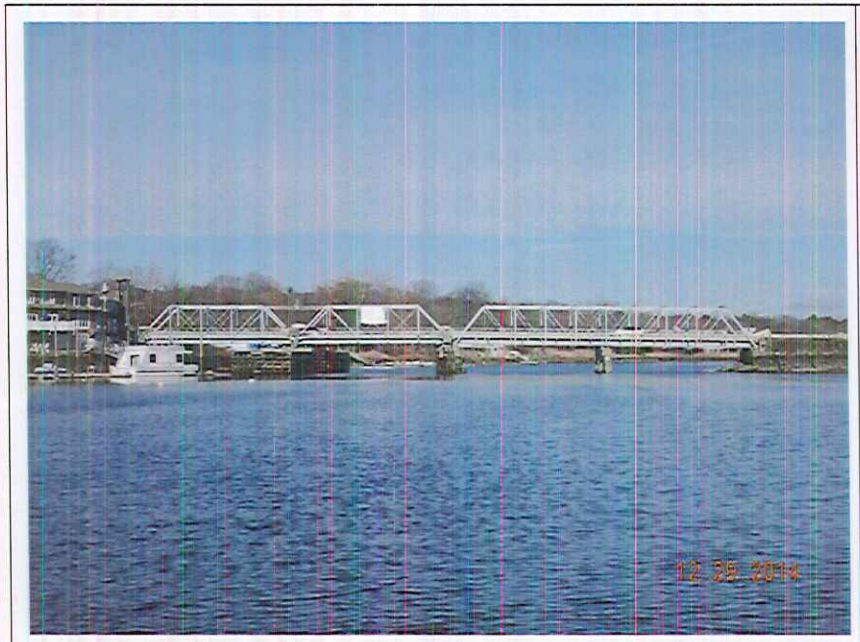


Photo # 3: South Bridge Elevation, Looking North

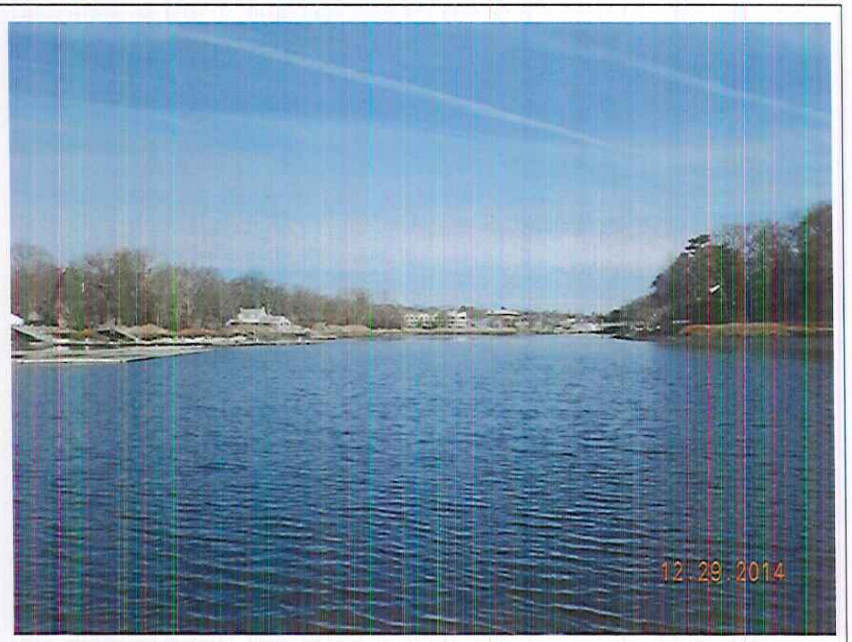


Photo # 4: Channel Looking Upstream / Flood (North)

Prepared by:
COLLINS ENGINEERS INC.

28/41

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 5: Channel Looking Downstream / Ebb (South)

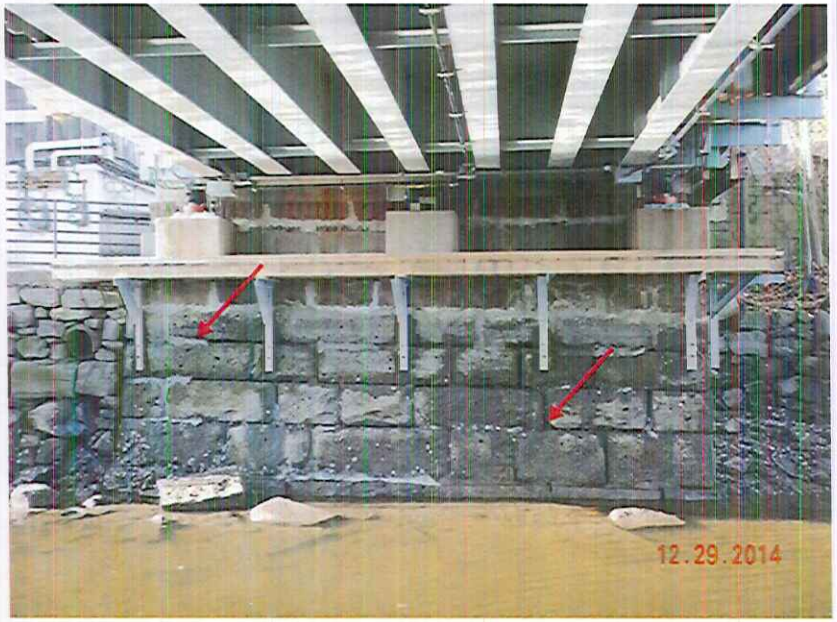


Photo # 6: West Abutment Elevation, Looking West

Note: Timber walkway anchored to abutment stem. Deteriorated / missing mortar and failing grout repair/ epoxy coating.

Prepared by:
COLLINS ENGINEERS INC.

29/41

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 7: East Abutment Elevation, Looking Southeast

.



Photo # 8: East Abutment Mortar Condition, Looking Southeast

Note: Deteriorated / missing mortar on abutment stem.

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 9: Pier 1 West Elevation and Fender System, Looking Southeast

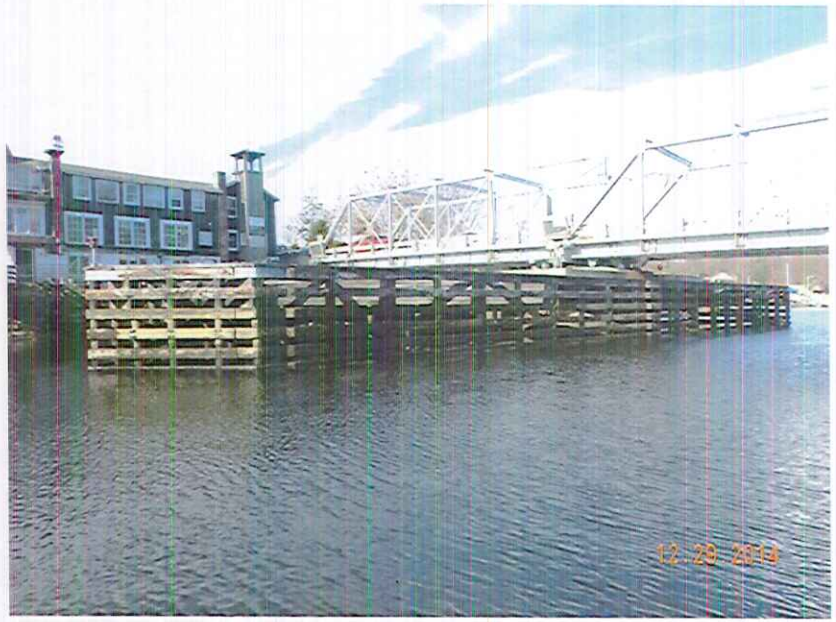


Photo # 10: Pier 1 East Elevation and Fender System, Looking Northwest

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 11: Pier 1 North Elevation, Looking South

Note: Steel jacket with moderate to severe corrosion with intermittent areas of 100% section loss.



Photo # 12: Pier 1 North Elevation, Steel Jacket Condition, Looking Southwest

Note: A band of the steel jacket is missing near the water surface.

Prepared by:
COLLINS ENGINEERS INC.

3 of 41

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 13: Pier 1 North Elevation, Near the Channel Bottom, Looking South

Note: Spall with exposed and loose aggregate on north face of Pier 1.



Photo # 14: Pier 2 West Elevation and Fender System, Looking Southeast

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 15: Pier 2 East Elevation, Looking West

Note: Masonry pier stem has deteriorated / missing mortar. A retrofit repair with reinforced concrete encased steel H-Piles, steel beams and reinforced concrete cap has been made on to the original masonry pier.



Photo # 16: Pier 2 South Elevation, Looking North

Note: Lower cross-brace is missing.

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 17: Pier 2, Pile 1 at Southwest Corner of Pier, Cross-bracing Connection to Pier Stem

Note: Severe corrosion with section loss on cross-bracing.

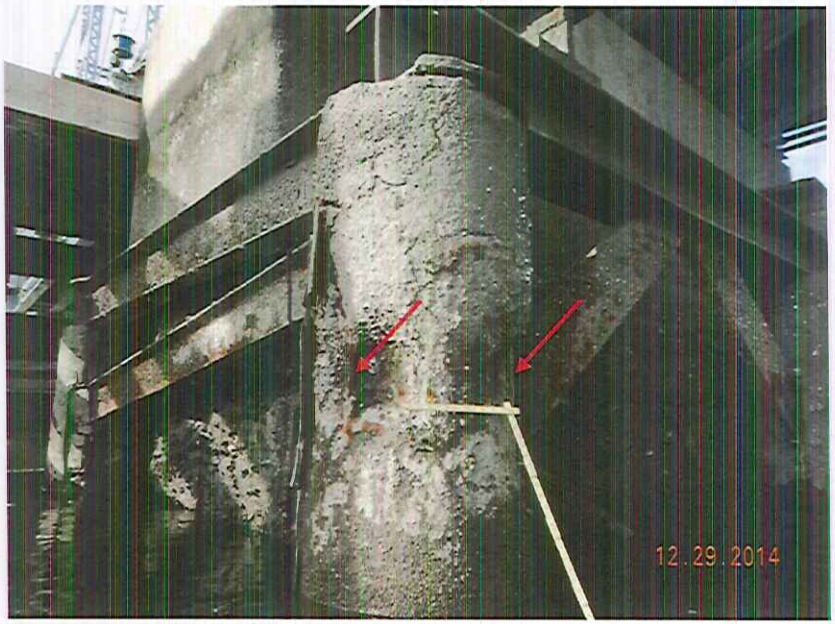


Photo # 18: Pier 2, Pile 2 at Southeast Corner of Pier

Note: Spall with exposed / corroded steel reinforcement on encasement.

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163

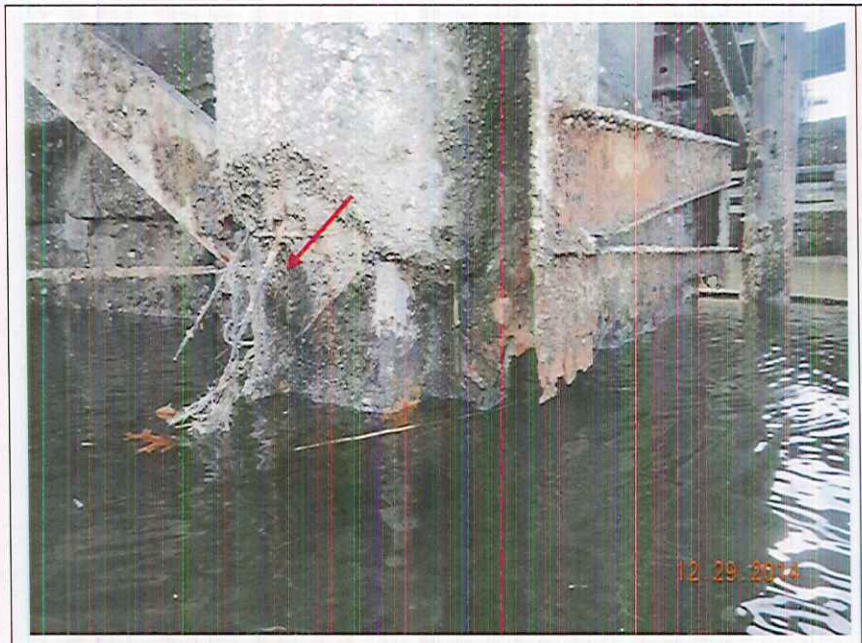


Photo # 19: Pier 2, Pile 4 at Northeast Corner of Pier, Looking West

Note: Spall with exposed / corroded steel reinforcement and exposed steel H-Pile.



Photo # 20: Pier 2, Pile 4 at Northeast Corner of Pier, Looking Northwest

Note: Corrosion and pitting on exposed steel H-Pile.

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 21: Pier 2 at Northwest Corner, Looking East

Note: Timber cribbing is exposed with evidence of marine borer activity.



Photo # 22: Pier 2 at Northwest Corner, Looking South

Note: Pier footing is undermined.

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 23: Pier 3 West Elevation, Looking Southeast

Note: Reinforced concrete encased steel H-piles covered by fiberglass forms.



Photo # 24: Pier 3 East Elevation, Looking Southwest

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 25: Northwest Channel Embankment / Channel Wall, Looking West



Photo # 26: Northwest Channel Wall, Looking Northwest

Note: Dry-laid stone wall void.

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 27: Northeast Channel Embankment, Looking Northeast



Photo # 28: Southwest Channel Embankment / Channel Wall, Looking Northwest

Prepared by:
COLLINS ENGINEERS INC.

Bridge No.	01349	**Inspected by:**	J. Karalekas, P.E.
Town:	Westport	**Inspected by:**	R. Snelgrove, J. Figueroa
Feature Carried:	Route 136	**Date Inspected:**	12/29/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3163



Photo # 29: Southeast Channel Embankment, Looking Southeast



Photo # 30: Southeast Retaining / Wingwall, Looking Northeast

Note: The wall has stone voids.

Prepared by:
COLLINS ENGINEERS INC.

APPENDIX

BRIDGE NO. 01349

ADDITIONAL FIELD NOTES

DATE: 12/29/2014

3/28

Connecticut Department of Transportation
UNDERWATER INSPECTION
BRI-59 Form

Bridge No: 01349 **Date Inspected:** ~~12/7/2012~~ 12/29/14

Job Number: 170-~~3013~~3163 **Client:** Connecticut D.O.T.

Route: 00136 **Mile point:** 8.65 **City:** ~~WESTPORT~~

FeatureCrossed: SAUGATUCK RIVER **State:** CT

Inspector: ~~Bill McLachlan~~ JK **Assistants:** ~~C. Carlson, K. Gabrielson~~ JF, RS

Time Arrived: ~~7:00 AM~~ 1000 AM **Time Departed:** 3:30 PM 3:30

Time In Water: 10:00 AM 11:00 **Time Out of Water:** 2:30 PM 2:30

Type of Inspection: Underwater ✓

Year built: 1884 ✓ **Total Length:** 287 ✓ **No. Spans:** 4 ✓

Bridge Type: Swing Span ✓

Total Number of Piers: 3 ✓ **Piers in the Water:** 3 ✓

Type of Piers: Concrete encased steel piles. OK

Abutments: Stone masonry with concrete cap. ✓

Bottom Composition: Intermittent rip-rap, up to 3.0' in diameter, sand silt and natural debris, with up to 2.0' penetration into the mudline. ✓

Previous U/W Insp: ~~12/8/2010~~ 12/7/12

Marine Growth: Barnacles, oysters and mussels up to 3" thick. ✓

Max. Water Depth: ~~17.5~~ 9.4

Max. Depth at Pier: ~~15.1~~ 7.1

Current Strength: <1 ft/sec OK

U/W Visibility: ~~2.0~~ 4'

Type of Water: Salt ✓

Access to Bridge: Boat ✓

RECEIVED
JAN 08 2013
CONNECTICUT - DOT
BRIDGE SAFETY & EVALUATION

Remarks: ~~CONN DOT representative Ron Jantzen made a site visit.~~ Boat Ramp located Elaine Rd

Inspection Equipment

Number of Boats: 1 ✓ **RR Protection:** No

Boat Size: ~~16~~ 21 **Equipment Comments:**

Dive Station: Yes ✓

Inspected by: [signature] **Date:** 1/3/13

Inspected by: [signature] **Date:** 1/3/13

L r. reviewed by: [signature] **Date:** 4/23/13

4/28

Connecticut Department of Transportation

UNDERWATER INSPECTION

BRI-58 Form

Bridge No: 01349 | Town: WESTPORT

Inspection Date: 12/7/2012 | Route Carried: 00136

Feature Crossed: SAUGATUCK RIVER

ITEM	RATING	REMARKS
60. SUBSTRUCTUR	5 ✓	
ABUTMENT 1:	6 ✓	West Abutment:
STEM	6	The stem exhibits missing mortar up to 30% with up to 3' penetration below MHW, and failing epoxy coating. (Sheet 9; Photos 5 & 14). Repair recommendations from BMM No. 09-530, Item No. 3 have not been addressed (See Sheet 18). 50' APPEARS TO BE SLIGHTLY TILTED TO THE EAST.
FOOTING	N	Not visible.
EROSION	8	
SETTLEMENT	(8)	7
SCOUR	7	Mudline elevations exhibit scour up to 1.3' since the 2010 inspection. (Sheet 9)
WINGWALLS	5	The dry laid stone retaining walls with up to 3.0' penetration into the stonework. The northwest wingwall/retaining wall exhibits void up to 2.5' H x 1.5' W x 1.5' D. (Sheet 9) Repair recommendations from BMM No. 09-530, Item No. 4 have not been addressed (See Sheet 18). ✓ w/ MISSING CHINK STONES (N NW NW
General remarks:		
ABUTMENT 2:	6 ✓	East Abutment:
STEM	6	The stem exhibits missing mortar up to 30% with up to 2.5' penetration below MHW, and failing epoxy coating. (Sheet 17; Photo 12 & 16) Repair recommendations from BMM No. 09-530, Item No. 3 have not been addressed (See Sheet 18).
FOOTING	N	Not visible.
EROSION	8	
SETTLEMENT	8	
SCOUR	7	Mudline elevations remain relatively unchanged since the 2010 inspection. (Sheet 17)
WINGWALLS	5	The southeast wingwall exhibits two voids up to 2.5' H x 4' W x 2' D. (Sheet 17, Photo 12) Repair recommendations from BMM No. 09-530, Item No. 4 have not been addressed (See Sheet 18).
General remarks:		
PIER NO. 1	5 OK	Circular concrete pier with steel jacket. 5 Masonry pier w/ timber cribbing. Encased in concrete w/ Steel shell @ 1951-1952 ✓ Add note OK
PILES	N	
STEM	5 ✓	The steel jacket exhibits a 4' H band of moderate to severe corrosion within the tidal zone with intermittent section loss up to 100%. The exposed concrete exhibits moderate to severe scale/spalls up to 52' L x 2' H x 10" D. (Sheets 10 & 11, Photos 6 & 7) Repair recommendations from BMM No. 09-530, Item No. 5 have not been addressed (See Sheet 18). 22 RDT 4/23/13
FOOTING	N	Not visible. per noted as Sd'
SCOUR	(6)	Mudline elevations exhibit scour up to 0.7' since the 2010 inspection. (Sheets 10 & 11)
SETTLEMENT	8	
General remarks:		
PIER NO. 2	5 ✓	Concrete cap supported by I-beams that are supported by six concrete encased H piles with fiberglass

1/4/2013

original Masonry pier is undermined however a retrofit repair has been added with steel piles. Encasement are rough shape but steel is good.

Connecticut Department of Transportation

UNDERWATER INSPECTION

BRI-58 Form

Bridge No: 01349 | Town: WESTPORT

Inspection Date: 12/7/2012 | Route Carried: 00136

Feature Crossed: SAUGATUCK RIVER

ITEM	RATING	REMARKS
PILES	4	Jacket. The piles exhibit areas of missing or loose fiberglass jacket. The exposed concrete encasement at Pile 4 (worst case scenario) exhibits delamination and spalls up to 3.5' W x 3' H x 7" D with exposed reinforcement. This spall also exposes the southeast flange of Pile 4. The exposed flange portion is in good condition. The reinforcement exhibits moderate to severe corrosion. Pile 5 exhibits a loose and or missing fiberglass jacket and a void up to 7" dia x 1" D. Pile 6 exhibits hollow sounding area up to 4" H x 50% of perimeter. The steel cross bracing members between the piles display severe corrosion with up to 100% section loss. (Sheet 12, 13 & 14; Photos 9, 13 & 15) Deficiencies in cross bracing members and pile jackets noted on BMM No. 06-091 and have not been addressed. (See Sheet 19, Item Nos. 1 & 3).
STEM	5	Stone masonry section exhibits mortar loss up to 25% with up to 2.5' penetration into the joints.
FOOTING	5	Concrete footing on timber cribbing: The non-structural footing is intermittently exposed. The timber cribbing is no longer exposed. The footing is no longer bearing the live load since the installation of the concrete encased H piles. (Sheets 12, 13 & 14)
SCOUR	5	Mudline elevations primarily exhibit aggradation up to 2.0' since the 2010 inspection. (Sheets 12, 13 & 14)
SETTLEMENT	7	
General remarks:		

PIER NO. 3

	6	Concrete cap supported by eight concrete encased H piles with plastic jacket.
PILES	7	Eight concrete encased steel H piles with plastic jackets. No deficiencies noted. (Sheets 15 & 16; Photos 10 & 11)
STEM	N	
FOOTING	N	
SCOUR	6	Mudline elevations exhibit aggradation up to 2.4, since the 2010 inspection. (Sheets 15 & 16)
SETTLEMENT	8	
General remarks:		

61. CHANNEL & CHANNEL PROTECTION:

CHANNEL SCOUR	6	Mudline elevations exhibit random areas of scour with no specific pattern up to 3.6', with the exception of the areas surrounding Pier Nos. 2 & 3, that exhibits aggradation of 3' to 5' since the 2008 and 2010 inspection. (Sheet 7 & 8)
EMBANKMENT EROSIO	8	
DEBRIS	6	Minor scattered debris.
VEGETATION	8	
CHANNEL CHANGE	7	No notable channel change was observed.
FENDER SYSTEM	5	Timber piles and horizontal wales exhibit splits and checks 1/4" to 1/2" w. throughout. Several piles with up to 30% section loss at mudline were abandoned and or part of the old Fender system. The hardware exhibits moderate to heavy corrosion in the tidal zone. Wales at random locations exhibit minor abrasion damage, possibly due to impact.
SPUR DIKES & JETTIE	N	

Connecticut Department of Transportation

UNDERWATER INSPECTION

BRI-58 Form

Bridge No: 01349 **Town:** WESTPORT

Inspection Date: 12/7/2012 **Route Carried:** 00136

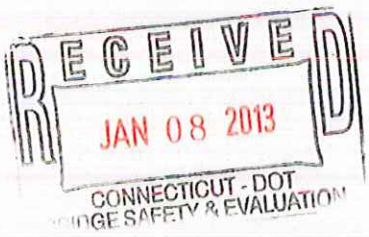
Feature Crossed: SAUGATUCK RIVER

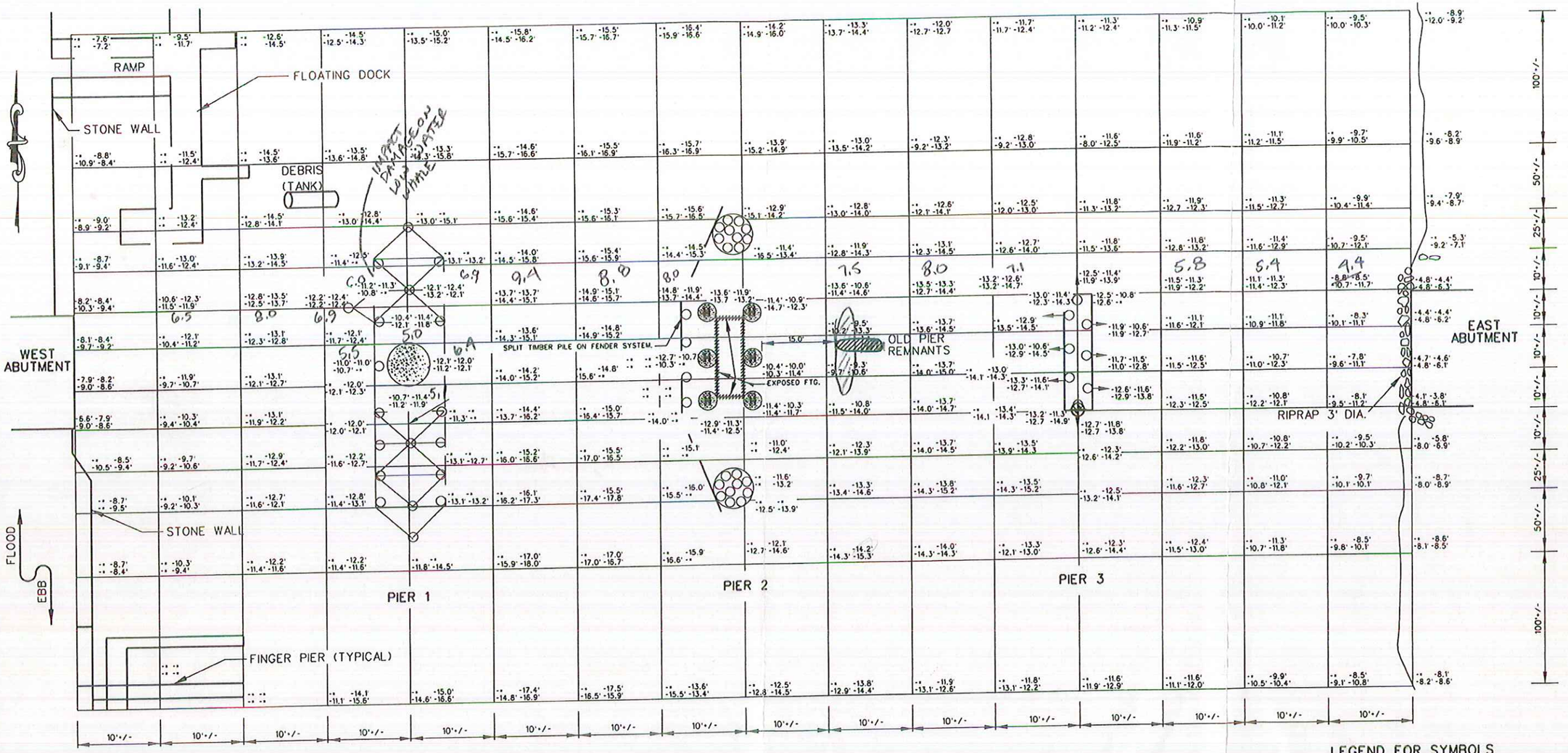
ITEM	RATING	REMARKS
RIP RAP	7	Riprap up to 3' diameter occurs at the East Abutment, and large rocks/riprap occurs at the northeast corner of Pier 3. (Sheet 16 & 17)
General remarks:		Channel scour comparisons were completed utilizing both 2008 and 2010 elevations as not all 2010 soundings and or elevations were available.

Inspected by: _____ Date: 1/4/13

Inspected by: Clay Carlson Date: 1/4/13

D.O.T. reviewed by: _____ Date: 4/23/2013





LEGEND FOR BOTTOM ELEVATIONS

DEC, 2010 → -0.0' -0.0' ← DEC, 2012
DEC, 2008 → -0.0' -0.0' ← DEC, 2006

* INDICATES NO INFORMATION

- ADD CHANNEL WALL NOTE
- " TIMBER FENDER NOTES

PLAN
N.T.S.

LEGEND FOR SYMBOLS

⊕ DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

▽ W.S. ELEV. -3.5' ~~-6.3'~~ 6.0 - 5.0 LATE EARLY
-6.8' -1.7'

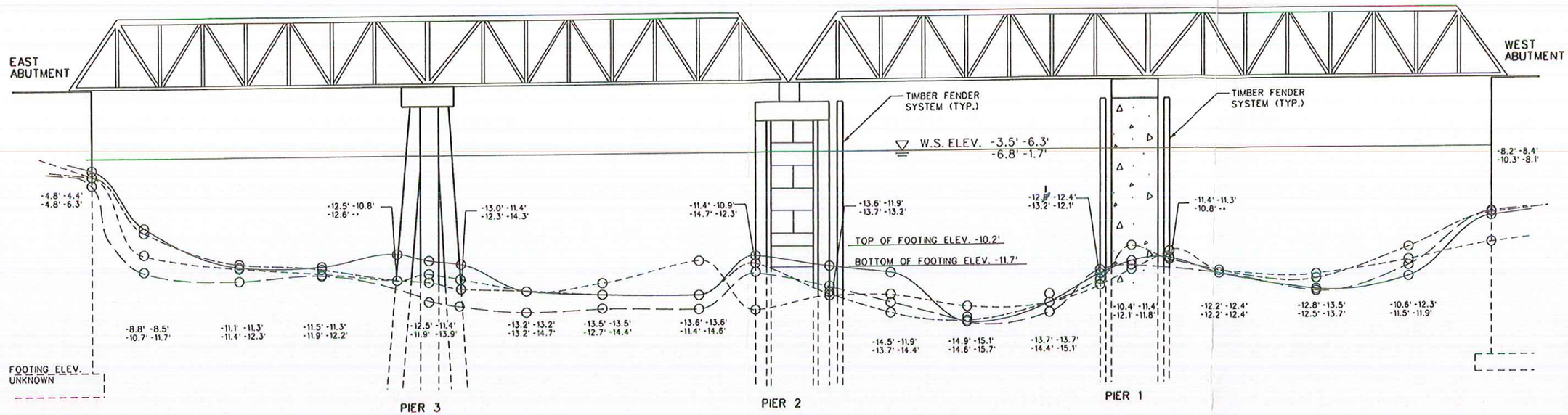
SEE ELEV SHEETS

A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1091
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PLAN

INSPECTED BY: BM REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 01349A



UPSTREAM (NORTH) PROFILE

N.T.S.

See grid sheet and profiles

LEGEND FOR BOTTOM ELEVATIONS

DEC, 2010 -0.0' -0.0' DEC, 2012
DEC, 2008 -0.0' -0.0' DEC, 2006

LEGEND FOR MUDLINE PROFILES

DEC, 2012
DEC, 2010
DEC, 2008
DEC, 2006

* INDICATES NO INFORMATION

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -3.5' -6.3' -6.8' -1.7'

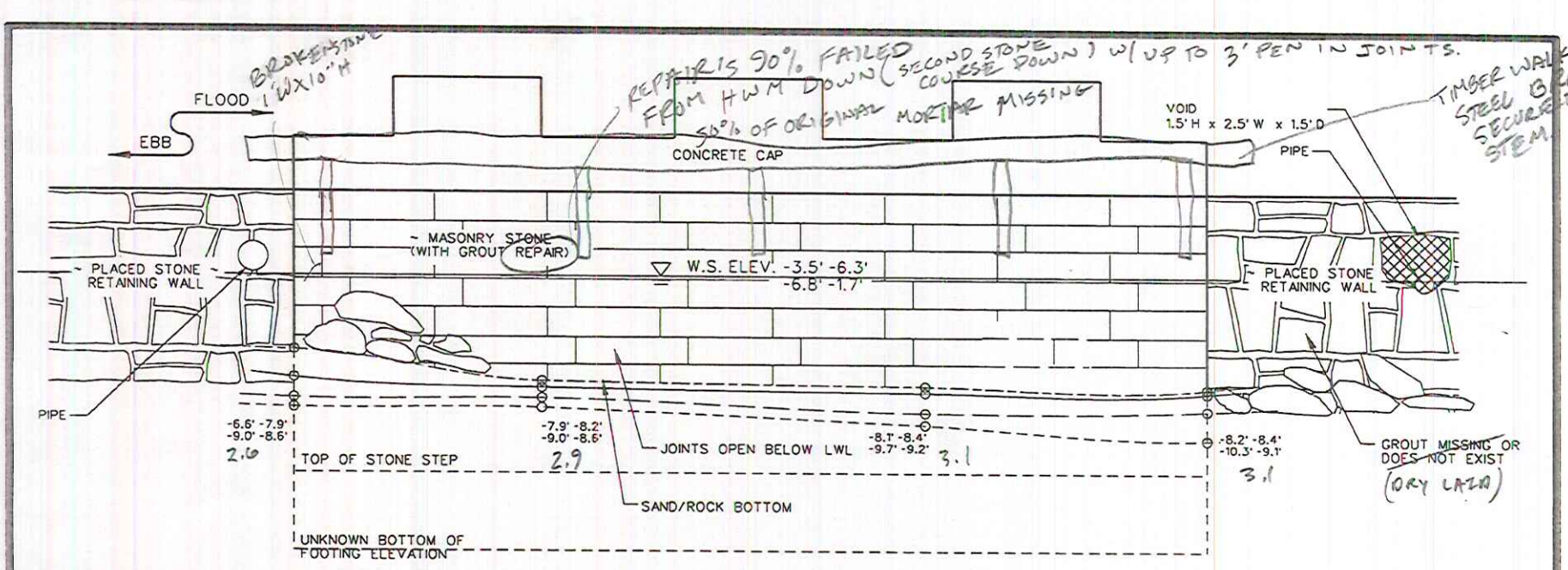
A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

UPSTREAM (NORTH) PROFILE

INSPECTED BY: BM REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 01349B



WEST ABUTMENT

N.T.S.

NOTES:

- MISSING MORTAR, UP TO ~~30%~~ 50%, WITH UP TO 3.0' PENETRATION INTO STONEWORK AND A FAILING EPOXY COATING. ✓
- THE PLACED STONE RETAINING WALLS HAVE UP TO 3.0' PENETRATION INTO THE STONEWORK. ✓
  - 2' PEN INTO ML

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

LEGEND FOR MUDLINE PROFILES

- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -3.5' -~~6.3'~~ -6.8' -1.7' 5.5

• INDICATES NO INFORMATION

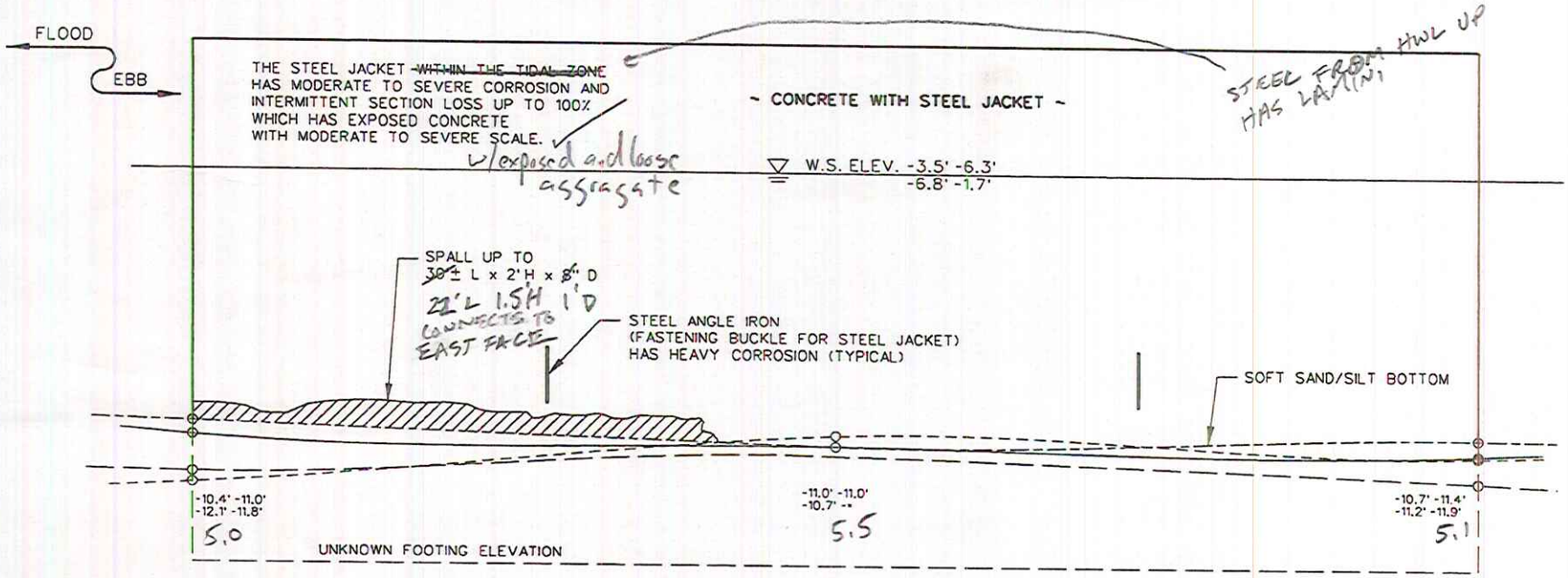
A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

WEST ABUTMENT

INSPECTED BY: BM REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 01349C



PIER 1 (WEST ELEVATION)

N.T.S.

NOTES:

- INTERMITTENT BAND OF MISSING STEEL AROUND ENTIRE PIER UP TO 4' HIGH ✓
- INTERMITTENT PROBING UP TO 2.0' PENETRATION INTO THE MUDLINE. ✓
- CONCRETE OVERPOUR NOTED AT MUDLINE. ✓
- HARDWARE EXHIBITS MODERATE TO HEAVY CORROSION IN THE TIDAL ZONE. ON FENDER ✓
- TIMBER WALES IN FAIR CONDITION WITH 1/4" CHECKING AND SOME LONGITUDINAL SPLITTING ON FENDER ✓

{MOVE TO SOUNDING}

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

LEGEND FOR MUDLINE PROFILES

——————— DEC. 2012
— — — — — — DEC. 2010
- - - - - - - - - DEC. 2008
— — — — — DEC. 2006

LEGEND FOR SYMBOLS

⊕ DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

▽ W.S. ELEV. -3.5' -6.3' -6.8' -1.7' 5.5

· INDICATES NO INFORMATION

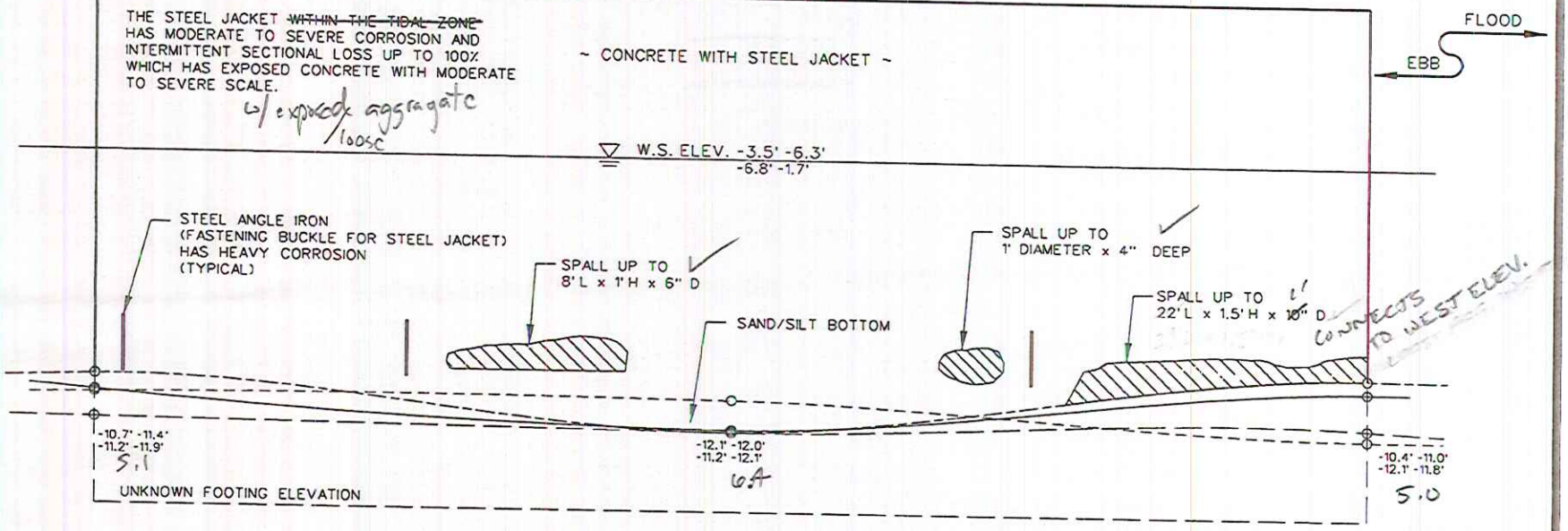
A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 1 (WEST ELEVATION)

INSPECTED BY: BM REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 01349D



PIER 1 (EAST ELEVATION)

N.T.S.

NOTES:

- A BAND MISSING STEEL NOTED AROUND ENTIRE PIER UP TO 4.0' HIGH.
- CONCRETE OVERPOUR NOTED AT MUDLINE.
- SPALLS HAVE LOOSE AGG. IN CONC.

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

LEGEND FOR MUDLINE PROFILES

DEC. 2012
DEC. 2010
DEC. 2008
DEC. 2006

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -3.5' ~~-6.3'~~ -6.8' -1.7' 5.5

* INDICATES NO INFORMATION

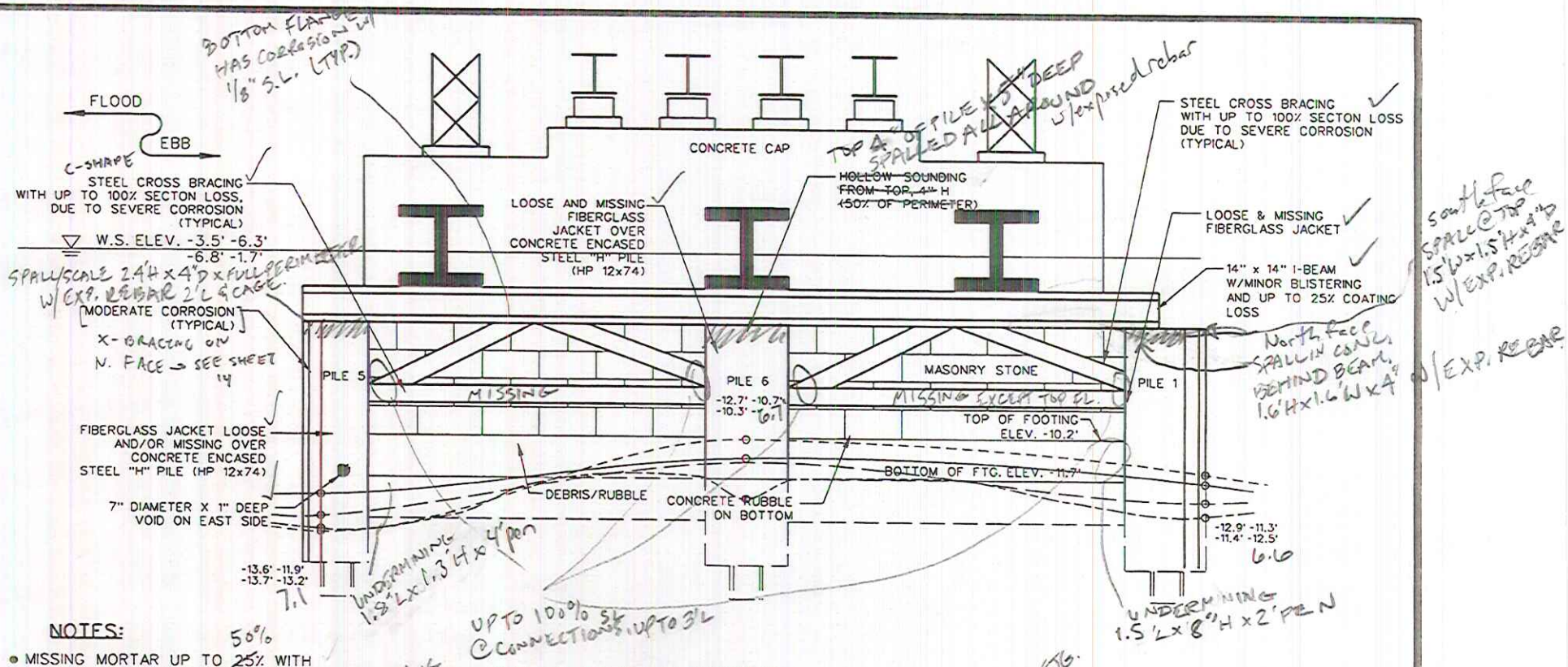
A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 1 (EAST ELEVATION)

INSPECTED BY: BM
REVISED BY: DM
SCALE: AS SHOWN
DATE OF INSPECTION 12 / 07 / 12
DRAWING NO. 01349E



PIER 2 (WEST ELEVATION)

N.T.S.

NOTES:

- MISSING MORTAR UP TO ~~25%~~ 50% WITH 2.5' HORIZONTAL PENETRATION INTO THE PIER, BETWEEN THE STONEWORK W/ MISSING CHINK STONES.
- INTERMITTENT CRACKS IN THE STONEWORK AND CAPPING WAS OBSERVED.

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2010 ← -0.0' -0.0' → DEC. 2012
DEC. 2008 ← -0.0' -0.0' → DEC. 2006

LEGEND FOR MUDLINE PROFILES

- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER ~~3~~.
- W.S. ELEV. -3.5' ~~-6.3'~~ 5.5 -6.8' -1.7'

* INDICATES NO INFORMATION

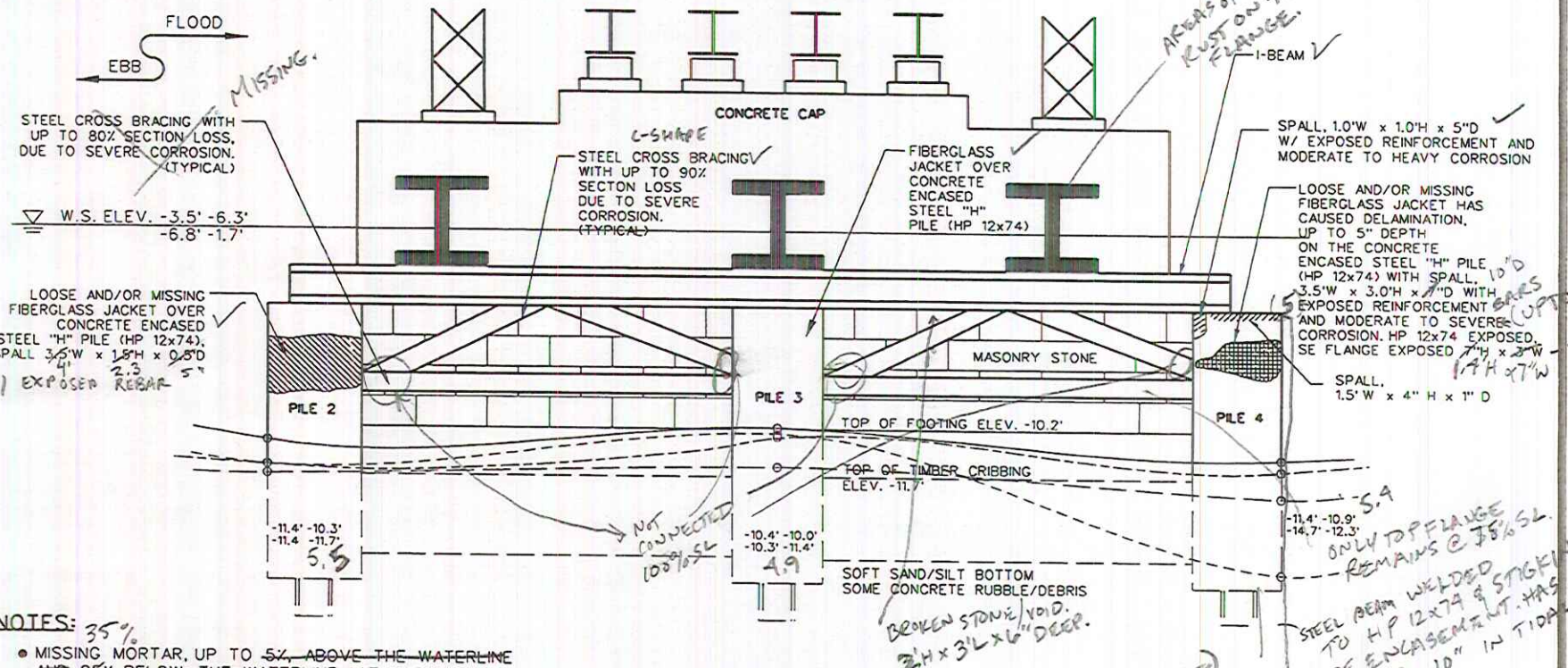
A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 2 (WEST ELEVATION)

INSPECTED BY: BM REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 01349F



NOTES:

- MISSING MORTAR, UP TO ~~5%, ABOVE THE WATERLINE AND 25% BELOW THE WATERLINE~~, WITH UP TO 2.5' HORIZONTAL PENETRATION INTO THE PIER, BETWEEN THE STONE WORK.
- INTERMITTENT CRACKS IN THE STONEWORK AND CAPPING WAS OBSERVED.

PIER 2 (EAST ELEVATION)

N.T.S.

TYP. (ADD'L ALL PIER 2 SHEETS) ENCASEMENTS HAVE SCALE W/ EXP. AGG. UP TO 1/2" DEEP.

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

LEGEND FOR MUDLINE PROFILES

DEC. 2012
DEC. 2010
DEC. 2008
DEC. 2006

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -3.5' -6.3' -6.8' -1.7'

5.5 (use 6.0 for elevations on pier 2)

* INDICATES NO INFORMATION

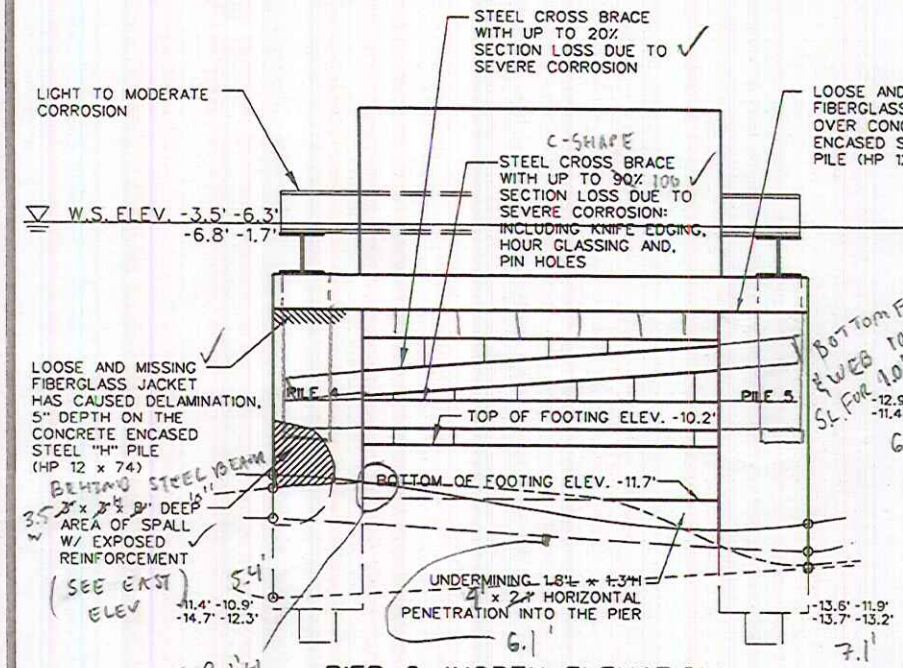
A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

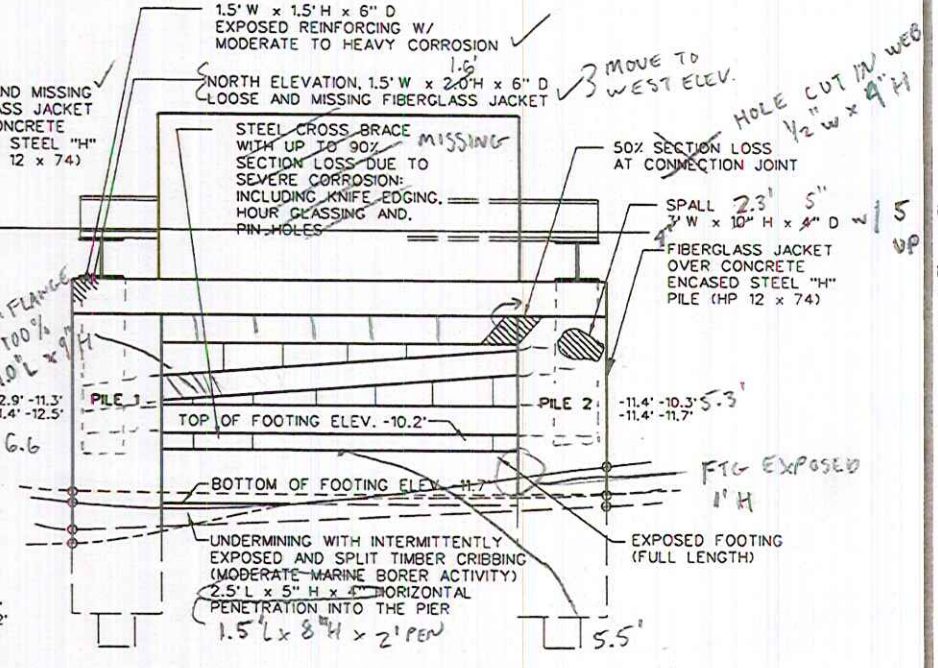
PIER 2 (EAST ELEVATION)

INSPECTED BY: BM / REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 01349G



PIER 2 (NORTH ELEVATION)

N.T.S.



PIER 2 (SOUTH ELEVATION)

N.T.S.

NOTES:

- MISSING MORTAR, UP TO 20% WITH 2.5' HORIZONTAL PENETRATION INTO THE PIER, BETWEEN THE STONEWORK.

TOP OF FOOTING @ 9' @ 1:30 PM

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

LEGEND FOR MUDLINE PROFILES

——————— DEC. 2012
— — — — — — DEC. 2010
- - - - - - - - - DEC. 2008
— — — — — DEC. 2006

LEGEND FOR SYMBOLS

⊕ DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

▽ W.S. ELEV. -3.5' -6.3' -6.8' -1.7' (6.0 USE FOR ELEVATIONS) 5.5

• INDICATES NO INFORMATION

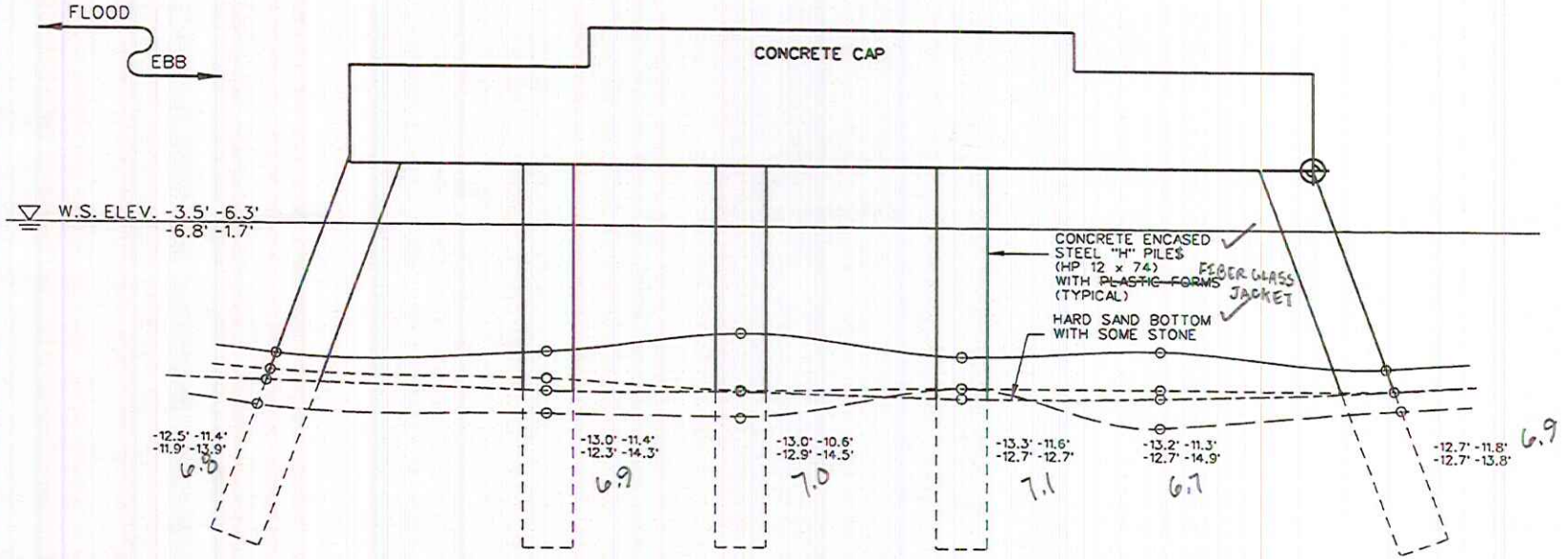
A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 2 NORTH AND SOUTH ELEVATIONS

INSPECTED BY: BM
REVISED BY: DM
SCALE: AS SHOWN
DATE OF INSPECTION 12 / 07 / 12
DRAWING NO. 01349H



NOTES

- HEAVY MARINE GROWTH ON PILES, BARNACLES, OYSTERS AND MUSSELS UP TO 3" THICK

PIER 3 (WEST ELEVATION)

N.T.S.

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

LEGEND FOR MUDLINE PROFILES

DEC. 2012
DEC. 2010
DEC. 2008
DEC. 2006

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -3.5' ~~-6.3'~~ 5.5
-6.8' -1.7'

• INDICATES NO INFORMATION

A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

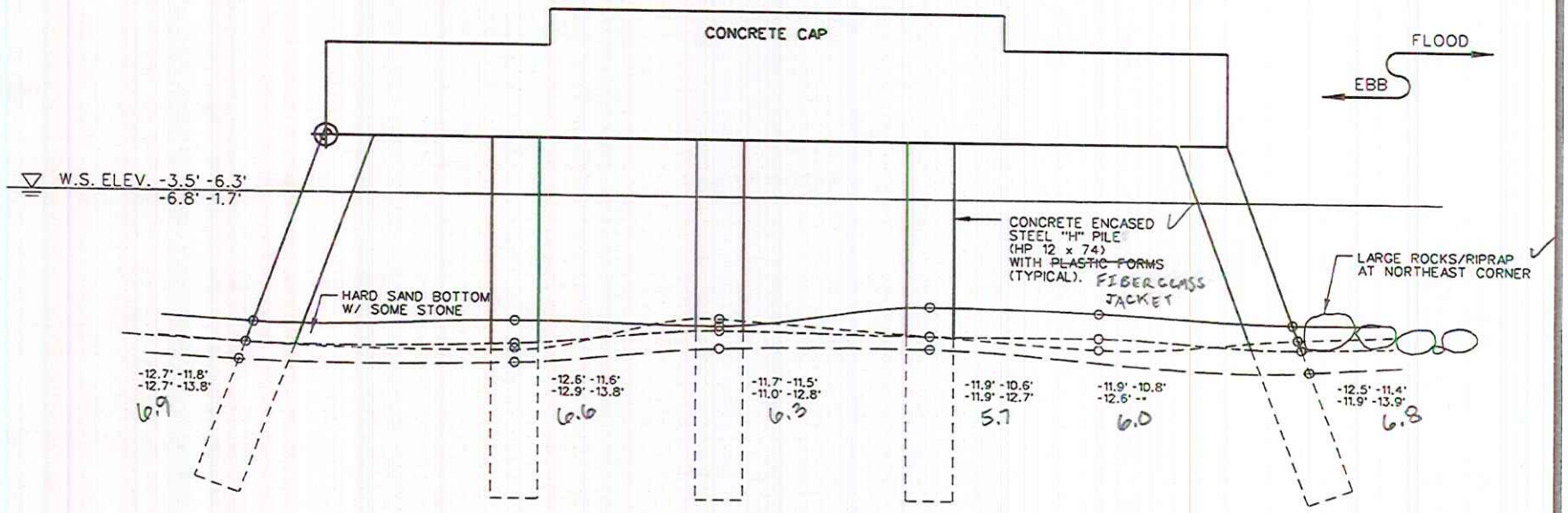
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 3 (WEST ELEVATION)

INSPECTED BY: BM REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 013491

PAGE 31 OF 32



NOTES:

- HEAVY MARINE GROWTH ON PILES, BARNACLES, OYSTERS AND MUSSELS UP TO 3" THICK.

PIER 3 (EAST ELEVATION)

N.T.S.

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

LEGEND FOR MUDLINE PROFILES

- DEC. 2012
- DEC. 2010
- DEC. 2008
- DEC. 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -3.5' ~~-6.3'~~ -6.8' -1.7' 5.5

* INDICATES NO INFORMATION

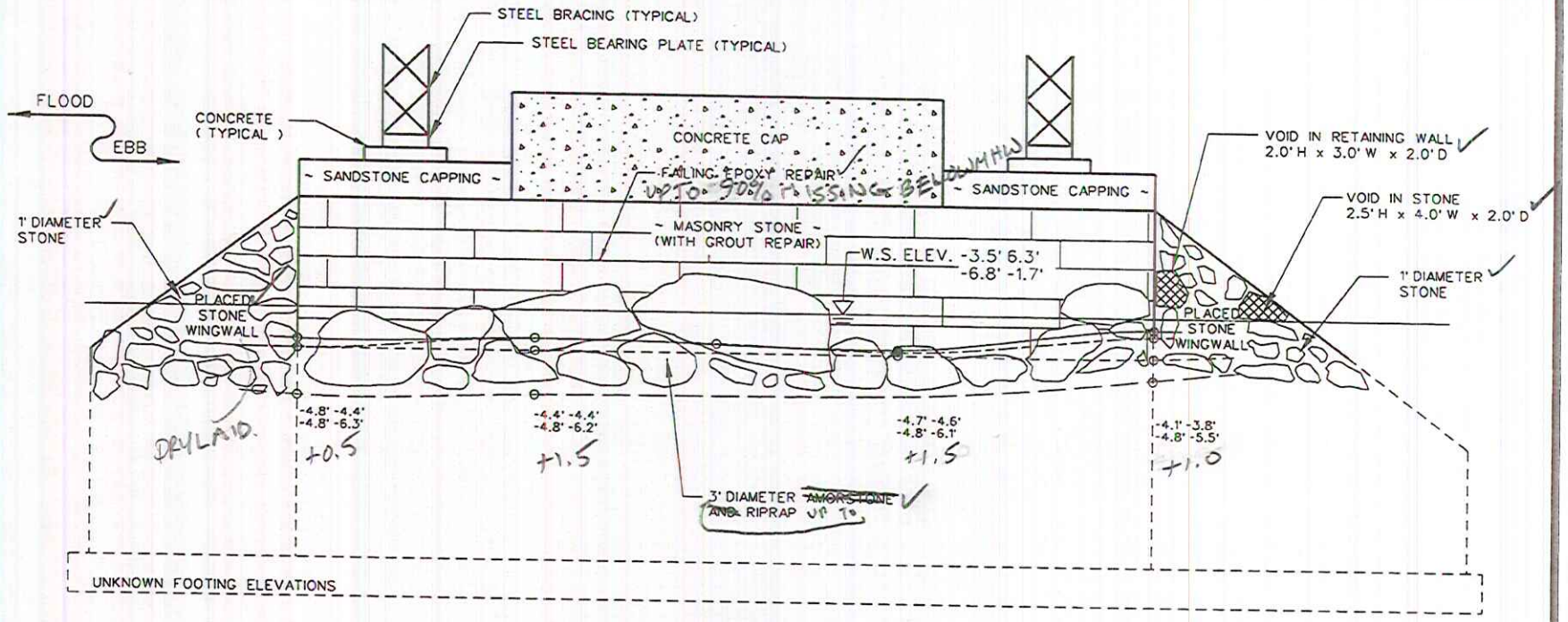
A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 3 (EAST ELEVATION)

INSPECTED BY: BM
REVISED BY: DM
SCALE: AS SHOWN
DATE OF INSPECTION 12 / 07 / 12
DRAWING NO. 01349J



EAST ABUTMENT

NOTE:

- FAILING EPOXY COATING ON THE ~~CONCRETE~~ STONE MASONRY STEM WAS OBSERVED. UP TO 90% BELOW MHW.
- RIPRAP UP TO 3.0' DIAMETER ~~WAS PLACED TO PREVENT SCOUR.~~ along abutment [REMOVE SINGLE NOTED ABOVE]
- ~~30%~~ 35% MISSING MORTAR WITH ~~2.5'~~ 4.0' PENETRATION.

ADD RETURN WALL NOTE

LEGEND FOR BOTTOM ELEVATIONS

DEC. 2010 — -0.0' -0.0' — DEC. 2012
DEC. 2008 — -0.0' -0.0' — DEC. 2006

LEGEND FOR MUDLINE PROFILES

——————— DEC. 2012
— — — — — — DEC. 2010
- - - - - - - - - DEC. 2008
— — — — — DEC. 2006

LEGEND FOR SYMBOLS

⊕ DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

▽ W.S. ELEV. -3.5' -~~6.3~~ 5.5' -6.8' -1.7'

* INDICATES NO INFORMATION

A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

EAST ABUTMENT

INSPECTED BY: BM REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 01349K

18/28

Revised 12/07/12
By: Bill McLachlan

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

subject: **BMM No.** 09-330
Bridge No. 01349
Route 136 over Saugatuck River
Westport, Connecticut

MEMORANDUM

date: 9/25/09

to: Mr. Robert P. Mongillo
Transportation Maintenance Administrator
Bureau of Highway Operations

from: Joseph C. Kozlowski
Transportation Supervising Engineer
Bridge Safety and Evaluation
Bureau of Engineering and Construction

Attached are two copies of our most recent inspection report for the subject structure. The following deficiencies were found:

~~X.~~ ~~The end of the south rail at the west abutment and the end of the north rail at the east abutment has an impact damages. See Photo No. 9.~~

~~2.~~ ~~The ends of the north bridge rail are touching at Pier 2.~~

Condition Remains 2014

3. The stone masonry abutments exhibit missing joint mortar (typically below the high tide line) and ~~the concrete pier caps have two spalls up to 12 in. x 18 in. x 3 in. deep.~~ NF

4. The stone masonry retaining walls have missing or non-existent grout and up to ~~2.5'~~ 3.0' of penetration. ~~A void is present near the top of the southeast wall up to 2' x 3' x 2' deep. See Photo No. 22.~~ Multiple voids present, up to 2.5' x 4.0' x 1.0' Deep.

5. The steel jacket at pier 1 has corrosion and perforations with exposed concrete, causing scaling and spalling of concrete in an area ~~30~~ 22 feet long by 2 feet high. ~~See Photo No. 24.~~

Please direct persons under your jurisdiction to:

Repair required 2014

~~X.~~ ~~Repair the impact damage.~~

~~2.~~ ~~Reset or adjust the terminal ends so that they no longer touch when the swing span closes.~~

3. Repoint the abutment joints ~~and patch the spall.~~ Total 70 LF.

4. Repair the voids. Total ~~12CF~~. 20 CF.

5. Repair/patch areas of spalled concrete and repair steel jacket. Total ~~1~~ CY

The above item 1 - 5 should be considered Priority "D". There may be other deficiencies which are considered routine maintenance, and should be corrected.

The attached inspection report also notes that the following items were issued under a previous BMM and have not been addressed.

BMM No.	Item
07-239	~~1. All scupper grates of the bridge drainage system are clogged along the gutter lines throughout. See Photo No. 10~~
	~~2. The inside of the end floorbeam at the west abutment and the inside of the pivot girder at pier 1 have heavy rust along the bottom flange. See Photo No. 13 & 15. There is now some trapped water standing inside the pivot girders.~~

19/28

Revised 12/07/12
By: Bill McLachlan

To: Mr. Robert P. Mongillo
From: Mr. Ralph A. Phillips

BMM No.
Bridge No. 01349

06-091

Condition Remains; Repair Required 2014

1. There are spalls up to 3ft. x 3.5 ft. x 6 in. deep with exposed rusted reinforcing bars in the concrete piles of pier 2. The spalls are now up to 7" deep, and steel H-pile flange exposed. measurements
2. ~~The timber sidewalk stringers in span 3 have two backed off nuts with two missing bolts (1/2 in. diameter x 4 in. grip) near pier 2 and the stringers in span 4 have two backed off nuts near the East abutment. See Report Photo No. 8. Note: The loose nuts and missing bolts are located at floorbeams 2 & 4.~~
3. The steel bracing between the H-piles of pier No. 2 exhibit severe section loss. The diagonal members were found to have up to ~~90%~~ 100% section loss at ends next to piles. The horizontal members were found to have up to 100% web and ~~bottom~~ flange section loss. ~~See Report Photo No. 25 & 26.~~

Bridge Safety and Evaluation believes that these repairs are structurally important and should be addressed.

All repairs shall be performed utilizing appropriate approved materials and tried and proven methods unless otherwise specified.

If you have any questions concerning these repairs, please contact me at ext. 3159. Please notify this section when the work has been completed.

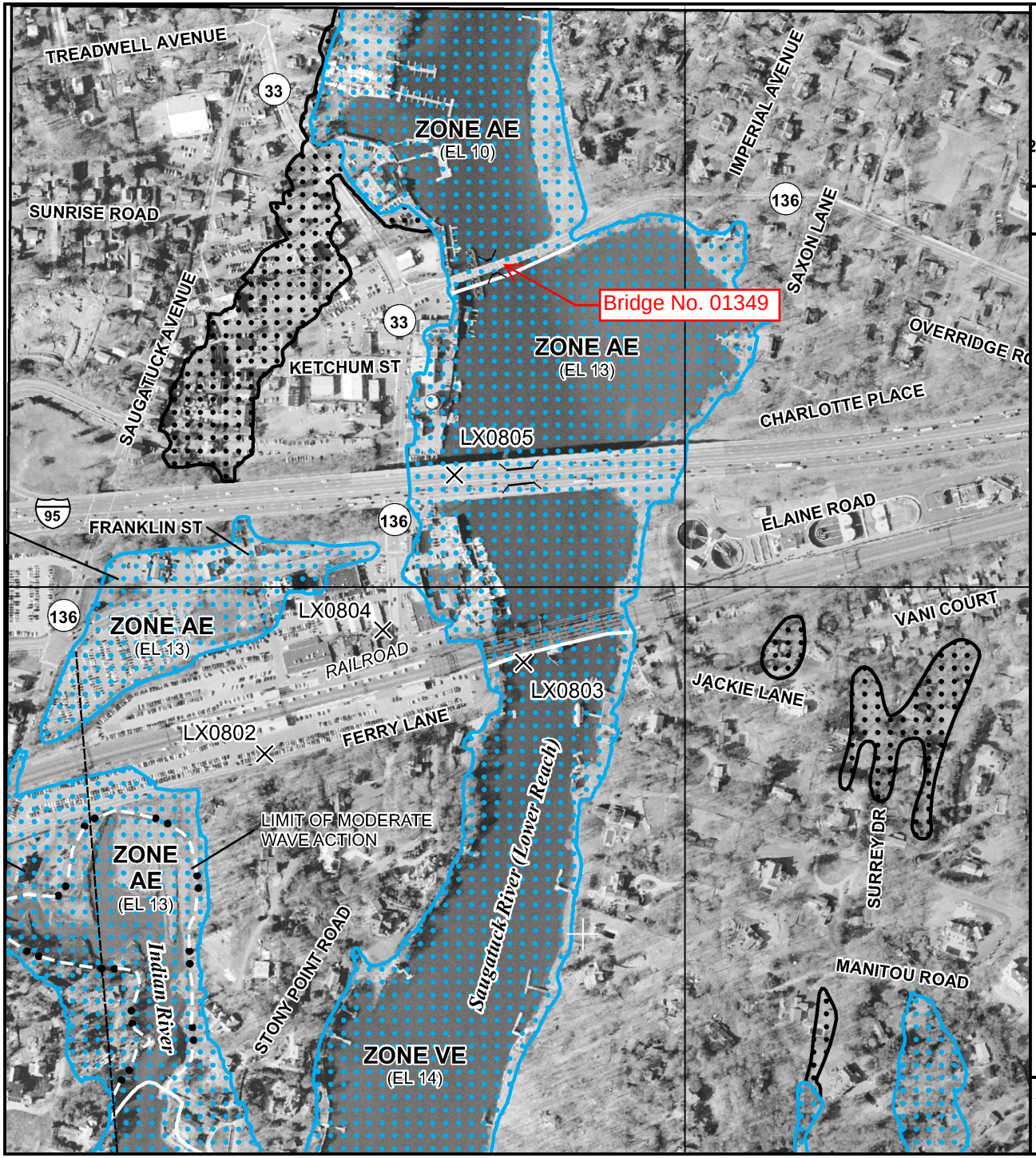
Attachments

G. Movarej/gm

cc: Joseph J. Obara
Robert P. Zaffetti – Ralph A. Phillips – David Tassavor
Theodore D. Lapierre – Leo Cain
Joseph C. Kozlowski
AI Engineers, Inc.

APPENDIX D

FEMA FIRMette



MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0551G

FIRM

FLOOD INSURANCE RATE MAP

FAIRFIELD COUNTY, CONNECTICUT

(ALL JURISDICTIONS)

PANEL 551 OF 626

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WESTPORT, TOWN OF	090019	0551	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
09001C0551G

MAP REVISED
JULY 8, 2013

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

APPENDIX E

Load Rating & Structural Analysis

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

APPENDIX E

LOAD RATING & STRUCTURAL ANALYSIS

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

Title

MIDAS CIVIL 2.1 ANALYSIS INPUT DATA

SWING SPAN – EXISTING STRUCTURE ANALYSIS

FIXED SPAN – EXISTING STRUCTURE ANALYSIS

SUBSTRUCTURE ANALYSIS

PROPOSED WIDENING ANALYSIS

EXISTING PLANS

VESSEL COLLISION ANALYSIS

APPENDIX E
PROJECT NO.158-212, BRIDGE NO 01349
ROUTE 136 OVER SAUGATUCK RIVER, WESTPORT

Bridge No. 01349 carries route 136 (Bridge Street) over the Saugatuck River in Westport, CT. This four span continuous multi-girder swing span bridge has a length of 287 feet and a curb-to-curb width of 19.5 feet. The bridge was constructed in 1870 and rehabilitated in 1993. The LFR rating for HS20 truck loading is 59 tons on record. The original Pratt Trusses were retained for aesthetic reasons and carry no live load. The swing span structure consists of two continuous 70-foot multi-girder, with steel plate deck spans with original Pratt truss supported by the original center pier 2 and west abutment. The fixed span structure consists of two continuous 70-foot multi-girder with exodermic deck spans with decorative façade Pratt truss supported by the new pier 3, original pier 2 and the east abutment.

Existing Structure Analysis

The existing superstructure and substructure for all spans were analyzed utilizing MIDAS CIVIL 2016 V2.1 and L-pile V2015 software's.

Superstructure Load Rating Analysis

The structure was modeled, analyzed, and rated in MIDAS CIVIL 2016 V2.1 Software utilizing LRFD methodology. The LRFR factors are in accordance with 2015 AASHTO LRFD specifications and AASHTO manual for bridge evaluation 2nd edition with 2016 interims. The superstructure was rated based on the HL-93 and HS-20 design loadings. The structure was also modeled and rated for legal loads H-20, CT-L3S2 and CT-L73.0 loadings. The original ornamental Pratt Truss was added as a uniform dead load to the structure for analysis. The governing LRFR rating factor for the swing span under HS-20 loading is 4.48 and under HL-93 loading is 3.31. The governing LRFR rating factor for fixed span under HS-20 loading is 1.86 and under HL-93 loading is 1.32. See tables 1 and 2 below.

Table 1: Swing Span Rating Factors

	Midas Civil 2016 V2.1	
	Rating Factor	Limit State
HL-93 Inv.		
Girder 1	3.3112	Strength I
Girder 2	4.3051	Strength I
Girder 3	4.5897	Strength I
Girder 4	4.4292	Strength I
Girder 5	4.5873	Strength I
Girder 6	4.3015	Strength I
Girder 7	3.3024	Strength I
HL-93 Oper.		
Girder 1	4.2923	Strength I
Girder 2	5.5807	Strength I
Girder 3	5.9496	Strength I
Girder 4	5.7416	Strength I
Girder 5	5.9465	Strength I
Girder 6	5.5760	Strength I
Girder 7	4.2809	Strength I
HS-20		
Girder 1	4.4782	Strength I
Girder 2	5.9657	Strength I
Girder 3	6.3059	Strength I

Girder 4	5.8383	Strength I
Girder 5	6.3024	Strength I
Girder 6	5.9609	Strength I
Girder 7	4.4676	Strength I
H-20		
Girder 1	6.9963	Strength I
Girder 2	9.0006	Strength I
Girder 3	9.3572	Strength I
Girder 4	7.6886	Strength I
Girder 5	9.3526	Strength I
Girder 6	8.9943	Strength I
Girder 7	6.9837	Strength I
CT-L3S2		
Girder 1	7.7236	Strength I
Girder 2	10.0684	Strength I
Girder 3	10.7420	Strength I
Girder 4	9.6244	Strength I
Girder 5	10.7358	Strength I
Girder 6	10.0534	Strength I
Girder 7	7.7012	Strength I
CT-L73.0		
Girder 1	5.7658	Strength I
Girder 2	7.3077	Strength I
Girder 3	7.7884	Strength I
Girder 4	7.0496	Strength I
Girder 5	7.7842	Strength I
Girder 6	7.3023	Strength I
Girder 7	5.7538	Strength I
CT-L3S2		
Girder 1	7.7236	Strength I
Girder 2	10.0684	Strength I
Girder 3	10.7420	Strength I
Girder 4	9.6244	Strength I
Girder 5	10.7358	Strength I
Girder 6	10.0534	Strength I
Girder 7	7.7012	Strength I

Table 2: Fixed Span Rating Factors

	Midas Civil 2016 V2.1	
	Rating Factor	Limit State
HL-93 Inv.		
Girder 1	1.32776	Strength I
Girder 2	1.41137	Strength I
Girder 3	1.41699	Strength I
Girder 4	1.36748	Strength I
HL-93 Oper.		
Girder 1	1.72122	Strength I
Girder 2	1.82939	Strength I
Girder 3	1.83667	Strength I
Girder 4	1.77257	Strength I
HS-20		
Girder 1	1.86047	Strength I
Girder 2	1.93039	Strength I
Girder 3	1.93807	Strength I
Girder 4	1.88140	Strength I
H-20		
Girder 1	2.77778	Strength I
Girder 2	2.82970	Strength I
Girder 3	2.84096	Strength I
Girder 4	2.80972	Strength I
CT-L3S2		
Girder 1	3.18421	Strength I
Girder 2	3.31162	Strength I
Girder 3	3.32481	Strength I
Girder 4	3.22010	Strength I
CT-L73.0		
Girder 1	2.29203	Strength I
Girder 2	2.39631	Strength I
Girder 3	2.40584	Strength I
Girder 4	2.31805	Strength I
CT-L3S2 + Lane Load		
Girder 1	3.18421	Strength I
Girder 2	3.31162	Strength I
Girder 3	3.32481	Strength I
Girder 4	3.22010	Strength I

Existing Truss Analysis

Swing Spans 1-2: The existing superstructure and substructure were modeled as a two span continuous with the existing truss as an ornamental Pratt Truss supported on swing span ends. The truss members were also analyzed under factored dead load and wind loads for stability and strength. See tables 3, 4, 5, and 6 below.

Table 3: Swing Span Truss Analysis (25.5 ksi Steel)

Swing Truss	Factored Dead Load and Wind Load (125 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (100 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (90 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (80 mph) (Strength III, Combine)	Displacement (Strength III)	Allowable Wind Speed
Cross Bracing	13.53 ksi	12.36 ksi	12.05 ksi	11.77 ksi	0.36 in	125 mph
Main Members	13.53 ksi	10.34 ksi	-	-	0.36 in	125 mph

***Combined**: Combined stress (Combined stress: Sax ± Sby ± Sbz).

Fixed Spans 3-4: Similar to the swing span the existing fixed span superstructure and substructure were modeled as a two span continuous with the existing truss as a ornamental Pratt Truss supported on the existing Pier 2 and east abutment. The existing Pratt Truss was also analyzed for its stability under factored dead load and wind loads. The substructure was modeled in MIDAS CIVIL 2016 V2.1 to determine the loads that would be transferred to the existing piles. The piles were then analyzed utilizing L-pile V2015. See tables 7, 8, 9, and 10 below.

Table 4: Fixed Span Truss Analysis (25.5 ksi Steel)

Fixed Truss	Factored Dead Load and Wind Load (125 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (100 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (90 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (80 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (70 mph) (Strength III, Combine)	Displacement (Strength III)	Allowable Wind Speed
Cross Bracing	35.17 ksi	24.56 ksi	20.97 ksi	18.36 ksi	17.58 ksi	1.85 in	90 mph
Main Members	30.83 ksi	20.80 ksi	17.41 ksi	14.39 ksi	11.67 ksi	2.05 in	100 mph

Substructure Analysis

Table 5: Pier 2 Carrying Beam Analysis (33 ksi Steel – Allowable .95*33ksi = 31.35ksi)

	Midas Civil 2016 V2.1				
	Displacement (in)	Stress (ksi)	Rating Factor	Rating Tons	Limit State
No Section Loss					
HL-93 Inventory	0.37	28.48	1.2609	N/A	Strength I
HL-93 Operating	0.34	26.04	1.6336	N/A	Strength I
HS-20	0.33	25.85	1.6772	60.38	Strength I
H20	0.29	23.01	2.6628	53.26	Strength I
CT-L3S2	0.28	22.58	2.8973	114.92	Strength I
CT-L73.0	0.31	24.11	2.1628	78.94	Strength I
CT-L3S2 + Lane Load	0.28	22.58	2.8973	N/A	Strength I
10% Section Loss					
HL-93 Inventory	0.42	32.90	**0.8713**	N/A	Strength I
HL-93 Operating	0.38	30.12	1.1285	N/A	Strength I
HS-20	0.37	29.90	1.1575	41.67	Strength I
H20	0.32	26.62	1.8336	36.67	Strength I
CT-L3S2	0.31	26.13	2.0078	80.31	Strength I
CT-L73.0	0.34	27.90	1.4928	54.49	Strength I
CT-L3S2 + Lane Load	0.31	26.13	2.0078	N/A	Strength I

*Main Carrying Beams WF14x219 (33 ksi steel)

Table 6: Pier 2 Pile Analysis (36 ksi Steel)

	Midas Civil 2016 V2.1		L-pile V2015		A-Pile	Pile Type	Allowable Compressive Resistance		C/D Ratio Axial	C_{Ma}=Combined Compressive and Flexural Resistance Factor* < 1	Rating Tons
Live load	Shear (kip)	Axial (kip)	Max Moment in Pile (in-kip)	Max Deflection (in)	Bearing Capacity (kips)		Axial (kips)	Moment (kip-in)			
HL-93 Inv.	10.5	379.8	1471.52	1.5026	520.0	HP14X89	567.3	2371	**0.896**	**1.508**	N/A
HL-93 Oper.	8.4	350.8	1144.859	1.1369	520.0	HP14X89	567.3	2371	0.970	1.313	N/A
HS-20	8.4	350.4	1131.133	1.1231	520.0	HP14X89	567.3	2371	0.971	1.306	27.72
H20	6.0	314.2	804.911	0.7968	520.0	HP14X89	567.3	2371	1.083	1.093	18.20
CT-L3S2	5.6	309.2	833.655	0.8256	520.0	HP14X89	567.3	2371	1.101	1.091	36.80
CT-L73.0	7.1	328.3	1085.494	1.0771	520.0	HP14X89	567.3	2371	1.037	1.234	29.57
CT-L3S2 + Lane Load	5.9	314.4	889.204	0.8810	520.0	HP14X89	567.3	2371	1.083	1.125	N/A

*Original HP14x89 Design Capacity 83.5 kips

*$C_{Ma}=P_U/P_R+\gamma((M_{ux}/M_{rx}))+(M_{uy}/M_{ry})) < 1.0$ (AASHTO 6.9.2.2-2)

*$C/D=P_R/P_U$ (AASHTO 6.9.4)

Table 7: Pier 3 Analysis (50 ksi steel)

	Midas Civil 2016 V2.1		
	Displacement (in)	Stress (ksi)	Limit State
HL-93 Inv.	0.035	6.26	Strength I
HS-20	0.030	5.26	Strength I

Table 8: Pier 3 Pile Analysis (50 ksi Steel)

	Midas Civil 2016 V2.1/Hand Calcs.			A-Pile	Pile Type	Allowable Compressive Resistance		C/D Ratio Axial	C_{Ma}=Combined Compressive and Flexural Resistance Factor* < 1
Live load	Shear (kip)	Axial (kip)	Moment (in-kip)	Bearing Capacity (kips)		Axial (kips)	Moment (kip-in)		
HL-93 Inv.	42.8	226.0	913.3	520.0	HP14X89	470.3	1677.6	1.249	**1.170**
HL-93 Inv.	97.9	190	1402	520.0	HP14X90	470.3	1677.6	1.485	**1.320**

*Original HP12x74 maximum design pile load capacity 196 kips (Group I, Working Stress)
*$C_{Ma}=P_U/P_R+\gamma((M_{ux}/M_{rx}))+(M_{uy}/M_{ry})) < 1.0$ (AASHTO 6.9.2.2-2)
*$C/D=P_R/P_U$ (AASHTO 6.9.4)

Proposed Widening Analysis

The proposed widening rehabilitation alternate was analyzed by MIDAS CIVIL 2016 V2.1 and L-pile V2015. The widening rehabilitation will consist of widening the existing truss 2-feet on each side of the structure for all spans and increasing the pier cap width (Pier 2) to encompass the three carrying beams. The existing floor beams will be extended from the truss to the fascia girders but will be allowed to move in the vertical direction.

Swing Spans 1-2: The widened Pratt Truss was analyzed to determine the allowable wind speed that it could withstand without being overstressed. The Pratt Truss was analyzed for both the cross bracing members and the main members. The cross bracing members and the main members can withstand a wind speed of 125 mph. See table 11 below.

Table 9: Swing Span Proposed Widening Truss Analysis (25.5-50 ksi Steel)

Swing Truss	Factored Dead Load and Wind Load (125 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (100 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (90 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (80 mph) (Strength III, Combine)	Displacement (Strength III)	Allowable Wind Speed
Cross Bracing	16.42 ksi	15.58 ksi	15.29 ksi	15.04 ksi	1.24 in	125 mph
Main Members	15.34 ksi	12.11 ksi	-	-	1.24 in	125 mph

Fixed Spans 3-4: Similar to the swing span, the fixed span Pratt Truss was analyzed for the allowable wind speed and the cross bracing members were determined to be overstressed under unfactored dead load. The main members of the Pratt Truss can withstand a wind speed of 125 mph before they become overstressed. Pier 2 was analyzed under Strength I for both HS-20 loading and HL-93 loading. The piles were then analyzed utilizing L-pile V2015. See tables 12, 13, and 14.

Table 10: Fixed Proposed Widening Truss Analysis (25.5-50 ksi Steel)

Fixed Truss	Factored Dead Load and Wind Load (125 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (100 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (90 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (80 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (70 mph) (Strength III, Combine)	Displacement (Strength III)	Allowable Wind Speed
Cross Bracing	20.66 ksi	19.93 ksi	19.68 ksi	19.46 ksi	19.26 ksi	1.69 in	125 mph
Main Members	16.83 ksi	14.30 ksi	13.45 ksi	12.69 ksi	10.97 ksi	1.12 in	125 mph

Table 11: Pier 2 Proposed Widening Carrying Beam Analysis (50 ksi Steel)

	Midas Civil 2016 V2.1		
	Displacement (in)	Stress (ksi)	Limit State
HL-93 Inv.	0.07	0.96	Strength I
HS-20	0.07	0.96	Strength I

Table 12: Pier 2 Proposed Widening Pile Analysis (50 ksi Steel)

	Midas Civil 2016 V2.1			L-pile V2015	A-Pile	Pile Type	Allowable Compressive Resistance		C/D Ratio Axial	C_{Ma}=Combined Compressive and Flexural Resistance Factor* < 1
Live load	Shear (kip)	Axial (kip)	Moment (in-kip)	Max Moment in Pile (in-kip)	Bearing Capacity (kips)		Axial (kips)	Moment (kip-in)		
HL-93 Inv.	14.1	225.0	1188.2	4337.1	520.0	HP14X117	1074.4	4570	**2.865**	**0.530**

*$C_{Ma}=P_U/P_R+\gamma((M_{ux}/M_{rx}))+(M_{uy}/M_{ry})) < 1.0$ (AASHTO 6.9.2.2-2)
*$C/D=P_R/P_U$ (AASHTO 6.9.4)

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

MIDAS CIVIL 2.1 ANALYSIS INPUT DATA

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

FIXED SPAN

YEAR BUILT: 1870, REHAB 1993
ADT: 13100
% TRUCK: 5

LENGTH: 140'
SPANS: 2
SKEW: 0

SIDEWEALK HANDRAIL WEIGHT

4X3X5/16" POST, 5'-8" HIGH

P = 4 + 3 + 4 + 3
= 14 in

V = P x t x H
= 14 x 0.3125 x 68
V = 297.5 in^3
= 0.1722 ft^3

N_{posts} = 10 ea

V_{posts} = 10 x 0.1722 = 1.7216 ft^3

HANDRAIL, 5X3X1/2" TUBE

P = 5 + 3 + 5 + 3
= 16 in

V = P x t x L
= 16 x 0.5 x 1680
V = 13440 in^3
= 7.7778 ft^3

TOTAL =(1.7216 + 7.7778)x 0.49 kcf
= 4.6547 k

$w_{handrail}$ = 4.6547 / 140
= 0.0332 k/ft/side

GUIDERAIL

W10X15 POSTS, 3'-9.25" HGIH

W/post = 15 x 3.7708 = 56.563 lb/post

N_{posts} = 10 ea

W_{posts} = 56.563 x 10 / 1000
= 0.5656 k

RAIL = 7.7778 x 0.49
= 3.8111 k

TOTAL =(0.5656 + 3.8111)/ 140
= 0.0313 k/ft/side

CURB
C10X20

A_{C10X20} = 5.87 in^2

b_{C10X20} = 2.74 in

Create equivalent rectangular section

h = 5.87 / 2.75 = 2.13 in

w = 490 pcf

BAY	SPACING
1	5
2	5
3	5

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

DIAPHRAGM WEIGHTS

DIAPH.	TYPE	WEIGHT	LENGTH	TOTAL	
Left of B1	W10X26	0.26	7.938	2.064	k
BAY 1	W10X26	0.26	5.000	1.300	k
BAY 2	C12X25	0.25	5.000	1.250	k
BAY 3	W10X26	0.26	5.000	1.300	k
Right of B4	W10X26	0.26	3.724	0.968	k

Outside Diaphragms

$N_{dia/side}$ = 10 ea

W = 10 x(2.064 + 0.9682)
= 30.32 k

W = 30.32 / 280
= 0.1083 k/ft/side
Program directly calculates this weight

LOADS TO ADD TO CURB LOADS

Outside Diaphragms and Railing

P = 0.0313 + 0.1083
= 0.1395 k/ft/side
Program directly calculates this weight

ADDITIONAL MEMBER LOADS

Timber Sidewalk

Timber = 50 pcf *pg 54 of design calculations

$W_{stringers}$ = b x h x wt. x $N_{stringers}$ / 144
= 4 x 16 x 50 x 2 / 144
= 44.444 lb/ft

W_{plank} = b x h x wt. x N_{plank} / 144
= 58.25 x 2 x 50 x 1 / 144
= 40.451 lb/ft

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

4 - C9X13.4

$W_{C9x13.4}$ = 13.4 x $N_{C9x13.4}$
= 13.4 x 4
= 53.6 lb/ft

$W_{sidewalk}$ = 44.444 + 40.451 + 53.6 + 33.248
= 171.74 lb/ft

$W_{sidewalk}$ = 0.1717 k/ft
Applied to exterior girder only

Curb and Rail Load

w_{curb} = 5.87 x 0.49 + 0.1395
= 0.160 k/ft/side

W_{curb} = w_{curb} x N_{sides} / $N_{girders}$
= 0.160 x 2 / 4
W_{curb} = 0.0798 k/ft

W_{curb} = 0.08 k/ft

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

EXODERMIC DECK THICKNESS

8.25" DECK - 4" Concrete over Steel Studs

A_{stud1} = 1.5 in^2
$N_{stud/ft}$ = 2 ea

A_{steel} = 3 in^2/ft

n = 8 *ratio steel to concrete

$A_{conc.equ.}$ = A_{steel} x n
= 3 x 8
$A_{conc.equ.}$ = 24 in^2/ft

$t_{conc.equ.}$ = $A_{conc.equ.}$ / 12 in/ft
= 24 / 12
$t_{conc.equ.}$ = 2 in

t_{deck} = 4 + $t_{conc.equ.}$
= 4 + 2
t_{deck} = 6 in

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

SWING SPAN

YEAR BUILT: 1870, REHAB 1993
ADT: 13100
% TRUCK: 5

LENGTH: 142'
SPANS: 2
SKEW: 0

SIDEWEALK HANDRAIL WEIGHT

$w_{handrail}$ = 0.0332 k/ft/side

GUIDERAIL

$w_{guiderail}$ = 0.0313 k/ft/side

CURB

2.75 x 2.13 Curb, 490 pcf

BAY	SPACING
1	3
2	3
3	3
4	3
5	3
6	3

DIAPHRAGM WEIGHTS

5/8" PLATE DIAPHRAGM, FULL HEIGHT AND WIDTH

d_{web} = 36 in
= 3 ft

$wid._{dia}$ = 3 ft
t_{dia} = 0.625 in
= 0.0521 ft

V_{dia} = 3 x 3 x 0.0521
V_{dia} = 0.4688 ft^3

Program directly calculates this weight

W_{dia} = V_{dia} x 0.49 kcf
= 0.4688 x 0.49 kcf
W_{dia} = 0.2297 k

W_{dia} = 0.3 k
Program directly calculates this weight

ADDITIONAL MEMBER LOADS

Curb and Rail Load

w_{curb} = 5.87 x 0.49 + 0.1395
= 0.160 k/ft/side

W_{curb} = w_{curb} x N_{sides} / $N_{girders}$
= 0.160 x 2 / 7
W_{curb} = 0.0456 k/ft

Truss Load

W_{truss} = 0.05 k/ft/girder
Program directly calculates this weight

Close, Jensen and Miller, P.C.

BY BA DATE 1/11/16 SUBJECT BR. 1349 SHEET NO. ..... OF .....

CHKD. BY ..... DATE ..... EXISTING STRUCTURE ANALYSIS JOB NO. .....

EXISTING SUPERSTRUCTURE LOADS

SWING SPAN:

TRUSS:

A1 P1 P2

Roller Fixed Roller



All Truss Member Connections (FIXED)

FIXED SPAN

USE TRUSS AS DEAD WEIGHT ON CONVENTIONAL SUPERSTRUCTURE

ALL 4 POINT DEAD LOAD ON PIER AND ABUTMENT FOR PIER ANALYSIS

SWING SPAN:

SUPERIMPOSED DL

RAILING .04 K/'

SIDEWALK .11 K/'

W10X26 8' SIDEWALK

4' CURB SIDE

$26^{lb/ft} \times 10 \times 8' = 2.9/140 = .015^{K/'}$

$.015/2 = .008^{K/'}$

FIXED SPAN:

SWING SPAN

CURBS .02 K/' SIDEWALK

$.02 + .015 = .035^{K/'} + .11^{K/'} = .145^{K/'} + .04^{RAILING} = (.185^{K/'})$

CURB SIDE:

$.02^{K/'} + .008^{K/'} + .04^{K/'} = (.07^{K/'})$

DESIGN WIND PRESSURE, P_D

$$P_D = P_B \frac{V_{DZ}^2}{10{,}000}$$ (AASHTO 3.8.1.2.1-1)

P_B VALUES FOR $V_B = 100$ MPH (AASHTO TABLE 3.8.1.2.2-1)

SKEW = 0° FOR TRUSSES, LATERAL $P_B = 0.075$ ksf
LONGIT. $P_B = 0$ ksf

$$V_{DZ} = 2.5 V_o \left(\frac{V_{30}}{V_B}\right) \ln\left(\frac{Z}{Z_o}\right)$$ (AASHTO 3.8.1.1-1)

$V_B = 100$ mph

$V_o = 12$ mph
$Z_o = 8.2$ ft
} AASHTO Table 3.8.1.1-1 (for City)

Per AASHTO 3.8.1.1, in the absense of better criterion, $V_{30} = V_B = 100$ mph

FOR Z: top of ground = EL. -17

Pier cap elevation = EL. 9.482'

truss height = 17'-7¼" = EL. 27.086'

$Z = 27.086' - (-17') = 44.086$

$$V_{DZ} = 2.5(12)\left(\frac{100}{100}\right)\ln\left(\frac{44.086}{8.2}\right) = 50.5 \text{ mph}$$

$$P_D = P_B \frac{V_{DZ}^2}{10{,}000} = 0.075\left(\frac{50.5^2}{10{,}000}\right)$$

$P_D = 0.019$ ksf = 20 psf

Close, Jensen and Miller, P.C.

BY DC DATE 1/19/16 SUBJECT Bridge 01349 SHEET NO. ..... OF .....
CHKD. BY ..... DATE ..... Existing Structure Analysis JOB NO. .....
Existing superstructure loads

Wind Pressure on structure

$P_D = P_b \left(V_{DZ} / V_B \right)^2$ (AASHTO 3.8.1.2.1-1)

$P_b = .05$ ksf (AASHTO Table 3.8.1.2.2-1)

$V_B = 100$ mph
$V_{DZ} = 50.5$ mph

$P_D = (.05 \text{ ksf}) \left(50.5 \text{ mph} / 100 \text{ mph} \right)^2 = .01275$ ksf

Swing Span

Girder height = (1 in + 36 in + 1.125 in + 2.5 in) (1 ft / 12 in) = 3.385 ft

$W_{SS} = P_D H_S = (.01275 \text{ ksf})(3.385 \text{ ft}) = .04316$ klf < .3 klf (AASHTO 3.8.1.2.1)
$W_{SS} = .3$ klf

Fixed Span

Girder height = (.975 in + 25.45 in + .975 in + 8.25 in) (1 ft / 12 in) = 2.97 ft

$W_{FS} = P_D H_F = (.01275 \text{ ksf})(2.97 \text{ ft}) = .03787$ klf < .3 klf (AASHTO 3.8.1.2.1)
$W_{FS} = .3$ klf

Wind Pressure on live load

$W_L = .1$ klf (AASHTO Table 3.8.1.3.1)
- acts at 6 ft above the roadway and shall be transmited to the structure

$W_L = .1$ klf transverse
$W_L = .04$ klf longitudinal

Close, Jensen and Miller, P.C.

BY DC DATE 11/9/10 SUBJECT Bridge B1349 SHEET NO. OF

CHKD. BY DATE Existing structure Analysis JOB NO.

Existing superstructure loads

Vertical wind Pressure

Length to width ratio

$L = 280\ ft$

$w = 20\ ft$

$L/w = 280/20 = 14 < 30$ not wind-sensitive (AASHTO 3.8.3.1)

$W_V = .02\ ksf\ w$ (AASHTO 3.8.2)

$W_V = (.02\ ksf)(20\ ft) = .4\ klf$

Wind on substructure

$P_B = .04\ ksf$ (AASHTO 3.8.1.2.3)

Pier 1

$D = 24\ ft$

$W_{p1} = P_B D = (.04\ ksf)(24\ ft) = .96\ klf$

Pier 2/3 piles

$D = 2\ ft$

$W_{p2/3} = P_B D = (.04\ ksf)(2\ ft) = .08\ klf$

Temperature Gradient

$T_1 = 41^{\circ}F$ (AASHTO Table 3.8.1.3-1)

$T_2 = 11^{\circ}F$

$T_1 - T_2 = 41^{\circ} - 11^{\circ} = 30^{\circ}$

Temperature range

Procedure A (AASHTO 3.12.2.1)

$T_{max} = 80^{\circ}F$ (AASHTO Table 3.12.2.1-1)

$T_{min} = 0^{\circ}F$

Design Thermal movements

$\Delta_T = \alpha L (T_{max} - T_{min})$ (AASHTO 3.12.2.3-1)

$\alpha = 6 \times 10^{-6}$ in/in/°F

$L = 140$ ft

$\Delta_T = (6 \times 10^{-6}\ in/in/^{\circ}F)(140\ ft)(12\ in/ft)(80^{\circ}F - 0^{\circ}F) = .806$ in

Close, Jensen and Miller P.C.					Project No.	158-212
Subject	TRUSS SECTION PROPERTIES		Bridge No.	1349	Sheet No.	
xxx	Date	5-Jan	Town	Westport	Computed By:	BA
Double Angle Top Horiz. Member					Checked By:	BA

SECTION PROPERTIES

GIRDER DESCRIPTION

Top Flange Angles (V x H x t)	2	x	3	x	0.25	Enter zeros for all Fl angle
Bot Flange Angles (V x H x t)	2	x	3	x	0.25	data to analyze as a Pl girder
Web Plate (H x t)	12.875	x	0.25			
Top Cover Plate (t x W)	0	x	13.375			
Bot Cover Plate (t x W)	0	x	13.375			
Overall Depth of Beam	13.38	in				

Are there any Section Losses (Y or N)? N

0.016	13.38	T
0.016	13.38	T
0.016	2.00	2.0

No. of Rivets or Bolts accross Flange : 0
0.875

Beam Weight ' Wt ' : 27.1 lb/ft
As-Built Moment Of Inertia ' I ' x axis : 228 inches^4

Bot. FL. Hole Area is Less Than 15% of Gross FL Area Therefore no Reduction was taken
(AASHTO Table 10.32.1A, note i)

AS-BUILT SECTION

		Area	Y	A x Y	A x Y²	I
Top Cover Pl		0	13.375	0.00	0.0	0.0
Top Fl Angles		2.375	12.882	30.59	394.1	0.8
Web Pl		3.22	6.688	21.53	144.0	44.5
Bot Fl Angles		2.375	0.493	1.17	0.6	0.8
Bot Cover Pl		0	0.000	0.00	0.0	0.0
		7.97		53.29	538.6	46.0
Y' =	6.69					
Ibot =	584.7					
Ic.g. =	**228.3**		**Stop =**	**34.13**	**Sbot =**	**34.13**

SECTION INCLUDING LOSSES

		Area	Y	A x Y	A x Y²	I
Losses to top Fl		0.20898	0.000	0.000	0.00	0.000
1st Losses to Web Plate		0.03125	2	0.063	0.13	0.010
2ndLosses to Web Plate		0	0	0.000	0.00	0.000
Losses to Bot Fl		0.20898	0.231	0.048	0.01	0.000
		0.44922		0.110776	0.14	0.010
Revised Section Totals		7.52		53.18	538.5	46.0
Y'loss =	7.07					
Ibotloss =	584.5					
Ic.g.loss =	**208.4**		**Stop =**	**34.13**	**Sbot =**	**29.47**

Close, Jensen and Miller P.C.					Project No.	158-212
Subject	TRUSS SECTION PROPERTIES		Bridge No.	1349	Sheet No.	
xxx		Date 5-Jan	Town	Westport	Computed By:	BA

TRANSFORMED SECTION TO PLATE GIRDER

Note:
The BDS software cannot accept Built-up Girders Sections for input, Therefore an Equivalent Transformed Section must be created. The new section will have the same depth and flange width as the orig. beam. The only change will be in the flange thickness and a correction for the tension flange holes if applicable.

As Built Beam Weight ' Wt ' : 27.1 lb/ft , Stop = 34.1
As-Built Moment Of Inertia ' I ' x axis : 228 inches^4 , Sbot = 29.5

New Top Flange Plate :	0.348	x	13.38	New Stop =	65.5
New Bot. Flange Plate :	0.348	x	13.38	New Sbot =	65.5
New Web Plate :	12.679	x	0.25		
New Beam Depth :	13.38 in.				

Trans. Beam ' Wt ' 42.5 lbs.
Trans. Beam Moment of Inertia 438 in.^4

Bot. FL. Hole Area is Less Than 15% of Gross FL Area Therefore no Reduction was taken (AASHTO Table 10.32.1A, note i)

TRANSFORMED SECTION PROPERTIES

	Area	Y	A x Y	A x Y²	I
Top Fl Plate	4.65784	13.20088	61.48761	811.6903	0.0
Web Plate	3.16963	6.6875	21.19687	141.754	42.5
Bot Fl Plate	4.65784	0.174125	0.811047	0.141224	0.0
	12.4853		83.49553	953.5856	42.55243
Y'	6.6875				
Ibot	996.1				
Ic.g.	**437.761657**		**Stop =**	**65.5 ,**	**Sbot =** **65.5**

W12x53

There is Change in Beam Wt. From Orig. to Trans. Which Must be Added into BDS as Self weight of the Beam = ***-15.4*** *lb/ft or* ***-1.3*** *lb/in*

Pier 3 L-Pile Analysis

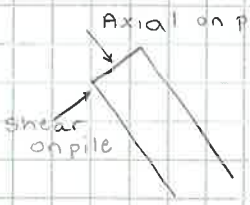
Maximum Loading

Midas Loads

Axial Load = 223 Kips
Shear = 42.2 Kips

Pile batter





$\alpha = \tan^{-1}(1/6) = 9.46^\circ$

Axial load on pile = (223 Kips) / cos (9.46) = 226 Kips

Shear load on pile = (42.2 Kips) / cos (9.46) = 42.8 Kips

- A wall located such that its collapse would endanger buildings or the lives of people.
- A wall supporting a multi-span structure (such as an abutment).

4.5 REHABILITATION OF EXISTING BRIDGES

4.5.1 General Requirements

In general, retrofit work on piers and abutments will not be required. Most retrofit work shall consist of providing lateral restraint at bridge bearings and providing adequate seat width.

The Department may require more extensive analysis and retrofit for major bridges, or if a unique situation exists such as a multi-level structure. The decision to include seismic retrofit of piers and abutments for these structures will be made on a case-by-case basis by the Department. For these cases, the designer shall use the load factor method for the analysis and design.

Actual implementation of corrective measures on bridge rehabilitations will be dependent on the cost, practicality of the modification, seriousness of the shortcoming, and the importance of the bridge.

4.5.2 Bridge Deck Patching Projects

All bridge rehabilitation projects that only include patching of the bridge deck need not be analyzed for seismic forces.

4.5.3 Bridge Widening Projects

4.5.3.1 *Widenings ≤ 25%*

$\frac{4\text{ ft widening}}{22\text{ ft}} = 18\% < 25\%$

All bridge rehabilitation projects where the widened portion of the cross section is less than 25% of the total width of the completed bridge will generally not require analysis for seismic forces.

4.5.3.2 *Widenings > 25%*

All bridge rehabilitation projects where the widened portion of the cross section is greater than or equal to 25% of the total width of the completed bridge shall be designed for seismic forces.

The preliminary design of the new portions of the substructure shall be based on all AASHTO loading conditions with the exception of seismic forces. Once the preliminary design is complete, the entire structure shall be analyzed for seismic forces. If deficiencies are found in the existing structure, the designer shall investigate the following alternatives:

The load factor for settlement, γ_{SE}, should be considered on a project-specific basis. In lieu of project-specific information to the contrary, γ_{SE}, may be taken as 1.0. Load combinations which include settlement shall also be applied without settlement.

For segmentally constructed bridges, the following combination shall be investigated at the service limit state:

$$DC + DW + EH + EV + ES + WA + CR + SH + TG + EL + PS \quad (3.4.1\text{-}2)$$

Table 3.4.1-1—Load Combinations and Load Factors

Load Combination Limit State	*DC DD DW EH EV ES EL PS CR SH*	*LL IM CE BR PL LS*	*WA*	*WS*	*WL*	*FR*	*TU*	*TG*	*SE*	Use One of These at a Time			
										EQ	*IC*	*CT*	*CV*
Strength I (unless noted)	γ_p	1.75	1.00	—	—	1.00	0.50/1.20	γ_{TG}	γ_{SE}	—	—	—	—
Strength II	γ_p	1.35	1.00	—	—	1.00	0.50/1.20	γ_{TG}	γ_{SE}	—	—	—	—
Strength III	γ_p	—	1.00	1.40	—	1.00	0.50/1.20	γ_{TG}	γ_{SE}	—	—	—	—
Strength IV	γ_p	—	1.00	—	—	1.00	0.50/1.20	—	—	—	—	—	—
Strength V	γ_p	1.35	1.00	0.40	1.0	1.00	0.50/1.20	γ_{TG}	γ_{SE}	—	—	—	—
Extreme Event I	γ_p	γEQ	1.00	—	—	1.00	—	—	—	1.00	—	—	—
Extreme Event II	γ_p	0.50	1.00	—	—	1.00	—	—	—	—	1.00	1.00	1.00
Service I	1.00	1.00	1.00	0.30	1.0	1.00	1.00/1.20	γ_{TG}	γ_{SE}	—	—	—	—
Service II	1.00	1.30	1.00	—	—	1.00	1.00/1.20	—	—	—	—	—	—
Service III	1.00	0.80	1.00	—	—	1.00	1.00/1.20	γ_{TG}	γ_{SE}	—	—	—	—
Service IV	1.00	—	1.00	0.70	—	1.00	1.00/1.20	—	1.0	—	—	—	—
Fatigue I—*LL, IM & CE* only	—	1.50	—	—	—	—	—	—	—	—	—	—	—
Fatigue I II—*LL, IM & CE* only	—	0.75	—	—	—	—	—	—	—	—	—	—	—

φ_c = Condition factor

φ_s = System factor

φ = LRFD resistance factor

The load rating shall be carried out at each applicable limit state and load effect with the lowest value determining the controlling rating factor. Limit states and load factors for load rating shall be selected from Table 6A.4.2.2-1.

Components subjected to combined load effects shall be load rated considering the interaction of load effects (i.e., axial-bending interaction or shear-bending interaction), as provided in this Manual under the sections on resistance of structures.

Secondary effects from prestressing of continuous spans and locked-in force effects from the construction process should be included as permanent loads other than dead loads, *P* (see Articles 6A.2.2.2. and 6A.2.2.3).

6A.4.2.2—Limit States

Strength is the primary limit state for load rating; service and fatigue limit states are selectively applied in accordance with the provisions of this Manual. Applicable limit states are summarized in Table 6A.4.2.2-1.

C6A.4.2.2

Service limit states that are relevant to load rating are discussed under the articles on resistance of structures (see Articles 6A.5, 6A.6, and 6A.7).

Table 6A.4.2.2-1—Limit States and Load Factors for Load Rating

Bridge Type	Limit State*	Dead Load γ_{DC}	Dead Load γ_{DW}	Design Load Inventory γ_{LL}	Design Load Operating γ_{LL}	Legal Load γ_{LL}	Permit Load γ_{LL}
Steel	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1
	Service II	1.00	1.00	1.30	1.00	1.30	1.00
	Fatigue	0.00	0.00	0.75	—	—	—
Reinforced Concrete	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1
	Service I	1.00	1.00	—	—	—	1.00
Prestressed Concrete	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1
	Service III	1.00	1.00	0.80	—	1.00	—
	Service I	1.00	1.00	—	—	—	1.00
Wood	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1

* Defined in the *AASHTO LRFD Bridge Design Specifications*.

Notes:

- Shaded cells of the table indicate optional checks.
- Service I is used to check the 0.9 F_y stress limit in reinforcing steel.
- Load factor for *DW* at the strength limit state may be taken as 1.25 where thickness has been field measured.
- Fatigue limit state is checked using the LRFD fatigue truck (see Article 6A.6.4.1).

Table 6A.4.2.4-1—System Factor: φ_s for Flexural and Axial Effects

Superstructure Type	φ_s
Welded Members in Two-Girder/Truss/Arch Bridges	0.85
Riveted Members in Two-Girder/Truss/Arch Bridges	0.90
Multiple Eyebar Members in Truss Bridges	0.90
Three-Girder Bridges with Girder Spacing 6 ft	0.85
Four-Girder Bridges with Girder Spacing ≤4 ft	0.95
All Other Girder Bridges and Slab Bridges	1.00
Floorbeams with Spacing >12 ft and Noncontinuous Stringers	0.85
Redundant Stringer Subsystems between Floorbeams	1.00

If the simplified system factors presented in Table 6A.4.2.4-1 are used, they should be applied only when checking flexural and axial effects at the strength limit state of typical spans and geometries.

A constant value of $\varphi_s = 1.0$ is to be applied when checking shear at the strength limit state.

For evaluating timber bridges, a constant value of $\varphi_s = 1.0$ is assigned for flexure and shear.

If Table 6A.4.2.4-1 is used, the system factors are used to maintain an adequate level of system safety. Nonredundant bridges are penalized by requiring their members to provide higher safety levels than those of similar bridges with redundant configurations. The aim of φ_s is to add a reserve capacity such that the overall system reliability is increased from approximately an operating level (for redundant systems) to a more realistic target for nonredundant systems corresponding to Inventory levels.

If the Engineer can demonstrate the presence of adequate redundancy in a superstructure system (Reference: NCHRP Report 406), then φ_s may be taken as 1.0. In some instances, the level of redundancy may be sufficient to utilize a value of φ_s greater than 1.0, but in no instance should φ_s be taken as greater than 1.2.

A more liberal system factor for nonredundant riveted sections and truss members with multiple eyebars has been provided. The internal redundancy in these members makes a sudden failure far less likely. An increased system factor of 0.90 is appropriate for such members.

Some agencies may consider all three-girder systems, irrespective of girder spacing, to be nonredundant. In such cases, φ_s may be taken as 0.85 for welded construction and 0.90 for riveted construction.

Subsystems that have redundant members should not be penalized if the overall system is nonredundant. Thus, closely spaced parallel stringers would be redundant even in a two-girder-floorbeam main system.

For narrow bridges (such as one-lane bridges) with closely spaced three-and four-girder systems, all the girders are almost equally loaded and there is no reserve strength available. Therefore, φ_s is decreased to 0.85.

For the purposes of determining system factors, each web of a box girder may be considered as an I-girder.

System factors are generally not appropriate for shear, as shear failures tend to be brittle, so system reserve is not possible. The design resistance, factored for shear, should be calibrated to reflect the brittle characteristics. Thus, in the evaluation, all the φ_s should be equal. A constant value of $\varphi_s = 1.0$ is assigned for evaluation.

More accurate quantification of redundancy is provided in NCHRP Report 406, *Redundancy in Highway Bridge Superstructures*. Tables of system factors are given in the referenced report for common simple-span and continuous bridges with varying number of beams and beam spacings. For bridges with configurations that are not covered by the tables, a direct redundancy analysis approach may be used, as described in NCHRP Report 406.

$$P_D = P_B\left(\frac{V_{DZ}}{V_B}\right)^2 = P_B\frac{V_{DZ}^{\ 2}}{10{,}000} \qquad (3.8.1.2.1\text{-}1)$$

P_B = base wind pressure specified in Table 3.8.1.2.1-1 (ksf)

The wind force on the structure shall be calculated by multiplying the design wind pressure, P_D, calculated using Eq. 3.8.1.2.1-1, by the exposed area, including the area of sound barriers, if existing, regardless of the design wind pressure used in designing the sound barriers themselves.

Table 3.8.1.2.1-1—Base Pressures, P_B, Corresponding to V_B = 100 mph

Superstructure Component	Windward Load, ksf	Leeward Load, ksf
Trusses, Columns, and Arches	0.050	0.025
Beams	0.050	NA
Large Flat Surfaces	0.040	NA

The total wind loading shall not be taken less than 0.30 klf in the plane of a windward chord and 0.15 klf in the plane of a leeward chord on truss and arch components, and not less than 0.30 klf on beam or girder spans.

3.8.1.2.2—Loads from Superstructures

Except where specified herein, where the wind is not taken as normal to the structure, the base wind pressures, P_B, for various angles of wind direction may be taken as specified in Table 3.8.1.2.2-1 and shall be applied to the centroid of a single plane of exposed area. The skew angle shall be taken as measured from a perpendicular to the longitudinal axis. The wind direction for design shall be that which produces the extreme force effect on the component under investigation. The transverse and longitudinal pressures shall be applied simultaneously.

Wind tunnel tests may be used to provide more precise estimates of wind pressures. Such testing should be considered where wind is a major design load.

Due to the lack of information on the wind force on sound barriers, the wind pressure specified in Article 15.8.2 for the design of sound barriers is based on producing similar wind pressures to those used for the design of sound barriers (AASHTO, 1989). Such values of wind pressures proved to produce safe designs in the past.

The term "columns" in Table 3.8.1.2.1-1 refers to columns in superstructures such as spandrel columns in arches.

WIND LOAD APPLICATION

C3.8.1.2.2

For trusses, columns, and arches, the base wind pressures specified in Table 3.8.1.2.2-1 are the sum of the pressures applied to both the windward and leeward areas.

Table 3.8.1.2.2-1—Base Wind Pressures, P_B, for Various Angles of Attack and V_B = 100 mph

Skew Angle of Wind (degrees)	Trusses, Columns and Arches		Girders	
	Lateral Load (ksf)	Longitudinal Load (ksf)	Lateral Load (ksf)	Longitudinal Load (ksf)
0	0.075	0.000	0.050	0.000
15	0.070	0.012	0.044	0.006
30	0.065	0.028	0.041	0.012
45	0.047	0.041	0.033	0.016
60	0.024	0.050	0.017	0.019

For the usual girder and slab bridges having an individual span length of not more than 125 ft and a maximum height of 30.0 ft above low ground or water level the following wind loading may be used:

- 0.05 ksf, transverse
- 0.012 ksf, longitudinal

Both forces shall be applied simultaneously. These forces shall not be used in determining the forces on sound barriers.

3.8.1.2.3—Forces Applied Directly to the Substructure

The transverse and longitudinal forces to be applied directly to the substructure shall be calculated from an assumed base wind pressure of 0.040 ksf. For wind directions taken skewed to the substructure, this force shall be resolved into components perpendicular to the end and front elevations of the substructure. The component perpendicular to the end elevation shall act on the exposed substructure area as seen in end elevation, and the component perpendicular to the front elevation shall act on the exposed areas and shall be applied simultaneously with the wind loads from the superstructure.

Wind pressure on sound barriers should be determined using the provisions of Article 15.8.2.

3.8.1.3—Wind Pressure on Vehicles: *WL*

When vehicles are present, the design wind pressure shall be applied to both structure and vehicles. Wind pressure on vehicles shall be represented by an interruptible, moving force of 0.10 klf acting normal to, and 6.0 ft above, the roadway and shall be transmitted to the structure.

Except where specified herein, when wind on vehicles is not taken as normal to the structure, the components of normal and parallel force applied to the live load may be taken as specified in Table 3.8.1.3-1 with the skew angle taken as referenced normal to the surface.

C3.8.1.3

Based on practical experience, maximum live loads are not expected to be present on the bridge when the wind velocity exceeds 55 mph. The load factor corresponding to the treatment of wind on structure only in Load Combination Strength III would be $(55/100)^2$ $(1.4) = 0.42$, which has been rounded to 0.40 in the Strength V Load Combination. This load factor corresponds to 0.3 in Service I.

The 0.10 klf wind load is based on a long row of randomly sequenced passenger cars, commercial vans, and trucks exposed to the 55 mph design wind. This horizontal live load, similar to the design lane load, should be applied only to the tributary areas producing a force effect of the same kind.

Table 3.8.1.3-1—Wind Components on Live Load

Skew Angle (degrees)	Normal Component (klf)	Parallel Component (klf)
0	0.100	0.000
15	0.088	0.012
30	0.082	0.024
45	0.066	0.032
60	0.034	0.038

3.11 Wind Loads

3.11.1 Wind Load to Superstructure

For the usual girder and slab bridges with less than 30′ height above ground, the following simplified wind pressure on structure (*WS*), could be used in lieu of the general method described in AASHTO LRFD Article 3.8.1.2:

- 0.05 kip per square foot, transverse
- 0.012 kip per square foot, longitudinal

Both forces shall be applied simultaneously.

For the usual girder and slab bridges with less than 30′ height above ground, the following simplified wind pressure on vehicle (*WL*), could be used in lieu of the general method described in AASHTO LRFD Article 3.8.1.3:

- 0.10 kip per linear foot, transverse
- 0.04 kip per linear foot, longitudinal

Both forces shall be applied simultaneously.

3.11.2 Wind Load to Substructure

Wind forces shall be applied to the substructure units in accordance with the loadings specified in AASHTO. Transverse stiffness of the superstructure may be considered, as necessary, to properly distribute loads to the substructure provided that the superstructure is capable of sustaining such loads. Vertical wind pressure, per AASHTO LRFD 3.8.2, shall be included in the design where appropriate, for example, on single column piers. Wind loads shall be applied through shear keys or other positive means from the superstructure to the substructure. Wind loads shall be distributed to the piers and abutments in accordance with the laws of statics. Transverse wind loads can be applied directly to the piers assuming the superstructure to act as a rigid beam. For large structures a more appropriate result might be obtained by considering the superstructure to act as a flexible beam on elastic supports.

Table 3–12. Heat capacity of solid wood at selected temperatures and moisture contents

Temperature			Specific heat (kJ/kg·K (Btu/lb·°F))			
(K)	(°C	(°F))	Ovendry	5% MC	12% MC	20% MC
280	7	(45)	1.2 (0.28)	1.3 (0.32)	1.5 (0.37)	1.7 (0.41)
290	17	(75)	1.2 (0.29)	1.4 (0.33)	1.6 (0.38)	1.8 (0.43)
300	27	(80)	1.3 (0.30)	1.4 (0.34)	1.7 (0.40)	1.9 (0.45)
320	47	(116)	1.3 (0.32)	1.5 (0.37)	1.8 (0.43)	2.0 (0.49)
340	67	(152)	1.4 (0.34)	1.6 (0.39)	1.9 (0.46)	2.2 (0.52)
360	87	(188)	1.5 (0.36)	1.7 (0.41)	2.0 (0.49)	2.3 (0.56)

Thermal Expansion Coefficient

The coefficient of thermal expansion is a measure of the change of dimension caused by temperature change. The thermal expansion coefficients of completely dry wood are positive in all directions; that is, wood expands on heating and contracts on cooling. Limited research has been carried out to explore the influence of wood property variability on thermal expansion. The thermal expansion coefficient of ovendry wood parallel to the grain appears to be independent of specific gravity and species. In tests of both hardwoods and softwoods, the parallel-to-grain values have ranged from about 0.000031 to 0.0000045 per K (0.0000017 to 0.0000025 per °F).

The thermal expansion coefficients across the grain (radial and tangential) are proportional to wood specific gravity. These coefficients range from about 5 to more than 10 times greater than the parallel-to-grain coefficients and are of more practical interest. The radial and tangential thermal expansion coefficients for ovendry wood, α_r and α_t, can be approximated by the following equations, over an ovendry specific gravity range of about 0.1 to 0.8:

$$\alpha_r = (32.4G + 9.9)10^{-6} \text{ per K} \quad (3\text{–}11a)$$

$$\alpha_r = (18G + 5.5)10^{-6} \text{ per °F} \quad (3\text{–}11b)$$

$$\alpha_t = (32.4G + 18.4)10^{-6} \text{ per K} \quad (3\text{–}12a)$$

$$\alpha_t = (18G + 10.2)10^{-6} \text{ per °F} \quad (3\text{–}12b)$$

Thermal expansion coefficients can be considered independent of temperature over the temperature range of –51.1°C to 54.4°C (–60°F to 130°F).

Wood that contains moisture reacts differently to varying temperature than does dry wood. When moist wood is heated, it tends to expand because of normal thermal expansion and to shrink because of loss in moisture content. Unless the wood is very dry initially (perhaps 3% or 4% moisture content or less), shrinkage caused by moisture loss on heating will be greater than thermal expansion, so the net dimensional change on heating will be negative. Wood at intermediate moisture levels (about 8% to 20%) will expand when first heated, then gradually shrink to a volume smaller than the initial volume as the wood gradually loses water while in the heated condition.

Even in the longitudinal (grain) direction, where dimensional change caused by moisture change is very small, such changes will still predominate over corresponding dimensional changes as a result of thermal expansion unless the wood is very dry initially. For wood at usual moisture levels, net dimensional changes will generally be negative after prolonged heating.

Electrical Properties

The most important electrical properties of wood are conductivity, dielectric constant, and dielectric power factor. The conductivity of a material determines the electric current that will flow when the material is placed under a given voltage gradient. The dielectric constant of a nonconducting material determines the amount of potential electric energy, in the form of induced polarization, that is stored in a given volume of the material when that material is placed in an electric field. The power factor of a nonconducting material determines the fraction of stored energy that is dissipated as heat when the material experiences a complete polarize–depolarize cycle.

Examples of industrial wood processes and applications in which electrical properties of wood are important include crossarms and poles for high voltage powerlines, utility worker's tools, and the heat-curing of adhesives in wood products by high frequency electric fields. Moisture meters for wood utilize the relationship between electrical properties and moisture content to estimate the moisture content.

Conductivity

The electrical conductivity of wood varies slightly with applied voltage and approximately doubles for each temperature increase of 10°C (18°F). The electrical conductivity of wood (or its reciprocal, resistivity) varies greatly with moisture content, especially below the fiber saturation point. As the moisture content of wood increases from near zero to fiber saturation, electrical conductivity increases (resistivity decreases) by 10^{10} to 10^{13} times. Resistivity is about 10^{14} to 10^{16} Ω·m for ovendry wood and 10^{3} to 10^{4} Ω·m for wood at fiber saturation. As the moisture content increases from fiber saturation to complete saturation of the wood structure, the

Mechanical properties of eyebars, high-strength eyebars, forged eyebars, and cables vary depending on manufacturer and year of construction. When information from records is not available, microstructural and chemical analyses and hardness testing are helpful in classifying the material. In the absence of material tests, the Engineer should carefully investigate the material properties using manufacturer's data and compilation of older steel properties before establishing the yield point and tensile strength to be used in load rating the bridge.

6A.6.2.2—Pins

If the material designation for pins is unknown, the yield strength may be selected from Table 6A.6.2.2-1, based on the year of construction.

Table 6A.6.2.2-1—Minimum Yield Point of Pins by Year of Construction

Year of Construction	Minimum Yield Point, F_y, ksi
Prior to 1905	25.5
1905 through 1935	30
1936 through 1963	33
After 1963	36

6A.6.2.3—Wrought Iron

When the material designation is unknown for wrought iron, the minimum tensile strength, F_u, should be taken as 48 ksi and the minimum yield point, F_y, should be taken as 26 ksi.

Where practical, coupon tests should be performed to confirm the minimum mechanical properties used in the evaluation.

6A.6.3—Resistance Factors

Resistance factors, φ, for steel members, for the strength limit state, shall be taken as specified in LRFD Design Article 6.5.4.2.

C6A.6.3

For service limit states, φ = 1.0.

6A.6.4—Limit States

The applicable limit states and their load combinations for the evaluation of structural steel and wrought iron members are specified for the various rating procedures. The load combinations, and the load factors which comprise them, are specified in Table 6A.4.2.2-1 and in these Articles.

6A.6.4.1—Design-Load Rating

Strength I and Service II load combinations shall be checked for the design loading. Live load factors shall be taken as tabulated in Table 6A.4.2.2-1.

In situations where fatigue-prone details are present (category C or lower) a rating factor for infinite fatigue life should be computed. Members that do not satisfy the infinite fatigue life check may be evaluated for remaining fatigue life using procedures given in Section 7. This is an optional requirement.

C6A.6.4.1

Rating factors for applicable strength, service, and fatigue limit states computed during the design load rating will aid in identifying vulnerable limit states for further evaluation and future inspections.

Table 6B.5.2.1-1—Inventory Rating Allowable Stresses, psi

		DATE BUILT-STEEL UNKNOWN								
		Prior to 1905	1905 to 1936	1936 to 1963	After 1963	Carbon Steel	Silicon Steel Over 2 in. to 4 in. incl.	Nickel Steel	$1\frac{1}{8}$ in. and under	Over $1\frac{1}{8}$ in. to 2 in. incl.
AASHTO Designation[a]						M 94 (1961)	M 95 (1961)	M 96 (1961)		
ASTM Designation[a]						A7 (1967)	A94 (1966)	A8 (1961)	A94	A94
Minimum Tensile Strength	F_u	52,000	60,000			60,000	70,000	90,000	75,000	72,000
Minimum Yield Point	F_y	26,000	30,000	33,000	36,000	33,000	45,000	55,000	50,000	47,000
Axial tension in members with no holes for high-strength bolts or rivets. Use net section when member has any open holes larger than $1\frac{1}{4}$-in. diameter, such as perforations.	$0.55F_y$	14,000	16,000	18,000	20,000	18,000	24,000	30,000	27,000	25,000
	$0.46F_y$	NOT APPLICABLE								
Axial tension in members with holes for high-strength bolts or rivets and tension in extreme fiber of rolled shapes, girders, and built-up sections subject to bending. use whichever is smaller	Gross Section $0.55F_y$	14,000	16,000	18,000	20,000	18,000	24,000	30,000	27,000	25,000
• When the area of holes deducted for high-strength bolts or rivets is more than 15 percent of the gross area, that area in excess of 15 percent shall be deducted from the gross area in determining stress on the gross section. In determining gross section, any open holes larger than $1\frac{1}{4}$-in. diameter, such as perforations, shall be deducted.	Net Section $0.50F_u$	26,000	30,000	30,000	30,000	30,000	35,000	45,000	37,000	36,000
	Net Section $0.46F_u$	NOT APPLICABLE								
Axial tension in members without holes. Axial compression, gross section: stiffeners of plate girders. Compression in splice material, gross section.	$0.55F_y$	14,000	16,000	18,000	20,000	18,000	24,000	30,000	27,000	25,000
Compression in extreme fibers of rolled shapes, girders, and built-up sections, subject to bending, gross section, when compression flange is:	$0.55F_y$	14,000	16,000	18,000	20,000	18,000	24,000	30,000	27,000	25,000
(A) Supported laterally its full length by embedment in concrete										
(B) Partially supported or unsupported[b]										

$$F_b = \frac{91\times10^6 C_{\ell s}}{(F.S.)\,S_{xc}}\left(\frac{\ell_{yc}}{\ell}\right)\sqrt{0.772\frac{J}{\ell_{yc}}+9.87\left(\frac{d}{\ell}\right)^2} \le 0.55F_y$$

C_b = $1.75 + 1.05\,(M_1/M_2) + 0.3\,(M_1/M_2)2 \le 2.3$ where M_1 is the smaller and M_2 is the larger end moment in the unbraced segment of the beams: M_1/M_2 is positive when the moments cause reverse curvature and negative when bent in single curvature.

= 1.0 for unbraced cantilevers and for members where the moment within a significant portion of the unbraced segment is greater than or equal to the larger of the segment end moments.

$F.S.$ = Factor of Safety at Inventory Level = 1.82

Table 1. Tensile strengths of steel and factors of safety for tension fracture at net section.

Source	Year	Grade of Steel	Yield stress, minimum, ksi (MPA)	Ultimate stress, minimum, ksi (MPA)	Allowable stress on net section, ksi (MPA)	Factor of safety for fracture
Pottsville Iron & Steel Co.[7]	1887				15.6 (108)	
Carnegie Phipps & Co.[7]	1889-1893	for bridges			12.5 (86)	
IATM[10]	1900	medium	35 (241)	60 (414)		
Waddell[16]	1901	medium	35 (241)	60 (414)	16 (110) 18 (124)	3.8 3.3
Burr and Falk[4]	1901					3.5 to 6.0@
Copper[12]	1909	medium			10 to 25 (69 to 720)#	2.4 to 6.0#
Michigan[13]	1910	medium	30 (207)	60 (414)	15 (103)	4.0
Bethlehem Steel Co.[7]	1907-11	moving loads			12.5 (86)	
Waddell[17]	1916	medium	35 (241)	60 (414)	16 (110)	3.8
Ketchum[12]	1920	medium			16 (110)	
AASHTO[3]	pre 1905		26 (179)	52 (358)	26 (179)*	2.0*
	1905-36		30 (207)	60 (414)	30 (207)*	2.0*
AASHTO[1]	current	ASTM A36	36 (248)	58 (400)	29 (200)*	2.0*

* for inventory rating, less than 100,000 load cycles
@ depending on span # depending on type of load, including impact factor

Table 2. Tensile strengths of wrought iron and factors of safety for tension fracture.

Source	Year	Grade of Steel	Yield stress, minimum, ksi (MPA)	Ultimate stress, minimum, ksi (MPA)	Allowable stress ksi (MPA)	Factor of safety for fracture
Carnegie Kloman & Co.[7]	1873	wrought iron			14 (97)	3
Waddell[15]	1883	iron	26 (179)	50 (345)	8 to 12.5 (55 to 86)#	4.0 to 6.2#
Phoenix Iron Co.[7]	1885				12 (83)	
IATM[11]	1900	refined iron	25 (172)	48 (331)		
		test iron class A	25 (172)	48 (331)		
		test iron class B	25 (172)	50 (345)		
		stay-bolt iron	25 (172)	46 (317)		
Waddell[16]	1901	wrought iron	26 (179)	50 (345)	13 (90)	3.8
AASHTO[3]		wrought iron			14.6 (101)*	

* for inventory rating # depending on service class and influence area

increased those values to 320 and 180 lb/ft.[17] (4.67 and 2.63 kN/m). The Illinois Highway Department designed for the larger of 25 lb/ft.^{2} (1.2 kN/m^2) on the vertical projection of each truss and of the deck, or 300 and 150 lb/ft. (4.38 and 2.19 kN/m) on the loaded and unloaded chords, respectively[12]. Modern specifications[1,2] are much more demanding, requiring design for wind loads of 75 lb/ft.^{2} (3.6 kN/m^2) on the vertical projection of each truss and of the deck, plus 300 and 150 lb/ft. (4.38 and 2.19 kN/m) on the loaded and unloaded chords, respectively (this lineal load is not required for pedestrian bridges), plus 20 lb/ft.^{2} (0.96 kN/m^2) upward on the deck. Clearly, historic bridges are unlikely to have been designed for the wind loads currently mandated.

Structural Analysis and Design

The components of each of the rehabilitated project bridges were analyzed to estimate design stresses associated with internal forces caused by specified combinations of loads[1] and acting on the original uncorroded member cross-sections. Allowable stresses were computed from assumed material properties[3] and specified factors of

Modulus of Subgrade Reaction, K

Sandy Soils:

Loose Sand	30-100 kcf
Medium Sand	60-500 kcf
Dense Sand	400-800 kcf
Sand w/Clay (mix)	200-50 kcf
Sand w/Silt (mix)	150-300 kcf

Clayey Soils:

qu < 4 ksf	75-150 kcf
4 ksf < qu < 8 ksf	150-300 kcf
qu > 8 ksf	> 300 kcf

where: qu = unconfined compression strength

Note: if 'K' is known/given in units of kcf, multiply by 1000/1728 = 0.5787 to convert kcf to pci for input.

This program takes 'K' input in pci and multiplies it by 1728/1000 = 1.728 to convert to kcf for use throughout.

Max. Shears and L

+V(max) = 6.27

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

SWING SPAN – EXISTING STRUCTURE ANALYSIS

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

SWING SPAN – RATING RESULTS

Bridge 01349 - Midas load Rating

Swing Span - Minimum Rating Fator

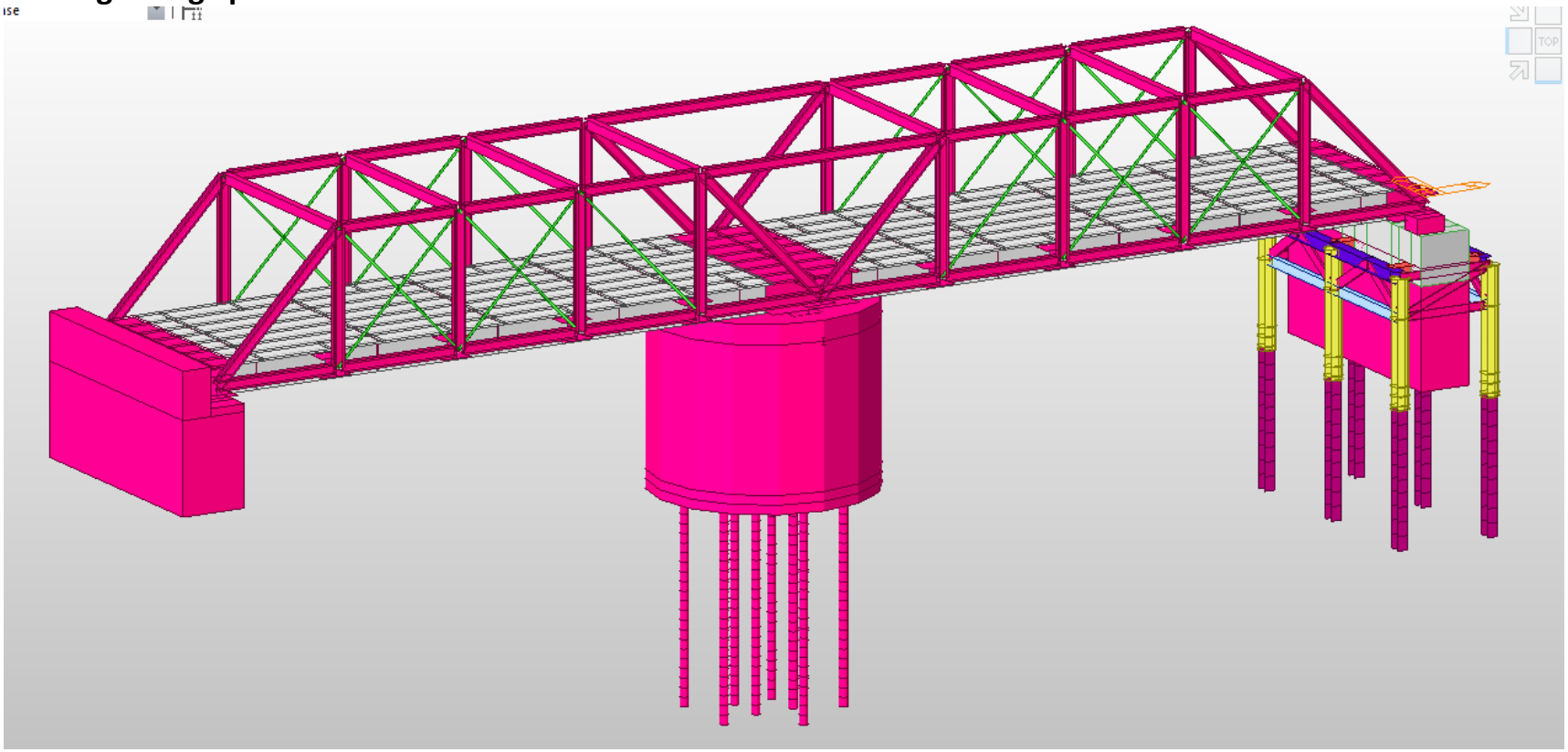
Loading	Minimum Rating Factor	Limit State
HL-93 Inventory	3.302	Strength I
HL-93 Operating	4.281	Strength I
HS-20	4.468	Strength I
H-20	6.984	Strength I
CT-L3S2	7.701	Strength I
CT-L73.0	5.754	Strength I
CT-L3S2 + 0.2 klf Lane Load	7.701	Strength I

Swing Span - Rating Factor Results

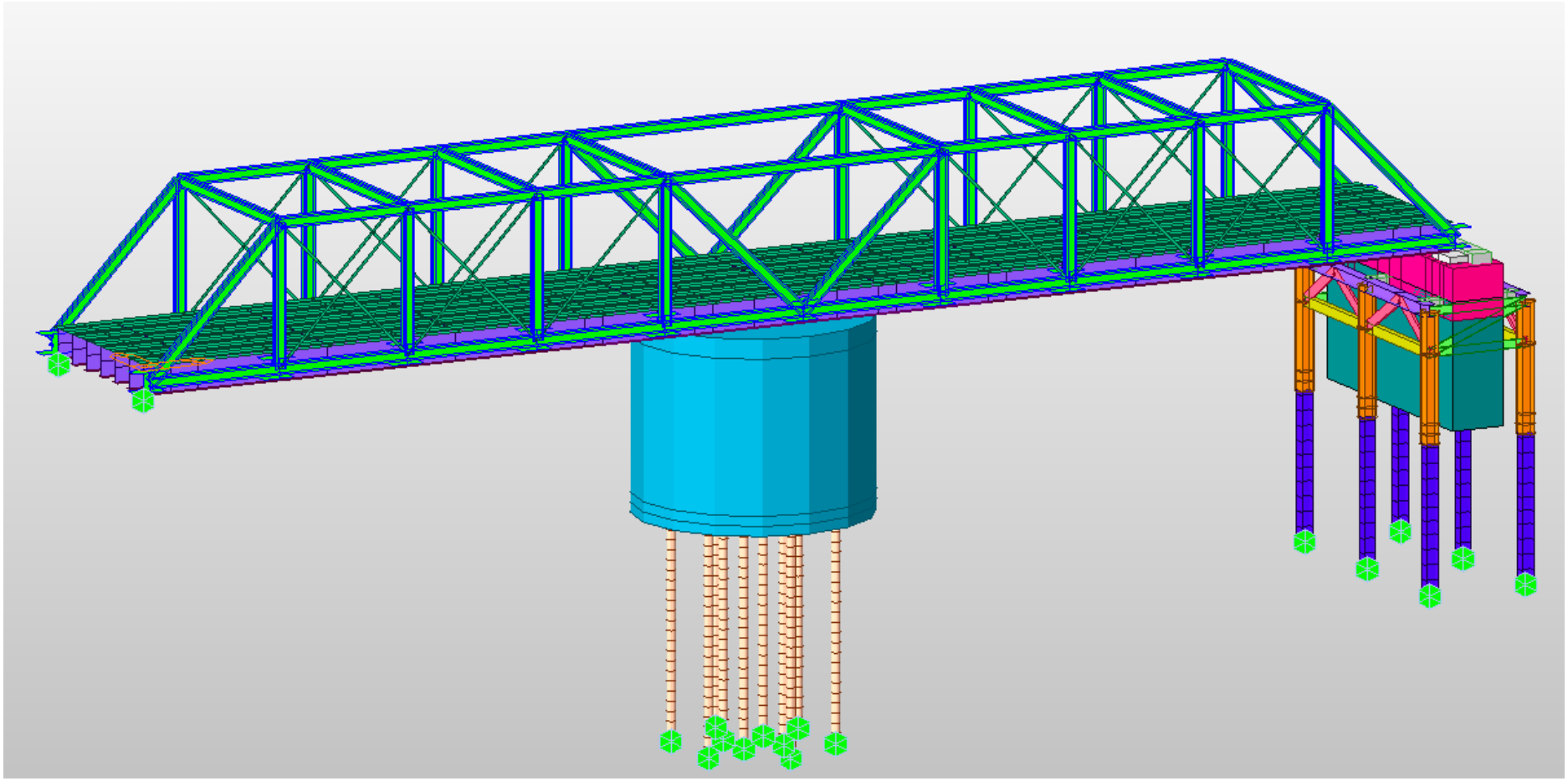
	Midas Civil 2016 V2.1	
	Rating Factor	Limit State
HL-93 Inv.		
Girder 1	3.3112	Strength I
Girder 2	4.3051	Strength I
Girder 3	4.5897	Strength I
Girder 4	4.4292	Strength I
Girder 5	4.5873	Strength I
Girder 6	4.3015	Strength I
Girder 7	3.3024	Strength I
HL-93 Oper.		
Girder 1	4.2923	Strength I
Girder 2	5.5807	Strength I
Girder 3	5.9496	Strength I
Girder 4	5.7416	Strength I
Girder 5	5.9465	Strength I
Girder 6	5.5760	Strength I
Girder 7	4.2809	Strength I
HS-20		
Girder 1	4.4782	Strength I
Girder 2	5.9657	Strength I
Girder 3	6.3059	Strength I
Girder 4	5.8383	Strength I
Girder 5	6.3024	Strength I
Girder 6	5.9609	Strength I
Girder 7	4.4676	Strength I
H-20		
Girder 1	6.9963	Strength I
Girder 2	9.0006	Strength I
Girder 3	9.3572	Strength I
Girder 4	7.6886	Strength I
Girder 5	9.3526	Strength I
Girder 6	8.9943	Strength I
Girder 7	6.9837	Strength I

CT-L3S2			
	Girder 1	7.7236	Strength I
	Girder 2	10.0684	Strength I
	Girder 3	10.7420	Strength I
	Girder 4	9.6244	Strength I
	Girder 5	10.7358	Strength I
	Girder 6	10.0534	Strength I
	Girder 7	7.7012	Strength I
CT-L73.0			
	Girder 1	5.7658	Strength I
	Girder 2	7.3077	Strength I
	Girder 3	7.7884	Strength I
	Girder 4	7.0496	Strength I
	Girder 5	7.7842	Strength I
	Girder 6	7.3023	Strength I
	Girder 7	5.7538	Strength I
CT-L3S2			
	Girder 1	7.7236	Strength I
	Girder 2	10.0684	Strength I
	Girder 3	10.7420	Strength I
	Girder 4	9.6244	Strength I
	Girder 5	10.7358	Strength I
	Girder 6	10.0534	Strength I
	Girder 7	7.7012	Strength I

Existing Swing Span



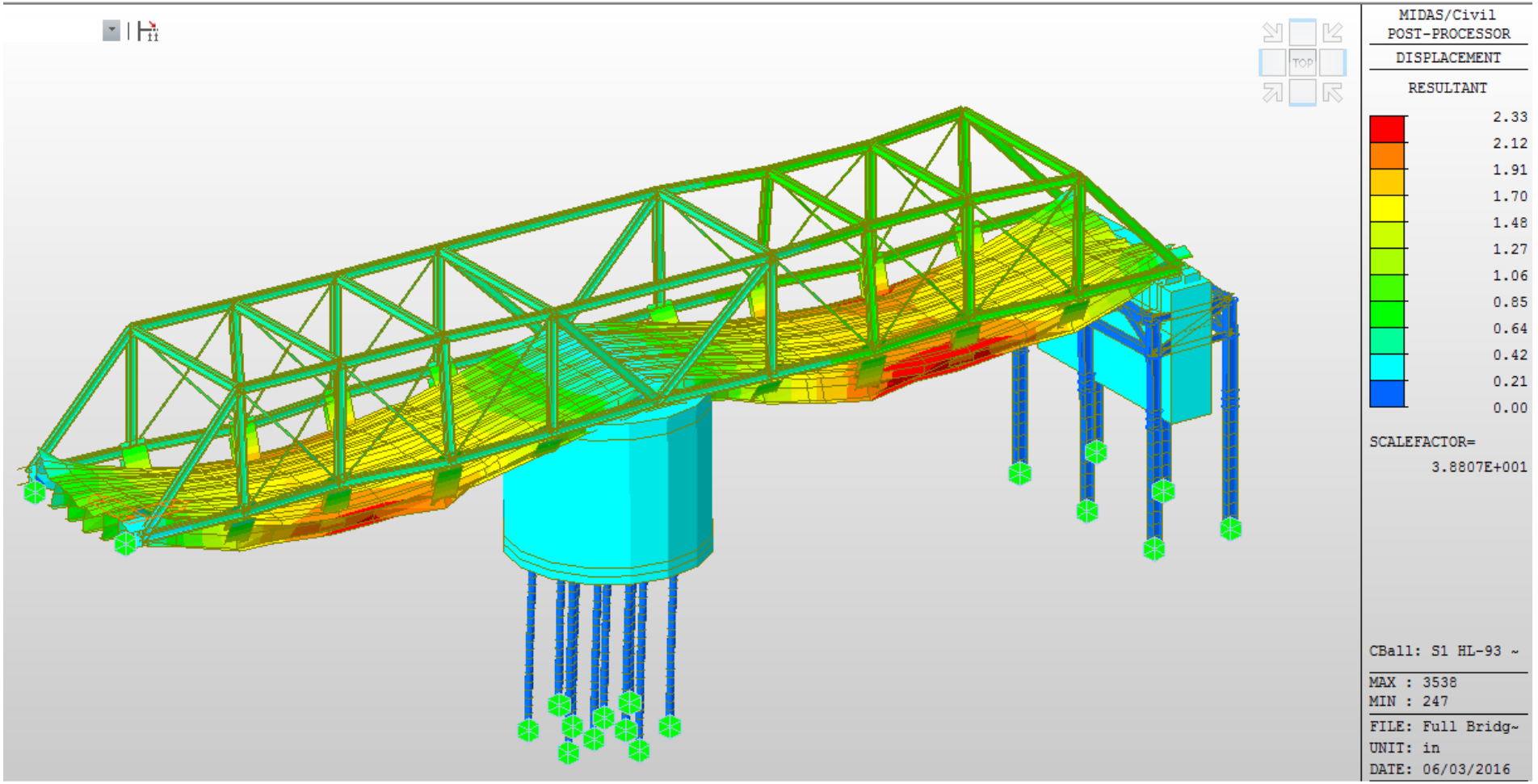
Existing Swing Span



LRFD ANALYSIS

Swing Span

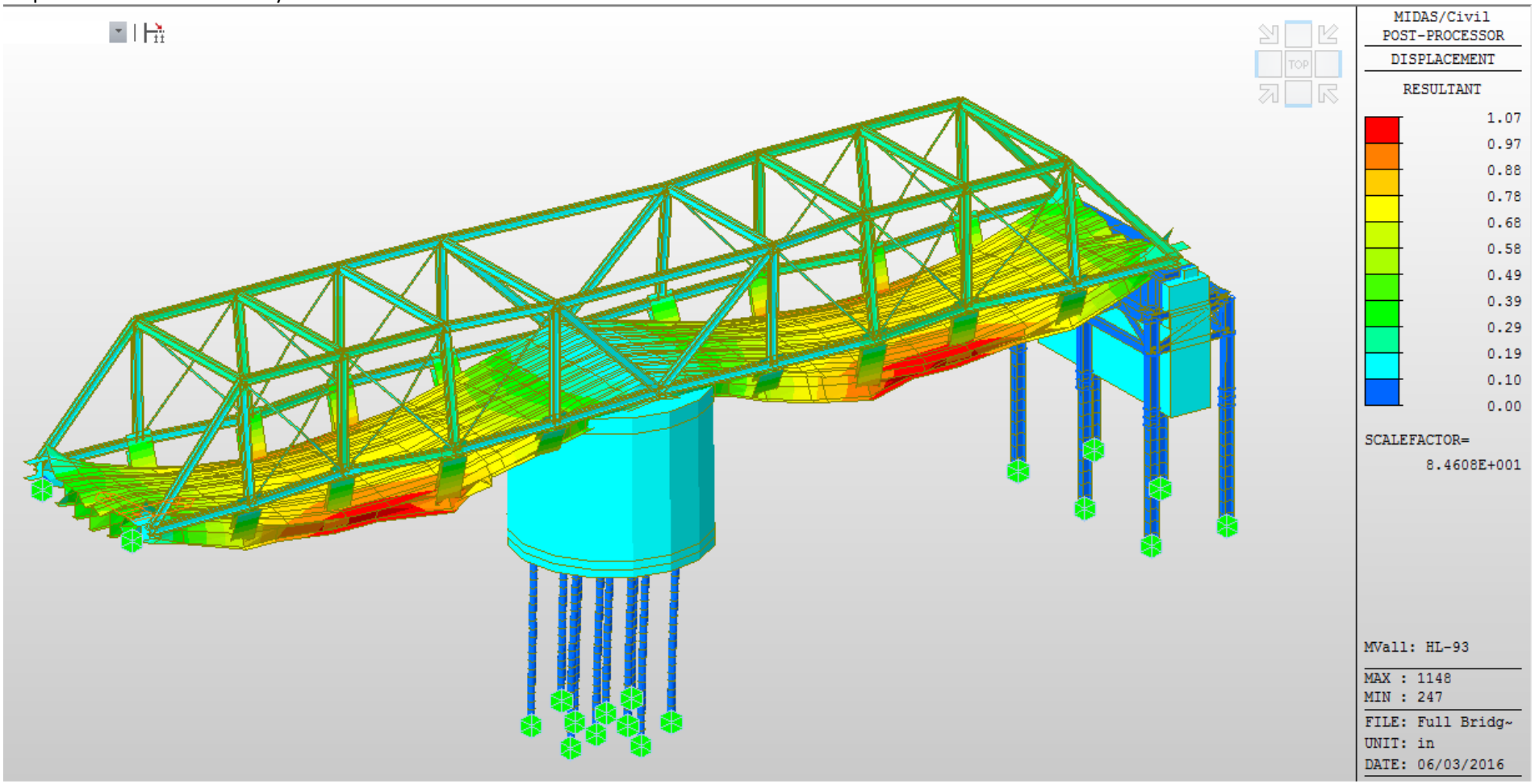
Displacement: Strength I (Factored DL and LL)



LRFD ANALYSIS

Swing Span

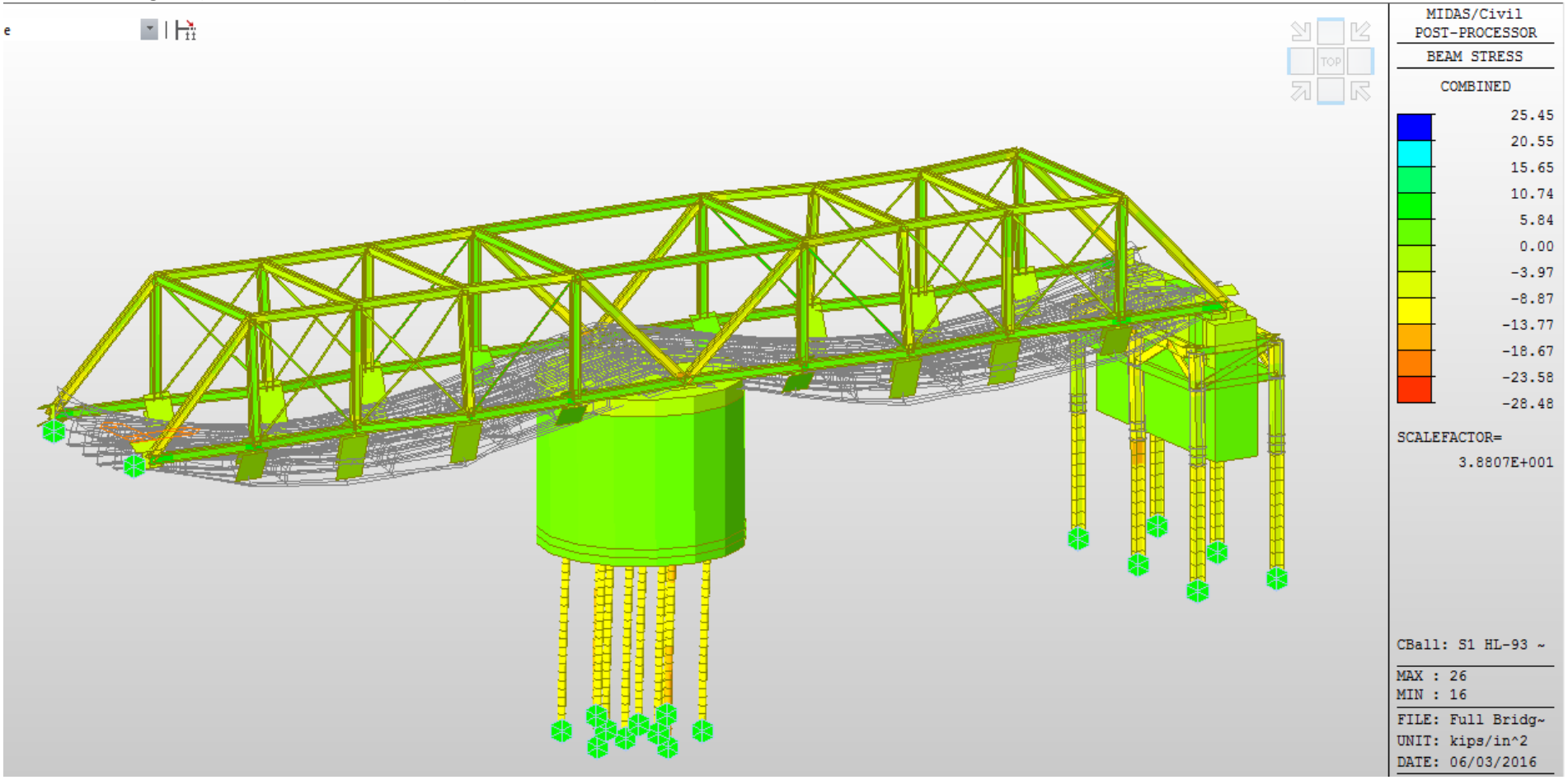
Displacement: Live Load Only



LRFD ANALYSIS

Swing Span

Stresses: Strength I (Stresses on Truss Chords) (Factored DL and LL)



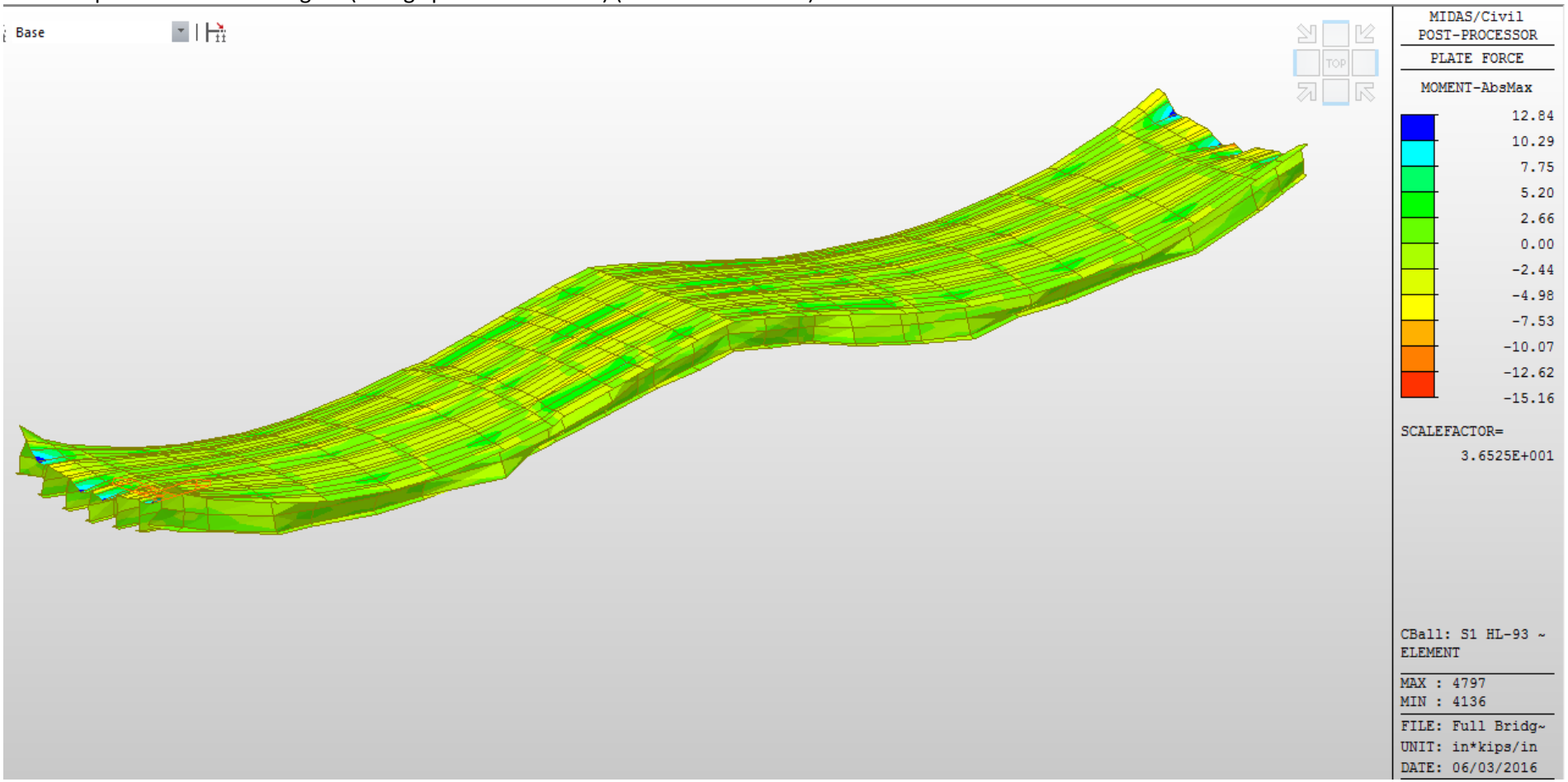
25.5 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Swing Span

Moment per linear foot: Strength I (Swing Span Main Girders) (Factored DL and LL)

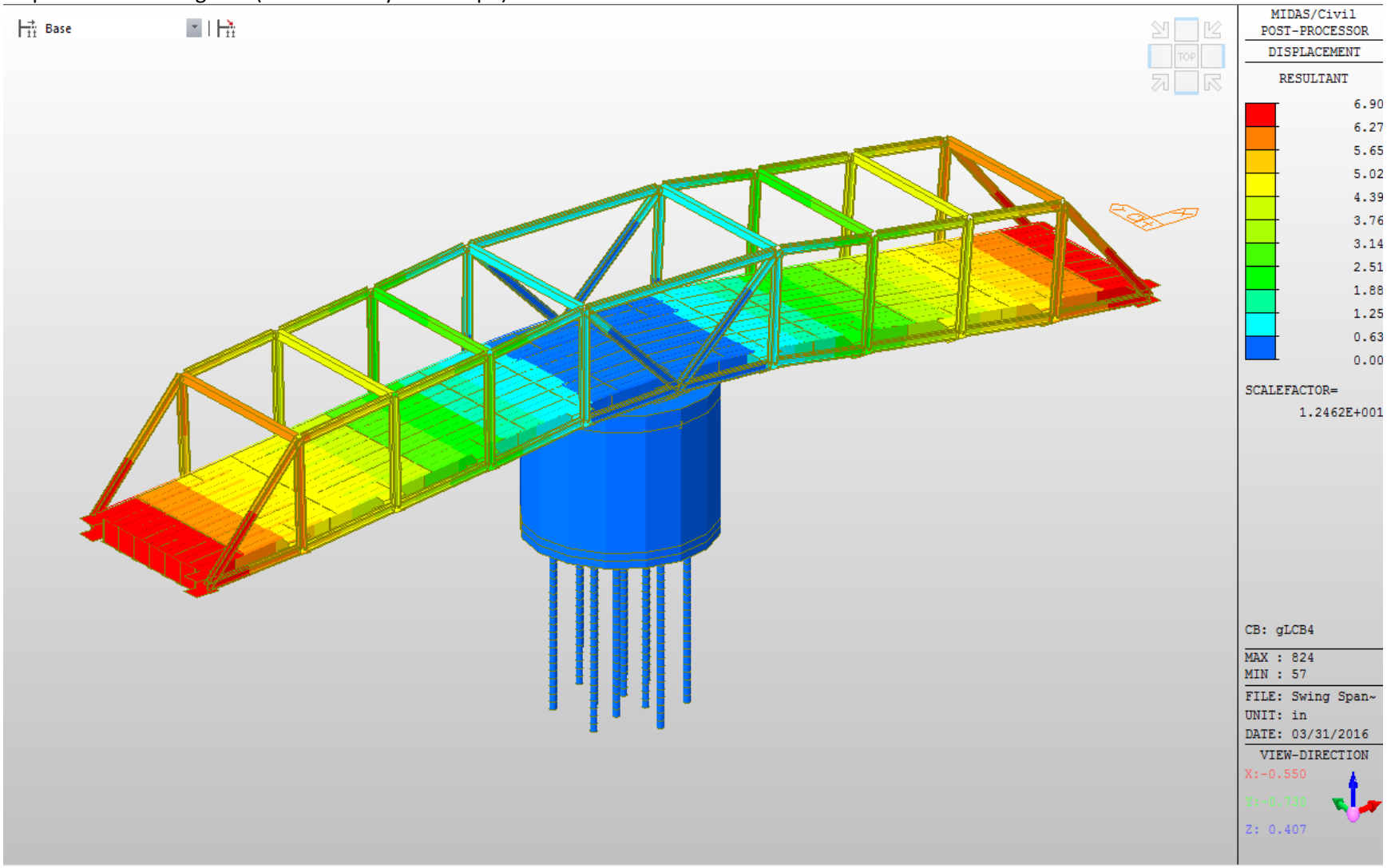


50 ksi Steel

LRFD ANALYSIS

Swing Span Analysis (open)

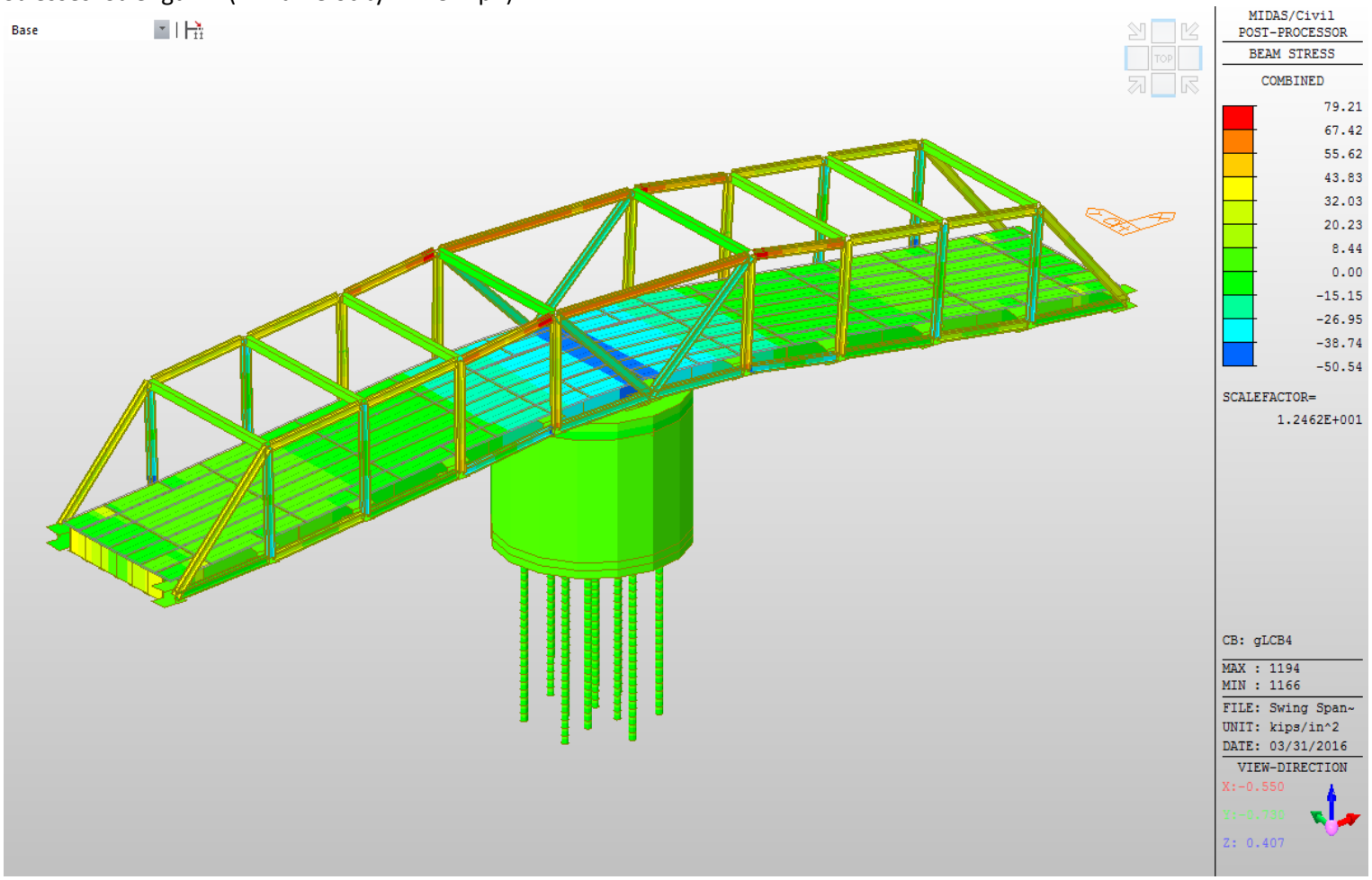
Displacement: Strength III (Wind Velocity = 125 mph)



LRFD ANALYSIS

Swing Span Analysis (open)

Stresses: Strength III (Wind Velocity = 125 mph)



25.5 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

SWING SPAN – RATING OUTPUT

LOAD RATING SWING SPAN

RF= RATING FACTOR

$RF = (C - f_{DL+SDL}) / (f_{LL+I})$

$f_{DL+SDL}=1.25*DL+1.5*DW$

$f_{LL+I}=\Upsilon_{LL}*LL$

$C=\varphi_C\varphi_S\varphi R_nS_x = (1.0)(1.0)(.95)(50)(930.83)$

Virtual Beam	LOADING	R_n (ksi)	S_x (in^3)	$C=\varphi_C\varphi_S\varphi R_nS_x$	M_{DL+SDL} (kip-in)	M_{LL+I} (kip-in)	RF
1	HL-93 Inventory	50	930.83	44214.425	-35.32	-350.87	125.9130
1	HL-93 Inventory	50	930.83	44214.425	2757.58	12519.8	3.3113
2	HL-93 Inventory	50	930.83	44214.425	1340.69	6161.96	6.9578
2	HL-93 Inventory	50	930.83	44214.425	2353.36	11038.4	3.7923
3	HL-93 Inventory	50	930.83	44214.425	2514.92	11391.8	3.6605
3	HL-93 Inventory	50	930.83	44214.425	1916.1	10204	4.1453
4	HL-93 Inventory	50	930.83	44214.425	2228.89	10452.7	4.0167
4	HL-93 Inventory	50	930.83	44214.425	1840.96	11001.6	3.8516
5	HL-93 Inventory	50	930.83	44214.425	2113.66	10617	3.9654
5	HL-93 Inventory	50	930.83	44214.425	1840.96	11001.6	3.8516
6	HL-93 Inventory	50	930.83	44214.425	2113.66	10617	3.9654
6	HL-93 Inventory	50	930.83	44214.425	1590.57	10682.2	3.9902
7	HL-93 Inventory	50	930.83	44214.425	1996.24	11234.8	3.7578
7	HL-93 Inventory	50	930.83	44214.425	1032.56	9471.1	4.5593
8	HL-93 Inventory	50	930.83	44214.425	1679.31	10848.7	3.9208
8	HL-93 Inventory	50	930.83	44214.425	1032.56	9471.1	4.5593
9	HL-93 Inventory	50	930.83	44214.425	1679.31	10848.7	3.9208
9	HL-93 Inventory	50	930.83	44214.425	429.08	7778.11	5.6293
10	HL-93 Inventory	50	930.83	44214.425	1114.22	9627.41	4.4768
10	HL-93 Inventory	50	930.83	44214.425	-704.69	-5608.73	7.7575
11	HL-93 Inventory	50	930.83	44214.425	231.25	7137.62	6.1622
11	HL-93 Inventory	50	930.83	44214.425	-704.69	-5608.73	7.7575
12	HL-93 Inventory	50	930.83	44214.425	231.25	7137.62	6.1622
12	HL-93 Inventory	50	930.83	44214.425	-1716.52	-6614.5	6.4250
13	HL-93 Inventory	50	930.83	44214.425	-1321.91	-6194.19	6.9246
13	HL-93 Inventory	50	930.83	44214.425	-2624.03	-7732.51	5.3786
14	HL-93 Inventory	50	930.83	44214.425	-1669.96	-6574.15	6.4715
14	HL-93 Inventory	50	930.83	44214.425	-3676.48	-9237.54	4.3884
15	HL-93 Inventory	50	930.83	44214.425	-3675.62	-9279.51	4.3686
15	HL-93 Inventory	50	930.83	44214.425	-1668.81	-6531.66	6.5138
16	HL-93 Inventory	50	930.83	44214.425	-2623.08	-7689.76	5.4087
16	HL-93 Inventory	50	930.83	44214.425	-1320.73	-6151.18	6.9732
17	HL-93 Inventory	50	930.83	44214.425	-1715.44	-6572.29	6.4664
17	HL-93 Inventory	50	930.83	44214.425	232.73	7097.73	6.1966
18	HL-93 Inventory	50	930.83	44214.425	-703.49	-5563.54	7.8207
18	HL-93 Inventory	50	930.83	44214.425	232.73	7097.73	6.1966
19	HL-93 Inventory	50	930.83	44214.425	-703.49	-5563.54	7.8207
19	HL-93 Inventory	50	930.83	44214.425	1116.11	9589.44	4.4944
20	HL-93 Inventory	50	930.83	44214.425	430.7	7738.46	5.6579
20	HL-93 Inventory	50	930.83	44214.425	1681.38	10816.6	3.9322
21	HL-93 Inventory	50	930.83	44214.425	1034.3	9433.79	4.5772
21	HL-93 Inventory	50	930.83	44214.425	1681.38	10816.6	3.9322
22	HL-93 Inventory	50	930.83	44214.425	1034.3	9433.79	4.5772
22	HL-93 Inventory	50	930.83	44214.425	1998.88	11212	3.7652
23	HL-93 Inventory	50	930.83	44214.425	1592.45	10650	4.0021
23	HL-93 Inventory	50	930.83	44214.425	2116.96	10602.4	3.9706
24	HL-93 Inventory	50	930.83	44214.425	1843.23	10979.5	3.8591
24	HL-93 Inventory	50	930.83	44214.425	2116.96	10602.4	3.9706
25	HL-93 Inventory	50	930.83	44214.425	1843.23	10979.5	3.8591
25	HL-93 Inventory	50	930.83	44214.425	2233.75	10444.6	4.0194
26	HL-93 Inventory	50	930.83	44214.425	1918.69	10190	4.1507
26	HL-93 Inventory	50	930.83	44214.425	2521.94	11394.1	3.6591
27	HL-93 Inventory	50	930.83	44214.425	2357.47	11027.2	3.7958
27	HL-93 Inventory	50	930.83	44214.425	1347.65	6177.27	6.9394
28	HL-93 Inventory	50	930.83	44214.425	2764.16	12518.2	3.3112
28	HL-93 Inventory	50	930.83	44214.425	-28.01	-320.57	137.8370
29	HL-93 Inventory	50	930.83	44214.425	58.91	353.29	124.9838
29	HL-93 Inventory	50	930.83	44214.425	109.1	-2514.61	17.5396
30	HL-93 Inventory	50	930.83	44214.425	155.04	-976.53	45.1183
30	HL-93 Inventory	50	930.83	44214.425	1368.35	6626.52	6.4658
31	HL-93 Inventory	50	930.83	44214.425	152.67	-2419.25	18.2130
31	HL-93 Inventory	50	930.83	44214.425	1941.22	9476.97	4.4606
32	HL-93 Inventory	50	930.83	44214.425	1277.19	6336.27	6.7764
32	HL-93 Inventory	50	930.83	44214.425	1899.93	9818.57	4.3096

Minimum Rating factor	3.3112	**Girder 1**
Minimum Rating factor	4.3051	**Girder 2**
Minimum Rating factor	4.5897	**Girder 3**
Minimum Rating factor	4.4292	**Girder 4**
Minimum Rating factor	4.5873	**Girder 5**
Minimum Rating factor	4.3015	**Girder 6**
Minimum Rating factor	3.3024	**Girder 7**

33	HL-93 Inventory	50	930.83	44214.425	1830.74	9118.82	4.6479
33	HL-93 Inventory	50	930.83	44214.425	1899.93	9818.57	4.3096
34	HL-93 Inventory	50	930.83	44214.425	1830.74	9118.82	4.6479
34	HL-93 Inventory	50	930.83	44214.425	1704.64	9854.83	4.3136
35	HL-93 Inventory	50	930.83	44214.425	1884.42	9786.73	4.3252
35	HL-93 Inventory	50	930.83	44214.425	1167.89	8543.67	5.0384
36	HL-93 Inventory	50	930.83	44214.425	1711.84	9872.58	4.3051
36	HL-93 Inventory	50	930.83	44214.425	1167.89	8543.67	5.0384
37	HL-93 Inventory	50	930.83	44214.425	1711.84	9872.58	4.3051
37	HL-93 Inventory	50	930.83	44214.425	521.46	7106.86	6.1480
38	HL-93 Inventory	50	930.83	44214.425	1162.86	8517.53	5.0545
38	HL-93 Inventory	50	930.83	44214.425	-667.57	-5389.93	8.0793
39	HL-93 Inventory	50	930.83	44214.425	246.03	6329.33	6.9468
39	HL-93 Inventory	50	930.83	44214.425	-667.57	-5389.93	8.0793
40	HL-93 Inventory	50	930.83	44214.425	246.03	6329.33	6.9468
40	HL-93 Inventory	50	930.83	44214.425	-1801.2	-6297.19	6.7353
41	HL-93 Inventory	50	930.83	44214.425	-1408.94	-5940.7	7.2055
41	HL-93 Inventory	50	930.83	44214.425	-2818.11	-7416.48	5.5817
42	HL-93 Inventory	50	930.83	44214.425	-1821.05	-6328.21	6.6991
42	HL-93 Inventory	50	930.83	44214.425	-3943.48	-8819.76	4.5660
43	HL-93 Inventory	50	930.83	44214.425	-3942.53	-8820.38	4.5658
43	HL-93 Inventory	50	930.83	44214.425	-1819.86	-6277.23	6.7537
44	HL-93 Inventory	50	930.83	44214.425	-2817.07	-7364.37	5.6213
44	HL-93 Inventory	50	930.83	44214.425	-1407.74	-5889.56	7.2682
45	HL-93 Inventory	50	930.83	44214.425	-1800.05	-6246.31	6.7903
45	HL-93 Inventory	50	930.83	44214.425	247.41	6283.1	6.9977
46	HL-93 Inventory	50	930.83	44214.425	-666.35	-5334.17	8.1640
46	HL-93 Inventory	50	930.83	44214.425	247.41	6283.1	6.9977
47	HL-93 Inventory	50	930.83	44214.425	-666.35	-5334.17	8.1640
47	HL-93 Inventory	50	930.83	44214.425	1164.6	8473.36	5.0806
48	HL-93 Inventory	50	930.83	44214.425	522.97	7061.89	6.1869
48	HL-93 Inventory	50	930.83	44214.425	1713.82	9834.43	4.3216
49	HL-93 Inventory	50	930.83	44214.425	1169.54	8499.29	5.0645
49	HL-93 Inventory	50	930.83	44214.425	1713.82	9834.43	4.3216
50	HL-93 Inventory	50	930.83	44214.425	1169.54	8499.29	5.0645
50	HL-93 Inventory	50	930.83	44214.425	1886.49	9758.14	4.3377
51	HL-93 Inventory	50	930.83	44214.425	1706.51	9816.5	4.3303
51	HL-93 Inventory	50	930.83	44214.425	1833.06	9101.02	4.6568
52	HL-93 Inventory	50	930.83	44214.425	1902	9789.95	4.3220
52	HL-93 Inventory	50	930.83	44214.425	1833.06	9101.02	4.6568
53	HL-93 Inventory	50	930.83	44214.425	1902	9789.95	4.3220
53	HL-93 Inventory	50	930.83	44214.425	1278.31	6323.11	6.7903
54	HL-93 Inventory	50	930.83	44214.425	1943.83	9459.43	4.4686
54	HL-93 Inventory	50	930.83	44214.425	152.35	-2419.5	18.2112
55	HL-93 Inventory	50	930.83	44214.425	1369.91	6614.8	6.4771
55	HL-93 Inventory	50	930.83	44214.425	155.05	-976.66	45.1123
56	HL-93 Inventory	50	930.83	44214.425	109.01	-2514.88	17.5378
56	HL-93 Inventory	50	930.83	44214.425	58.94	352.9	125.1218
57	HL-93 Inventory	50	930.83	44214.425	-0.66	-180.22	245.3322
57	HL-93 Inventory	50	930.83	44214.425	-116.89	-2206.06	19.9893
58	HL-93 Inventory	50	930.83	44214.425	-33.87	-1036.58	42.6215
58	HL-93 Inventory	50	930.83	44214.425	952.79	5210	8.3036
59	HL-93 Inventory	50	930.83	44214.425	-0.84	-1944.36	22.7394
59	HL-93 Inventory	50	930.83	44214.425	1561.71	7755.58	5.4996
60	HL-93 Inventory	50	930.83	44214.425	1068.85	5616.59	7.6818
60	HL-93 Inventory	50	930.83	44214.425	1801.31	9217	4.6016
61	HL-93 Inventory	50	930.83	44214.425	1505.76	7608.87	5.6130
61	HL-93 Inventory	50	930.83	44214.425	1801.31	9217	4.6016
62	HL-93 Inventory	50	930.83	44214.425	1505.76	7608.87	5.6130
62	HL-93 Inventory	50	930.83	44214.425	1714.06	9259.97	4.5897
63	HL-93 Inventory	50	930.83	44214.425	1722.11	9006.24	4.7181
63	HL-93 Inventory	50	930.83	44214.425	1186.06	8370.09	5.1407
64	HL-93 Inventory	50	930.83	44214.425	1662.53	9122.19	4.6647
64	HL-93 Inventory	50	930.83	44214.425	1186.06	8370.09	5.1407
65	HL-93 Inventory	50	930.83	44214.425	1662.53	9122.19	4.6647
65	HL-93 Inventory	50	930.83	44214.425	561.77	6760.29	6.4572
66	HL-93 Inventory	50	930.83	44214.425	1147.95	8282.21	5.1999
66	HL-93 Inventory	50	930.83	44214.425	-617.7	-4929.19	8.8446
67	HL-93 Inventory	50	930.83	44214.425	271.79	6144.98	7.1510
67	HL-93 Inventory	50	930.83	44214.425	-617.7	-4929.19	8.8446
68	HL-93 Inventory	50	930.83	44214.425	271.79	6144.98	7.1510
68	HL-93 Inventory	50	930.83	44214.425	-1809.51	-5917.85	7.1656
69	HL-93 Inventory	50	930.83	44214.425	-1403.25	-5545.07	7.7206
69	HL-93 Inventory	50	930.83	44214.425	-2826.84	-6981.95	5.9278
70	HL-93 Inventory	50	930.83	44214.425	-1825.34	-5928.54	7.1500

70	HL-93 Inventory	50	930.83	44214.425	-3948.95	-8307.59	4.8468
71	HL-93 Inventory	50	930.83	44214.425	-3947.97	-8269.48	4.8693
71	HL-93 Inventory	50	930.83	44214.425	-1824.24	-5879.79	7.2095
72	HL-93 Inventory	50	930.83	44214.425	-2825.82	-6932.03	5.9706
72	HL-93 Inventory	50	930.83	44214.425	-1402.14	-5495.83	7.7900
73	HL-93 Inventory	50	930.83	44214.425	-1808.43	-5868.98	7.2254
73	HL-93 Inventory	50	930.83	44214.425	273	6099.29	7.2044
74	HL-93 Inventory	50	930.83	44214.425	-616.59	-4875.07	8.9430
74	HL-93 Inventory	50	930.83	44214.425	273	6099.29	7.2044
75	HL-93 Inventory	50	930.83	44214.425	-616.59	-4875.07	8.9430
75	HL-93 Inventory	50	930.83	44214.425	1149.39	8238.75	5.2271
76	HL-93 Inventory	50	930.83	44214.425	563.1	6714	6.5015
76	HL-93 Inventory	50	930.83	44214.425	1664.1	9083.97	4.6841
77	HL-93 Inventory	50	930.83	44214.425	1187.49	8325.91	5.1678
77	HL-93 Inventory	50	930.83	44214.425	1664.1	9083.97	4.6841
78	HL-93 Inventory	50	930.83	44214.425	1187.49	8325.91	5.1678
78	HL-93 Inventory	50	930.83	44214.425	1723.47	8977.43	4.7331
79	HL-93 Inventory	50	930.83	44214.425	1715.65	9221.55	4.6086
79	HL-93 Inventory	50	930.83	44214.425	1506.98	7591.15	5.6260
80	HL-93 Inventory	50	930.83	44214.425	1802.83	9187.77	4.6161
80	HL-93 Inventory	50	930.83	44214.425	1506.98	7591.15	5.6260
81	HL-93 Inventory	50	930.83	44214.425	1802.83	9187.77	4.6161
81	HL-93 Inventory	50	930.83	44214.425	1069.54	5603.99	7.6990
82	HL-93 Inventory	50	930.83	44214.425	1563.11	7738.16	5.5118
82	HL-93 Inventory	50	930.83	44214.425	-1.01	-1944.35	22.7394
83	HL-93 Inventory	50	930.83	44214.425	953.57	5199.04	8.3209
83	HL-93 Inventory	50	930.83	44214.425	-33.98	-1036.59	42.6209
84	HL-93 Inventory	50	930.83	44214.425	-116.98	-2205.97	19.9900
84	HL-93 Inventory	50	930.83	44214.425	-0.69	-180.22	245.3320
85	HL-93 Inventory	50	930.83	44214.425	-12.09	201.01	219.9012
85	HL-93 Inventory	50	930.83	44214.425	-135.14	-5001.41	8.8134
86	HL-93 Inventory	50	930.83	44214.425	-66.51	-2317.9	19.0465
86	HL-93 Inventory	50	930.83	44214.425	845.4	5824.36	7.4461
87	HL-93 Inventory	50	930.83	44214.425	-12.15	-4513.37	9.7936
87	HL-93 Inventory	50	930.83	44214.425	1421.63	6857.02	6.2407
88	HL-93 Inventory	50	930.83	44214.425	1009.87	6386.15	6.7654
88	HL-93 Inventory	50	930.83	44214.425	1757.56	9585.59	4.4292
89	HL-93 Inventory	50	930.83	44214.425	1395.06	6822.95	6.2758
89	HL-93 Inventory	50	930.83	44214.425	1757.56	9585.59	4.4292
90	HL-93 Inventory	50	930.83	44214.425	1395.06	6822.95	6.2758
90	HL-93 Inventory	50	930.83	44214.425	1713.65	8556.49	4.9671
91	HL-93 Inventory	50	930.83	44214.425	1671.56	9360.56	4.5449
91	HL-93 Inventory	50	930.83	44214.425	1193.39	9007.54	4.7761
92	HL-93 Inventory	50	930.83	44214.425	1640.55	8371.28	5.0857
92	HL-93 Inventory	50	930.83	44214.425	1193.39	9007.54	4.7761
93	HL-93 Inventory	50	930.83	44214.425	1640.55	8371.28	5.0857
93	HL-93 Inventory	50	930.83	44214.425	575.99	6435.42	6.7810
94	HL-93 Inventory	50	930.83	44214.425	1141.5	8925.63	4.8258
94	HL-93 Inventory	50	930.83	44214.425	-603.15	-4551.69	9.5813
95	HL-93 Inventory	50	930.83	44214.425	281.17	6392.03	6.8731
95	HL-93 Inventory	50	930.83	44214.425	-603.15	-4551.69	9.5813
96	HL-93 Inventory	50	930.83	44214.425	281.17	6392.03	6.8731
96	HL-93 Inventory	50	930.83	44214.425	-1808.23	-5517.58	7.6857
97	HL-93 Inventory	50	930.83	44214.425	-1399.55	-5157.98	8.3007
97	HL-93 Inventory	50	930.83	44214.425	-2828.65	-6529.78	6.3380
98	HL-93 Inventory	50	930.83	44214.425	-1822.65	-5526.59	7.6705
98	HL-93 Inventory	50	930.83	44214.425	-3954.07	-8135.73	4.9486
99	HL-93 Inventory	50	930.83	44214.425	-3953.09	-8166.61	4.9300
99	HL-93 Inventory	50	930.83	44214.425	-1821.66	-5481.45	7.7339
100	HL-93 Inventory	50	930.83	44214.425	-2827.66	-6483.08	6.3838
100	HL-93 Inventory	50	930.83	44214.425	-1398.55	-5112.33	8.3750
101	HL-93 Inventory	50	930.83	44214.425	-1807.23	-5472.24	7.7495
101	HL-93 Inventory	50	930.83	44214.425	282.18	6347.9	6.9208
102	HL-93 Inventory	50	930.83	44214.425	-602.15	-4499.66	9.6923
102	HL-93 Inventory	50	930.83	44214.425	282.18	6347.9	6.9208
103	HL-93 Inventory	50	930.83	44214.425	-602.15	-4499.66	9.6923
103	HL-93 Inventory	50	930.83	44214.425	1142.6	8882.44	4.8491
104	HL-93 Inventory	50	930.83	44214.425	577.13	6389.98	6.8290
104	HL-93 Inventory	50	930.83	44214.425	1641.66	8333.02	5.1089
105	HL-93 Inventory	50	930.83	44214.425	1194.55	8963.57	4.7994
105	HL-93 Inventory	50	930.83	44214.425	1641.66	8333.02	5.1089
106	HL-93 Inventory	50	930.83	44214.425	1194.55	8963.57	4.7994
106	HL-93 Inventory	50	930.83	44214.425	1672.43	9331.87	4.5588
107	HL-93 Inventory	50	930.83	44214.425	1714.84	8516.66	4.9902
107	HL-93 Inventory	50	930.83	44214.425	1395.64	6804.25	6.2929

108	HL-93 Inventory	50	930.83	44214.425	1758.58	9556.54	4.4426
108	HL-93 Inventory	50	930.83	44214.425	1395.64	6804.25	6.2929
109	HL-93 Inventory	50	930.83	44214.425	1758.58	9556.54	4.4426
109	HL-93 Inventory	50	930.83	44214.425	1010.22	6373.05	6.7792
110	HL-93 Inventory	50	930.83	44214.425	1422.34	6838.34	6.2577
110	HL-93 Inventory	50	930.83	44214.425	-12.25	-4513.72	9.7928
111	HL-93 Inventory	50	930.83	44214.425	845.77	5813.06	7.4606
111	HL-93 Inventory	50	930.83	44214.425	-66.58	-2317.53	19.0495
112	HL-93 Inventory	50	930.83	44214.425	-135.21	-5001.14	8.8138
112	HL-93 Inventory	50	930.83	44214.425	-12.11	201.03	219.8792
113	HL-93 Inventory	50	930.83	44214.425	-0.68	-180.24	245.3048
113	HL-93 Inventory	50	930.83	44214.425	-116.97	-2206.15	19.9884
114	HL-93 Inventory	50	930.83	44214.425	-33.95	-1036.76	42.6140
114	HL-93 Inventory	50	930.83	44214.425	953.53	5213.56	8.2978
115	HL-93 Inventory	50	930.83	44214.425	-1.02	-1944.37	22.7392
115	HL-93 Inventory	50	930.83	44214.425	1563.01	7761.98	5.4949
116	HL-93 Inventory	50	930.83	44214.425	1069.45	5619.41	7.6778
116	HL-93 Inventory	50	930.83	44214.425	1802.46	9222.19	4.5989
117	HL-93 Inventory	50	930.83	44214.425	1506.9	7614.3	5.6089
117	HL-93 Inventory	50	930.83	44214.425	1802.46	9222.19	4.5989
118	HL-93 Inventory	50	930.83	44214.425	1506.9	7614.3	5.6089
118	HL-93 Inventory	50	930.83	44214.425	1715.13	9264.49	4.5873
119	HL-93 Inventory	50	930.83	44214.425	1723.17	9010.79	4.7156
119	HL-93 Inventory	50	930.83	44214.425	1186.94	8372.87	5.1389
120	HL-93 Inventory	50	930.83	44214.425	1663.62	9126.73	4.6622
120	HL-93 Inventory	50	930.83	44214.425	1186.94	8372.87	5.1389
121	HL-93 Inventory	50	930.83	44214.425	1663.62	9126.73	4.6622
121	HL-93 Inventory	50	930.83	44214.425	562.52	6761.9	6.4556
122	HL-93 Inventory	50	930.83	44214.425	1148.86	8285.15	5.1979
122	HL-93 Inventory	50	930.83	44214.425	-617.18	-4929.17	8.8447
123	HL-93 Inventory	50	930.83	44214.425	272.43	6145.83	7.1499
123	HL-93 Inventory	50	930.83	44214.425	-617.18	-4929.17	8.8447
124	HL-93 Inventory	50	930.83	44214.425	272.43	6145.83	7.1499
124	HL-93 Inventory	50	930.83	44214.425	-1809.06	-5917.64	7.1659
125	HL-93 Inventory	50	930.83	44214.425	-1402.75	-5544.91	7.7209
125	HL-93 Inventory	50	930.83	44214.425	-2826.46	-6981.66	5.9281
126	HL-93 Inventory	50	930.83	44214.425	-1824.86	-5928.35	7.1503
126	HL-93 Inventory	50	930.83	44214.425	-3948.63	-8307.23	4.8471
127	HL-93 Inventory	50	930.83	44214.425	-3947.65	-8272.65	4.8675
127	HL-93 Inventory	50	930.83	44214.425	-1823.98	-5882.56	7.2061
128	HL-93 Inventory	50	930.83	44214.425	-2825.51	-6934.85	5.9682
128	HL-93 Inventory	50	930.83	44214.425	-1401.87	-5498.52	7.7862
129	HL-93 Inventory	50	930.83	44214.425	-1808.15	-5871.68	7.2222
129	HL-93 Inventory	50	930.83	44214.425	273.22	6100.24	7.2032
130	HL-93 Inventory	50	930.83	44214.425	-616.31	-4877.54	8.9385
130	HL-93 Inventory	50	930.83	44214.425	273.22	6100.24	7.2032
131	HL-93 Inventory	50	930.83	44214.425	-616.31	-4877.54	8.9385
131	HL-93 Inventory	50	930.83	44214.425	1149.64	8239.44	5.2267
132	HL-93 Inventory	50	930.83	44214.425	563.42	6714.69	6.5008
132	HL-93 Inventory	50	930.83	44214.425	1664.29	9084.51	4.6838
133	HL-93 Inventory	50	930.83	44214.425	1187.78	8326.5	5.1674
133	HL-93 Inventory	50	930.83	44214.425	1664.29	9084.51	4.6838
134	HL-93 Inventory	50	930.83	44214.425	1187.78	8326.5	5.1674
134	HL-93 Inventory	50	930.83	44214.425	1723.65	8977.84	4.7329
135	HL-93 Inventory	50	930.83	44214.425	1715.88	9222.01	4.6084
135	HL-93 Inventory	50	930.83	44214.425	1507.13	7591.36	5.6258
136	HL-93 Inventory	50	930.83	44214.425	1803.05	9188.09	4.6159
136	HL-93 Inventory	50	930.83	44214.425	1507.13	7591.36	5.6258
137	HL-93 Inventory	50	930.83	44214.425	1803.05	9188.09	4.6159
137	HL-93 Inventory	50	930.83	44214.425	1069.61	5604.14	7.6987
138	HL-93 Inventory	50	930.83	44214.425	1563.33	7738.25	5.5117
138	HL-93 Inventory	50	930.83	44214.425	-1.05	-1944.4	22.7388
139	HL-93 Inventory	50	930.83	44214.425	953.7	5199.06	8.3209
139	HL-93 Inventory	50	930.83	44214.425	-33.98	-1036.59	42.6209
140	HL-93 Inventory	50	930.83	44214.425	-117	-2205.98	19.9899
140	HL-93 Inventory	50	930.83	44214.425	-0.68	-180.22	245.3321
141	HL-93 Inventory	50	930.83	44214.425	58.93	353.35	124.9625
141	HL-93 Inventory	50	930.83	44214.425	109.06	-2514.61	17.5396
142	HL-93 Inventory	50	930.83	44214.425	155.03	-976.53	45.1183
142	HL-93 Inventory	50	930.83	44214.425	1370.13	6634.95	6.4574
143	HL-93 Inventory	50	930.83	44214.425	152.32	-2419.29	18.2128
143	HL-93 Inventory	50	930.83	44214.425	1944.11	9490.71	4.4539
144	HL-93 Inventory	50	930.83	44214.425	1278.47	6341.96	6.7701
144	HL-93 Inventory	50	930.83	44214.425	1902.22	9827.91	4.3053
145	HL-93 Inventory	50	930.83	44214.425	1833.31	9130.81	4.6416

145	HL-93 Inventory	50	930.83	44214.425	1902.22	9827.91	4.3053
146	HL-93 Inventory	50	930.83	44214.425	1833.31	9130.81	4.6416
146	HL-93 Inventory	50	930.83	44214.425	1706.67	9862.11	4.3102
147	HL-93 Inventory	50	930.83	44214.425	1886.67	9795.84	4.3210
147	HL-93 Inventory	50	930.83	44214.425	1169.6	8548.19	5.0355
148	HL-93 Inventory	50	930.83	44214.425	1713.96	9880.35	4.3015
148	HL-93 Inventory	50	930.83	44214.425	1169.6	8548.19	5.0355
149	HL-93 Inventory	50	930.83	44214.425	1713.96	9880.35	4.3015
149	HL-93 Inventory	50	930.83	44214.425	522.96	7109.46	6.1455
150	HL-93 Inventory	50	930.83	44214.425	1164.64	8522.42	5.0514
150	HL-93 Inventory	50	930.83	44214.425	-666.53	-5389.84	8.0796
151	HL-93 Inventory	50	930.83	44214.425	247.3	6330.56	6.9452
151	HL-93 Inventory	50	930.83	44214.425	-666.53	-5389.84	8.0796
152	HL-93 Inventory	50	930.83	44214.425	247.3	6330.56	6.9452
152	HL-93 Inventory	50	930.83	44214.425	-1800.28	-6296.78	6.7358
153	HL-93 Inventory	50	930.83	44214.425	-1407.95	-5940.4	7.2060
153	HL-93 Inventory	50	930.83	44214.425	-2817.36	-7415.85	5.5822
154	HL-93 Inventory	50	930.83	44214.425	-1820.09	-6327.83	6.6997
154	HL-93 Inventory	50	930.83	44214.425	-3942.87	-8818.94	4.5665
155	HL-93 Inventory	50	930.83	44214.425	-3941.88	-8819.8	4.5662
155	HL-93 Inventory	50	930.83	44214.425	-1819.32	-6281.91	6.7488
156	HL-93 Inventory	50	930.83	44214.425	-2816.45	-7369	5.6179
156	HL-93 Inventory	50	930.83	44214.425	-1407.2	-5894.07	7.2628
157	HL-93 Inventory	50	930.83	44214.425	-1799.47	-6250.81	6.7855
157	HL-93 Inventory	50	930.83	44214.425	247.85	6284.86	6.9956
158	HL-93 Inventory	50	930.83	44214.425	-665.8	-5338.31	8.1578
158	HL-93 Inventory	50	930.83	44214.425	247.85	6284.86	6.9956
159	HL-93 Inventory	50	930.83	44214.425	-665.8	-5338.31	8.1578
159	HL-93 Inventory	50	930.83	44214.425	1165.09	8474.59	5.0798
160	HL-93 Inventory	50	930.83	44214.425	523.6	7063.13	6.1858
160	HL-93 Inventory	50	930.83	44214.425	1714.21	9835.41	4.3211
161	HL-93 Inventory	50	930.83	44214.425	1170.12	8500.33	5.0638
161	HL-93 Inventory	50	930.83	44214.425	1714.21	9835.41	4.3211
162	HL-93 Inventory	50	930.83	44214.425	1170.12	8500.33	5.0638
162	HL-93 Inventory	50	930.83	44214.425	1886.84	9758.92	4.3373
163	HL-93 Inventory	50	930.83	44214.425	1706.98	9817.3	4.3299
163	HL-93 Inventory	50	930.83	44214.425	1833.32	9101.52	4.6565
164	HL-93 Inventory	50	930.83	44214.425	1902.42	9790.58	4.3217
164	HL-93 Inventory	50	930.83	44214.425	1833.32	9101.52	4.6565
165	HL-93 Inventory	50	930.83	44214.425	1902.42	9790.58	4.3217
165	HL-93 Inventory	50	930.83	44214.425	1278.54	6323.24	6.7902
166	HL-93 Inventory	50	930.83	44214.425	1944.18	9459.76	4.4684
166	HL-93 Inventory	50	930.83	44214.425	152.41	-2419.48	18.2114
167	HL-93 Inventory	50	930.83	44214.425	1370.27	6614.71	6.4771
167	HL-93 Inventory	50	930.83	44214.425	155.1	-976.64	45.1132
168	HL-93 Inventory	50	930.83	44214.425	109.15	-2514.79	17.5384
168	HL-93 Inventory	50	930.83	44214.425	58.95	352.9	125.1218
169	HL-93 Inventory	50	930.83	44214.425	-27.98	-318.77	138.6154
169	HL-93 Inventory	50	930.83	44214.425	2763.91	12551.7	3.3024
170	HL-93 Inventory	50	930.83	44214.425	1347.53	6195.28	6.9193
170	HL-93 Inventory	50	930.83	44214.425	2357.71	11059.7	3.7846
171	HL-93 Inventory	50	930.83	44214.425	2521.66	11425.9	3.6490
171	HL-93 Inventory	50	930.83	44214.425	1919.32	10215	4.1405
172	HL-93 Inventory	50	930.83	44214.425	2233.93	10477.5	4.0067
172	HL-93 Inventory	50	930.83	44214.425	1843.96	11010.7	3.8481
173	HL-93 Inventory	50	930.83	44214.425	2117.39	10630.9	3.9599
173	HL-93 Inventory	50	930.83	44214.425	1843.96	11010.7	3.8481
174	HL-93 Inventory	50	930.83	44214.425	2117.39	10630.9	3.9599
174	HL-93 Inventory	50	930.83	44214.425	1593.26	10689.4	3.9872
175	HL-93 Inventory	50	930.83	44214.425	1999.48	11245.4	3.7540
175	HL-93 Inventory	50	930.83	44214.425	1034.92	9475.99	4.5567
176	HL-93 Inventory	50	930.83	44214.425	1682.13	10856.4	3.9177
176	HL-93 Inventory	50	930.83	44214.425	1034.92	9475.99	4.5567
177	HL-93 Inventory	50	930.83	44214.425	1682.13	10856.4	3.9177
177	HL-93 Inventory	50	930.83	44214.425	431.21	7781.28	5.6267
178	HL-93 Inventory	50	930.83	44214.425	1116.72	9632.79	4.4741
178	HL-93 Inventory	50	930.83	44214.425	-703.26	-5608.68	7.7578
179	HL-93 Inventory	50	930.83	44214.425	233.07	7139.36	6.1604
179	HL-93 Inventory	50	930.83	44214.425	-703.26	-5608.68	7.7578
180	HL-93 Inventory	50	930.83	44214.425	233.07	7139.36	6.1604
180	HL-93 Inventory	50	930.83	44214.425	-1715.31	-6614.15	6.4255
181	HL-93 Inventory	50	930.83	44214.425	-1320.56	-6193.96	6.9251
181	HL-93 Inventory	50	930.83	44214.425	-2623.01	-7732.04	5.3791
182	HL-93 Inventory	50	930.83	44214.425	-1668.68	-6573.86	6.4720
182	HL-93 Inventory	50	930.83	44214.425	-3675.61	-9240.55	4.3871

183	HL-93 Inventory	50	930.83	44214.425	-3674.64	-9279.22	4.3689
183	HL-93 Inventory	50	930.83	44214.425	-1668.05	-6537.15	6.5084
184	HL-93 Inventory	50	930.83	44214.425	-2622.16	-7695.23	5.4049
184	HL-93 Inventory	50	930.83	44214.425	-1319.96	-6156.53	6.9673
185	HL-93 Inventory	50	930.83	44214.425	-1714.61	-6577.59	6.4613
185	HL-93 Inventory	50	930.83	44214.425	233.34	7099.55	6.1949
186	HL-93 Inventory	50	930.83	44214.425	-702.69	-5568.51	7.8139
186	HL-93 Inventory	50	930.83	44214.425	233.34	7099.55	6.1949
187	HL-93 Inventory	50	930.83	44214.425	-702.69	-5568.51	7.8139
187	HL-93 Inventory	50	930.83	44214.425	1116.83	9590.76	4.4937
188	HL-93 Inventory	50	930.83	44214.425	431.57	7739.86	5.6568
188	HL-93 Inventory	50	930.83	44214.425	1681.98	10817.5	3.9318
189	HL-93 Inventory	50	930.83	44214.425	1035.1	9434.91	4.5765
189	HL-93 Inventory	50	930.83	44214.425	1681.98	10817.5	3.9318
190	HL-93 Inventory	50	930.83	44214.425	1035.1	9434.91	4.5765
190	HL-93 Inventory	50	930.83	44214.425	1999.37	11212.9	3.7649
191	HL-93 Inventory	50	930.83	44214.425	1593.16	10650.7	4.0017
191	HL-93 Inventory	50	930.83	44214.425	2117.21	10603.2	3.9702
192	HL-93 Inventory	50	930.83	44214.425	1843.78	10980.2	3.8588
192	HL-93 Inventory	50	930.83	44214.425	2117.21	10603.2	3.9702
193	HL-93 Inventory	50	930.83	44214.425	1843.78	10980.2	3.8588
193	HL-93 Inventory	50	930.83	44214.425	2234.09	10445	4.0192
194	HL-93 Inventory	50	930.83	44214.425	1919.04	10190.6	4.1504
194	HL-93 Inventory	50	930.83	44214.425	2522.53	11393.7	3.6592
195	HL-93 Inventory	50	930.83	44214.425	2357.96	11027.3	3.7957
195	HL-93 Inventory	50	930.83	44214.425	1348.01	6177.01	6.9397
196	HL-93 Inventory	50	930.83	44214.425	2764.84	12517.6	3.3113
196	HL-93 Inventory	50	930.83	44214.425	-27.99	-320.52	137.8586

LOAD RATING SWING SPAN

RF= RATING FACTOR

$RF = (C - f_{DL+SDL}) / (f_{LL+I})$

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

$C=\varphi_C\varphi_S\varphi R_n S_x$ = (1.0)(1.0)(.95)(50)(930.83)

Virtual Beam	LOADING	R_n (ksi)	S_x (in^3)	$C=\varphi_C\varphi_S\varphi R_n S_x$	M_{DL+SDL} (kip-in)	M_{LL+I} (kip-in)	RF			
1	HL-93 Operating	50	930.83	44214.425	-35.32	-270.67	163.2213			
1	HL-93 Operating	50	930.83	44214.425	2757.58	9658.17	4.2924			
2	HL-93 Operating	50	930.83	44214.425	1340.69	4753.51	9.0194			
2	HL-93 Operating	50	930.83	44214.425	2353.36	8515.36	4.9159	Minimum Rating factor	4.2923	**Girder 1**
3	HL-93 Operating	50	930.83	44214.425	2514.92	8787.94	4.7451			
3	HL-93 Operating	50	930.83	44214.425	1916.1	7871.63	5.3735	Minimum Rating factor	5.5807	**Girder 2**
4	HL-93 Operating	50	930.83	44214.425	2228.89	8063.55	5.2068			
4	HL-93 Operating	50	930.83	44214.425	1840.96	8486.94	4.9928	Minimum Rating factor	5.9496	**Girder 3**
5	HL-93 Operating	50	930.83	44214.425	2113.66	8190.29	5.1403			
5	HL-93 Operating	50	930.83	44214.425	1840.96	8486.94	4.9928	Minimum Rating factor	5.7416	**Girder 4**
6	HL-93 Operating	50	930.83	44214.425	2113.66	8190.29	5.1403			
6	HL-93 Operating	50	930.83	44214.425	1590.57	8240.57	5.1724	Minimum Rating factor	5.9465	**Girder 5**
7	HL-93 Operating	50	930.83	44214.425	1996.24	8666.84	4.8712			
7	HL-93 Operating	50	930.83	44214.425	1032.56	7306.27	5.9102	Minimum Rating factor	5.5760	**Girder 6**
8	HL-93 Operating	50	930.83	44214.425	1679.31	8368.97	5.0825			
8	HL-93 Operating	50	930.83	44214.425	1032.56	7306.27	5.9102	Minimum Rating factor	4.2809	**Girder 7**
9	HL-93 Operating	50	930.83	44214.425	1679.31	8368.97	5.0825			
9	HL-93 Operating	50	930.83	44214.425	429.08	6000.26	7.2972			
10	HL-93 Operating	50	930.83	44214.425	1114.22	7426.86	5.8033			
10	HL-93 Operating	50	930.83	44214.425	-704.69	-4326.73	10.0560			
11	HL-93 Operating	50	930.83	44214.425	231.25	5506.17	7.9880			
11	HL-93 Operating	50	930.83	44214.425	-704.69	-4326.73	10.0560			
12	HL-93 Operating	50	930.83	44214.425	231.25	5506.17	7.9880			
12	HL-93 Operating	50	930.83	44214.425	-1716.52	-5102.62	8.3286			
13	HL-93 Operating	50	930.83	44214.425	-1321.91	-4778.38	8.9764			
13	HL-93 Operating	50	930.83	44214.425	-2624.03	-5965.08	6.9723			
14	HL-93 Operating	50	930.83	44214.425	-1669.96	-5071.49	8.3889			
14	HL-93 Operating	50	930.83	44214.425	-3676.48	-7126.11	5.6886			
15	HL-93 Operating	50	930.83	44214.425	-3675.62	-7158.48	5.6630			
15	HL-93 Operating	50	930.83	44214.425	-1668.81	-5038.71	8.4438			
16	HL-93 Operating	50	930.83	44214.425	-2623.08	-5932.1	7.0112			
16	HL-93 Operating	50	930.83	44214.425	-1320.73	-4745.2	9.0394			
17	HL-93 Operating	50	930.83	44214.425	-1715.44	-5070.05	8.3824			
17	HL-93 Operating	50	930.83	44214.425	232.73	5475.39	8.0326			
18	HL-93 Operating	50	930.83	44214.425	-703.49	-4291.88	10.1380			
18	HL-93 Operating	50	930.83	44214.425	232.73	5475.39	8.0326			
19	HL-93 Operating	50	930.83	44214.425	-703.49	-4291.88	10.1380			
19	HL-93 Operating	50	930.83	44214.425	1116.11	7397.57	5.8260			
20	HL-93 Operating	50	930.83	44214.425	430.7	5969.67	7.3344			
20	HL-93 Operating	50	930.83	44214.425	1681.38	8344.21	5.0973			
21	HL-93 Operating	50	930.83	44214.425	1034.3	7277.49	5.9334			
21	HL-93 Operating	50	930.83	44214.425	1681.38	8344.21	5.0973			
22	HL-93 Operating	50	930.83	44214.425	1034.3	7277.49	5.9334			
22	HL-93 Operating	50	930.83	44214.425	1998.88	8649.27	4.8808			
23	HL-93 Operating	50	930.83	44214.425	1592.45	8215.7	5.1879			
23	HL-93 Operating	50	930.83	44214.425	2116.96	8179.03	5.1470			
24	HL-93 Operating	50	930.83	44214.425	1843.23	8469.93	5.0025			
24	HL-93 Operating	50	930.83	44214.425	2116.96	8179.03	5.1470			
25	HL-93 Operating	50	930.83	44214.425	1843.23	8469.93	5.0025			
25	HL-93 Operating	50	930.83	44214.425	2233.75	8057.28	5.2103			
26	HL-93 Operating	50	930.83	44214.425	1918.69	7860.85	5.3806			
26	HL-93 Operating	50	930.83	44214.425	2521.94	8789.73	4.7433			
27	HL-93 Operating	50	930.83	44214.425	2357.47	8506.71	4.9205			
27	HL-93 Operating	50	930.83	44214.425	1347.65	4765.32	8.9956			
28	HL-93 Operating	50	930.83	44214.425	2764.16	9656.87	4.2923			
28	HL-93 Operating	50	930.83	44214.425	-28.01	-247.3	178.6754			
29	HL-93 Operating	50	930.83	44214.425	58.91	272.54	162.0148			
29	HL-93 Operating	50	930.83	44214.425	109.1	-1939.84	22.7366			
30	HL-93 Operating	50	930.83	44214.425	155.04	-753.32	58.4869			
30	HL-93 Operating	50	930.83	44214.425	1368.35	5111.89	8.3817			
31	HL-93 Operating	50	930.83	44214.425	152.67	-1866.28	23.6094			
31	HL-93 Operating	50	930.83	44214.425	1941.22	7310.81	5.7823			
32	HL-93 Operating	50	930.83	44214.425	1277.19	4887.98	8.7842			
32	HL-93 Operating	50	930.83	44214.425	1899.93	7574.32	5.5866			

33	HL-93 Operating	50	930.83	44214.425	1830.74	7034.52	6.0251
33	HL-93 Operating	50	930.83	44214.425	1899.93	7574.32	5.5866
34	HL-93 Operating	50	930.83	44214.425	1830.74	7034.52	6.0251
34	HL-93 Operating	50	930.83	44214.425	1704.64	7602.3	5.5917
35	HL-93 Operating	50	930.83	44214.425	1884.42	7549.76	5.6068
35	HL-93 Operating	50	930.83	44214.425	1167.89	6590.83	6.5313
36	HL-93 Operating	50	930.83	44214.425	1711.84	7615.99	5.5807
36	HL-93 Operating	50	930.83	44214.425	1167.89	6590.83	6.5313
37	HL-93 Operating	50	930.83	44214.425	1711.84	7615.99	5.5807
37	HL-93 Operating	50	930.83	44214.425	521.46	5482.44	7.9696
38	HL-93 Operating	50	930.83	44214.425	1162.86	6570.67	6.5521
38	HL-93 Operating	50	930.83	44214.425	-667.57	-4157.94	10.4732
39	HL-93 Operating	50	930.83	44214.425	246.03	4882.63	9.0051
39	HL-93 Operating	50	930.83	44214.425	-667.57	-4157.94	10.4732
40	HL-93 Operating	50	930.83	44214.425	246.03	4882.63	9.0051
40	HL-93 Operating	50	930.83	44214.425	-1801.2	-4857.83	8.7309
41	HL-93 Operating	50	930.83	44214.425	-1408.94	-4582.82	9.3404
41	HL-93 Operating	50	930.83	44214.425	-2818.11	-5721.28	7.2355
42	HL-93 Operating	50	930.83	44214.425	-1821.05	-4881.76	8.6840
42	HL-93 Operating	50	930.83	44214.425	-3943.48	-6803.81	5.9189
43	HL-93 Operating	50	930.83	44214.425	-3942.53	-6804.29	5.9186
43	HL-93 Operating	50	930.83	44214.425	-1819.86	-4842.44	8.7548
44	HL-93 Operating	50	930.83	44214.425	-2817.07	-5681.09	7.2869
44	HL-93 Operating	50	930.83	44214.425	-1407.74	-4543.37	9.4218
45	HL-93 Operating	50	930.83	44214.425	-1800.05	-4818.58	8.8023
45	HL-93 Operating	50	930.83	44214.425	247.41	4846.96	9.0710
46	HL-93 Operating	50	930.83	44214.425	-666.35	-4114.93	10.5829
46	HL-93 Operating	50	930.83	44214.425	247.41	4846.96	9.0710
47	HL-93 Operating	50	930.83	44214.425	-666.35	-4114.93	10.5829
47	HL-93 Operating	50	930.83	44214.425	1164.6	6536.59	6.5860
48	HL-93 Operating	50	930.83	44214.425	522.97	5447.74	8.0201
48	HL-93 Operating	50	930.83	44214.425	1713.82	7586.56	5.6021
49	HL-93 Operating	50	930.83	44214.425	1169.54	6556.6	6.5651
49	HL-93 Operating	50	930.83	44214.425	1713.82	7586.56	5.6021
50	HL-93 Operating	50	930.83	44214.425	1169.54	6556.6	6.5651
50	HL-93 Operating	50	930.83	44214.425	1886.49	7527.7	5.6230
51	HL-93 Operating	50	930.83	44214.425	1706.51	7572.73	5.6133
51	HL-93 Operating	50	930.83	44214.425	1833.06	7020.79	6.0366
52	HL-93 Operating	50	930.83	44214.425	1902	7552.25	5.6026
52	HL-93 Operating	50	930.83	44214.425	1833.06	7020.79	6.0366
53	HL-93 Operating	50	930.83	44214.425	1902	7552.25	5.6026
53	HL-93 Operating	50	930.83	44214.425	1278.31	4877.82	8.8023
54	HL-93 Operating	50	930.83	44214.425	1943.83	7297.27	5.7927
54	HL-93 Operating	50	930.83	44214.425	152.35	-1866.47	23.6072
55	HL-93 Operating	50	930.83	44214.425	1369.91	5102.84	8.3962
55	HL-93 Operating	50	930.83	44214.425	155.05	-753.43	58.4784
56	HL-93 Operating	50	930.83	44214.425	109.01	-1940.05	22.7342
56	HL-93 Operating	50	930.83	44214.425	58.94	272.24	162.1932
57	HL-93 Operating	50	930.83	44214.425	-0.66	-139.03	318.0160
57	HL-93 Operating	50	930.83	44214.425	-116.89	-1701.82	25.9120
58	HL-93 Operating	50	930.83	44214.425	-33.87	-799.64	55.2506
58	HL-93 Operating	50	930.83	44214.425	952.79	4019.14	10.7639
59	HL-93 Operating	50	930.83	44214.425	-0.84	-1499.94	29.4769
59	HL-93 Operating	50	930.83	44214.425	1561.71	5982.88	7.1291
60	HL-93 Operating	50	930.83	44214.425	1068.85	4332.8	9.9579
60	HL-93 Operating	50	930.83	44214.425	1801.31	7110.25	5.9651
61	HL-93 Operating	50	930.83	44214.425	1505.76	5869.7	7.2761
61	HL-93 Operating	50	930.83	44214.425	1801.31	7110.25	5.9651
62	HL-93 Operating	50	930.83	44214.425	1505.76	5869.7	7.2761
62	HL-93 Operating	50	930.83	44214.425	1714.06	7143.41	5.9496
63	HL-93 Operating	50	930.83	44214.425	1722.11	6947.67	6.1161
63	HL-93 Operating	50	930.83	44214.425	1186.06	6456.93	6.6639
64	HL-93 Operating	50	930.83	44214.425	1662.53	7037.12	6.0468
64	HL-93 Operating	50	930.83	44214.425	1186.06	6456.93	6.6639
65	HL-93 Operating	50	930.83	44214.425	1662.53	7037.12	6.0468
65	HL-93 Operating	50	930.83	44214.425	561.77	5215.08	8.3705
66	HL-93 Operating	50	930.83	44214.425	1147.95	6389.14	6.7406
66	HL-93 Operating	50	930.83	44214.425	-617.7	-3802.52	11.4652
67	HL-93 Operating	50	930.83	44214.425	271.79	4740.42	9.2698
67	HL-93 Operating	50	930.83	44214.425	-617.7	-3802.52	11.4652
68	HL-93 Operating	50	930.83	44214.425	271.79	4740.42	9.2698
68	HL-93 Operating	50	930.83	44214.425	-1809.51	-4565.2	9.2887
69	HL-93 Operating	50	930.83	44214.425	-1403.25	-4277.63	10.0082
69	HL-93 Operating	50	930.83	44214.425	-2826.84	-5386.07	7.6842

70	HL-93 Operating	50	930.83	44214.425	-1825.34	-4573.45	9.2685
70	HL-93 Operating	50	930.83	44214.425	-3948.95	-6408.71	6.2829
71	HL-93 Operating	50	930.83	44214.425	-3947.97	-6379.32	6.3120
71	HL-93 Operating	50	930.83	44214.425	-1824.24	-4535.84	9.3456
72	HL-93 Operating	50	930.83	44214.425	-2825.82	-5347.56	7.7397
72	HL-93 Operating	50	930.83	44214.425	-1402.14	-4239.64	10.0981
73	HL-93 Operating	50	930.83	44214.425	-1808.43	-4527.5	9.3663
73	HL-93 Operating	50	930.83	44214.425	273	4705.17	9.3390
74	HL-93 Operating	50	930.83	44214.425	-616.59	-3760.77	11.5928
74	HL-93 Operating	50	930.83	44214.425	273	4705.17	9.3390
75	HL-93 Operating	50	930.83	44214.425	-616.59	-3760.77	11.5928
75	HL-93 Operating	50	930.83	44214.425	1149.39	6355.61	6.7759
76	HL-93 Operating	50	930.83	44214.425	563.1	5179.37	8.4279
76	HL-93 Operating	50	930.83	44214.425	1664.1	7007.63	6.0720
77	HL-93 Operating	50	930.83	44214.425	1187.49	6422.85	6.6990
77	HL-93 Operating	50	930.83	44214.425	1664.1	7007.63	6.0720
78	HL-93 Operating	50	930.83	44214.425	1187.49	6422.85	6.6990
78	HL-93 Operating	50	930.83	44214.425	1723.47	6925.45	6.1355
79	HL-93 Operating	50	930.83	44214.425	1715.65	7113.77	5.9742
79	HL-93 Operating	50	930.83	44214.425	1506.98	5856.03	7.2929
80	HL-93 Operating	50	930.83	44214.425	1802.83	7087.71	5.9838
80	HL-93 Operating	50	930.83	44214.425	1506.98	5856.03	7.2929
81	HL-93 Operating	50	930.83	44214.425	1802.83	7087.71	5.9838
81	HL-93 Operating	50	930.83	44214.425	1069.54	4323.07	9.9801
82	HL-93 Operating	50	930.83	44214.425	1563.11	5969.44	7.1449
82	HL-93 Operating	50	930.83	44214.425	-1.01	-1499.93	29.4770
83	HL-93 Operating	50	930.83	44214.425	953.57	4010.69	10.7864
83	HL-93 Operating	50	930.83	44214.425	-33.98	-799.66	55.2490
84	HL-93 Operating	50	930.83	44214.425	-116.98	-1701.75	25.9130
84	HL-93 Operating	50	930.83	44214.425	-0.69	-139.03	318.0158
85	HL-93 Operating	50	930.83	44214.425	-12.09	155.07	285.0476
85	HL-93 Operating	50	930.83	44214.425	-135.14	-3858.23	11.4247
86	HL-93 Operating	50	930.83	44214.425	-66.51	-1788.09	24.6900
86	HL-93 Operating	50	930.83	44214.425	845.4	4493.08	9.6524
87	HL-93 Operating	50	930.83	44214.425	-12.15	-3481.74	12.6955
87	HL-93 Operating	50	930.83	44214.425	1421.63	5289.7	8.0898
88	HL-93 Operating	50	930.83	44214.425	1009.87	4926.46	8.7699
88	HL-93 Operating	50	930.83	44214.425	1757.56	7394.6	5.7416
89	HL-93 Operating	50	930.83	44214.425	1395.06	5263.41	8.1353
89	HL-93 Operating	50	930.83	44214.425	1757.56	7394.6	5.7416
90	HL-93 Operating	50	930.83	44214.425	1395.06	5263.41	8.1353
90	HL-93 Operating	50	930.83	44214.425	1713.65	6600.72	6.4388
91	HL-93 Operating	50	930.83	44214.425	1671.56	7221	5.8915
91	HL-93 Operating	50	930.83	44214.425	1193.39	6948.67	6.1913
92	HL-93 Operating	50	930.83	44214.425	1640.55	6457.84	6.5926
92	HL-93 Operating	50	930.83	44214.425	1193.39	6948.67	6.1913
93	HL-93 Operating	50	930.83	44214.425	1640.55	6457.84	6.5926
93	HL-93 Operating	50	930.83	44214.425	575.99	4964.47	8.7901
94	HL-93 Operating	50	930.83	44214.425	1141.5	6885.49	6.2556
94	HL-93 Operating	50	930.83	44214.425	-603.15	-3511.3	12.4203
95	HL-93 Operating	50	930.83	44214.425	281.17	4930.99	8.9096
95	HL-93 Operating	50	930.83	44214.425	-603.15	-3511.3	12.4203
96	HL-93 Operating	50	930.83	44214.425	281.17	4930.99	8.9096
96	HL-93 Operating	50	930.83	44214.425	-1808.23	-4256.42	9.9629
97	HL-93 Operating	50	930.83	44214.425	-1399.55	-3979.01	10.7602
97	HL-93 Operating	50	930.83	44214.425	-2828.65	-5037.26	8.2159
98	HL-93 Operating	50	930.83	44214.425	-1822.65	-4263.37	9.9433
98	HL-93 Operating	50	930.83	44214.425	-3954.07	-6276.14	6.4148
99	HL-93 Operating	50	930.83	44214.425	-3953.09	-6299.95	6.3907
99	HL-93 Operating	50	930.83	44214.425	-1821.66	-4228.55	10.0254
100	HL-93 Operating	50	930.83	44214.425	-2827.66	-5001.23	8.2753
100	HL-93 Operating	50	930.83	44214.425	-1398.55	-3943.79	10.8565
101	HL-93 Operating	50	930.83	44214.425	-1807.23	-4221.44	10.0457
101	HL-93 Operating	50	930.83	44214.425	282.18	4896.95	8.9713
102	HL-93 Operating	50	930.83	44214.425	-602.15	-3471.16	12.5642
102	HL-93 Operating	50	930.83	44214.425	282.18	4896.95	8.9713
103	HL-93 Operating	50	930.83	44214.425	-602.15	-3471.16	12.5642
103	HL-93 Operating	50	930.83	44214.425	1142.6	6852.17	6.2859
104	HL-93 Operating	50	930.83	44214.425	577.13	4929.42	8.8524
104	HL-93 Operating	50	930.83	44214.425	1641.66	6428.33	6.6227
105	HL-93 Operating	50	930.83	44214.425	1194.55	6914.75	6.2215
105	HL-93 Operating	50	930.83	44214.425	1641.66	6428.33	6.6227
106	HL-93 Operating	50	930.83	44214.425	1194.55	6914.75	6.2215
106	HL-93 Operating	50	930.83	44214.425	1672.43	7198.87	5.9095

107	HL-93 Operating	50	930.83	44214.425	1714.84	6569.99	6.4687
107	HL-93 Operating	50	930.83	44214.425	1395.64	5248.99	8.1575
108	HL-93 Operating	50	930.83	44214.425	1758.58	7372.19	5.7589
108	HL-93 Operating	50	930.83	44214.425	1395.64	5248.99	8.1575
109	HL-93 Operating	50	930.83	44214.425	1758.58	7372.19	5.7589
109	HL-93 Operating	50	930.83	44214.425	1010.22	4916.35	8.7879
110	HL-93 Operating	50	930.83	44214.425	1422.34	5275.29	8.1118
110	HL-93 Operating	50	930.83	44214.425	-12.25	-3482.01	12.6944
111	HL-93 Operating	50	930.83	44214.425	845.77	4484.36	9.6711
111	HL-93 Operating	50	930.83	44214.425	-66.58	-1787.81	24.6938
112	HL-93 Operating	50	930.83	44214.425	-135.21	-3858.02	11.4253
112	HL-93 Operating	50	930.83	44214.425	-12.11	155.08	285.0291
113	HL-93 Operating	50	930.83	44214.425	-0.68	-139.04	317.9930
113	HL-93 Operating	50	930.83	44214.425	-116.97	-1701.89	25.9109
114	HL-93 Operating	50	930.83	44214.425	-33.95	-799.79	55.2401
114	HL-93 Operating	50	930.83	44214.425	953.53	4021.89	10.7564
115	HL-93 Operating	50	930.83	44214.425	-1.02	-1499.94	29.4768
115	HL-93 Operating	50	930.83	44214.425	1563.01	5987.81	7.1230
116	HL-93 Operating	50	930.83	44214.425	1069.45	4334.97	9.9528
116	HL-93 Operating	50	930.83	44214.425	1802.46	7114.26	5.9615
117	HL-93 Operating	50	930.83	44214.425	1506.9	5873.88	7.2708
117	HL-93 Operating	50	930.83	44214.425	1802.46	7114.26	5.9615
118	HL-93 Operating	50	930.83	44214.425	1506.9	5873.88	7.2708
118	HL-93 Operating	50	930.83	44214.425	1715.13	7146.89	5.9465
119	HL-93 Operating	50	930.83	44214.425	1723.17	6951.18	6.1128
119	HL-93 Operating	50	930.83	44214.425	1186.94	6459.07	6.6616
120	HL-93 Operating	50	930.83	44214.425	1663.62	7040.62	6.0436
120	HL-93 Operating	50	930.83	44214.425	1186.94	6459.07	6.6616
121	HL-93 Operating	50	930.83	44214.425	1663.62	7040.62	6.0436
121	HL-93 Operating	50	930.83	44214.425	562.52	5216.33	8.3683
122	HL-93 Operating	50	930.83	44214.425	1148.86	6391.41	6.7380
122	HL-93 Operating	50	930.83	44214.425	-617.18	-3802.5	11.4654
123	HL-93 Operating	50	930.83	44214.425	272.43	4741.07	9.2684
123	HL-93 Operating	50	930.83	44214.425	-617.18	-3802.5	11.4654
124	HL-93 Operating	50	930.83	44214.425	272.43	4741.07	9.2684
124	HL-93 Operating	50	930.83	44214.425	-1809.06	-4565.03	9.2892
125	HL-93 Operating	50	930.83	44214.425	-1402.75	-4277.5	10.0086
125	HL-93 Operating	50	930.83	44214.425	-2826.46	-5385.85	7.6846
126	HL-93 Operating	50	930.83	44214.425	-1824.86	-4573.3	9.2689
126	HL-93 Operating	50	930.83	44214.425	-3948.63	-6408.43	6.2833
127	HL-93 Operating	50	930.83	44214.425	-3947.65	-6381.76	6.3097
127	HL-93 Operating	50	930.83	44214.425	-1823.98	-4537.98	9.3413
128	HL-93 Operating	50	930.83	44214.425	-2825.51	-5349.74	7.7366
128	HL-93 Operating	50	930.83	44214.425	-1401.87	-4241.72	10.0932
129	HL-93 Operating	50	930.83	44214.425	-1808.15	-4529.58	9.3621
129	HL-93 Operating	50	930.83	44214.425	273.22	4705.9	9.3375
130	HL-93 Operating	50	930.83	44214.425	-616.31	-3762.67	11.5870
130	HL-93 Operating	50	930.83	44214.425	273.22	4705.9	9.3375
131	HL-93 Operating	50	930.83	44214.425	-616.31	-3762.67	11.5870
131	HL-93 Operating	50	930.83	44214.425	1149.64	6356.14	6.7753
132	HL-93 Operating	50	930.83	44214.425	563.42	5179.9	8.4270
132	HL-93 Operating	50	930.83	44214.425	1664.29	7008.05	6.0716
133	HL-93 Operating	50	930.83	44214.425	1187.78	6423.3	6.6985
133	HL-93 Operating	50	930.83	44214.425	1664.29	7008.05	6.0716
134	HL-93 Operating	50	930.83	44214.425	1187.78	6423.3	6.6985
134	HL-93 Operating	50	930.83	44214.425	1723.65	6925.76	6.1352
135	HL-93 Operating	50	930.83	44214.425	1715.88	7114.12	5.9738
135	HL-93 Operating	50	930.83	44214.425	1507.13	5856.19	7.2927
136	HL-93 Operating	50	930.83	44214.425	1803.05	7087.96	5.9836
136	HL-93 Operating	50	930.83	44214.425	1507.13	5856.19	7.2927
137	HL-93 Operating	50	930.83	44214.425	1803.05	7087.96	5.9836
137	HL-93 Operating	50	930.83	44214.425	1069.61	4323.19	9.9799
138	HL-93 Operating	50	930.83	44214.425	1563.33	5969.51	7.1448
138	HL-93 Operating	50	930.83	44214.425	-1.05	-1499.96	29.4764
139	HL-93 Operating	50	930.83	44214.425	953.7	4010.71	10.7863
139	HL-93 Operating	50	930.83	44214.425	-33.98	-799.66	55.2490
140	HL-93 Operating	50	930.83	44214.425	-117	-1701.75	25.9130
140	HL-93 Operating	50	930.83	44214.425	-0.68	-139.03	318.0159
141	HL-93 Operating	50	930.83	44214.425	58.93	272.59	161.9850
141	HL-93 Operating	50	930.83	44214.425	109.06	-1939.84	22.7366
142	HL-93 Operating	50	930.83	44214.425	155.03	-753.32	58.4870
142	HL-93 Operating	50	930.83	44214.425	1370.13	5118.39	8.3707
143	HL-93 Operating	50	930.83	44214.425	152.32	-1866.31	23.6092
143	HL-93 Operating	50	930.83	44214.425	1944.11	7321.41	5.7735

144	HL-93 Operating	50	930.83	44214.425	1278.47	4892.37	8.7761
144	HL-93 Operating	50	930.83	44214.425	1902.22	7581.53	5.5810
145	HL-93 Operating	50	930.83	44214.425	1833.31	7043.77	6.0168
145	HL-93 Operating	50	930.83	44214.425	1902.22	7581.53	5.5810
146	HL-93 Operating	50	930.83	44214.425	1833.31	7043.77	6.0168
146	HL-93 Operating	50	930.83	44214.425	1706.67	7607.91	5.5873
147	HL-93 Operating	50	930.83	44214.425	1886.67	7556.79	5.6013
147	HL-93 Operating	50	930.83	44214.425	1169.6	6594.32	6.5276
148	HL-93 Operating	50	930.83	44214.425	1713.96	7621.99	5.5760
148	HL-93 Operating	50	930.83	44214.425	1169.6	6594.32	6.5276
149	HL-93 Operating	50	930.83	44214.425	1713.96	7621.99	5.5760
149	HL-93 Operating	50	930.83	44214.425	522.96	5484.44	7.9664
150	HL-93 Operating	50	930.83	44214.425	1164.64	6574.44	6.5481
150	HL-93 Operating	50	930.83	44214.425	-666.53	-4157.88	10.4736
151	HL-93 Operating	50	930.83	44214.425	247.3	4883.58	9.0031
151	HL-93 Operating	50	930.83	44214.425	-666.53	-4157.88	10.4736
152	HL-93 Operating	50	930.83	44214.425	247.3	4883.58	9.0031
152	HL-93 Operating	50	930.83	44214.425	-1800.28	-4857.52	8.7316
153	HL-93 Operating	50	930.83	44214.425	-1407.95	-4582.59	9.3411
153	HL-93 Operating	50	930.83	44214.425	-2817.36	-5720.8	7.2362
154	HL-93 Operating	50	930.83	44214.425	-1820.09	-4881.47	8.6847
154	HL-93 Operating	50	930.83	44214.425	-3942.87	-6803.18	5.9195
155	HL-93 Operating	50	930.83	44214.425	-3941.88	-6803.84	5.9191
155	HL-93 Operating	50	930.83	44214.425	-1819.32	-4846.05	8.7484
156	HL-93 Operating	50	930.83	44214.425	-2816.45	-5684.66	7.2824
156	HL-93 Operating	50	930.83	44214.425	-1407.2	-4546.86	9.4147
157	HL-93 Operating	50	930.83	44214.425	-1799.47	-4822.06	8.7960
157	HL-93 Operating	50	930.83	44214.425	247.85	4848.32	9.0684
158	HL-93 Operating	50	930.83	44214.425	-665.8	-4118.13	10.5749
158	HL-93 Operating	50	930.83	44214.425	247.85	4848.32	9.0684
159	HL-93 Operating	50	930.83	44214.425	-665.8	-4118.13	10.5749
159	HL-93 Operating	50	930.83	44214.425	1165.09	6537.54	6.5849
160	HL-93 Operating	50	930.83	44214.425	523.6	5448.7	8.0186
160	HL-93 Operating	50	930.83	44214.425	1714.21	7587.31	5.6015
161	HL-93 Operating	50	930.83	44214.425	1170.12	6557.4	6.5642
161	HL-93 Operating	50	930.83	44214.425	1714.21	7587.31	5.6015
162	HL-93 Operating	50	930.83	44214.425	1170.12	6557.4	6.5642
162	HL-93 Operating	50	930.83	44214.425	1886.84	7528.31	5.6225
163	HL-93 Operating	50	930.83	44214.425	1706.98	7573.34	5.6128
163	HL-93 Operating	50	930.83	44214.425	1833.32	7021.17	6.0362
164	HL-93 Operating	50	930.83	44214.425	1902.42	7552.74	5.6022
164	HL-93 Operating	50	930.83	44214.425	1833.32	7021.17	6.0362
165	HL-93 Operating	50	930.83	44214.425	1902.42	7552.74	5.6022
165	HL-93 Operating	50	930.83	44214.425	1278.54	4877.93	8.8021
166	HL-93 Operating	50	930.83	44214.425	1944.18	7297.53	5.7924
166	HL-93 Operating	50	930.83	44214.425	152.41	-1866.45	23.6074
167	HL-93 Operating	50	930.83	44214.425	1370.27	5102.77	8.3963
167	HL-93 Operating	50	930.83	44214.425	155.1	-753.41	58.4799
168	HL-93 Operating	50	930.83	44214.425	109.15	-1939.98	22.7349
168	HL-93 Operating	50	930.83	44214.425	58.95	272.24	162.1932
169	HL-93 Operating	50	930.83	44214.425	-27.98	-245.91	179.6854
169	HL-93 Operating	50	930.83	44214.425	2763.91	9682.74	4.2809
170	HL-93 Operating	50	930.83	44214.425	1347.53	4779.22	8.9694
170	HL-93 Operating	50	930.83	44214.425	2357.71	8531.75	4.9060
171	HL-93 Operating	50	930.83	44214.425	2521.66	8814.23	4.7302
171	HL-93 Operating	50	930.83	44214.425	1919.32	7880.14	5.3673
172	HL-93 Operating	50	930.83	44214.425	2233.93	8082.64	5.1939
172	HL-93 Operating	50	930.83	44214.425	1843.96	8493.95	4.9883
173	HL-93 Operating	50	930.83	44214.425	2117.39	8201	5.1332
173	HL-93 Operating	50	930.83	44214.425	1843.96	8493.95	4.9883
174	HL-93 Operating	50	930.83	44214.425	2117.39	8201	5.1332
174	HL-93 Operating	50	930.83	44214.425	1593.26	8246.09	5.1687
175	HL-93 Operating	50	930.83	44214.425	1999.48	8674.99	4.8663
175	HL-93 Operating	50	930.83	44214.425	1034.92	7310.05	5.9069
176	HL-93 Operating	50	930.83	44214.425	1682.13	8374.94	5.0785
176	HL-93 Operating	50	930.83	44214.425	1034.92	7310.05	5.9069
177	HL-93 Operating	50	930.83	44214.425	1682.13	8374.94	5.0785
177	HL-93 Operating	50	930.83	44214.425	431.21	6002.7	7.2939
178	HL-93 Operating	50	930.83	44214.425	1116.72	7431.01	5.7997
178	HL-93 Operating	50	930.83	44214.425	-703.26	-4326.7	10.0564
179	HL-93 Operating	50	930.83	44214.425	233.07	5507.51	7.9857
179	HL-93 Operating	50	930.83	44214.425	-703.26	-4326.7	10.0564
180	HL-93 Operating	50	930.83	44214.425	233.07	5507.51	7.9857
180	HL-93 Operating	50	930.83	44214.425	-1715.31	-5102.35	8.3293

181	HL-93 Operating	50	930.83	44214.425	-1320.56	-4778.2	8.9770
181	HL-93 Operating	50	930.83	44214.425	-2623.01	-5964.71	6.9729
182	HL-93 Operating	50	930.83	44214.425	-1668.68	-5071.26	8.3896
182	HL-93 Operating	50	930.83	44214.425	-3675.61	-7128.42	5.6869
183	HL-93 Operating	50	930.83	44214.425	-3674.64	-7158.25	5.6634
183	HL-93 Operating	50	930.83	44214.425	-1668.05	-5042.95	8.4368
184	HL-93 Operating	50	930.83	44214.425	-2622.16	-5936.32	7.0064
184	HL-93 Operating	50	930.83	44214.425	-1319.96	-4749.33	9.0317
185	HL-93 Operating	50	930.83	44214.425	-1714.61	-5074.14	8.3758
185	HL-93 Operating	50	930.83	44214.425	233.34	5476.79	8.0304
186	HL-93 Operating	50	930.83	44214.425	-702.69	-4295.7	10.1291
186	HL-93 Operating	50	930.83	44214.425	233.34	5476.79	8.0304
187	HL-93 Operating	50	930.83	44214.425	-702.69	-4295.7	10.1291
187	HL-93 Operating	50	930.83	44214.425	1116.83	7398.59	5.8251
188	HL-93 Operating	50	930.83	44214.425	431.57	5970.75	7.3329
188	HL-93 Operating	50	930.83	44214.425	1681.98	8344.93	5.0968
189	HL-93 Operating	50	930.83	44214.425	1035.1	7278.36	5.9326
189	HL-93 Operating	50	930.83	44214.425	1681.98	8344.93	5.0968
190	HL-93 Operating	50	930.83	44214.425	1035.1	7278.36	5.9326
190	HL-93 Operating	50	930.83	44214.425	1999.37	8649.94	4.8804
191	HL-93 Operating	50	930.83	44214.425	1593.16	8216.29	5.1874
191	HL-93 Operating	50	930.83	44214.425	2117.21	8179.58	5.1466
192	HL-93 Operating	50	930.83	44214.425	1843.78	8470.47	5.0022
192	HL-93 Operating	50	930.83	44214.425	2117.21	8179.58	5.1466
193	HL-93 Operating	50	930.83	44214.425	1843.78	8470.47	5.0022
193	HL-93 Operating	50	930.83	44214.425	2234.09	8057.58	5.2100
194	HL-93 Operating	50	930.83	44214.425	1919.04	7861.31	5.3802
194	HL-93 Operating	50	930.83	44214.425	2522.53	8789.42	4.7434
195	HL-93 Operating	50	930.83	44214.425	2357.96	8506.74	4.9204
195	HL-93 Operating	50	930.83	44214.425	1348.01	4765.12	8.9959
196	HL-93 Operating	50	930.83	44214.425	2764.84	9656.44	4.2924
196	HL-93 Operating	50	930.83	44214.425	-27.99	-247.26	178.7043

LOAD RATING SWING SPAN

RF= RATING FACTOR

$RF = (C - f_{DL+SDL}) / (f_{LL+I})$

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=γ_{LL}*LL

$C=\varphi_C\varphi_S\varphi R_n S_x$ = (1.0)(1.0)(.95)(50)(930.83)

Virtual Beam	LOADING	R_n (ksi)	S_x (in^3)	$C=\varphi_C\varphi_S\varphi R_n S_x$	M_{DL+SDL} (kip-in)	M_{LL+I} (kip-in)	RF
1	HS-20	50	930.83	44214.425	-35.32	-266.85	165.5578
1	HS-20	50	930.83	44214.425	2757.58	9257.4	4.4782
2	HS-21	50	930.83	44214.425	1340.69	4621.25	9.2775
2	HS-22	50	930.83	44214.425	2353.36	8046.16	5.2026
3	HS-23	50	930.83	44214.425	2514.92	8426.91	4.9484
3	HS-24	50	930.83	44214.425	1916.1	7405.01	5.7121
4	HS-25	50	930.83	44214.425	2228.89	7602.72	5.5224
4	HS-26	50	930.83	44214.425	1840.96	7996.97	5.2987
5	HS-27	50	930.83	44214.425	2113.66	7670.36	5.4888
5	HS-28	50	930.83	44214.425	1840.96	7996.97	5.2987
6	HS-29	50	930.83	44214.425	2113.66	7670.36	5.4888
6	HS-30	50	930.83	44214.425	1590.57	7678.75	5.5509
7	HS-31	50	930.83	44214.425	1996.24	8132.08	5.1916
7	HS-32	50	930.83	44214.425	1032.56	6924.36	6.2362
8	HS-33	50	930.83	44214.425	1679.31	7799.96	5.4532
8	HS-34	50	930.83	44214.425	1032.56	6924.36	6.2362
9	HS-35	50	930.83	44214.425	1679.31	7799.96	5.4532
9	HS-36	50	930.83	44214.425	429.08	5700.95	7.6804
10	HS-37	50	930.83	44214.425	1114.22	7029.66	6.1312
10	HS-38	50	930.83	44214.425	-704.69	-3859.65	11.2730
11	HS-39	50	930.83	44214.425	231.25	5302.08	8.2955
11	HS-40	50	930.83	44214.425	-704.69	-3859.65	11.2730
12	HS-41	50	930.83	44214.425	231.25	5302.08	8.2955
12	HS-42	50	930.83	44214.425	-1716.52	-4260.47	9.9749
13	HS-43	50	930.83	44214.425	-1321.91	-4121.04	10.4082
13	HS-44	50	930.83	44214.425	-2624.03	-4552.93	9.1349
14	HS-45	50	930.83	44214.425	-1669.96	-4251.4	10.0072
14	HS-46	50	930.83	44214.425	-3676.48	-4986.89	8.1289
15	HS-47	50	930.83	44214.425	-3675.62	-5029.78	8.0598
15	HS-48	50	930.83	44214.425	-1668.81	-4213.22	10.0981
16	HS-49	50	930.83	44214.425	-2623.08	-4511.85	9.2182
16	HS-50	50	930.83	44214.425	-1320.73	-4084.08	10.5027
17	HS-51	50	930.83	44214.425	-1715.44	-4222.26	10.0655
17	HS-52	50	930.83	44214.425	232.73	5279.73	8.3303
18	HS-53	50	930.83	44214.425	-703.49	-3825.31	11.3745
18	HS-54	50	930.83	44214.425	232.73	5279.73	8.3303
19	HS-55	50	930.83	44214.425	-703.49	-3825.31	11.3745
19	HS-56	50	930.83	44214.425	1116.11	7006.69	6.1510
20	HS-57	50	930.83	44214.425	430.7	5678.3	7.7107
20	HS-58	50	930.83	44214.425	1681.38	7778.98	5.4677
21	HS-59	50	930.83	44214.425	1034.3	6901.77	6.2564
21	HS-60	50	930.83	44214.425	1681.38	7778.98	5.4677
22	HS-61	50	930.83	44214.425	1034.3	6901.77	6.2564
22	HS-62	50	930.83	44214.425	1998.88	8118.17	5.2001
23	HS-63	50	930.83	44214.425	1592.45	7657.66	5.5659
23	HS-64	50	930.83	44214.425	2116.96	7660.66	5.4953
24	HS-65	50	930.83	44214.425	1843.23	7983.26	5.3075
24	HS-66	50	930.83	44214.425	2116.96	7660.66	5.4953
25	HS-67	50	930.83	44214.425	1843.23	7983.26	5.3075
25	HS-68	50	930.83	44214.425	2233.75	7596.2	5.5265
26	HS-69	50	930.83	44214.425	1918.69	7396.17	5.7186
26	HS-70	50	930.83	44214.425	2521.94	8426	4.9481
27	HS-71	50	930.83	44214.425	2357.47	8037.63	5.2076
27	HS-72	50	930.83	44214.425	1347.65	4629.07	9.2603
28	HS-73	50	930.83	44214.425	2764.16	9253.77	4.4793
28	HS-74	50	930.83	44214.425	-28.01	-247.97	178.1926
29	HS-75	50	930.83	44214.425	58.91	287	153.8520
29	HS-76	50	930.83	44214.425	109.1	-2390.33	18.4516
30	HS-77	50	930.83	44214.425	155.04	-929.87	47.3823
30	HS-78	50	930.83	44214.425	1368.35	4857.11	8.8213
31	HS-79	50	930.83	44214.425	152.67	-2292.94	19.2163
31	HS-80	50	930.83	44214.425	1941.22	6885.6	6.1394
32	HS-81	50	930.83	44214.425	1277.19	4671.93	9.1905
32	HS-82	50	930.83	44214.425	1899.93	7022.79	6.0253

Minimum Rating factor	4.4782	**Girder 1**
Minimum Rating factor	5.9657	**Girder 2**
Minimum Rating factor	6.3059	**Girder 3**
Minimum Rating factor	5.8383	**Girder 4**
Minimum Rating factor	6.3024	**Girder 5**
Minimum Rating factor	5.9609	**Girder 6**
Minimum Rating factor	4.4676	**Girder 7**

33	HS-83	50	930.83	44214.425	1830.74	6651.22	6.3723
33	HS-84	50	930.83	44214.425	1899.93	7022.79	6.0253
34	HS-85	50	930.83	44214.425	1830.74	6651.22	6.3723
34	HS-86	50	930.83	44214.425	1704.64	7119.54	5.9709
35	HS-87	50	930.83	44214.425	1884.42	7006.2	6.0418
35	HS-88	50	930.83	44214.425	1167.89	6132.65	7.0192
36	HS-89	50	930.83	44214.425	1711.84	7124.46	5.9657
36	HS-90	50	930.83	44214.425	1167.89	6132.65	7.0192
37	HS-91	50	930.83	44214.425	1711.84	7124.46	5.9657
37	HS-92	50	930.83	44214.425	521.46	5246.89	8.3274
38	HS-93	50	930.83	44214.425	1162.86	6111.57	7.0443
38	HS-94	50	930.83	44214.425	-667.57	-3670.16	11.8651
39	HS-95	50	930.83	44214.425	246.03	4670.14	9.4148
39	HS-96	50	930.83	44214.425	-667.57	-3670.16	11.8651
40	HS-97	50	930.83	44214.425	246.03	4670.14	9.4148
40	HS-98	50	930.83	44214.425	-1801.2	-4034.93	10.5115
41	HS-99	50	930.83	44214.425	-1408.94	-3915.13	10.9333
41	HS-100	50	930.83	44214.425	-2818.11	-4339.9	9.5385
42	HS-101	50	930.83	44214.425	-1821.05	-4047.5	10.4740
42	HS-102	50	930.83	44214.425	-3943.48	-4630.7	8.6965
43	HS-103	50	930.83	44214.425	-3942.53	-4632.46	8.6934
43	HS-104	50	930.83	44214.425	-1819.86	-4000.86	10.5964
44	HS-105	50	930.83	44214.425	-2817.07	-4289.64	9.6505
44	HS-106	50	930.83	44214.425	-1407.74	-3870.19	11.0606
45	HS-107	50	930.83	44214.425	-1800.05	-3988.46	10.6343
45	HS-108	50	930.83	44214.425	247.41	4643.28	9.4690
46	HS-109	50	930.83	44214.425	-666.35	-3628.33	12.0022
46	HS-110	50	930.83	44214.425	247.41	4643.28	9.4690
47	HS-111	50	930.83	44214.425	-666.35	-3628.33	12.0022
47	HS-112	50	930.83	44214.425	1164.6	6084.21	7.0757
48	HS-113	50	930.83	44214.425	522.97	5220.74	8.3688
48	HS-114	50	930.83	44214.425	1713.82	7099.26	5.9866
49	HS-115	50	930.83	44214.425	1169.54	6105.14	7.0506
49	HS-116	50	930.83	44214.425	1713.82	7099.26	5.9866
50	HS-117	50	930.83	44214.425	1169.54	6105.14	7.0506
50	HS-118	50	930.83	44214.425	1886.49	6987.7	6.0575
51	HS-119	50	930.83	44214.425	1706.51	7094.15	5.9920
51	HS-120	50	930.83	44214.425	1833.06	6639.38	6.3833
52	HS-121	50	930.83	44214.425	1902	7004.29	6.0409
52	HS-122	50	930.83	44214.425	1833.06	6639.38	6.3833
53	HS-123	50	930.83	44214.425	1902	7004.29	6.0409
53	HS-124	50	930.83	44214.425	1278.31	4662.96	9.2079
54	HS-125	50	930.83	44214.425	1943.83	6874.08	6.1493
54	HS-126	50	930.83	44214.425	152.35	-2293.74	19.2097
55	HS-127	50	930.83	44214.425	1369.91	4849.1	8.8356
55	HS-128	50	930.83	44214.425	155.05	-930.28	47.3614
56	HS-129	50	930.83	44214.425	109.01	-2390.96	18.4467
56	HS-130	50	930.83	44214.425	58.94	286.71	154.0075
57	HS-131	50	930.83	44214.425	-0.66	-170.58	259.1967
57	HS-132	50	930.83	44214.425	-116.89	-1991.72	22.1404
58	HS-133	50	930.83	44214.425	-33.87	-981.97	44.9918
58	HS-134	50	930.83	44214.425	952.79	3921.41	11.0322
59	HS-135	50	930.83	44214.425	-0.84	-1798.78	24.5798
59	HS-136	50	930.83	44214.425	1561.71	5728.72	7.4454
60	HS-137	50	930.83	44214.425	1068.85	4207.24	10.2551
60	HS-138	50	930.83	44214.425	1801.31	6725.94	6.3059
61	HS-139	50	930.83	44214.425	1505.76	5633.99	7.5805
61	HS-140	50	930.83	44214.425	1801.31	6725.94	6.3059
62	HS-141	50	930.83	44214.425	1505.76	5633.99	7.5805
62	HS-142	50	930.83	44214.425	1714.06	6724.18	6.3205
63	HS-143	50	930.83	44214.425	1722.11	6590.5	6.4475
63	HS-144	50	930.83	44214.425	1186.06	6116.22	7.0351
64	HS-145	50	930.83	44214.425	1662.53	6634.51	6.4137
64	HS-146	50	930.83	44214.425	1186.06	6116.22	7.0351
65	HS-147	50	930.83	44214.425	1662.53	6634.51	6.4137
65	HS-148	50	930.83	44214.425	561.77	4989.72	8.7485
66	HS-149	50	930.83	44214.425	1147.95	6064.83	7.1010
66	HS-150	50	930.83	44214.425	-617.7	-3380.42	12.8968
67	HS-151	50	930.83	44214.425	271.79	4578.58	9.5974
67	HS-152	50	930.83	44214.425	-617.7	-3380.42	12.8968
68	HS-153	50	930.83	44214.425	271.79	4578.58	9.5974
68	HS-154	50	930.83	44214.425	-1809.51	-3793.4	11.1786
69	HS-155	50	930.83	44214.425	-1403.25	-3659.46	11.6988
69	HS-156	50	930.83	44214.425	-2826.84	-4093.88	10.1096

70	HS-157	50	930.83	44214.425	-1825.34	-3792.57	11.1769
70	HS-158	50	930.83	44214.425	-3948.95	-4372.31	9.2092
71	HS-159	50	930.83	44214.425	-3947.97	-4335.29	9.2881
71	HS-160	50	930.83	44214.425	-1824.24	-3748.2	11.3095
72	HS-161	50	930.83	44214.425	-2825.82	-4045.75	10.2301
72	HS-162	50	930.83	44214.425	-1402.14	-3616.71	11.8374
73	HS-163	50	930.83	44214.425	-1808.43	-3748.97	11.3114
73	HS-164	50	930.83	44214.425	273	4553.08	9.6509
74	HS-165	50	930.83	44214.425	-616.59	-3341.06	13.0491
74	HS-166	50	930.83	44214.425	273	4553.08	9.6509
75	HS-167	50	930.83	44214.425	-616.59	-3341.06	13.0491
75	HS-168	50	930.83	44214.425	1149.39	6038.3	7.1320
76	HS-169	50	930.83	44214.425	563.1	4963.39	8.7947
76	HS-170	50	930.83	44214.425	1664.1	6609.74	6.4375
77	HS-171	50	930.83	44214.425	1187.49	6089.57	7.0657
77	HS-172	50	930.83	44214.425	1664.1	6609.74	6.4375
78	HS-173	50	930.83	44214.425	1187.49	6089.57	7.0657
78	HS-174	50	930.83	44214.425	1723.47	6571.58	6.4659
79	HS-175	50	930.83	44214.425	1715.65	6699.29	6.3438
79	HS-176	50	930.83	44214.425	1506.98	5622.13	7.5963
80	HS-177	50	930.83	44214.425	1802.83	6707.14	6.3234
80	HS-178	50	930.83	44214.425	1506.98	5622.13	7.5963
81	HS-179	50	930.83	44214.425	1802.83	6707.14	6.3234
81	HS-180	50	930.83	44214.425	1069.54	4198.42	10.2765
82	HS-181	50	930.83	44214.425	1563.11	5717.2	7.4602
82	HS-182	50	930.83	44214.425	-1.01	-1798.95	24.5773
83	HS-183	50	930.83	44214.425	953.57	3913.64	11.0539
83	HS-184	50	930.83	44214.425	-33.98	-981.98	44.9912
84	HS-185	50	930.83	44214.425	-116.98	-1991.68	22.1408
84	HS-186	50	930.83	44214.425	-0.69	-170.59	259.1813
85	HS-187	50	930.83	44214.425	-12.09	192.69	229.3961
85	HS-188	50	930.83	44214.425	-135.14	-4697.71	9.3831
86	HS-189	50	930.83	44214.425	-66.51	-2218.77	19.8975
86	HS-190	50	930.83	44214.425	845.4	4659.56	9.3075
87	HS-191	50	930.83	44214.425	-12.15	-4314.7	10.2446
87	HS-192	50	930.83	44214.425	1421.63	5168.76	8.2791
88	HS-193	50	930.83	44214.425	1009.87	5070.15	8.5214
88	HS-194	50	930.83	44214.425	1757.56	7272.12	5.8383
89	HS-195	50	930.83	44214.425	1395.06	5143.51	8.3249
89	HS-196	50	930.83	44214.425	1757.56	7272.12	5.8383
90	HS-197	50	930.83	44214.425	1395.06	5143.51	8.3249
90	HS-198	50	930.83	44214.425	1713.65	6259.73	6.7896
91	HS-199	50	930.83	44214.425	1671.56	7118.28	5.9766
91	HS-200	50	930.83	44214.425	1193.39	6848.18	6.2821
92	HS-201	50	930.83	44214.425	1640.55	6144.72	6.9285
92	HS-202	50	930.83	44214.425	1193.39	6848.18	6.2821
93	HS-203	50	930.83	44214.425	1640.55	6144.72	6.9285
93	HS-204	50	930.83	44214.425	575.99	4806.84	9.0784
94	HS-205	50	930.83	44214.425	1141.5	6811.48	6.3236
94	HS-206	50	930.83	44214.425	-603.15	-3124.82	13.9564
95	HS-207	50	930.83	44214.425	281.17	4928.52	8.9141
95	HS-208	50	930.83	44214.425	-603.15	-3124.82	13.9564
96	HS-209	50	930.83	44214.425	281.17	4928.52	8.9141
96	HS-210	50	930.83	44214.425	-1808.23	-3523.11	12.0366
97	HS-211	50	930.83	44214.425	-1399.55	-3394.13	12.6144
97	HS-212	50	930.83	44214.425	-2828.65	-3809.32	10.8643
98	HS-213	50	930.83	44214.425	-1822.65	-3519.01	12.0465
98	HS-214	50	930.83	44214.425	-3954.07	-4330.25	9.2975
99	HS-215	50	930.83	44214.425	-3953.09	-4362.03	9.2300
99	HS-216	50	930.83	44214.425	-1821.66	-3477.35	12.1911
100	HS-217	50	930.83	44214.425	-2827.66	-3764.08	10.9952
100	HS-218	50	930.83	44214.425	-1398.55	-3353.95	12.7658
101	HS-219	50	930.83	44214.425	-1807.23	-3481.35	12.1813
101	HS-220	50	930.83	44214.425	282.18	4903.53	8.9593
102	HS-221	50	930.83	44214.425	-602.15	-3087.82	14.1240
102	HS-222	50	930.83	44214.425	282.18	4903.53	8.9593
103	HS-223	50	930.83	44214.425	-602.15	-3087.82	14.1240
103	HS-224	50	930.83	44214.425	1142.6	6784.81	6.3483
104	HS-225	50	930.83	44214.425	577.13	4781.27	9.1267
104	HS-226	50	930.83	44214.425	1641.66	6119.99	6.9563
105	HS-227	50	930.83	44214.425	1194.55	6821.4	6.3066
105	HS-228	50	930.83	44214.425	1641.66	6119.99	6.9563
106	HS-229	50	930.83	44214.425	1194.55	6821.4	6.3066
106	HS-230	50	930.83	44214.425	1672.43	7099.5	5.9923

107	HS-231	50	930.83	44214.425	1714.84	6233.52	6.8179
107	HS-232	50	930.83	44214.425	1395.64	5130.58	8.3458
108	HS-233	50	930.83	44214.425	1758.58	7253.27	5.8533
108	HS-234	50	930.83	44214.425	1395.64	5130.58	8.3458
109	HS-235	50	930.83	44214.425	1758.58	7253.27	5.8533
109	HS-236	50	930.83	44214.425	1010.22	5060.96	8.5368
110	HS-237	50	930.83	44214.425	1422.34	5155.94	8.2996
110	HS-238	50	930.83	44214.425	-12.25	-4315.23	10.2433
111	HS-239	50	930.83	44214.425	845.77	4651.33	9.3239
111	HS-240	50	930.83	44214.425	-66.58	-2218.46	19.9002
112	HS-241	50	930.83	44214.425	-135.21	-4697.46	9.3836
112	HS-242	50	930.83	44214.425	-12.11	192.74	229.3365
113	HS-243	50	930.83	44214.425	-0.68	-170.6	259.1661
113	HS-244	50	930.83	44214.425	-116.97	-1991.91	22.1383
114	HS-245	50	930.83	44214.425	-33.95	-982.16	44.9830
114	HS-246	50	930.83	44214.425	953.53	3923.86	11.0251
115	HS-247	50	930.83	44214.425	-1.02	-1798.88	24.5783
115	HS-248	50	930.83	44214.425	1563.01	5733.12	7.4395
116	HS-249	50	930.83	44214.425	1069.45	4209.18	10.2502
116	HS-250	50	930.83	44214.425	1802.46	6729.48	6.3024
117	HS-251	50	930.83	44214.425	1506.9	5637.73	7.5753
117	HS-252	50	930.83	44214.425	1802.46	6729.48	6.3024
118	HS-253	50	930.83	44214.425	1506.9	5637.73	7.5753
118	HS-254	50	930.83	44214.425	1715.13	6727.29	6.3174
119	HS-255	50	930.83	44214.425	1723.17	6593.62	6.4443
119	HS-256	50	930.83	44214.425	1186.94	6118.1	7.0328
120	HS-257	50	930.83	44214.425	1663.62	6637.63	6.4105
120	HS-258	50	930.83	44214.425	1186.94	6118.1	7.0328
121	HS-259	50	930.83	44214.425	1663.62	6637.63	6.4105
121	HS-260	50	930.83	44214.425	562.52	4990.75	8.7466
122	HS-261	50	930.83	44214.425	1148.86	6066.81	7.0986
122	HS-262	50	930.83	44214.425	-617.18	-3380.37	12.8972
123	HS-263	50	930.83	44214.425	272.43	4579.12	9.5962
123	HS-264	50	930.83	44214.425	-617.18	-3380.37	12.8972
124	HS-265	50	930.83	44214.425	272.43	4579.12	9.5962
124	HS-266	50	930.83	44214.425	-1809.06	-3793.07	11.1797
125	HS-267	50	930.83	44214.425	-1402.75	-3659.25	11.6996
125	HS-268	50	930.83	44214.425	-2826.46	-4093.31	10.1111
126	HS-269	50	930.83	44214.425	-1824.86	-3792.28	11.1779
126	HS-270	50	930.83	44214.425	-3948.63	-4371.53	9.2109
127	HS-271	50	930.83	44214.425	-3947.65	-4337.72	9.2829
127	HS-272	50	930.83	44214.425	-1823.98	-3750.22	11.3035
128	HS-273	50	930.83	44214.425	-2825.51	-4047.86	10.2249
128	HS-274	50	930.83	44214.425	-1401.87	-3618.63	11.8312
129	HS-275	50	930.83	44214.425	-1808.15	-3750.93	11.3055
129	HS-276	50	930.83	44214.425	273.22	4553.74	9.6495
130	HS-277	50	930.83	44214.425	-616.31	-3342.73	13.0427
130	HS-278	50	930.83	44214.425	273.22	4553.74	9.6495
131	HS-279	50	930.83	44214.425	-616.31	-3342.73	13.0427
131	HS-280	50	930.83	44214.425	1149.64	6038.78	7.1314
132	HS-281	50	930.83	44214.425	563.42	4963.88	8.7937
132	HS-282	50	930.83	44214.425	1664.29	6610.11	6.4371
133	HS-283	50	930.83	44214.425	1187.78	6089.98	7.0652
133	HS-284	50	930.83	44214.425	1664.29	6610.11	6.4371
134	HS-285	50	930.83	44214.425	1187.78	6089.98	7.0652
134	HS-286	50	930.83	44214.425	1723.65	6571.86	6.4656
135	HS-287	50	930.83	44214.425	1715.88	6699.6	6.3434
135	HS-288	50	930.83	44214.425	1507.13	5622.27	7.5961
136	HS-289	50	930.83	44214.425	1803.05	6707.37	6.3231
136	HS-290	50	930.83	44214.425	1507.13	5622.27	7.5961
137	HS-291	50	930.83	44214.425	1803.05	6707.37	6.3231
137	HS-292	50	930.83	44214.425	1069.61	4198.51	10.2762
138	HS-293	50	930.83	44214.425	1563.33	5717.27	7.4600
138	HS-294	50	930.83	44214.425	-1.05	-1798.95	24.5773
139	HS-295	50	930.83	44214.425	953.7	3913.65	11.0538
139	HS-296	50	930.83	44214.425	-33.98	-981.98	44.9912
140	HS-297	50	930.83	44214.425	-117	-1991.67	22.1409
140	HS-298	50	930.83	44214.425	-0.68	-170.59	259.1813
141	HS-299	50	930.83	44214.425	58.93	287.04	153.8305
141	HS-300	50	930.83	44214.425	109.06	-2390.35	18.4514
142	HS-301	50	930.83	44214.425	155.03	-929.87	47.3823
142	HS-302	50	930.83	44214.425	1370.13	4862.5	8.8112
143	HS-303	50	930.83	44214.425	152.32	-2293.15	19.2147
143	HS-304	50	930.83	44214.425	1944.11	6895.01	6.1306

144	HS-305	50	930.83	44214.425	1278.47	4675.58	9.1830
144	HS-306	50	930.83	44214.425	1902.22	7029.19	6.0195
145	HS-307	50	930.83	44214.425	1833.31	6659.46	6.3640
145	HS-308	50	930.83	44214.425	1902.22	7029.19	6.0195
146	HS-309	50	930.83	44214.425	1833.31	6659.46	6.3640
146	HS-310	50	930.83	44214.425	1706.67	7124.56	5.9664
147	HS-311	50	930.83	44214.425	1886.67	7012.45	6.0361
147	HS-312	50	930.83	44214.425	1169.6	6135.68	7.0155
148	HS-313	50	930.83	44214.425	1713.96	7129.82	5.9609
148	HS-314	50	930.83	44214.425	1169.6	6135.68	7.0155
149	HS-315	50	930.83	44214.425	1713.96	7129.82	5.9609
149	HS-316	50	930.83	44214.425	522.96	5248.55	8.3245
150	HS-317	50	930.83	44214.425	1164.64	6114.85	7.0402
150	HS-318	50	930.83	44214.425	-666.53	-3669.95	11.8661
151	HS-319	50	930.83	44214.425	247.3	4670.89	9.4130
151	HS-320	50	930.83	44214.425	-666.53	-3669.95	11.8661
152	HS-321	50	930.83	44214.425	247.3	4670.89	9.4130
152	HS-322	50	930.83	44214.425	-1800.28	-4034.22	10.5136
153	HS-323	50	930.83	44214.425	-1407.95	-3914.64	10.9350
153	HS-324	50	930.83	44214.425	-2817.36	-4338.71	9.5413
154	HS-325	50	930.83	44214.425	-1820.09	-4046.84	10.4759
154	HS-326	50	930.83	44214.425	-3942.87	-4629.07	8.6997
155	HS-327	50	930.83	44214.425	-3941.88	-4630.69	8.6969
155	HS-328	50	930.83	44214.425	-1819.32	-4004.27	10.5875
156	HS-329	50	930.83	44214.425	-2816.45	-4293.12	9.6429
156	HS-330	50	930.83	44214.425	-1407.2	-3873.4	11.0516
157	HS-331	50	930.83	44214.425	-1799.47	-3991.72	10.6257
157	HS-332	50	930.83	44214.425	247.85	4644.49	9.4664
158	HS-333	50	930.83	44214.425	-665.8	-3631.13	11.9931
158	HS-334	50	930.83	44214.425	247.85	4644.49	9.4664
159	HS-335	50	930.83	44214.425	-665.8	-3631.13	11.9931
159	HS-336	50	930.83	44214.425	1165.09	6085.06	7.0746
160	HS-337	50	930.83	44214.425	523.6	5221.59	8.3673
160	HS-338	50	930.83	44214.425	1714.21	7099.92	5.9860
161	HS-339	50	930.83	44214.425	1170.12	6105.86	7.0497
161	HS-340	50	930.83	44214.425	1714.21	7099.92	5.9860
162	HS-341	50	930.83	44214.425	1170.12	6105.86	7.0497
162	HS-342	50	930.83	44214.425	1886.84	6988.23	6.0570
163	HS-343	50	930.83	44214.425	1706.98	7094.68	5.9915
163	HS-344	50	930.83	44214.425	1833.32	6639.71	6.3830
164	HS-345	50	930.83	44214.425	1902.42	7004.71	6.0405
164	HS-346	50	930.83	44214.425	1833.32	6639.71	6.3830
165	HS-347	50	930.83	44214.425	1902.42	7004.71	6.0405
165	HS-348	50	930.83	44214.425	1278.54	4663.03	9.2077
166	HS-349	50	930.83	44214.425	1944.18	6874.3	6.1490
166	HS-350	50	930.83	44214.425	152.41	-2293.74	19.2097
167	HS-351	50	930.83	44214.425	1370.27	4849.02	8.8356
167	HS-352	50	930.83	44214.425	155.1	-930.28	47.3614
168	HS-353	50	930.83	44214.425	109.15	-2390.97	18.4466
168	HS-354	50	930.83	44214.425	58.95	286.71	154.0074
169	HS-355	50	930.83	44214.425	-27.98	-246.66	179.1391
169	HS-356	50	930.83	44214.425	2763.91	9278.06	4.4676
170	HS-357	50	930.83	44214.425	1347.53	4642.25	9.2341
170	HS-358	50	930.83	44214.425	2357.71	8060.52	5.1928
171	HS-359	50	930.83	44214.425	2521.66	8449.02	4.9346
171	HS-360	50	930.83	44214.425	1919.32	7412.58	5.7059
172	HS-361	50	930.83	44214.425	2233.93	7619.56	5.5096
172	HS-362	50	930.83	44214.425	1843.96	8003.18	5.2942
173	HS-363	50	930.83	44214.425	2117.39	7679.85	5.4815
173	HS-364	50	930.83	44214.425	1843.96	8003.18	5.2942
174	HS-365	50	930.83	44214.425	2117.39	7679.85	5.4815
174	HS-366	50	930.83	44214.425	1593.26	7683.67	5.5470
175	HS-367	50	930.83	44214.425	1999.48	8139.28	5.1866
175	HS-368	50	930.83	44214.425	1034.92	6927.65	6.2329
176	HS-369	50	930.83	44214.425	1682.13	7805.29	5.4492
176	HS-370	50	930.83	44214.425	1034.92	6927.65	6.2329
177	HS-371	50	930.83	44214.425	1682.13	7805.29	5.4492
177	HS-372	50	930.83	44214.425	431.21	5703.01	7.6772
178	HS-373	50	930.83	44214.425	1116.72	7033.29	6.1277
178	HS-374	50	930.83	44214.425	-703.26	-3859.6	11.2735
179	HS-375	50	930.83	44214.425	233.07	5303.19	8.2934
179	HS-376	50	930.83	44214.425	-703.26	-3859.6	11.2735
180	HS-377	50	930.83	44214.425	233.07	5303.19	8.2934
180	HS-378	50	930.83	44214.425	-1715.31	-4259.97	9.9764

181	HS-379	50	930.83	44214.425	-1320.56	-4120.75	10.4092
181	HS-380	50	930.83	44214.425	-2623.01	-4552.04	9.1369
182	HS-381	50	930.83	44214.425	-1668.68	-4250.98	10.0085
182	HS-382	50	930.83	44214.425	-3675.61	-4989.23	8.1253
183	HS-383	50	930.83	44214.425	-3674.64	-5028.02	8.0628
183	HS-384	50	930.83	44214.425	-1668.05	-4217.16	10.0889
184	HS-385	50	930.83	44214.425	-2622.16	-4515.9	9.2102
184	HS-386	50	930.83	44214.425	-1319.96	-4087.85	10.4932
185	HS-387	50	930.83	44214.425	-1714.61	-4226.07	10.0566
185	HS-388	50	930.83	44214.425	233.34	5281	8.3282
186	HS-389	50	930.83	44214.425	-702.69	-3828.68	11.3647
186	HS-390	50	930.83	44214.425	233.34	5281	8.3282
187	HS-391	50	930.83	44214.425	-702.69	-3828.68	11.3647
187	HS-392	50	930.83	44214.425	1116.83	7007.62	6.1501
188	HS-393	50	930.83	44214.425	431.57	5679.29	7.7092
188	HS-394	50	930.83	44214.425	1681.98	7779.61	5.4672
189	HS-395	50	930.83	44214.425	1035.1	6902.57	6.2555
189	HS-396	50	930.83	44214.425	1681.98	7779.61	5.4672
190	HS-397	50	930.83	44214.425	1035.1	6902.57	6.2555
190	HS-398	50	930.83	44214.425	1999.37	8118.77	5.1997
191	HS-399	50	930.83	44214.425	1593.16	7658.18	5.5655
191	HS-400	50	930.83	44214.425	2117.21	7661.13	5.4949
192	HS-401	50	930.83	44214.425	1843.78	7983.75	5.3071
192	HS-402	50	930.83	44214.425	2117.21	7661.13	5.4949
193	HS-403	50	930.83	44214.425	1843.78	7983.75	5.3071
193	HS-404	50	930.83	44214.425	2234.09	7596.42	5.5263
194	HS-405	50	930.83	44214.425	1919.04	7396.57	5.7182
194	HS-406	50	930.83	44214.425	2522.53	8425.76	4.9481
195	HS-407	50	930.83	44214.425	2357.96	8037.64	5.2076
195	HS-408	50	930.83	44214.425	1348.01	4628.92	9.2606
196	HS-409	50	930.83	44214.425	2764.84	9253.45	4.4794
196	HS-410	50	930.83	44214.425	-27.99	-247.94	178.2142

LOAD RATING SWING SPAN

RF= RATING FACTOR

$RF = (C - f_{DL+SDL}) / (f_{LL+I})$

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

$C=\varphi_C\varphi_S\varphi R_n S_x$ = (1.0)(1.0)(.95)(50)(930.83)

Virtual Beam	LOADING	R_n (ksi)	S_x (in^3)	$C=\varphi_C\varphi_S\varphi R_n S_x$	M_{DL+SDL} (kip-in)	M_{LL+I} (kip-in)	RF
1	H-20	50	930.83	44214.425	-35.32	-184.2	239.8431
1	H-20	50	930.83	44214.425	2757.58	5925.53	6.9963
2	H-21	50	930.83	44214.425	1340.69	2973.82	14.4171
2	H-22	50	930.83	44214.425	2353.36	5187.03	8.0703
3	H-23	50	930.83	44214.425	2514.92	5404.08	7.7163
3	H-24	50	930.83	44214.425	1916.1	4947.33	8.5497
4	H-25	50	930.83	44214.425	2228.89	4899.12	8.5700
4	H-26	50	930.83	44214.425	1840.96	5355.92	7.9115
5	H-27	50	930.83	44214.425	2113.66	5128.1	8.2098
5	H-28	50	930.83	44214.425	1840.96	5355.92	7.9115
6	H-29	50	930.83	44214.425	2113.66	5128.1	8.2098
6	H-30	50	930.83	44214.425	1590.57	5183.49	8.2230
7	H-31	50	930.83	44214.425	1996.24	5441.19	7.7590
7	H-32	50	930.83	44214.425	1032.56	4695.36	9.1967
8	H-33	50	930.83	44214.425	1679.31	5244.74	8.1101
8	H-34	50	930.83	44214.425	1032.56	4695.36	9.1967
9	H-35	50	930.83	44214.425	1679.31	5244.74	8.1101
9	H-36	50	930.83	44214.425	429.08	3966.77	11.0380
10	H-37	50	930.83	44214.425	1114.22	4744.92	9.0834
10	H-38	50	930.83	44214.425	-704.69	2595.22	16.7653
11	H-39	50	930.83	44214.425	231.25	3729.93	11.7920
11	H-40	50	930.83	44214.425	-704.69	2595.22	16.7653
12	H-41	50	930.83	44214.425	231.25	3729.93	11.7920
12	H-42	50	930.83	44214.425	-1716.52	-2488.5	17.0777
13	H-43	50	930.83	44214.425	-1321.91	-2407.03	17.8197
13	H-44	50	930.83	44214.425	-2624.03	-2660.46	15.6328
14	H-45	50	930.83	44214.425	-1669.96	-2483.46	17.1311
14	H-46	50	930.83	44214.425	-3676.48	-2919.72	13.8842
15	H-47	50	930.83	44214.425	-3675.62	-2943.27	13.7734
15	H-48	50	930.83	44214.425	-1668.81	-2462.48	17.2775
16	H-49	50	930.83	44214.425	-2623.08	-2637.89	15.7669
16	H-50	50	930.83	44214.425	-1320.73	-2386.74	17.9717
17	H-51	50	930.83	44214.425	-1715.44	-2467.51	17.2234
17	H-52	50	930.83	44214.425	232.73	3718.36	11.8283
18	H-53	50	930.83	44214.425	-703.49	2585.1	16.8314
18	H-54	50	930.83	44214.425	232.73	3718.36	11.8283
19	H-55	50	930.83	44214.425	-703.49	2585.1	16.8314
19	H-56	50	930.83	44214.425	1116.11	4732.91	9.1061
20	H-57	50	930.83	44214.425	430.7	3955.01	11.0704
20	H-58	50	930.83	44214.425	1681.38	5233.77	8.1267
21	H-59	50	930.83	44214.425	1034.3	4683.55	9.2195
21	H-60	50	930.83	44214.425	1681.38	5233.77	8.1267
22	H-61	50	930.83	44214.425	1034.3	4683.55	9.2195
22	H-62	50	930.83	44214.425	1998.88	5433.15	7.7700
23	H-63	50	930.83	44214.425	1592.45	5172.45	8.2402
23	H-64	50	930.83	44214.425	2116.96	5122.54	8.2181
24	H-65	50	930.83	44214.425	1843.23	5347.99	7.9228
24	H-66	50	930.83	44214.425	2116.96	5122.54	8.2181
25	H-67	50	930.83	44214.425	1843.23	5347.99	7.9228
25	H-68	50	930.83	44214.425	2233.75	4893.5	8.5789
26	H-69	50	930.83	44214.425	1918.69	4941.22	8.5598
26	H-70	50	930.83	44214.425	2521.94	5400.17	7.7206
27	H-71	50	930.83	44214.425	2357.47	5180.38	8.0799
27	H-72	50	930.83	44214.425	1347.65	2975.02	14.4089
28	H-73	50	930.83	44214.425	2764.16	5920.16	7.0015
28	H-74	50	930.83	44214.425	-28.01	-175.59	251.6454
29	H-75	50	930.83	44214.425	58.91	228.2	193.4948
29	H-76	50	930.83	44214.425	109.1	-2390.33	18.4516
30	H-77	50	930.83	44214.425	155.04	-929.87	47.3823
30	H-78	50	930.83	44214.425	1368.35	3344.83	12.8096
31	H-79	50	930.83	44214.425	152.67	-2292.94	19.2163
31	H-80	50	930.83	44214.425	1941.22	4551.2	9.2884
32	H-81	50	930.83	44214.425	1277.19	3249.95	13.2117
32	H-82	50	930.83	44214.425	1899.93	4615.47	9.1680

Minimum Rating factor	6.9963	**Girder 1**
Minimum Rating factor	9.0006	**Girder 2**
Minimum Rating factor	9.3572	**Girder 3**
Minimum Rating factor	7.6886	**Girder 4**
Minimum Rating factor	9.3526	**Girder 5**
Minimum Rating factor	8.9943	**Girder 6**
Minimum Rating factor	6.9837	**Girder 7**

33	H-83	50	930.83	44214.425	1830.74	4395.33	9.6429
33	H-84	50	930.83	44214.425	1899.93	4615.47	9.1680
34	H-85	50	930.83	44214.425	1830.74	4395.33	9.6429
34	H-86	50	930.83	44214.425	1704.64	4720.22	9.0059
35	H-87	50	930.83	44214.425	1884.42	4606.73	9.1887
35	H-88	50	930.83	44214.425	1167.89	4099.34	10.5008
36	H-89	50	930.83	44214.425	1711.84	4722.21	9.0006
36	H-90	50	930.83	44214.425	1167.89	4099.34	10.5008
37	H-91	50	930.83	44214.425	1711.84	4722.21	9.0006
37	H-92	50	930.83	44214.425	521.46	3580.23	12.2040
38	H-93	50	930.83	44214.425	1162.86	4093.28	10.5176
38	H-94	50	930.83	44214.425	-667.57	2571.88	16.9319
39	H-95	50	930.83	44214.425	246.03	3185.76	13.8015
39	H-96	50	930.83	44214.425	-667.57	2571.88	16.9319
40	H-97	50	930.83	44214.425	246.03	3185.76	13.8015
40	H-98	50	930.83	44214.425	-1801.2	-2355.85	18.0034
41	H-99	50	930.83	44214.425	-1408.94	-2285.65	18.7279
41	H-100	50	930.83	44214.425	-2818.11	-2533.93	16.3368
42	H-101	50	930.83	44214.425	-1821.05	-2363.44	17.9371
42	H-102	50	930.83	44214.425	-3943.48	-2706.05	14.8818
43	H-103	50	930.83	44214.425	-3942.53	-2712.37	14.8475
43	H-104	50	930.83	44214.425	-1819.86	-2337.85	18.1340
44	H-105	50	930.83	44214.425	-2817.07	-2506.33	16.5171
44	H-106	50	930.83	44214.425	-1407.74	-2260.99	18.9327
45	H-107	50	930.83	44214.425	-1800.05	-2330.35	18.2009
45	H-108	50	930.83	44214.425	247.41	3171.17	13.8646
46	H-109	50	930.83	44214.425	-666.35	2562.88	16.9919
46	H-110	50	930.83	44214.425	247.41	3171.17	13.8646
47	H-111	50	930.83	44214.425	-666.35	2562.88	16.9919
47	H-112	50	930.83	44214.425	1164.6	4079.21	10.5535
48	H-113	50	930.83	44214.425	522.97	3566.04	12.2521
48	H-114	50	930.83	44214.425	1713.82	4709.04	9.0253
49	H-115	50	930.83	44214.425	1169.54	4085.21	10.5368
49	H-116	50	930.83	44214.425	1713.82	4709.04	9.0253
50	H-117	50	930.83	44214.425	1169.54	4085.21	10.5368
50	H-118	50	930.83	44214.425	1886.49	4596.71	9.2083
51	H-119	50	930.83	44214.425	1706.51	4706.79	9.0312
51	H-120	50	930.83	44214.425	1833.06	4387.83	9.6588
52	H-121	50	930.83	44214.425	1902	4605.46	9.1874
52	H-122	50	930.83	44214.425	1833.06	4387.83	9.6588
53	H-123	50	930.83	44214.425	1902	4605.46	9.1874
53	H-124	50	930.83	44214.425	1278.31	3244.49	13.2335
54	H-125	50	930.83	44214.425	1943.83	4543.85	9.3028
54	H-126	50	930.83	44214.425	152.35	-2293.74	19.2097
55	H-127	50	930.83	44214.425	1369.91	3339.8	12.8285
55	H-128	50	930.83	44214.425	155.05	-930.28	47.3614
56	H-129	50	930.83	44214.425	109.01	-2390.96	18.4467
56	H-130	50	930.83	44214.425	58.94	228.08	193.5965
57	H-131	50	930.83	44214.425	-0.66	-166.43	265.6598
57	H-132	50	930.83	44214.425	-116.89	-1977.03	22.3049
58	H-133	50	930.83	44214.425	-33.87	-963.46	45.8561
58	H-134	50	930.83	44214.425	952.79	2705.95	15.9876
59	H-135	50	930.83	44214.425	-0.84	-1798.78	24.5798
59	H-136	50	930.83	44214.425	1561.71	3879.33	10.9949
60	H-137	50	930.83	44214.425	1068.85	2888.31	14.9380
60	H-138	50	930.83	44214.425	1801.31	4532.68	9.3572
61	H-139	50	930.83	44214.425	1505.76	3809.81	11.2102
61	H-140	50	930.83	44214.425	1801.31	4532.68	9.3572
62	H-141	50	930.83	44214.425	1505.76	3809.81	11.2102
62	H-142	50	930.83	44214.425	1714.06	4519.47	9.4038
63	H-143	50	930.83	44214.425	1722.11	4455.36	9.5373
63	H-144	50	930.83	44214.425	1186.06	4129.65	10.4194
64	H-145	50	930.83	44214.425	1662.53	4471.96	9.5153
64	H-146	50	930.83	44214.425	1186.06	4129.65	10.4194
65	H-147	50	930.83	44214.425	1662.53	4471.96	9.5153
65	H-148	50	930.83	44214.425	561.77	3501.03	12.4685
66	H-149	50	930.83	44214.425	1147.95	4100.89	10.5017
66	H-150	50	930.83	44214.425	-617.7	2378.21	18.3317
67	H-151	50	930.83	44214.425	271.79	3262.97	13.4671
67	H-152	50	930.83	44214.425	-617.7	2378.21	18.3317
68	H-153	50	930.83	44214.425	271.79	3262.97	13.4671
68	H-154	50	930.83	44214.425	-1809.51	-2213.73	19.1554
69	H-155	50	930.83	44214.425	-1403.25	-2135.69	20.0456
69	H-156	50	930.83	44214.425	-2826.84	-2388.25	17.3297

70	H-157	50	930.83	44214.425	-1825.34	-2212.72	19.1570
70	H-158	50	930.83	44214.425	-3948.95	-2549.57	15.7930
71	H-159	50	930.83	44214.425	-3947.97	-2531.42	15.9067
71	H-160	50	930.83	44214.425	-1824.24	-2188.39	19.3705
72	H-161	50	930.83	44214.425	-2825.82	-2361.86	17.5237
72	H-162	50	930.83	44214.425	-1402.14	-2112.26	20.2685
73	H-163	50	930.83	44214.425	-1808.43	-2189.37	19.3690
73	H-164	50	930.83	44214.425	273	3249.01	13.5246
74	H-165	50	930.83	44214.425	-616.59	2366.55	18.4225
74	H-166	50	930.83	44214.425	273	3249.01	13.5246
75	H-167	50	930.83	44214.425	-616.59	2366.55	18.4225
75	H-168	50	930.83	44214.425	1149.39	4086.75	10.5377
76	H-169	50	930.83	44214.425	563.1	3487.37	12.5170
76	H-170	50	930.83	44214.425	1664.1	4459.31	9.5419
77	H-171	50	930.83	44214.425	1187.49	4115.44	10.4550
77	H-172	50	930.83	44214.425	1664.1	4459.31	9.5419
78	H-173	50	930.83	44214.425	1187.49	4115.44	10.4550
78	H-174	50	930.83	44214.425	1723.47	4444.82	9.5597
79	H-175	50	930.83	44214.425	1715.65	4505.87	9.4319
79	H-176	50	930.83	44214.425	1506.98	3801.95	11.2330
80	H-177	50	930.83	44214.425	1802.83	4522.22	9.3785
80	H-178	50	930.83	44214.425	1506.98	3801.95	11.2330
81	H-179	50	930.83	44214.425	1802.83	4522.22	9.3785
81	H-180	50	930.83	44214.425	1069.54	2882.89	14.9658
82	H-181	50	930.83	44214.425	1563.11	3871.63	11.0164
82	H-182	50	930.83	44214.425	-1.01	-1798.95	24.5773
83	H-183	50	930.83	44214.425	953.57	2701.12	16.0159
83	H-184	50	930.83	44214.425	-33.98	-963.43	45.8575
84	H-185	50	930.83	44214.425	-116.98	-1976.96	22.3057
84	H-186	50	930.83	44214.425	-0.69	-166.44	265.6437
85	H-187	50	930.83	44214.425	-12.09	192.69	229.3961
85	H-188	50	930.83	44214.425	-135.14	-4563.37	9.6594
86	H-189	50	930.83	44214.425	-66.51	-2092.52	21.0980
86	H-190	50	930.83	44214.425	845.4	3697.04	11.7307
87	H-191	50	930.83	44214.425	-12.15	-4230.81	10.4477
87	H-192	50	930.83	44214.425	1421.63	3639.05	11.7593
88	H-193	50	930.83	44214.425	1009.87	3989.12	10.8306
88	H-194	50	930.83	44214.425	1757.56	5522.04	7.6886
89	H-195	50	930.83	44214.425	1395.06	3626.48	11.8074
89	H-196	50	930.83	44214.425	1757.56	5522.04	7.6886
90	H-197	50	930.83	44214.425	1395.06	3626.48	11.8074
90	H-198	50	930.83	44214.425	1713.65	4421.73	9.6118
91	H-199	50	930.83	44214.425	1671.56	5434.73	7.8280
91	H-200	50	930.83	44214.425	1193.39	5198.58	8.2755
92	H-201	50	930.83	44214.425	1640.55	4365.83	9.7516
92	H-202	50	930.83	44214.425	1193.39	5198.58	8.2755
93	H-203	50	930.83	44214.425	1640.55	4365.83	9.7516
93	H-204	50	930.83	44214.425	575.99	3539.96	12.3274
94	H-205	50	930.83	44214.425	1141.5	5171.08	8.3296
94	H-206	50	930.83	44214.425	-603.15	2529.94	17.2381
95	H-207	50	930.83	44214.425	281.17	3840.15	11.4405
95	H-208	50	930.83	44214.425	-603.15	2529.94	17.2381
96	H-209	50	930.83	44214.425	281.17	3840.15	11.4405
96	H-210	50	930.83	44214.425	-1808.23	2481.78	17.0870
97	H-211	50	930.83	44214.425	-1399.55	2684.04	15.9517
97	H-212	50	930.83	44214.425	-2828.65	-2222.41	18.6220
98	H-213	50	930.83	44214.425	-1822.65	2539.63	16.6921
98	H-214	50	930.83	44214.425	-3954.07	-2488.2	16.1805
99	H-215	50	930.83	44214.425	-3953.09	-2497.96	16.1177
99	H-216	50	930.83	44214.425	-1821.66	2534.53	16.7261
100	H-217	50	930.83	44214.425	-2827.66	-2197.63	18.8325
100	H-218	50	930.83	44214.425	-1398.55	2674.7	16.0077
101	H-219	50	930.83	44214.425	-1807.23	2476.67	17.1227
101	H-220	50	930.83	44214.425	282.18	3827.24	11.4788
102	H-221	50	930.83	44214.425	-602.15	2518.93	17.3138
102	H-222	50	930.83	44214.425	282.18	3827.24	11.4788
103	H-223	50	930.83	44214.425	-602.15	2518.93	17.3138
103	H-224	50	930.83	44214.425	1142.6	5157.09	8.3520
104	H-225	50	930.83	44214.425	577.13	3526.7	12.3734
104	H-226	50	930.83	44214.425	1641.66	4352.51	9.7812
105	H-227	50	930.83	44214.425	1194.55	5184.55	8.2977
105	H-228	50	930.83	44214.425	1641.66	4352.51	9.7812
106	H-229	50	930.83	44214.425	1194.55	5184.55	8.2977
106	H-230	50	930.83	44214.425	1672.43	5423.81	7.8436

107	H-231	50	930.83	44214.425	1714.84	4407.88	9.6417
107	H-232	50	930.83	44214.425	1395.64	3618.09	11.8346
108	H-233	50	930.83	44214.425	1758.58	5511.07	7.7037
108	H-234	50	930.83	44214.425	1395.64	3618.09	11.8346
109	H-235	50	930.83	44214.425	1758.58	5511.07	7.7037
109	H-236	50	930.83	44214.425	1010.22	3983.25	10.8465
110	H-237	50	930.83	44214.425	1422.34	3630.71	11.7861
110	H-238	50	930.83	44214.425	-12.25	-4231.13	10.4469
111	H-239	50	930.83	44214.425	845.77	3691.76	11.7474
111	H-240	50	930.83	44214.425	-66.58	-2092.31	21.1000
112	H-241	50	930.83	44214.425	-135.21	-4563.19	9.6597
112	H-242	50	930.83	44214.425	-12.11	192.74	229.3365
113	H-243	50	930.83	44214.425	-0.68	-166.45	265.6278
113	H-244	50	930.83	44214.425	-116.97	-1977.11	22.3040
114	H-245	50	930.83	44214.425	-33.95	-963.55	45.8518
114	H-246	50	930.83	44214.425	953.53	2707.26	15.9796
115	H-247	50	930.83	44214.425	-1.02	-1798.88	24.5783
115	H-248	50	930.83	44214.425	1563.01	3881.84	10.9874
116	H-249	50	930.83	44214.425	1069.45	2889.35	14.9324
116	H-250	50	930.83	44214.425	1802.46	4534.77	9.3526
117	H-251	50	930.83	44214.425	1506.9	3811.95	11.2036
117	H-252	50	930.83	44214.425	1802.46	4534.77	9.3526
118	H-253	50	930.83	44214.425	1506.9	3811.95	11.2036
118	H-254	50	930.83	44214.425	1715.13	4521.25	9.3999
119	H-255	50	930.83	44214.425	1723.17	4457.2	9.5332
119	H-256	50	930.83	44214.425	1186.94	4130.69	10.4165
120	H-257	50	930.83	44214.425	1663.62	4473.75	9.5112
120	H-258	50	930.83	44214.425	1186.94	4130.69	10.4165
121	H-259	50	930.83	44214.425	1663.62	4473.75	9.5112
121	H-260	50	930.83	44214.425	562.52	3501.59	12.4663
122	H-261	50	930.83	44214.425	1148.86	4101.99	10.4987
122	H-262	50	930.83	44214.425	-617.18	2378.18	18.3322
123	H-263	50	930.83	44214.425	272.43	3263.24	13.4658
123	H-264	50	930.83	44214.425	-617.18	2378.18	18.3322
124	H-265	50	930.83	44214.425	272.43	3263.24	13.4658
124	H-266	50	930.83	44214.425	-1809.06	-2213.53	19.1573
125	H-267	50	930.83	44214.425	-1402.75	-2135.57	20.0470
125	H-268	50	930.83	44214.425	-2826.46	-2387.92	17.3322
126	H-269	50	930.83	44214.425	-1824.86	-2212.55	19.1587
126	H-270	50	930.83	44214.425	-3948.63	-2549.12	15.7960
127	H-271	50	930.83	44214.425	-3947.65	-2532.81	15.8981
127	H-272	50	930.83	44214.425	-1823.98	-2189.55	19.3603
128	H-273	50	930.83	44214.425	-2825.51	-2363.07	17.5149
128	H-274	50	930.83	44214.425	-1401.87	-2113.35	20.2581
129	H-275	50	930.83	44214.425	-1808.15	-2190.49	19.3593
129	H-276	50	930.83	44214.425	273.22	3249.4	13.5229
130	H-277	50	930.83	44214.425	-616.31	2366.9	18.4199
130	H-278	50	930.83	44214.425	273.22	3249.4	13.5229
131	H-279	50	930.83	44214.425	-616.31	2366.9	18.4199
131	H-280	50	930.83	44214.425	1149.64	4087.04	10.5369
132	H-281	50	930.83	44214.425	563.42	3487.65	12.5159
132	H-282	50	930.83	44214.425	1664.29	4459.54	9.5414
133	H-283	50	930.83	44214.425	1187.78	4115.69	10.4543
133	H-284	50	930.83	44214.425	1664.29	4459.54	9.5414
134	H-285	50	930.83	44214.425	1187.78	4115.69	10.4543
134	H-286	50	930.83	44214.425	1723.65	4444.98	9.5593
135	H-287	50	930.83	44214.425	1715.88	4506.07	9.4314
135	H-288	50	930.83	44214.425	1507.13	3802.02	11.2328
136	H-289	50	930.83	44214.425	1803.05	4522.34	9.3782
136	H-290	50	930.83	44214.425	1507.13	3802.02	11.2328
137	H-291	50	930.83	44214.425	1803.05	4522.34	9.3782
137	H-292	50	930.83	44214.425	1069.61	2882.93	14.9656
138	H-293	50	930.83	44214.425	1563.33	3871.65	11.0163
138	H-294	50	930.83	44214.425	-1.05	-1798.95	24.5773
139	H-295	50	930.83	44214.425	953.7	2701.11	16.0159
139	H-296	50	930.83	44214.425	-33.98	-963.43	45.8575
140	H-297	50	930.83	44214.425	-117	-1976.95	22.3058
140	H-298	50	930.83	44214.425	-0.68	-166.44	265.6437
141	H-299	50	930.83	44214.425	58.93	228.22	193.4778
141	H-300	50	930.83	44214.425	109.06	-2390.35	18.4514
142	H-301	50	930.83	44214.425	155.03	-929.87	47.3823
142	H-302	50	930.83	44214.425	1370.13	3347.57	12.7986
143	H-303	50	930.83	44214.425	152.32	-2293.15	19.2147
143	H-304	50	930.83	44214.425	1944.11	4556.59	9.2767

144	H-305	50	930.83	44214.425	1278.47	3251.81	13.2037
144	H-306	50	930.83	44214.425	1902.22	4619	9.1605
145	H-307	50	930.83	44214.425	1833.31	4400.04	9.6320
145	H-308	50	930.83	44214.425	1902.22	4619	9.1605
146	H-309	50	930.83	44214.425	1833.31	4400.04	9.6320
146	H-310	50	930.83	44214.425	1706.67	4723.11	9.0000
147	H-311	50	930.83	44214.425	1886.67	4610.17	9.1814
147	H-312	50	930.83	44214.425	1169.6	4100.9	10.4964
148	H-313	50	930.83	44214.425	1713.96	4725.29	8.9943
148	H-314	50	930.83	44214.425	1169.6	4100.9	10.4964
149	H-315	50	930.83	44214.425	1713.96	4725.29	8.9943
149	H-316	50	930.83	44214.425	522.96	3581.13	12.2005
150	H-317	50	930.83	44214.425	1164.64	4094.98	10.5128
150	H-318	50	930.83	44214.425	-666.53	2571.93	16.9320
151	H-319	50	930.83	44214.425	247.3	3186.15	13.7995
151	H-320	50	930.83	44214.425	-666.53	2571.93	16.9320
152	H-321	50	930.83	44214.425	247.3	3186.15	13.7995
152	H-322	50	930.83	44214.425	-1800.28	-2355.43	18.0070
153	H-323	50	930.83	44214.425	-1407.95	-2285.35	18.7308
153	H-324	50	930.83	44214.425	-2817.36	-2533.23	16.3416
154	H-325	50	930.83	44214.425	-1820.09	-2363.05	17.9405
154	H-326	50	930.83	44214.425	-3942.87	-2706.61	14.8790
155	H-327	50	930.83	44214.425	-3941.88	-2711.33	14.8534
155	H-328	50	930.83	44214.425	-1819.32	-2339.8	18.1191
156	H-329	50	930.83	44214.425	-2816.45	-2508.32	16.5043
156	H-330	50	930.83	44214.425	-1407.2	-2262.83	18.9176
157	H-331	50	930.83	44214.425	-1799.47	-2332.21	18.1866
157	H-332	50	930.83	44214.425	247.85	3171.88	13.8614
158	H-333	50	930.83	44214.425	-665.8	2563.4	16.9886
158	H-334	50	930.83	44214.425	247.85	3171.88	13.8614
159	H-335	50	930.83	44214.425	-665.8	2563.4	16.9886
159	H-336	50	930.83	44214.425	1165.09	4079.69	10.5521
160	H-337	50	930.83	44214.425	523.6	3566.55	12.2502
160	H-338	50	930.83	44214.425	1714.21	4709.44	9.0245
161	H-339	50	930.83	44214.425	1170.12	4085.6	10.5356
161	H-340	50	930.83	44214.425	1714.21	4709.44	9.0245
162	H-341	50	930.83	44214.425	1170.12	4085.6	10.5356
162	H-342	50	930.83	44214.425	1886.84	4597	9.2077
163	H-343	50	930.83	44214.425	1706.98	4707.12	9.0305
163	H-344	50	930.83	44214.425	1833.32	4387.99	9.6584
164	H-345	50	930.83	44214.425	1902.42	4605.69	9.1869
164	H-346	50	930.83	44214.425	1833.32	4387.99	9.6584
165	H-347	50	930.83	44214.425	1902.42	4605.69	9.1869
165	H-348	50	930.83	44214.425	1278.54	3244.51	13.2334
166	H-349	50	930.83	44214.425	1944.18	4543.95	9.3025
166	H-350	50	930.83	44214.425	152.41	-2293.74	19.2097
167	H-351	50	930.83	44214.425	1370.27	3339.74	12.8286
167	H-352	50	930.83	44214.425	155.1	-930.28	47.3614
168	H-353	50	930.83	44214.425	109.15	-2390.97	18.4466
168	H-354	50	930.83	44214.425	58.95	228.07	193.6049
169	H-355	50	930.83	44214.425	-27.98	-174.79	252.7973
169	H-356	50	930.83	44214.425	2763.91	5935.32	6.9837
170	H-357	50	930.83	44214.425	1347.53	2983.21	14.3694
170	H-358	50	930.83	44214.425	2357.71	5194.56	8.0578
171	H-359	50	930.83	44214.425	2521.66	5414.55	7.7001
171	H-360	50	930.83	44214.425	1919.32	4951.66	8.5416
172	H-361	50	930.83	44214.425	2233.93	4907.97	8.5535
172	H-362	50	930.83	44214.425	1843.96	5359.58	7.9056
173	H-363	50	930.83	44214.425	2117.39	5133.61	8.2003
173	H-364	50	930.83	44214.425	1843.96	5359.58	7.9056
174	H-365	50	930.83	44214.425	2117.39	5133.61	8.2003
174	H-366	50	930.83	44214.425	1593.26	5186.31	8.2180
175	H-367	50	930.83	44214.425	1999.48	5445.44	7.7523
175	H-368	50	930.83	44214.425	1034.92	4697.19	9.1926
176	H-369	50	930.83	44214.425	1682.13	5247.8	8.1048
176	H-370	50	930.83	44214.425	1034.92	4697.19	9.1926
177	H-371	50	930.83	44214.425	1682.13	5247.8	8.1048
177	H-372	50	930.83	44214.425	431.21	3967.88	11.0344
178	H-373	50	930.83	44214.425	1116.72	4746.93	9.0791
178	H-374	50	930.83	44214.425	-703.26	2595.22	16.7659
179	H-375	50	930.83	44214.425	233.07	3730.53	11.7896
179	H-376	50	930.83	44214.425	-703.26	2595.22	16.7659
180	H-377	50	930.83	44214.425	233.07	3730.53	11.7896
180	H-378	50	930.83	44214.425	-1715.31	-2488.2	17.0803

181	H-379	50	930.83	44214.425	-1320.56	-2406.86	17.8215
181	H-380	50	930.83	44214.425	-2623.01	-2659.93	15.6363
182	H-381	50	930.83	44214.425	-1668.68	-2483.2	17.1334
182	H-382	50	930.83	44214.425	-3675.61	-2921.06	13.8781
183	H-383	50	930.83	44214.425	-3674.64	-2942.24	13.7785
183	H-384	50	930.83	44214.425	-1668.05	-2464.74	17.2620
184	H-385	50	930.83	44214.425	-2622.16	-2640.21	15.7534
184	H-386	50	930.83	44214.425	-1319.96	-2388.9	17.9557
185	H-387	50	930.83	44214.425	-1714.61	-2469.7	17.2085
185	H-388	50	930.83	44214.425	233.34	3719.1	11.8257
186	H-389	50	930.83	44214.425	-702.69	2585.75	16.8275
186	H-390	50	930.83	44214.425	233.34	3719.1	11.8257
187	H-391	50	930.83	44214.425	-702.69	2585.75	16.8275
187	H-392	50	930.83	44214.425	1116.83	4733.47	9.1049
188	H-393	50	930.83	44214.425	431.57	3955.6	11.0686
188	H-394	50	930.83	44214.425	1681.98	5234.16	8.1259
189	H-395	50	930.83	44214.425	1035.1	4684.02	9.2184
189	H-396	50	930.83	44214.425	1681.98	5234.16	8.1259
190	H-397	50	930.83	44214.425	1035.1	4684.02	9.2184
190	H-398	50	930.83	44214.425	1999.37	5433.49	7.7694
191	H-399	50	930.83	44214.425	1593.16	5172.78	8.2395
191	H-400	50	930.83	44214.425	2117.21	5122.8	8.2176
192	H-401	50	930.83	44214.425	1843.78	5348.27	7.9223
192	H-402	50	930.83	44214.425	2117.21	5122.8	8.2176
193	H-403	50	930.83	44214.425	1843.78	5348.27	7.9223
193	H-404	50	930.83	44214.425	2234.09	4893.58	8.5787
194	H-405	50	930.83	44214.425	1919.04	4941.4	8.5594
194	H-406	50	930.83	44214.425	2522.53	5400.07	7.7206
195	H-407	50	930.83	44214.425	2357.96	5180.37	8.0798
195	H-408	50	930.83	44214.425	1348.01	2974.95	14.4091
196	H-409	50	930.83	44214.425	2764.84	5920.03	7.0016
196	H-410	50	930.83	44214.425	-27.99	-175.58	251.6598

LOAD RATING SWING SPAN

RF= RATING FACTOR

$RF = (C - f_{DL+SDL}) / (f_{LL+I})$

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

$C=\varphi_C\varphi_S\varphi R_n S_x$ = (1.0)(1.0)(.95)(50)(930.83)

Virtual Beam	LOADING	R_n (ksi)	S_x (in^3)	$C=\varphi_C\varphi_S\varphi R_n S_x$	M_{DL+SDL} (kip-in)	M_{LL+I} (kip-in)	RF
1	CT-L3S2	50	930.83	44214.425	-35.32	-161.62	273.3517
1	CT-L3S2	50	930.83	44214.425	2757.58	5367.37	7.7239
2	CT-L3S3	50	930.83	44214.425	1340.69	2622.29	16.3497
2	CT-L3S4	50	930.83	44214.425	2353.36	4913	8.5205
3	CT-L3S5	50	930.83	44214.425	2514.92	4855.35	8.5884
3	CT-L3S6	50	930.83	44214.425	1916.1	4476.31	9.4494
4	CT-L3S7	50	930.83	44214.425	2228.89	4644.43	9.0400
4	CT-L3S8	50	930.83	44214.425	1840.96	4702.34	9.0111
5	CT-L3S9	50	930.83	44214.425	2113.66	4681.05	8.9939
5	CT-L3S10	50	930.83	44214.425	1840.96	4702.34	9.0111
6	CT-L3S11	50	930.83	44214.425	2113.66	4681.05	8.9939
6	CT-L3S12	50	930.83	44214.425	1590.57	4408.13	9.6694
7	CT-L3S13	50	930.83	44214.425	1996.24	4824.62	8.7506
7	CT-L3S14	50	930.83	44214.425	1032.56	4015.95	10.7526
8	CT-L3S15	50	930.83	44214.425	1679.31	4474.34	9.5065
8	CT-L3S16	50	930.83	44214.425	1032.56	4015.95	10.7526
9	CT-L3S17	50	930.83	44214.425	1679.31	4474.34	9.5065
9	CT-L3S18	50	930.83	44214.425	429.08	3416.79	12.8148
10	CT-L3S19	50	930.83	44214.425	1114.22	4075.29	10.5760
10	CT-L3S20	50	930.83	44214.425	-704.69	-2351.06	18.5064
11	CT-L3S21	50	930.83	44214.425	231.25	3166.62	13.8896
11	CT-L3S22	50	930.83	44214.425	-704.69	-2351.06	18.5064
12	CT-L3S23	50	930.83	44214.425	231.25	3166.62	13.8896
12	CT-L3S24	50	930.83	44214.425	-1716.52	-2594.47	16.3802
13	CT-L3S25	50	930.83	44214.425	-1321.91	-2509.4	17.0927
13	CT-L3S26	50	930.83	44214.425	-2624.03	-2769.19	15.0190
14	CT-L3S27	50	930.83	44214.425	-1669.96	-2587.77	16.4406
14	CT-L3S28	50	930.83	44214.425	-3676.48	-3675.04	11.0306
15	CT-L3S29	50	930.83	44214.425	-3675.62	-3682.07	11.0098
15	CT-L3S30	50	930.83	44214.425	-1668.81	-2554.25	16.6568
16	CT-L3S31	50	930.83	44214.425	-2623.08	-2732.59	15.2205
16	CT-L3S32	50	930.83	44214.425	-1320.73	-2476.93	17.3173
17	CT-L3S33	50	930.83	44214.425	-1715.44	-2560.92	16.5952
17	CT-L3S34	50	930.83	44214.425	232.73	3141.34	14.0009
18	CT-L3S35	50	930.83	44214.425	-703.49	-2320.81	18.7482
18	CT-L3S36	50	930.83	44214.425	232.73	3141.34	14.0009
19	CT-L3S37	50	930.83	44214.425	-703.49	-2320.81	18.7482
19	CT-L3S38	50	930.83	44214.425	1116.11	4049.77	10.6422
20	CT-L3S39	50	930.83	44214.425	430.7	3391.2	12.9110
20	CT-L3S40	50	930.83	44214.425	1681.38	4463.4	9.5293
21	CT-L3S41	50	930.83	44214.425	1034.3	3993.39	10.8129
21	CT-L3S42	50	930.83	44214.425	1681.38	4463.4	9.5293
22	CT-L3S43	50	930.83	44214.425	1034.3	3993.39	10.8129
22	CT-L3S44	50	930.83	44214.425	1998.88	4814.37	8.7687
23	CT-L3S45	50	930.83	44214.425	1592.45	4397.13	9.6931
23	CT-L3S46	50	930.83	44214.425	2116.96	4674.51	9.0057
24	CT-L3S47	50	930.83	44214.425	1843.23	4693.77	9.0271
24	CT-L3S48	50	930.83	44214.425	2116.96	4674.51	9.0057
25	CT-L3S49	50	930.83	44214.425	1843.23	4693.77	9.0271
25	CT-L3S50	50	930.83	44214.425	2233.75	4639.65	9.0482
26	CT-L3S51	50	930.83	44214.425	1918.69	4469.21	9.4638
26	CT-L3S52	50	930.83	44214.425	2521.94	4856.57	8.5848
27	CT-L3S53	50	930.83	44214.425	2357.47	4906.97	8.5301
27	CT-L3S54	50	930.83	44214.425	1347.65	2628.89	16.3060
28	CT-L3S55	50	930.83	44214.425	2764.16	5366.71	7.7236
28	CT-L3S56	50	930.83	44214.425	-28.01	-147.77	299.0216
29	CT-L3S57	50	930.83	44214.425	58.91	166.54	265.1346
29	CT-L3S58	50	930.83	44214.425	109.1	-1263.44	34.9089
30	CT-L3S59	50	930.83	44214.425	155.04	-388.55	113.3944
30	CT-L3S60	50	930.83	44214.425	1368.35	2789.63	15.3591
31	CT-L3S61	50	930.83	44214.425	152.67	-1182.12	37.2735
31	CT-L3S62	50	930.83	44214.425	1941.22	4198.61	10.0684
32	CT-L3S63	50	930.83	44214.425	1277.19	2645.29	16.2316
32	CT-L3S64	50	930.83	44214.425	1899.93	4089.12	10.3481

Minimum Rating factor	7.7236	**Girder 1**
Minimum Rating factor	10.0684	**Girder 2**
Minimum Rating factor	10.7420	**Girder 3**
Minimum Rating factor	9.6244	**Girder 4**
Minimum Rating factor	10.7358	**Girder 5**
Minimum Rating factor	10.0534	**Girder 6**
Minimum Rating factor	7.7012	**Girder 7**

33	CT-L3S65	50	930.83	44214.425	1830.74	4026.59	10.5259
33	CT-L3S66	50	930.83	44214.425	1899.93	4089.12	10.3481
34	CT-L3S67	50	930.83	44214.425	1830.74	4026.59	10.5259
34	CT-L3S68	50	930.83	44214.425	1704.64	4078.47	10.4230
35	CT-L3S69	50	930.83	44214.425	1884.42	4071.91	10.3956
35	CT-L3S70	50	930.83	44214.425	1167.89	3489.28	12.3368
36	CT-L3S71	50	930.83	44214.425	1711.84	4069.4	10.4444
36	CT-L3S72	50	930.83	44214.425	1167.89	3489.28	12.3368
37	CT-L3S73	50	930.83	44214.425	1711.84	4069.4	10.4444
37	CT-L3S74	50	930.83	44214.425	521.46	3151.65	13.8635
38	CT-L3S75	50	930.83	44214.425	1162.86	3496.28	12.3135
38	CT-L3S76	50	930.83	44214.425	-667.57	-2258.87	19.2782
39	CT-L3S77	50	930.83	44214.425	246.03	2799.28	15.7070
39	CT-L3S78	50	930.83	44214.425	-667.57	-2258.87	19.2782
40	CT-L3S79	50	930.83	44214.425	246.03	2799.28	15.7070
40	CT-L3S80	50	930.83	44214.425	-1801.2	-2480.87	17.0961
41	CT-L3S81	50	930.83	44214.425	-1408.94	-2408.02	17.7762
41	CT-L3S82	50	930.83	44214.425	-2818.11	-2668.47	15.5131
42	CT-L3S83	50	930.83	44214.425	-1821.05	-2488.56	17.0353
42	CT-L3S84	50	930.83	44214.425	-3943.48	-3412.53	11.8009
43	CT-L3S85	50	930.83	44214.425	-3942.53	-3411.62	11.8043
43	CT-L3S86	50	930.83	44214.425	-1819.86	-2445.65	17.3347
44	CT-L3S87	50	930.83	44214.425	-2817.07	-2622.43	15.7859
44	CT-L3S88	50	930.83	44214.425	-1407.74	-2366.84	18.0860
45	CT-L3S89	50	930.83	44214.425	-1800.05	-2438.34	17.3948
45	CT-L3S90	50	930.83	44214.425	247.41	2768.4	15.8817
46	CT-L3S91	50	930.83	44214.425	-666.35	-2220.47	19.6121
46	CT-L3S92	50	930.83	44214.425	247.41	2768.4	15.8817
47	CT-L3S93	50	930.83	44214.425	-666.35	-2220.47	19.6121
47	CT-L3S94	50	930.83	44214.425	1164.6	3468.79	12.4106
48	CT-L3S95	50	930.83	44214.425	522.97	3120.93	13.9995
48	CT-L3S96	50	930.83	44214.425	1713.82	4055.8	10.4790
49	CT-L3S97	50	930.83	44214.425	1169.54	3461.67	12.4347
49	CT-L3S98	50	930.83	44214.425	1713.82	4055.8	10.4790
50	CT-L3S99	50	930.83	44214.425	1169.54	3461.67	12.4347
50	CT-L3S100	50	930.83	44214.425	1886.49	4060.82	10.4235
51	CT-L3S101	50	930.83	44214.425	1706.51	4064.76	10.4577
51	CT-L3S102	50	930.83	44214.425	1833.06	4018.01	10.5478
52	CT-L3S103	50	930.83	44214.425	1902	4078.02	10.3757
52	CT-L3S104	50	930.83	44214.425	1833.06	4018.01	10.5478
53	CT-L3S105	50	930.83	44214.425	1902	4078.02	10.3757
53	CT-L3S106	50	930.83	44214.425	1278.31	2638.82	16.2710
54	CT-L3S107	50	930.83	44214.425	1943.83	4190.18	10.0880
54	CT-L3S108	50	930.83	44214.425	152.35	-1182.78	37.2530
55	CT-L3S109	50	930.83	44214.425	1369.91	2783.74	15.3910
55	CT-L3S110	50	930.83	44214.425	155.05	-388.72	113.3448
56	CT-L3S111	50	930.83	44214.425	109.01	-1263.94	34.8952
56	CT-L3S112	50	930.83	44214.425	58.94	166.37	265.4053
57	CT-L3S113	50	930.83	44214.425	-0.66	-89.36	494.7825
57	CT-L3S114	50	930.83	44214.425	-116.89	-1105.71	39.8816
58	CT-L3S115	50	930.83	44214.425	-33.87	-434.94	101.5785
58	CT-L3S116	50	930.83	44214.425	952.79	2223.66	19.4551
59	CT-L3S117	50	930.83	44214.425	-0.84	-960.5	46.0318
59	CT-L3S118	50	930.83	44214.425	1561.71	3411.93	12.5011
60	CT-L3S119	50	930.83	44214.425	1068.85	2396.24	18.0055
60	CT-L3S120	50	930.83	44214.425	1801.31	3948.35	10.7420
61	CT-L3S121	50	930.83	44214.425	1505.76	3333.55	12.8118
61	CT-L3S122	50	930.83	44214.425	1801.31	3948.35	10.7420
62	CT-L3S123	50	930.83	44214.425	1505.76	3333.55	12.8118
62	CT-L3S124	50	930.83	44214.425	1714.06	3830.61	11.0949
63	CT-L3S125	50	930.83	44214.425	1722.11	3865.64	10.9923
63	CT-L3S126	50	930.83	44214.425	1186.06	3534.32	12.1744
64	CT-L3S127	50	930.83	44214.425	1662.53	3791.38	11.2233
64	CT-L3S128	50	930.83	44214.425	1186.06	3534.32	12.1744
65	CT-L3S129	50	930.83	44214.425	1662.53	3791.38	11.2233
65	CT-L3S130	50	930.83	44214.425	561.77	3024.6	14.4325
66	CT-L3S131	50	930.83	44214.425	1147.95	3480.22	12.3746
66	CT-L3S132	50	930.83	44214.425	-617.7	-2082.4	20.9358
67	CT-L3S133	50	930.83	44214.425	271.79	2750.67	15.9752
67	CT-L3S134	50	930.83	44214.425	-617.7	-2082.4	20.9358
68	CT-L3S135	50	930.83	44214.425	271.79	2750.67	15.9752
68	CT-L3S136	50	930.83	44214.425	-1809.51	-2339.86	18.1228
69	CT-L3S137	50	930.83	44214.425	-1403.25	-2256.77	18.9701
69	CT-L3S138	50	930.83	44214.425	-2826.84	-2527.9	16.3723

70	CT-L3S139	50	930.83	44214.425	-1825.34	-2340.99	18.1073
70	CT-L3S140	50	930.83	44214.425	-3948.95	-3276.97	12.2874
71	CT-L3S141	50	930.83	44214.425	-3947.97	-3269.85	12.3145
71	CT-L3S142	50	930.83	44214.425	-1824.24	-2300.14	18.4294
72	CT-L3S143	50	930.83	44214.425	-2825.82	-2483.81	16.6634
72	CT-L3S144	50	930.83	44214.425	-1402.14	-2217.33	19.3080
73	CT-L3S145	50	930.83	44214.425	-1808.43	-2298.91	18.4461
73	CT-L3S146	50	930.83	44214.425	273	2721.13	16.1482
74	CT-L3S147	50	930.83	44214.425	-616.59	-2046.02	21.3086
74	CT-L3S148	50	930.83	44214.425	273	2721.13	16.1482
75	CT-L3S149	50	930.83	44214.425	-616.59	-2046.02	21.3086
75	CT-L3S150	50	930.83	44214.425	1149.39	3451.97	12.4755
76	CT-L3S151	50	930.83	44214.425	563.1	2995.01	14.5747
76	CT-L3S152	50	930.83	44214.425	1664.1	3778.7	11.2606
77	CT-L3S153	50	930.83	44214.425	1187.49	3505.93	12.2726
77	CT-L3S154	50	930.83	44214.425	1664.1	3778.7	11.2606
78	CT-L3S155	50	930.83	44214.425	1187.49	3505.93	12.2726
78	CT-L3S156	50	930.83	44214.425	1723.47	3854.4	11.0240
79	CT-L3S157	50	930.83	44214.425	1715.65	3818.27	11.1304
79	CT-L3S158	50	930.83	44214.425	1506.98	3324.62	12.8458
80	CT-L3S159	50	930.83	44214.425	1802.83	3936.18	10.7748
80	CT-L3S160	50	930.83	44214.425	1506.98	3324.62	12.8458
81	CT-L3S161	50	930.83	44214.425	1802.83	3936.18	10.7748
81	CT-L3S162	50	930.83	44214.425	1069.54	2391.01	18.0446
82	CT-L3S163	50	930.83	44214.425	1563.11	3403.16	12.5329
82	CT-L3S164	50	930.83	44214.425	-1.01	-960.67	46.0235
83	CT-L3S165	50	930.83	44214.425	953.57	2219.06	19.4951
83	CT-L3S166	50	930.83	44214.425	-33.98	-434.94	101.5783
84	CT-L3S167	50	930.83	44214.425	-116.98	-1105.67	39.8830
84	CT-L3S168	50	930.83	44214.425	-0.69	-89.37	494.7268
85	CT-L3S169	50	930.83	44214.425	-12.09	93.98	470.3377
85	CT-L3S170	50	930.83	44214.425	-135.14	-2594.01	16.9927
86	CT-L3S171	50	930.83	44214.425	-66.51	-897.36	49.1976
86	CT-L3S172	50	930.83	44214.425	845.4	2718.62	15.9526
87	CT-L3S173	50	930.83	44214.425	-12.15	-2324.08	19.0193
87	CT-L3S174	50	930.83	44214.425	1421.63	2932.41	14.5930
88	CT-L3S175	50	930.83	44214.425	1009.87	2955	14.6208
88	CT-L3S176	50	930.83	44214.425	1757.56	4411.38	9.6244
89	CT-L3S177	50	930.83	44214.425	1395.06	2904.28	14.7435
89	CT-L3S178	50	930.83	44214.425	1757.56	4411.38	9.6244
90	CT-L3S179	50	930.83	44214.425	1395.06	2904.28	14.7435
90	CT-L3S180	50	930.83	44214.425	1713.65	3539.43	12.0078
91	CT-L3S181	50	930.83	44214.425	1671.56	4335.91	9.8118
91	CT-L3S182	50	930.83	44214.425	1193.39	4145.42	10.3780
92	CT-L3S183	50	930.83	44214.425	1640.55	3498.14	12.1704
92	CT-L3S184	50	930.83	44214.425	1193.39	4145.42	10.3780
93	CT-L3S185	50	930.83	44214.425	1640.55	3498.14	12.1704
93	CT-L3S186	50	930.83	44214.425	575.99	2843.24	15.3481
94	CT-L3S187	50	930.83	44214.425	1141.5	4069.74	10.5837
94	CT-L3S188	50	930.83	44214.425	-603.15	-1925.49	22.6494
95	CT-L3S189	50	930.83	44214.425	281.17	2907.09	15.1125
95	CT-L3S190	50	930.83	44214.425	-603.15	-1925.49	22.6494
96	CT-L3S191	50	930.83	44214.425	281.17	2907.09	15.1125
96	CT-L3S192	50	930.83	44214.425	-1808.23	-2181.29	19.4409
97	CT-L3S193	50	930.83	44214.425	-1399.55	-2099.33	20.3945
97	CT-L3S194	50	930.83	44214.425	-2828.65	-2367.9	17.4778
98	CT-L3S195	50	930.83	44214.425	-1822.65	-2183.24	19.4169
98	CT-L3S196	50	930.83	44214.425	-3954.07	-3505.63	11.4845
99	CT-L3S197	50	930.83	44214.425	-3953.09	-3502.53	11.4949
99	CT-L3S198	50	930.83	44214.425	-1821.66	-2144.97	19.7638
100	CT-L3S199	50	930.83	44214.425	-2827.66	-2326.4	17.7900
100	CT-L3S200	50	930.83	44214.425	-1398.55	-2062.41	20.7601
101	CT-L3S201	50	930.83	44214.425	-1807.23	-2142.94	19.7893
101	CT-L3S202	50	930.83	44214.425	282.18	2881.89	15.2442
102	CT-L3S203	50	930.83	44214.425	-602.15	-1891.23	23.0603
102	CT-L3S204	50	930.83	44214.425	282.18	2881.89	15.2442
103	CT-L3S205	50	930.83	44214.425	-602.15	-1891.23	23.0603
103	CT-L3S206	50	930.83	44214.425	1142.6	4050.21	10.6345
104	CT-L3S207	50	930.83	44214.425	577.13	2817.64	15.4872
104	CT-L3S208	50	930.83	44214.425	1641.66	3484.47	12.2179
105	CT-L3S209	50	930.83	44214.425	1194.55	4116.56	10.4504
105	CT-L3S210	50	930.83	44214.425	1641.66	3484.47	12.2179
106	CT-L3S211	50	930.83	44214.425	1194.55	4116.56	10.4504
106	CT-L3S212	50	930.83	44214.425	1672.43	4322.64	9.8417

107	CT-L3S213	50	930.83	44214.425	1714.84	3527.49	12.0481
107	CT-L3S214	50	930.83	44214.425	1395.64	2894.8	14.7916
108	CT-L3S215	50	930.83	44214.425	1758.58	4398.03	9.6534
108	CT-L3S216	50	930.83	44214.425	1395.64	2894.8	14.7916
109	CT-L3S217	50	930.83	44214.425	1758.58	4398.03	9.6534
109	CT-L3S218	50	930.83	44214.425	1010.22	2949.85	14.6462
110	CT-L3S219	50	930.83	44214.425	1422.34	2922.98	14.6399
110	CT-L3S220	50	930.83	44214.425	-12.25	-2324.38	19.0168
111	CT-L3S221	50	930.83	44214.425	845.77	2714.01	15.9795
111	CT-L3S222	50	930.83	44214.425	-66.58	-897.25	49.2035
112	CT-L3S223	50	930.83	44214.425	-135.21	-2593.87	16.9936
112	CT-L3S224	50	930.83	44214.425	-12.11	94.02	470.1374
113	CT-L3S225	50	930.83	44214.425	-0.68	-89.38	494.6716
113	CT-L3S226	50	930.83	44214.425	-116.97	-1105.8	39.8783
114	CT-L3S227	50	930.83	44214.425	-33.95	-435.02	101.5596
114	CT-L3S228	50	930.83	44214.425	953.53	2225.1	19.4422
115	CT-L3S229	50	930.83	44214.425	-1.02	-960.61	46.0264
115	CT-L3S230	50	930.83	44214.425	1563.01	3414.7	12.4905
116	CT-L3S231	50	930.83	44214.425	1069.45	2397.38	17.9967
116	CT-L3S232	50	930.83	44214.425	1802.46	3950.53	10.7358
117	CT-L3S233	50	930.83	44214.425	1506.9	3335.91	12.8024
117	CT-L3S234	50	930.83	44214.425	1802.46	3950.53	10.7358
118	CT-L3S235	50	930.83	44214.425	1506.9	3335.91	12.8024
118	CT-L3S236	50	930.83	44214.425	1715.13	3832.3	11.0898
119	CT-L3S237	50	930.83	44214.425	1723.17	3867.47	10.9868
119	CT-L3S238	50	930.83	44214.425	1186.94	3535.52	12.1701
120	CT-L3S239	50	930.83	44214.425	1663.62	3793.08	11.2180
120	CT-L3S240	50	930.83	44214.425	1186.94	3535.52	12.1701
121	CT-L3S241	50	930.83	44214.425	1663.62	3793.08	11.2180
121	CT-L3S242	50	930.83	44214.425	562.52	3025.36	14.4287
122	CT-L3S243	50	930.83	44214.425	1148.86	3481.49	12.3699
122	CT-L3S244	50	930.83	44214.425	-617.18	-2082.39	20.9362
123	CT-L3S245	50	930.83	44214.425	272.43	2751.08	15.9726
123	CT-L3S246	50	930.83	44214.425	-617.18	-2082.39	20.9362
124	CT-L3S247	50	930.83	44214.425	272.43	2751.08	15.9726
124	CT-L3S248	50	930.83	44214.425	-1809.06	-2339.67	18.1245
125	CT-L3S249	50	930.83	44214.425	-1402.75	-2256.66	18.9713
125	CT-L3S250	50	930.83	44214.425	-2826.46	-2527.58	16.3745
126	CT-L3S251	50	930.83	44214.425	-1824.86	-2340.83	18.1088
126	CT-L3S252	50	930.83	44214.425	-3948.63	-3276.89	12.2878
127	CT-L3S253	50	930.83	44214.425	-3947.65	-3270.76	12.3111
127	CT-L3S254	50	930.83	44214.425	-1823.98	-2301.48	18.4188
128	CT-L3S255	50	930.83	44214.425	-2825.51	-2485.22	16.6540
128	CT-L3S256	50	930.83	44214.425	-1401.87	-2218.6	19.2971
129	CT-L3S257	50	930.83	44214.425	-1808.15	-2300.21	18.4358
129	CT-L3S258	50	930.83	44214.425	273.22	2721.53	16.1458
130	CT-L3S259	50	930.83	44214.425	-616.31	-2047.12	21.2973
130	CT-L3S260	50	930.83	44214.425	273.22	2721.53	16.1458
131	CT-L3S261	50	930.83	44214.425	-616.31	-2047.12	21.2973
131	CT-L3S262	50	930.83	44214.425	1149.64	3452.23	12.4745
132	CT-L3S263	50	930.83	44214.425	563.42	2995.28	14.5733
132	CT-L3S264	50	930.83	44214.425	1664.29	3778.91	11.2599
133	CT-L3S265	50	930.83	44214.425	1187.78	3506.15	12.2718
133	CT-L3S266	50	930.83	44214.425	1664.29	3778.91	11.2599
134	CT-L3S267	50	930.83	44214.425	1187.78	3506.15	12.2718
134	CT-L3S268	50	930.83	44214.425	1723.65	3854.55	11.0235
135	CT-L3S269	50	930.83	44214.425	1715.88	3818.45	11.1298
135	CT-L3S270	50	930.83	44214.425	1507.13	3324.7	12.8455
136	CT-L3S271	50	930.83	44214.425	1803.05	3936.31	10.7744
136	CT-L3S272	50	930.83	44214.425	1507.13	3324.7	12.8455
137	CT-L3S273	50	930.83	44214.425	1803.05	3936.31	10.7744
137	CT-L3S274	50	930.83	44214.425	1069.61	2391.08	18.0441
138	CT-L3S275	50	930.83	44214.425	1563.33	3403.19	12.5327
138	CT-L3S276	50	930.83	44214.425	-1.05	-960.67	46.0235
139	CT-L3S277	50	930.83	44214.425	953.7	2219.07	19.4950
139	CT-L3S278	50	930.83	44214.425	-33.98	-434.94	101.5783
140	CT-L3S279	50	930.83	44214.425	-117	-1105.66	39.8834
140	CT-L3S280	50	930.83	44214.425	-0.68	-89.37	494.7269
141	CT-L3S281	50	930.83	44214.425	58.93	166.57	265.0867
141	CT-L3S282	50	930.83	44214.425	109.06	-1263.46	34.9084
142	CT-L3S283	50	930.83	44214.425	155.03	-388.55	113.3944
142	CT-L3S284	50	930.83	44214.425	1370.13	2793.12	15.3392
143	CT-L3S285	50	930.83	44214.425	152.32	-1182.31	37.2678
143	CT-L3S286	50	930.83	44214.425	1944.11	4204.58	10.0534

144	CT-L3S287	50	930.83	44214.425	1278.47	2647.65	16.2166
144	CT-L3S288	50	930.83	44214.425	1902.22	4092.86	10.3381
145	CT-L3S289	50	930.83	44214.425	1833.31	4031.81	10.5117
145	CT-L3S290	50	930.83	44214.425	1902.22	4092.86	10.3381
146	CT-L3S291	50	930.83	44214.425	1833.31	4031.81	10.5117
146	CT-L3S292	50	930.83	44214.425	1706.67	4081.24	10.4154
147	CT-L3S293	50	930.83	44214.425	1886.67	4075.56	10.3858
147	CT-L3S294	50	930.83	44214.425	1169.6	3491.29	12.3292
148	CT-L3S295	50	930.83	44214.425	1713.96	4072.36	10.4363
148	CT-L3S296	50	930.83	44214.425	1169.6	3491.29	12.3292
149	CT-L3S297	50	930.83	44214.425	1713.96	4072.36	10.4363
149	CT-L3S298	50	930.83	44214.425	522.96	3152.86	13.8577
150	CT-L3S299	50	930.83	44214.425	1164.64	3498.46	12.3054
150	CT-L3S300	50	930.83	44214.425	-666.53	-2258.78	19.2794
151	CT-L3S301	50	930.83	44214.425	247.3	2799.85	15.7034
151	CT-L3S302	50	930.83	44214.425	-666.53	-2258.78	19.2794
152	CT-L3S303	50	930.83	44214.425	247.3	2799.85	15.7034
152	CT-L3S304	50	930.83	44214.425	-1800.28	-2480.47	17.0992
153	CT-L3S305	50	930.83	44214.425	-1407.95	-2407.75	17.7786
153	CT-L3S306	50	930.83	44214.425	-2817.36	-2667.78	15.5174
154	CT-L3S307	50	930.83	44214.425	-1820.09	-2488.19	17.0382
154	CT-L3S308	50	930.83	44214.425	-3942.87	-3413.03	11.7994
155	CT-L3S309	50	930.83	44214.425	-3941.88	-3412.16	11.8027
155	CT-L3S310	50	930.83	44214.425	-1819.32	-2447.94	17.3187
156	CT-L3S311	50	930.83	44214.425	-2816.45	-2624.76	15.7721
156	CT-L3S312	50	930.83	44214.425	-1407.2	-2369	18.0697
157	CT-L3S313	50	930.83	44214.425	-1799.47	-2440.53	17.3794
157	CT-L3S314	50	930.83	44214.425	247.85	2769.14	15.8773
158	CT-L3S315	50	930.83	44214.425	-665.8	-2222.34	19.5958
158	CT-L3S316	50	930.83	44214.425	247.85	2769.14	15.8773
159	CT-L3S317	50	930.83	44214.425	-665.8	-2222.34	19.5958
159	CT-L3S318	50	930.83	44214.425	1165.09	3469.27	12.4088
160	CT-L3S319	50	930.83	44214.425	523.6	3121.43	13.9971
160	CT-L3S320	50	930.83	44214.425	1714.21	4056.17	10.4779
161	CT-L3S321	50	930.83	44214.425	1170.12	3462.07	12.4331
161	CT-L3S322	50	930.83	44214.425	1714.21	4056.17	10.4779
162	CT-L3S323	50	930.83	44214.425	1170.12	3462.07	12.4331
162	CT-L3S324	50	930.83	44214.425	1886.84	4061.12	10.4226
163	CT-L3S325	50	930.83	44214.425	1706.98	4065.06	10.4568
163	CT-L3S326	50	930.83	44214.425	1833.32	4018.22	10.5472
164	CT-L3S327	50	930.83	44214.425	1902.42	4078.26	10.3750
164	CT-L3S328	50	930.83	44214.425	1833.32	4018.22	10.5472
165	CT-L3S329	50	930.83	44214.425	1902.42	4078.26	10.3750
165	CT-L3S330	50	930.83	44214.425	1278.54	2638.87	16.2706
166	CT-L3S331	50	930.83	44214.425	1944.18	4190.32	10.0876
166	CT-L3S332	50	930.83	44214.425	152.41	-1182.79	37.2526
167	CT-L3S333	50	930.83	44214.425	1370.27	2783.68	15.3912
167	CT-L3S334	50	930.83	44214.425	155.1	-388.73	113.3417
168	CT-L3S335	50	930.83	44214.425	109.15	-1263.96	34.8945
168	CT-L3S336	50	930.83	44214.425	58.95	166.36	265.4212
169	CT-L3S337	50	930.83	44214.425	-27.98	-146.96	300.6699
169	CT-L3S338	50	930.83	44214.425	2763.91	5382.36	7.7012
170	CT-L3S339	50	930.83	44214.425	1347.53	2636.59	16.2585
170	CT-L3S340	50	930.83	44214.425	2357.71	4922.79	8.5026
171	CT-L3S341	50	930.83	44214.425	2521.66	4871.39	8.5587
171	CT-L3S342	50	930.83	44214.425	1919.32	4481.04	9.4387
172	CT-L3S343	50	930.83	44214.425	2233.93	4655.8	9.0168
172	CT-L3S344	50	930.83	44214.425	1843.96	4705.98	9.0035
173	CT-L3S345	50	930.83	44214.425	2117.39	4687.04	8.9816
173	CT-L3S346	50	930.83	44214.425	1843.96	4705.98	9.0035
174	CT-L3S347	50	930.83	44214.425	2117.39	4687.04	8.9816
174	CT-L3S348	50	930.83	44214.425	1593.26	4410.84	9.6628
175	CT-L3S349	50	930.83	44214.425	1999.48	4829.08	8.7418
175	CT-L3S350	50	930.83	44214.425	1034.92	4018.08	10.7463
176	CT-L3S351	50	930.83	44214.425	1682.13	4477.28	9.4996
176	CT-L3S352	50	930.83	44214.425	1034.92	4018.08	10.7463
177	CT-L3S353	50	930.83	44214.425	1682.13	4477.28	9.4996
177	CT-L3S354	50	930.83	44214.425	431.21	3418.28	12.8086
178	CT-L3S355	50	930.83	44214.425	1116.72	4077.61	10.5694
178	CT-L3S356	50	930.83	44214.425	-703.26	-2351.06	18.5070
179	CT-L3S357	50	930.83	44214.425	233.07	3167.46	13.8854
179	CT-L3S358	50	930.83	44214.425	-703.26	-2351.06	18.5070
180	CT-L3S359	50	930.83	44214.425	233.07	3167.46	13.8854
180	CT-L3S360	50	930.83	44214.425	-1715.31	-2594.19	16.3824

181	CT-L3S361	50	930.83	44214.425	-1320.56	-2509.26	17.0942
181	CT-L3S362	50	930.83	44214.425	-2623.01	-2768.69	15.0221
182	CT-L3S363	50	930.83	44214.425	-1668.68	-2587.54	16.4425
182	CT-L3S364	50	930.83	44214.425	-3675.61	-3675.6	11.0292
183	CT-L3S365	50	930.83	44214.425	-3674.64	-3682.11	11.0099
183	CT-L3S366	50	930.83	44214.425	-1668.05	-2556.84	16.6402
184	CT-L3S367	50	930.83	44214.425	-2622.16	-2735.24	15.2061
184	CT-L3S368	50	930.83	44214.425	-1319.96	-2479.4	17.3003
185	CT-L3S369	50	930.83	44214.425	-1714.61	-2563.42	16.5793
185	CT-L3S370	50	930.83	44214.425	233.34	3142.1	13.9974
186	CT-L3S371	50	930.83	44214.425	-702.69	-2323.02	18.7307
186	CT-L3S372	50	930.83	44214.425	233.34	3142.1	13.9974
187	CT-L3S373	50	930.83	44214.425	-702.69	-2323.02	18.7307
187	CT-L3S374	50	930.83	44214.425	1116.83	4050.26	10.6407
188	CT-L3S375	50	930.83	44214.425	431.57	3391.76	12.9086
188	CT-L3S376	50	930.83	44214.425	1681.98	4463.77	9.5284
189	CT-L3S377	50	930.83	44214.425	1035.1	3993.83	10.8115
189	CT-L3S378	50	930.83	44214.425	1681.98	4463.77	9.5284
190	CT-L3S379	50	930.83	44214.425	1035.1	3993.83	10.8115
190	CT-L3S380	50	930.83	44214.425	1999.37	4814.72	8.7679
191	CT-L3S381	50	930.83	44214.425	1593.16	4397.43	9.6923
191	CT-L3S382	50	930.83	44214.425	2117.21	4674.84	9.0051
192	CT-L3S383	50	930.83	44214.425	1843.78	4694.04	9.0265
192	CT-L3S384	50	930.83	44214.425	2117.21	4674.84	9.0051
193	CT-L3S385	50	930.83	44214.425	1843.78	4694.04	9.0265
193	CT-L3S386	50	930.83	44214.425	2234.09	4639.82	9.0478
194	CT-L3S387	50	930.83	44214.425	1919.04	4469.46	9.4632
194	CT-L3S388	50	930.83	44214.425	2522.53	4856.34	8.5850
195	CT-L3S389	50	930.83	44214.425	2357.96	4906.95	8.5300
195	CT-L3S390	50	930.83	44214.425	1348.01	2628.77	16.3066
196	CT-L3S391	50	930.83	44214.425	2764.84	5366.39	7.7239
196	CT-L3S392	50	930.83	44214.425	-27.99	-147.74	299.0824

LOAD RATING SWING SPAN

RF= RATING FACTOR

$RF = (C - f_{DL+SDL}) / (f_{LL+I})$

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

$C=\varphi_C\varphi_S\varphi R_n S_x$ = (1.0)(1.0)(.95)(50)(930.83)

Virtual Beam	LOADING	R_n (ksi)	S_x (in^3)	$C=\varphi_C\varphi_S\varphi R_n S_x$	M_{DL+SDL} (kip-in)	M_{LL+I} (kip-in)	RF			
1	CT-L73.0	50	930.83	44214.425	-35.32	-196.13	225.2542			
1	CT-L73.0	50	930.83	44214.425	2757.58	7190.19	5.7658			
2	CT-L73.1	50	930.83	44214.425	1340.69	3572.28	12.0018			
2	CT-L73.2	50	930.83	44214.425	2353.36	6339.41	6.6033	Minimum Rating factor	5.7658	**Girder 1**
3	CT-L73.3	50	930.83	44214.425	2514.92	6537.35	6.3787			
3	CT-L73.4	50	930.83	44214.425	1916.1	5976.51	7.0774	Minimum Rating factor	7.3077	**Girder 2**
4	CT-L73.5	50	930.83	44214.425	2228.89	6000.63	6.9969			
4	CT-L73.6	50	930.83	44214.425	1840.96	6480.48	6.5386	Minimum Rating factor	7.7884	**Girder 3**
5	CT-L73.7	50	930.83	44214.425	2113.66	6212.38	6.7769			
5	CT-L73.8	50	930.83	44214.425	1840.96	6480.48	6.5386	Minimum Rating factor	7.0496	**Girder 4**
6	CT-L73.9	50	930.83	44214.425	2113.66	6212.38	6.7769			
6	CT-L73.10	50	930.83	44214.425	1590.57	6234.95	6.8363	Minimum Rating factor	7.7842	**Girder 5**
7	CT-L73.11	50	930.83	44214.425	1996.24	6588.94	6.4074			
7	CT-L73.12	50	930.83	44214.425	1032.56	5625.93	7.6755	Minimum Rating factor	7.3023	**Girder 6**
8	CT-L73.13	50	930.83	44214.425	1679.31	6322.52	6.7276			
8	CT-L73.14	50	930.83	44214.425	1032.56	5625.93	7.6755	Minimum Rating factor	5.7538	**Girder 7**
9	CT-L73.15	50	930.83	44214.425	1679.31	6322.52	6.7276			
9	CT-L73.16	50	930.83	44214.425	429.08	4673.79	9.3683			
10	CT-L73.17	50	930.83	44214.425	1114.22	5696.74	7.5658			
10	CT-L73.18	50	930.83	44214.425	-704.69	-2982.06	14.5905			
11	CT-L73.19	50	930.83	44214.425	231.25	4340.45	10.1333			
11	CT-L73.20	50	930.83	44214.425	-704.69	-2982.06	14.5905			
12	CT-L73.21	50	930.83	44214.425	231.25	4340.45	10.1333			
12	CT-L73.22	50	930.83	44214.425	-1716.52	-3291.6	12.9110			
13	CT-L73.23	50	930.83	44214.425	-1321.91	-3183.84	13.4719			
13	CT-L73.24	50	930.83	44214.425	-2624.03	-3518.28	11.8212			
14	CT-L73.25	50	930.83	44214.425	-1669.96	-3284.72	12.9522			
14	CT-L73.26	50	930.83	44214.425	-3676.48	-3857	10.5102			
15	CT-L73.27	50	930.83	44214.425	-3675.62	-3888.97	10.4240			
15	CT-L73.28	50	930.83	44214.425	-1668.81	-3256.26	13.0658			
16	CT-L73.29	50	930.83	44214.425	-2623.08	-3487.65	11.9253			
16	CT-L73.30	50	930.83	44214.425	-1320.73	-3156.3	13.5899			
17	CT-L73.31	50	930.83	44214.425	-1715.44	-3263.11	13.0241			
17	CT-L73.32	50	930.83	44214.425	232.73	4324.07	10.1714			
18	CT-L73.33	50	930.83	44214.425	-703.49	-2956.48	14.7171			
18	CT-L73.34	50	930.83	44214.425	232.73	4324.07	10.1714			
19	CT-L73.35	50	930.83	44214.425	-703.49	-2956.48	14.7171			
19	CT-L73.36	50	930.83	44214.425	1116.11	5679.85	7.5879			
20	CT-L73.37	50	930.83	44214.425	430.7	4657.18	9.4013			
20	CT-L73.38	50	930.83	44214.425	1681.38	6307.12	6.7437			
21	CT-L73.39	50	930.83	44214.425	1034.3	5609.32	7.6979			
21	CT-L73.40	50	930.83	44214.425	1681.38	6307.12	6.7437			
22	CT-L73.41	50	930.83	44214.425	1034.3	5609.32	7.6979			
22	CT-L73.42	50	930.83	44214.425	1998.88	6578.32	6.4174			
23	CT-L73.43	50	930.83	44214.425	1592.45	6219.45	6.8530			
23	CT-L73.44	50	930.83	44214.425	2116.96	6205.03	6.7844			
24	CT-L73.45	50	930.83	44214.425	1843.23	6470	6.5489			
24	CT-L73.46	50	930.83	44214.425	2116.96	6205.03	6.7844			
25	CT-L73.47	50	930.83	44214.425	1843.23	6470	6.5489			
25	CT-L73.48	50	930.83	44214.425	2233.75	5993.94	7.0039			
26	CT-L73.49	50	930.83	44214.425	1918.69	5968.43	7.0866			
26	CT-L73.50	50	930.83	44214.425	2521.94	6536.03	6.3789			
27	CT-L73.51	50	930.83	44214.425	2357.47	6331.29	6.6111			
27	CT-L73.52	50	930.83	44214.425	1347.65	3577.66	11.9818			
28	CT-L73.53	50	930.83	44214.425	2764.16	7184.64	5.7693			
28	CT-L73.54	50	930.83	44214.425	-28.01	-182.32	242.3564			
29	CT-L73.55	50	930.83	44214.425	58.91	203.32	217.1725			
29	CT-L73.56	50	930.83	44214.425	109.1	-1263.44	34.9089			
30	CT-L73.57	50	930.83	44214.425	155.04	489.59	89.9924			
30	CT-L73.58	50	930.83	44214.425	1368.35	3794.48	11.2917			
31	CT-L73.59	50	930.83	44214.425	152.67	-1182.12	37.2735			
31	CT-L73.60	50	930.83	44214.425	1941.22	5603.49	7.5441			
32	CT-L73.61	50	930.83	44214.425	1277.19	3640.74	11.7935			
32	CT-L73.62	50	930.83	44214.425	1899.93	5651.39	7.4874			

33	CT-L73.63	50	930.83	44214.425	1830.74	5395.75	7.8550
33	CT-L73.64	50	930.83	44214.425	1899.93	5651.39	7.4874
34	CT-L73.65	50	930.83	44214.425	1830.74	5395.75	7.8550
34	CT-L73.66	50	930.83	44214.425	1704.64	5814.76	7.3107
35	CT-L73.67	50	930.83	44214.425	1884.42	5640.65	7.5045
35	CT-L73.68	50	930.83	44214.425	1167.89	4942.72	8.7091
36	CT-L73.69	50	930.83	44214.425	1711.84	5816.12	7.3077
36	CT-L73.70	50	930.83	44214.425	1167.89	4942.72	8.7091
37	CT-L73.71	50	930.83	44214.425	1711.84	5816.12	7.3077
37	CT-L73.72	50	930.83	44214.425	521.46	4319.21	10.1160
38	CT-L73.73	50	930.83	44214.425	1162.86	4931.05	8.7307
38	CT-L73.74	50	930.83	44214.425	-667.57	-2834.71	15.3620
39	CT-L73.75	50	930.83	44214.425	246.03	3846.67	11.4302
39	CT-L73.76	50	930.83	44214.425	-667.57	-2834.71	15.3620
40	CT-L73.77	50	930.83	44214.425	246.03	3846.67	11.4302
40	CT-L73.78	50	930.83	44214.425	-1801.2	-3117.2	13.6062
41	CT-L73.79	50	930.83	44214.425	-1408.94	-3024.48	14.1530
41	CT-L73.80	50	930.83	44214.425	-2818.11	-3353.01	12.3460
42	CT-L73.81	50	930.83	44214.425	-1821.05	-3127.1	13.5568
42	CT-L73.82	50	930.83	44214.425	-3943.48	-3578.4	11.2539
43	CT-L73.83	50	930.83	44214.425	-3942.53	-3585.29	11.2325
43	CT-L73.84	50	930.83	44214.425	-1819.86	-3091.99	13.7111
44	CT-L73.85	50	930.83	44214.425	-2817.07	-3315.16	12.4873
44	CT-L73.86	50	930.83	44214.425	-1407.74	-2990.64	14.3136
45	CT-L73.87	50	930.83	44214.425	-1800.05	-3082.21	13.7610
45	CT-L73.88	50	930.83	44214.425	247.41	3826.62	11.4898
46	CT-L73.89	50	930.83	44214.425	-666.35	-2803.23	15.5350
46	CT-L73.90	50	930.83	44214.425	247.41	3826.62	11.4898
47	CT-L73.91	50	930.83	44214.425	-666.35	-2803.23	15.5350
47	CT-L73.92	50	930.83	44214.425	1164.6	4911.09	8.7658
48	CT-L73.93	50	930.83	44214.425	522.97	4299.17	10.1628
48	CT-L73.94	50	930.83	44214.425	1713.82	5799.02	7.3289
49	CT-L73.95	50	930.83	44214.425	1169.54	4922.65	8.7443
49	CT-L73.96	50	930.83	44214.425	1713.82	5799.02	7.3289
50	CT-L73.97	50	930.83	44214.425	1169.54	4922.65	8.7443
50	CT-L73.98	50	930.83	44214.425	1886.49	5626.74	7.5226
51	CT-L73.99	50	930.83	44214.425	1706.51	5797.44	7.3322
51	CT-L73.100	50	930.83	44214.425	1833.06	5385.85	7.8690
52	CT-L73.101	50	930.83	44214.425	1902	5637.48	7.5056
52	CT-L73.102	50	930.83	44214.425	1833.06	5385.85	7.8690
53	CT-L73.103	50	930.83	44214.425	1902	5637.48	7.5056
53	CT-L73.104	50	930.83	44214.425	1278.31	3633.7	11.8161
54	CT-L73.105	50	930.83	44214.425	1943.83	5593.79	7.5567
54	CT-L73.106	50	930.83	44214.425	152.35	-1182.78	37.2530
55	CT-L73.107	50	930.83	44214.425	1369.91	3788.22	11.3099
55	CT-L73.108	50	930.83	44214.425	155.05	488.75	90.1471
56	CT-L73.109	50	930.83	44214.425	109.01	-1263.94	34.8952
56	CT-L73.110	50	930.83	44214.425	58.94	203.1	217.4076
57	CT-L73.111	50	930.83	44214.425	-0.66	-91.83	481.4741
57	CT-L73.112	50	930.83	44214.425	-116.89	-1108.27	39.7895
58	CT-L73.113	50	930.83	44214.425	-33.87	-461.24	95.7865
58	CT-L73.114	50	930.83	44214.425	952.79	3074.21	14.0724
59	CT-L73.115	50	930.83	44214.425	-0.84	-960.5	46.0318
59	CT-L73.116	50	930.83	44214.425	1561.71	4609.08	9.2541
60	CT-L73.117	50	930.83	44214.425	1068.85	3295.97	13.0904
60	CT-L73.118	50	930.83	44214.425	1801.31	5445.69	7.7884
61	CT-L73.119	50	930.83	44214.425	1505.76	4516.48	9.4562
61	CT-L73.120	50	930.83	44214.425	1801.31	5445.69	7.7884
62	CT-L73.121	50	930.83	44214.425	1505.76	4516.48	9.4562
62	CT-L73.122	50	930.83	44214.425	1714.06	5443.62	7.8074
63	CT-L73.123	50	930.83	44214.425	1722.11	5344.71	7.9503
63	CT-L73.124	50	930.83	44214.425	1186.06	4943.26	8.7045
64	CT-L73.125	50	930.83	44214.425	1662.53	5374.99	7.9166
64	CT-L73.126	50	930.83	44214.425	1186.06	4943.26	8.7045
65	CT-L73.127	50	930.83	44214.425	1662.53	5374.99	7.9166
65	CT-L73.128	50	930.83	44214.425	561.77	4101.9	10.6421
66	CT-L73.129	50	930.83	44214.425	1147.95	4904.43	8.7811
66	CT-L73.130	50	930.83	44214.425	-617.7	2630.02	16.5766
67	CT-L73.131	50	930.83	44214.425	271.79	3762.13	11.6803
67	CT-L73.132	50	930.83	44214.425	-617.7	2630.02	16.5766
68	CT-L73.133	50	930.83	44214.425	271.79	3762.13	11.6803
68	CT-L73.134	50	930.83	44214.425	-1809.51	-2929.4	14.4756
69	CT-L73.135	50	930.83	44214.425	-1403.25	-2826.05	15.1488
69	CT-L73.136	50	930.83	44214.425	-2826.84	-3160.94	13.0934

70	CT-L73.137	50	930.83	44214.425	-1825.34	-2928.45	14.4749
70	CT-L73.138	50	930.83	44214.425	-3948.95	-3375.26	11.9296
71	CT-L73.139	50	930.83	44214.425	-3947.97	-3349.52	12.0216
71	CT-L73.140	50	930.83	44214.425	-1824.24	-2895.41	14.6405
72	CT-L73.141	50	930.83	44214.425	-2825.82	-3125.09	13.2440
72	CT-L73.142	50	930.83	44214.425	-1402.14	-2794.21	15.3218
73	CT-L73.143	50	930.83	44214.425	-1808.43	-2896.32	14.6413
73	CT-L73.144	50	930.83	44214.425	273	3743.04	11.7395
74	CT-L73.145	50	930.83	44214.425	-616.59	2613.58	16.6813
74	CT-L73.146	50	930.83	44214.425	273	3743.04	11.7395
75	CT-L73.147	50	930.83	44214.425	-616.59	2613.58	16.6813
75	CT-L73.148	50	930.83	44214.425	1149.39	4885.11	8.8156
76	CT-L73.149	50	930.83	44214.425	563.1	4082.61	10.6920
76	CT-L73.150	50	930.83	44214.425	1664.1	5356.9	7.9431
77	CT-L73.151	50	930.83	44214.425	1187.49	4923.84	8.7385
77	CT-L73.152	50	930.83	44214.425	1664.1	5356.9	7.9431
78	CT-L73.153	50	930.83	44214.425	1187.49	4923.84	8.7385
78	CT-L73.154	50	930.83	44214.425	1723.47	5330.8	7.9708
79	CT-L73.155	50	930.83	44214.425	1715.65	5425.41	7.8333
79	CT-L73.156	50	930.83	44214.425	1506.98	4506.08	9.4777
80	CT-L73.157	50	930.83	44214.425	1802.83	5431.88	7.8079
80	CT-L73.158	50	930.83	44214.425	1506.98	4506.08	9.4777
81	CT-L73.159	50	930.83	44214.425	1802.83	5431.88	7.8079
81	CT-L73.160	50	930.83	44214.425	1069.54	3289.25	13.1169
82	CT-L73.161	50	930.83	44214.425	1563.11	4598.9	9.2742
82	CT-L73.162	50	930.83	44214.425	-1.01	-960.67	46.0235
83	CT-L73.163	50	930.83	44214.425	953.57	3068.29	14.0993
83	CT-L73.164	50	930.83	44214.425	-33.98	-461.23	95.7883
84	CT-L73.165	50	930.83	44214.425	-116.98	-1108.24	39.7905
84	CT-L73.166	50	930.83	44214.425	-0.69	-91.83	481.4738
85	CT-L73.167	50	930.83	44214.425	-12.09	93.98	470.3377
85	CT-L73.168	50	930.83	44214.425	-135.14	-2618.66	16.8328
86	CT-L73.169	50	930.83	44214.425	-66.51	-1048.63	42.1006
86	CT-L73.170	50	930.83	44214.425	845.4	3582.89	12.1045
87	CT-L73.171	50	930.83	44214.425	-12.15	-2337.2	18.9125
87	CT-L73.172	50	930.83	44214.425	1421.63	3926.68	10.8980
88	CT-L73.173	50	930.83	44214.425	1009.87	3942.26	10.9593
88	CT-L73.174	50	930.83	44214.425	1757.56	6022.58	7.0496
89	CT-L73.175	50	930.83	44214.425	1395.06	3925.54	10.9079
89	CT-L73.176	50	930.83	44214.425	1757.56	6022.58	7.0496
90	CT-L73.177	50	930.83	44214.425	1395.06	3925.54	10.9079
90	CT-L73.178	50	930.83	44214.425	1713.65	4934.89	8.6123
91	CT-L73.179	50	930.83	44214.425	1671.56	5906.89	7.2022
91	CT-L73.180	50	930.83	44214.425	1193.39	5628.25	7.6438
92	CT-L73.181	50	930.83	44214.425	1640.55	4864.2	8.7525
92	CT-L73.182	50	930.83	44214.425	1193.39	5628.25	7.6438
93	CT-L73.183	50	930.83	44214.425	1640.55	4864.2	8.7525
93	CT-L73.184	50	930.83	44214.425	575.99	3805.41	11.4675
94	CT-L73.185	50	930.83	44214.425	1141.5	5589.61	7.7059
94	CT-L73.186	50	930.83	44214.425	-603.15	-2413.34	18.0709
95	CT-L73.187	50	930.83	44214.425	281.17	3953.89	11.1114
95	CT-L73.188	50	930.83	44214.425	-603.15	-2413.34	18.0709
96	CT-L73.189	50	930.83	44214.425	281.17	3953.89	11.1114
96	CT-L73.190	50	930.83	44214.425	-1808.23	-2720.65	15.5868
97	CT-L73.191	50	930.83	44214.425	-1399.55	-2621.12	16.3346
97	CT-L73.192	50	930.83	44214.425	-2828.65	-2941.38	14.0702
98	CT-L73.193	50	930.83	44214.425	-1822.65	-2717.38	15.6002
98	CT-L73.194	50	930.83	44214.425	-3954.07	-3196.71	12.5943
99	CT-L73.195	50	930.83	44214.425	-3953.09	-3219.66	12.5048
99	CT-L73.196	50	930.83	44214.425	-1821.66	-2686.38	15.7806
100	CT-L73.197	50	930.83	44214.425	-2827.66	-2907.71	14.2335
100	CT-L73.198	50	930.83	44214.425	-1398.55	-2591.23	16.5234
101	CT-L73.199	50	930.83	44214.425	-1807.23	-2689.57	15.7673
101	CT-L73.200	50	930.83	44214.425	282.18	3935.61	11.1628
102	CT-L73.201	50	930.83	44214.425	-602.15	-2385.82	18.2798
102	CT-L73.202	50	930.83	44214.425	282.18	3935.61	11.1628
103	CT-L73.203	50	930.83	44214.425	-602.15	-2385.82	18.2798
103	CT-L73.204	50	930.83	44214.425	1142.6	5569.98	7.7329
104	CT-L73.205	50	930.83	44214.425	577.13	3786.68	11.5239
104	CT-L73.206	50	930.83	44214.425	1641.66	4848.75	8.7802
105	CT-L73.207	50	930.83	44214.425	1194.55	5608.55	7.6704
105	CT-L73.208	50	930.83	44214.425	1641.66	4848.75	8.7802
106	CT-L73.209	50	930.83	44214.425	1194.55	5608.55	7.6704
106	CT-L73.210	50	930.83	44214.425	1672.43	5892.48	7.2197

107	CT-L73.211	50	930.83	44214.425	1714.84	4915.54	8.6460
107	CT-L73.212	50	930.83	44214.425	1395.64	3914.43	10.9387
108	CT-L73.213	50	930.83	44214.425	1758.58	6008.12	7.0664
108	CT-L73.214	50	930.83	44214.425	1395.64	3914.43	10.9387
109	CT-L73.215	50	930.83	44214.425	1758.58	6008.12	7.0664
109	CT-L73.216	50	930.83	44214.425	1010.22	3934.48	10.9809
110	CT-L73.217	50	930.83	44214.425	1422.34	3915.63	10.9285
110	CT-L73.218	50	930.83	44214.425	-12.25	-2337.54	18.9097
111	CT-L73.219	50	930.83	44214.425	845.77	3575.89	12.1281
111	CT-L73.220	50	930.83	44214.425	-66.58	-1048.42	42.1089
112	CT-L73.221	50	930.83	44214.425	-135.21	-2618.5	16.8338
112	CT-L73.222	50	930.83	44214.425	-12.11	94.02	470.1374
113	CT-L73.223	50	930.83	44214.425	-0.68	-91.85	481.3690
113	CT-L73.224	50	930.83	44214.425	-116.97	-1108.39	39.7851
114	CT-L73.225	50	930.83	44214.425	-33.95	-461.34	95.7655
114	CT-L73.226	50	930.83	44214.425	953.53	3076.08	14.0636
115	CT-L73.227	50	930.83	44214.425	-1.02	-960.61	46.0264
115	CT-L73.228	50	930.83	44214.425	1563.01	4612.44	9.2470
116	CT-L73.229	50	930.83	44214.425	1069.45	3297.45	13.0843
116	CT-L73.230	50	930.83	44214.425	1802.46	5448.44	7.7842
117	CT-L73.231	50	930.83	44214.425	1506.9	4519.33	9.4500
117	CT-L73.232	50	930.83	44214.425	1802.46	5448.44	7.7842
118	CT-L73.233	50	930.83	44214.425	1506.9	4519.33	9.4500
118	CT-L73.234	50	930.83	44214.425	1715.13	5445.99	7.8038
119	CT-L73.235	50	930.83	44214.425	1723.17	5347.14	7.9465
119	CT-L73.236	50	930.83	44214.425	1186.94	4944.67	8.7018
120	CT-L73.237	50	930.83	44214.425	1663.62	5377.38	7.9129
120	CT-L73.238	50	930.83	44214.425	1186.94	4944.67	8.7018
121	CT-L73.239	50	930.83	44214.425	1663.62	5377.38	7.9129
121	CT-L73.240	50	930.83	44214.425	562.52	4102.68	10.6399
122	CT-L73.241	50	930.83	44214.425	1148.86	4905.93	8.7783
122	CT-L73.242	50	930.83	44214.425	-617.18	2629.92	16.5774
123	CT-L73.243	50	930.83	44214.425	272.43	3762.53	11.6788
123	CT-L73.244	50	930.83	44214.425	-617.18	2629.92	16.5774
124	CT-L73.245	50	930.83	44214.425	272.43	3762.53	11.6788
124	CT-L73.246	50	930.83	44214.425	-1809.06	-2929.14	14.4771
125	CT-L73.247	50	930.83	44214.425	-1402.75	-2825.88	15.1499
125	CT-L73.248	50	930.83	44214.425	-2826.46	-3160.51	13.0953
126	CT-L73.249	50	930.83	44214.425	-1824.86	-2928.22	14.4762
126	CT-L73.250	50	930.83	44214.425	-3948.63	-3374.66	11.9318
127	CT-L73.251	50	930.83	44214.425	-3947.65	-3351.38	12.0150
127	CT-L73.252	50	930.83	44214.425	-1823.98	-2896.95	14.6328
128	CT-L73.253	50	930.83	44214.425	-2825.51	-3126.71	13.2372
128	CT-L73.254	50	930.83	44214.425	-1401.87	-2795.68	15.3138
129	CT-L73.255	50	930.83	44214.425	-1808.15	-2897.81	14.6339
129	CT-L73.256	50	930.83	44214.425	273.22	3743.56	11.7378
130	CT-L73.257	50	930.83	44214.425	-616.31	2614.01	16.6786
130	CT-L73.258	50	930.83	44214.425	273.22	3743.56	11.7378
131	CT-L73.259	50	930.83	44214.425	-616.31	2614.01	16.6786
131	CT-L73.260	50	930.83	44214.425	1149.64	4885.48	8.8149
132	CT-L73.261	50	930.83	44214.425	563.42	4082.99	10.6909
132	CT-L73.262	50	930.83	44214.425	1664.29	5357.19	7.9426
133	CT-L73.263	50	930.83	44214.425	1187.78	4924.17	8.7378
133	CT-L73.264	50	930.83	44214.425	1664.29	5357.19	7.9426
134	CT-L73.265	50	930.83	44214.425	1187.78	4924.17	8.7378
134	CT-L73.266	50	930.83	44214.425	1723.65	5331.01	7.9705
135	CT-L73.267	50	930.83	44214.425	1715.88	5425.65	7.8329
135	CT-L73.268	50	930.83	44214.425	1507.13	4506.17	9.4775
136	CT-L73.269	50	930.83	44214.425	1803.05	5432.05	7.8076
136	CT-L73.270	50	930.83	44214.425	1507.13	4506.17	9.4775
137	CT-L73.271	50	930.83	44214.425	1803.05	5432.05	7.8076
137	CT-L73.272	50	930.83	44214.425	1069.61	3289.32	13.1166
138	CT-L73.273	50	930.83	44214.425	1563.33	4598.93	9.2741
138	CT-L73.274	50	930.83	44214.425	-1.05	-960.67	46.0235
139	CT-L73.275	50	930.83	44214.425	953.7	3068.3	14.0992
139	CT-L73.276	50	930.83	44214.425	-33.98	-461.23	95.7883
140	CT-L73.277	50	930.83	44214.425	-117	-1108.24	39.7905
140	CT-L73.278	50	930.83	44214.425	-0.68	-91.84	481.4214
141	CT-L73.279	50	930.83	44214.425	58.93	203.35	217.1404
141	CT-L73.280	50	930.83	44214.425	109.06	-1263.46	34.9084
142	CT-L73.281	50	930.83	44214.425	155.03	489.56	89.9979
142	CT-L73.282	50	930.83	44214.425	1370.13	3798.88	11.2781
143	CT-L73.283	50	930.83	44214.425	152.32	-1182.31	37.2678
143	CT-L73.284	50	930.83	44214.425	1944.11	5610.68	7.5339

144	CT-L73.285	50	930.83	44214.425	1278.47	3643.73	11.7835
144	CT-L73.286	50	930.83	44214.425	1902.22	5656.35	7.4805
145	CT-L73.287	50	930.83	44214.425	1833.31	5402.04	7.8454
145	CT-L73.288	50	930.83	44214.425	1902.22	5656.35	7.4805
146	CT-L73.289	50	930.83	44214.425	1833.31	5402.04	7.8454
146	CT-L73.290	50	930.83	44214.425	1706.67	5818.53	7.3056
147	CT-L73.291	50	930.83	44214.425	1886.67	5645.49	7.4976
147	CT-L73.292	50	930.83	44214.425	1169.6	4945	8.7047
148	CT-L73.293	50	930.83	44214.425	1713.96	5820.12	7.3023
148	CT-L73.294	50	930.83	44214.425	1169.6	4945	8.7047
149	CT-L73.295	50	930.83	44214.425	1713.96	5820.12	7.3023
149	CT-L73.296	50	930.83	44214.425	522.96	4320.45	10.1127
150	CT-L73.297	50	930.83	44214.425	1164.64	4933.53	8.7260
150	CT-L73.298	50	930.83	44214.425	-666.53	-2834.55	15.3632
151	CT-L73.299	50	930.83	44214.425	247.3	3847.22	11.4283
151	CT-L73.300	50	930.83	44214.425	-666.53	-2834.55	15.3632
152	CT-L73.301	50	930.83	44214.425	247.3	3847.22	11.4283
152	CT-L73.302	50	930.83	44214.425	-1800.28	-3116.64	13.6089
153	CT-L73.303	50	930.83	44214.425	-1407.95	-3024.1	14.1551
153	CT-L73.304	50	930.83	44214.425	-2817.36	-3352.08	12.3497
154	CT-L73.305	50	930.83	44214.425	-1820.09	-3126.59	13.5593
154	CT-L73.306	50	930.83	44214.425	-3942.87	-3577.14	11.2580
155	CT-L73.307	50	930.83	44214.425	-3941.88	-3583.92	11.2370
155	CT-L73.308	50	930.83	44214.425	-1819.32	-3094.59	13.6997
156	CT-L73.309	50	930.83	44214.425	-2816.45	-3317.81	12.4775
156	CT-L73.310	50	930.83	44214.425	-1407.2	-2993.1	14.3020
157	CT-L73.311	50	930.83	44214.425	-1799.47	-3084.7	13.7501
157	CT-L73.312	50	930.83	44214.425	247.85	3827.56	11.4868
158	CT-L73.313	50	930.83	44214.425	-665.8	-2805.36	15.5234
158	CT-L73.314	50	930.83	44214.425	247.85	3827.56	11.4868
159	CT-L73.315	50	930.83	44214.425	-665.8	-2805.36	15.5234
159	CT-L73.316	50	930.83	44214.425	1165.09	4911.76	8.7645
160	CT-L73.317	50	930.83	44214.425	523.6	4299.84	10.1610
160	CT-L73.318	50	930.83	44214.425	1714.21	5799.57	7.3282
161	CT-L73.319	50	930.83	44214.425	1170.12	4923.21	8.7431
161	CT-L73.320	50	930.83	44214.425	1714.21	5799.57	7.3282
162	CT-L73.321	50	930.83	44214.425	1170.12	4923.21	8.7431
162	CT-L73.322	50	930.83	44214.425	1886.84	5627.15	7.5220
163	CT-L73.323	50	930.83	44214.425	1706.98	5797.88	7.3315
163	CT-L73.324	50	930.83	44214.425	1833.32	5386.07	7.8687
164	CT-L73.325	50	930.83	44214.425	1902.42	5637.8	7.5051
164	CT-L73.326	50	930.83	44214.425	1833.32	5386.07	7.8687
165	CT-L73.327	50	930.83	44214.425	1902.42	5637.8	7.5051
165	CT-L73.328	50	930.83	44214.425	1278.54	3633.76	11.8158
166	CT-L73.329	50	930.83	44214.425	1944.18	5593.93	7.5564
166	CT-L73.330	50	930.83	44214.425	152.41	-1182.79	37.2526
167	CT-L73.331	50	930.83	44214.425	1370.27	3788.16	11.3100
167	CT-L73.332	50	930.83	44214.425	155.1	488.71	90.1543
168	CT-L73.333	50	930.83	44214.425	109.15	-1263.96	34.8945
168	CT-L73.334	50	930.83	44214.425	58.95	203.09	217.4183
169	CT-L73.335	50	930.83	44214.425	-27.98	-181.31	243.7066
169	CT-L73.336	50	930.83	44214.425	2763.91	7204.05	5.7538
170	CT-L73.337	50	930.83	44214.425	1347.53	3587.84	11.9478
170	CT-L73.338	50	930.83	44214.425	2357.71	6349.81	6.5918
171	CT-L73.339	50	930.83	44214.425	2521.66	6553.83	6.3616
171	CT-L73.340	50	930.83	44214.425	1919.32	5982.29	7.0701
172	CT-L73.341	50	930.83	44214.425	2233.93	6012.82	6.9818
172	CT-L73.342	50	930.83	44214.425	1843.96	6485.3	6.5333
173	CT-L73.343	50	930.83	44214.425	2117.39	6219.71	6.7683
173	CT-L73.344	50	930.83	44214.425	1843.96	6485.3	6.5333
174	CT-L73.345	50	930.83	44214.425	2117.39	6219.71	6.7683
174	CT-L73.346	50	930.83	44214.425	1593.26	6238.72	6.8317
175	CT-L73.347	50	930.83	44214.425	1999.48	6594.53	6.4015
175	CT-L73.348	50	930.83	44214.425	1034.92	5628.42	7.6717
176	CT-L73.349	50	930.83	44214.425	1682.13	6326.61	6.7228
176	CT-L73.350	50	930.83	44214.425	1034.92	5628.42	7.6717
177	CT-L73.351	50	930.83	44214.425	1682.13	6326.61	6.7228
177	CT-L73.352	50	930.83	44214.425	431.21	4675.33	9.3647
178	CT-L73.353	50	930.83	44214.425	1116.72	5699.47	7.5617
178	CT-L73.354	50	930.83	44214.425	-703.26	-2982.02	14.5912
179	CT-L73.355	50	930.83	44214.425	233.07	4341.27	10.1310
179	CT-L73.356	50	930.83	44214.425	-703.26	-2982.02	14.5912
180	CT-L73.357	50	930.83	44214.425	233.07	4341.27	10.1310
180	CT-L73.358	50	930.83	44214.425	-1715.31	-3291.2	12.9130

181	CT-L73.359	50	930.83	44214.425	-1320.56	-3183.62	13.4733
181	CT-L73.360	50	930.83	44214.425	-2623.01	-3517.59	11.8238
182	CT-L73.361	50	930.83	44214.425	-1668.68	-3284.39	12.9539
182	CT-L73.362	50	930.83	44214.425	-3675.61	-3858.78	10.5056
183	CT-L73.363	50	930.83	44214.425	-3674.64	-3887.6	10.4280
183	CT-L73.364	50	930.83	44214.425	-1668.05	-3259.27	13.0540
184	CT-L73.365	50	930.83	44214.425	-2622.16	-3490.75	11.9150
184	CT-L73.366	50	930.83	44214.425	-1319.96	-3159.18	13.5777
185	CT-L73.367	50	930.83	44214.425	-1714.61	-3266.02	13.0127
185	CT-L73.368	50	930.83	44214.425	233.34	4325.06	10.1689
186	CT-L73.369	50	930.83	44214.425	-702.69	-2959.05	14.7046
186	CT-L73.370	50	930.83	44214.425	233.34	4325.06	10.1689
187	CT-L73.371	50	930.83	44214.425	-702.69	-2959.05	14.7046
187	CT-L73.372	50	930.83	44214.425	1116.83	5680.58	7.5868
188	CT-L73.373	50	930.83	44214.425	431.57	4657.95	9.3996
188	CT-L73.374	50	930.83	44214.425	1681.98	6307.62	6.7430
189	CT-L73.375	50	930.83	44214.425	1035.1	5609.95	7.6969
189	CT-L73.376	50	930.83	44214.425	1681.98	6307.62	6.7430
190	CT-L73.377	50	930.83	44214.425	1035.1	5609.95	7.6969
190	CT-L73.378	50	930.83	44214.425	1999.37	6578.78	6.4169
191	CT-L73.379	50	930.83	44214.425	1593.16	6219.87	6.8524
191	CT-L73.380	50	930.83	44214.425	2117.21	6205.38	6.7840
192	CT-L73.381	50	930.83	44214.425	1843.78	6470.38	6.5484
192	CT-L73.382	50	930.83	44214.425	2117.21	6205.38	6.7840
193	CT-L73.383	50	930.83	44214.425	1843.78	6470.38	6.5484
193	CT-L73.384	50	930.83	44214.425	2234.09	5994.06	7.0037
194	CT-L73.385	50	930.83	44214.425	1919.04	5968.69	7.0862
194	CT-L73.386	50	930.83	44214.425	2522.53	6535.85	6.3790
195	CT-L73.387	50	930.83	44214.425	2357.96	6331.28	6.6111
195	CT-L73.388	50	930.83	44214.425	1348.01	3577.56	11.9820
196	CT-L73.389	50	930.83	44214.425	2764.84	7184.42	5.7694
196	CT-L73.390	50	930.83	44214.425	-27.99	-182.3	242.3831

LOAD RATING SWING SPAN

RF= RATING FACTOR

$RF = (C - f_{DL+SDL}) / (f_{LL+I})$

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

$C=\varphi_C\varphi_S\varphi R_nS_x$ = (1.0)(1.0)(.95)(50 ksi)(930.83 in^3)

Virtual Beam	LOADING	R_n (ksi)	S_x (in^3)	$C=\varphi_C\varphi_S\varphi R_nS_x$	M_{DL+SDL} (kip-in)	M_{LL+I} (kip-in)	RF
1	CT-L3S2 + Lane Load	50	930.83	44214.425	-35.32	-161.62	273.3517
1	CT-L3S2 + Lane Load	50	930.83	44214.425	2757.58	5367.37	7.7239
2	CT-L3S2 + Lane Load	50	930.83	44214.425	1340.69	2622.29	16.3497
2	CT-L3S2 + Lane Load	50	930.83	44214.425	2353.36	4913	8.5205
3	CT-L3S2 + Lane Load	50	930.83	44214.425	2514.92	4855.35	8.5884
3	CT-L3S2 + Lane Load	50	930.83	44214.425	1916.1	4476.31	9.4494
4	CT-L3S2 + Lane Load	50	930.83	44214.425	2228.89	4644.43	9.0400
4	CT-L3S2 + Lane Load	50	930.83	44214.425	1840.96	4702.34	9.0111
5	CT-L3S2 + Lane Load	50	930.83	44214.425	2113.66	4681.05	8.9939
5	CT-L3S2 + Lane Load	50	930.83	44214.425	1840.96	4702.34	9.0111
6	CT-L3S2 + Lane Load	50	930.83	44214.425	2113.66	4681.05	8.9939
6	CT-L3S2 + Lane Load	50	930.83	44214.425	1590.57	4408.13	9.6694
7	CT-L3S2 + Lane Load	50	930.83	44214.425	1996.24	4824.62	8.7506
7	CT-L3S2 + Lane Load	50	930.83	44214.425	1032.56	4015.95	10.7526
8	CT-L3S2 + Lane Load	50	930.83	44214.425	1679.31	4474.34	9.5065
8	CT-L3S2 + Lane Load	50	930.83	44214.425	1032.56	4015.95	10.7526
9	CT-L3S2 + Lane Load	50	930.83	44214.425	1679.31	4474.34	9.5065
9	CT-L3S2 + Lane Load	50	930.83	44214.425	429.08	3416.79	12.8148
10	CT-L3S2 + Lane Load	50	930.83	44214.425	1114.22	4075.29	10.5760
10	CT-L3S2 + Lane Load	50	930.83	44214.425	-704.69	-2351.06	18.5064
11	CT-L3S2 + Lane Load	50	930.83	44214.425	231.25	3166.62	13.8896
11	CT-L3S2 + Lane Load	50	930.83	44214.425	-704.69	-2351.06	18.5064
12	CT-L3S2 + Lane Load	50	930.83	44214.425	231.25	3166.62	13.8896
12	CT-L3S2 + Lane Load	50	930.83	44214.425	-1716.52	-2594.47	16.3802
13	CT-L3S2 + Lane Load	50	930.83	44214.425	-1321.91	-2509.4	17.0927
13	CT-L3S2 + Lane Load	50	930.83	44214.425	-2624.03	-2769.19	15.0190
14	CT-L3S2 + Lane Load	50	930.83	44214.425	-1669.96	-2587.77	16.4406
14	CT-L3S2 + Lane Load	50	930.83	44214.425	-3676.48	-3675.04	11.0306
15	CT-L3S2 + Lane Load	50	930.83	44214.425	-3675.62	-3682.07	11.0098
15	CT-L3S2 + Lane Load	50	930.83	44214.425	-1668.81	-2554.25	16.6568
16	CT-L3S2 + Lane Load	50	930.83	44214.425	-2623.08	-2732.59	15.2205
16	CT-L3S2 + Lane Load	50	930.83	44214.425	-1320.73	-2476.93	17.3173
17	CT-L3S2 + Lane Load	50	930.83	44214.425	-1715.44	-2560.92	16.5952
17	CT-L3S2 + Lane Load	50	930.83	44214.425	232.73	3141.34	14.0009
18	CT-L3S2 + Lane Load	50	930.83	44214.425	-703.49	-2320.81	18.7482
18	CT-L3S2 + Lane Load	50	930.83	44214.425	232.73	3141.34	14.0009
19	CT-L3S2 + Lane Load	50	930.83	44214.425	-703.49	-2320.81	18.7482
19	CT-L3S2 + Lane Load	50	930.83	44214.425	1116.11	4049.77	10.6422
20	CT-L3S2 + Lane Load	50	930.83	44214.425	430.7	3391.2	12.9110
20	CT-L3S2 + Lane Load	50	930.83	44214.425	1681.38	4463.4	9.5293
21	CT-L3S2 + Lane Load	50	930.83	44214.425	1034.3	3993.39	10.8129
21	CT-L3S2 + Lane Load	50	930.83	44214.425	1681.38	4463.4	9.5293
22	CT-L3S2 + Lane Load	50	930.83	44214.425	1034.3	3993.39	10.8129
22	CT-L3S2 + Lane Load	50	930.83	44214.425	1998.88	4814.37	8.7687
23	CT-L3S2 + Lane Load	50	930.83	44214.425	1592.45	4397.13	9.6931
23	CT-L3S2 + Lane Load	50	930.83	44214.425	2116.96	4674.51	9.0057
24	CT-L3S2 + Lane Load	50	930.83	44214.425	1843.23	4693.77	9.0271
24	CT-L3S2 + Lane Load	50	930.83	44214.425	2116.96	4674.51	9.0057
25	CT-L3S2 + Lane Load	50	930.83	44214.425	1843.23	4693.77	9.0271
25	CT-L3S2 + Lane Load	50	930.83	44214.425	2233.75	4639.65	9.0482
26	CT-L3S2 + Lane Load	50	930.83	44214.425	1918.69	4469.21	9.4638
26	CT-L3S2 + Lane Load	50	930.83	44214.425	2521.94	4856.57	8.5848
27	CT-L3S2 + Lane Load	50	930.83	44214.425	2357.47	4906.97	8.5301
27	CT-L3S2 + Lane Load	50	930.83	44214.425	1347.65	2628.89	16.3060
28	CT-L3S2 + Lane Load	50	930.83	44214.425	2764.16	5366.71	7.7236
28	CT-L3S2 + Lane Load	50	930.83	44214.425	-28.01	-147.77	299.0216
29	CT-L3S2 + Lane Load	50	930.83	44214.425	58.91	166.54	265.1346
29	CT-L3S2 + Lane Load	50	930.83	44214.425	109.1	-1263.44	34.9089
30	CT-L3S2 + Lane Load	50	930.83	44214.425	155.04	-388.55	113.3944
30	CT-L3S2 + Lane Load	50	930.83	44214.425	1368.35	2789.63	15.3591
31	CT-L3S2 + Lane Load	50	930.83	44214.425	152.67	-1182.12	37.2735
31	CT-L3S2 + Lane Load	50	930.83	44214.425	1941.22	4198.61	10.0684
32	CT-L3S2 + Lane Load	50	930.83	44214.425	1277.19	2645.29	16.2316
32	CT-L3S2 + Lane Load	50	930.83	44214.425	1899.93	4089.12	10.3481
33	CT-L3S2 + Lane Load	50	930.83	44214.425	1830.74	4026.59	10.5259

Minimum Rating factor	7.7236	**Girder 1**
Minimum Rating factor	10.0684	**Girder 2**
Minimum Rating factor	10.7420	**Girder 3**
Minimum Rating factor	9.6244	**Girder 4**
Minimum Rating factor	10.7358	**Girder 5**
Minimum Rating factor	10.0534	**Girder 6**
Minimum Rating factor	7.7012	**Girder 7**

33	CT-L3S2 + Lane Load	50	930.83	44214.425	1899.93	4089.12	10.3481
34	CT-L3S2 + Lane Load	50	930.83	44214.425	1830.74	4026.59	10.5259
34	CT-L3S2 + Lane Load	50	930.83	44214.425	1704.64	4078.47	10.4230
35	CT-L3S2 + Lane Load	50	930.83	44214.425	1884.42	4071.91	10.3956
35	CT-L3S2 + Lane Load	50	930.83	44214.425	1167.89	3489.28	12.3368
36	CT-L3S2 + Lane Load	50	930.83	44214.425	1711.84	4069.4	10.4444
36	CT-L3S2 + Lane Load	50	930.83	44214.425	1167.89	3489.28	12.3368
37	CT-L3S2 + Lane Load	50	930.83	44214.425	1711.84	4069.4	10.4444
37	CT-L3S2 + Lane Load	50	930.83	44214.425	521.46	3151.65	13.8635
38	CT-L3S2 + Lane Load	50	930.83	44214.425	1162.86	3496.28	12.3135
38	CT-L3S2 + Lane Load	50	930.83	44214.425	-667.57	-2258.87	19.2782
39	CT-L3S2 + Lane Load	50	930.83	44214.425	246.03	2799.28	15.7070
39	CT-L3S2 + Lane Load	50	930.83	44214.425	-667.57	-2258.87	19.2782
40	CT-L3S2 + Lane Load	50	930.83	44214.425	246.03	2799.28	15.7070
40	CT-L3S2 + Lane Load	50	930.83	44214.425	-1801.2	-2480.87	17.0961
41	CT-L3S2 + Lane Load	50	930.83	44214.425	-1408.94	-2408.02	17.7762
41	CT-L3S2 + Lane Load	50	930.83	44214.425	-2818.11	-2668.47	15.5131
42	CT-L3S2 + Lane Load	50	930.83	44214.425	-1821.05	-2488.56	17.0353
42	CT-L3S2 + Lane Load	50	930.83	44214.425	-3943.48	-3412.53	11.8009
43	CT-L3S2 + Lane Load	50	930.83	44214.425	-3942.53	-3411.62	11.8043
43	CT-L3S2 + Lane Load	50	930.83	44214.425	-1819.86	-2445.65	17.3347
44	CT-L3S2 + Lane Load	50	930.83	44214.425	-2817.07	-2622.43	15.7859
44	CT-L3S2 + Lane Load	50	930.83	44214.425	-1407.74	-2366.84	18.0860
45	CT-L3S2 + Lane Load	50	930.83	44214.425	-1800.05	-2438.34	17.3948
45	CT-L3S2 + Lane Load	50	930.83	44214.425	247.41	2768.4	15.8817
46	CT-L3S2 + Lane Load	50	930.83	44214.425	-666.35	-2220.47	19.6121
46	CT-L3S2 + Lane Load	50	930.83	44214.425	247.41	2768.4	15.8817
47	CT-L3S2 + Lane Load	50	930.83	44214.425	-666.35	-2220.47	19.6121
47	CT-L3S2 + Lane Load	50	930.83	44214.425	1164.6	3468.79	12.4106
48	CT-L3S2 + Lane Load	50	930.83	44214.425	522.97	3120.93	13.9995
48	CT-L3S2 + Lane Load	50	930.83	44214.425	1713.82	4055.8	10.4790
49	CT-L3S2 + Lane Load	50	930.83	44214.425	1169.54	3461.67	12.4347
49	CT-L3S2 + Lane Load	50	930.83	44214.425	1713.82	4055.8	10.4790
50	CT-L3S2 + Lane Load	50	930.83	44214.425	1169.54	3461.67	12.4347
50	CT-L3S2 + Lane Load	50	930.83	44214.425	1886.49	4060.82	10.4235
51	CT-L3S2 + Lane Load	50	930.83	44214.425	1706.51	4064.76	10.4577
51	CT-L3S2 + Lane Load	50	930.83	44214.425	1833.06	4018.01	10.5478
52	CT-L3S2 + Lane Load	50	930.83	44214.425	1902	4078.02	10.3757
52	CT-L3S2 + Lane Load	50	930.83	44214.425	1833.06	4018.01	10.5478
53	CT-L3S2 + Lane Load	50	930.83	44214.425	1902	4078.02	10.3757
53	CT-L3S2 + Lane Load	50	930.83	44214.425	1278.31	2638.82	16.2710
54	CT-L3S2 + Lane Load	50	930.83	44214.425	1943.83	4190.18	10.0880
54	CT-L3S2 + Lane Load	50	930.83	44214.425	152.35	-1182.78	37.2530
55	CT-L3S2 + Lane Load	50	930.83	44214.425	1369.91	2783.74	15.3910
55	CT-L3S2 + Lane Load	50	930.83	44214.425	155.05	-388.72	113.3448
56	CT-L3S2 + Lane Load	50	930.83	44214.425	109.01	-1263.94	34.8952
56	CT-L3S2 + Lane Load	50	930.83	44214.425	58.94	166.37	265.4053
57	CT-L3S2 + Lane Load	50	930.83	44214.425	-0.66	-89.36	494.7825
57	CT-L3S2 + Lane Load	50	930.83	44214.425	-116.89	-1105.71	39.8816
58	CT-L3S2 + Lane Load	50	930.83	44214.425	-33.87	-434.94	101.5785
58	CT-L3S2 + Lane Load	50	930.83	44214.425	952.79	2223.66	19.4551
59	CT-L3S2 + Lane Load	50	930.83	44214.425	-0.84	-960.5	46.0318
59	CT-L3S2 + Lane Load	50	930.83	44214.425	1561.71	3411.93	12.5011
60	CT-L3S2 + Lane Load	50	930.83	44214.425	1068.85	2396.24	18.0055
60	CT-L3S2 + Lane Load	50	930.83	44214.425	1801.31	3948.35	10.7420
61	CT-L3S2 + Lane Load	50	930.83	44214.425	1505.76	3333.55	12.8118
61	CT-L3S2 + Lane Load	50	930.83	44214.425	1801.31	3948.35	10.7420
62	CT-L3S2 + Lane Load	50	930.83	44214.425	1505.76	3333.55	12.8118
62	CT-L3S2 + Lane Load	50	930.83	44214.425	1714.06	3830.61	11.0949
63	CT-L3S2 + Lane Load	50	930.83	44214.425	1722.11	3865.64	10.9923
63	CT-L3S2 + Lane Load	50	930.83	44214.425	1186.06	3534.32	12.1744
64	CT-L3S2 + Lane Load	50	930.83	44214.425	1662.53	3791.38	11.2233
64	CT-L3S2 + Lane Load	50	930.83	44214.425	1186.06	3534.32	12.1744
65	CT-L3S2 + Lane Load	50	930.83	44214.425	1662.53	3791.38	11.2233
65	CT-L3S2 + Lane Load	50	930.83	44214.425	561.77	3024.6	14.4325
66	CT-L3S2 + Lane Load	50	930.83	44214.425	1147.95	3480.22	12.3746
66	CT-L3S2 + Lane Load	50	930.83	44214.425	-617.7	-2082.4	20.9358
67	CT-L3S2 + Lane Load	50	930.83	44214.425	271.79	2750.67	15.9752
67	CT-L3S2 + Lane Load	50	930.83	44214.425	-617.7	-2082.4	20.9358
68	CT-L3S2 + Lane Load	50	930.83	44214.425	271.79	2750.67	15.9752
68	CT-L3S2 + Lane Load	50	930.83	44214.425	-1809.51	-2339.86	18.1228
69	CT-L3S2 + Lane Load	50	930.83	44214.425	-1403.25	-2256.77	18.9701
69	CT-L3S2 + Lane Load	50	930.83	44214.425	-2826.84	-2527.9	16.3723
70	CT-L3S2 + Lane Load	50	930.83	44214.425	-1825.34	-2340.99	18.1073
70	CT-L3S2 + Lane Load	50	930.83	44214.425	-3948.95	-3276.97	12.2874

71	CT-L3S2 + Lane Load	50	930.83	44214.425	-3947.97	-3269.85	12.3145
71	CT-L3S2 + Lane Load	50	930.83	44214.425	-1824.24	-2300.14	18.4294
72	CT-L3S2 + Lane Load	50	930.83	44214.425	-2825.82	-2483.81	16.6634
72	CT-L3S2 + Lane Load	50	930.83	44214.425	-1402.14	-2217.33	19.3080
73	CT-L3S2 + Lane Load	50	930.83	44214.425	-1808.43	-2298.91	18.4461
73	CT-L3S2 + Lane Load	50	930.83	44214.425	273	2721.13	16.1482
74	CT-L3S2 + Lane Load	50	930.83	44214.425	-616.59	-2046.02	21.3086
74	CT-L3S2 + Lane Load	50	930.83	44214.425	273	2721.13	16.1482
75	CT-L3S2 + Lane Load	50	930.83	44214.425	-616.59	-2046.02	21.3086
75	CT-L3S2 + Lane Load	50	930.83	44214.425	1149.39	3451.97	12.4755
76	CT-L3S2 + Lane Load	50	930.83	44214.425	563.1	2995.01	14.5747
76	CT-L3S2 + Lane Load	50	930.83	44214.425	1664.1	3778.7	11.2606
77	CT-L3S2 + Lane Load	50	930.83	44214.425	1187.49	3505.93	12.2726
77	CT-L3S2 + Lane Load	50	930.83	44214.425	1664.1	3778.7	11.2606
78	CT-L3S2 + Lane Load	50	930.83	44214.425	1187.49	3505.93	12.2726
78	CT-L3S2 + Lane Load	50	930.83	44214.425	1723.47	3854.4	11.0240
79	CT-L3S2 + Lane Load	50	930.83	44214.425	1715.65	3818.27	11.1304
79	CT-L3S2 + Lane Load	50	930.83	44214.425	1506.98	3324.62	12.8458
80	CT-L3S2 + Lane Load	50	930.83	44214.425	1802.83	3936.18	10.7748
80	CT-L3S2 + Lane Load	50	930.83	44214.425	1506.98	3324.62	12.8458
81	CT-L3S2 + Lane Load	50	930.83	44214.425	1802.83	3936.18	10.7748
81	CT-L3S2 + Lane Load	50	930.83	44214.425	1069.54	2391.01	18.0446
82	CT-L3S2 + Lane Load	50	930.83	44214.425	1563.11	3403.16	12.5329
82	CT-L3S2 + Lane Load	50	930.83	44214.425	-1.01	-960.67	46.0235
83	CT-L3S2 + Lane Load	50	930.83	44214.425	953.57	2219.06	19.4951
83	CT-L3S2 + Lane Load	50	930.83	44214.425	-33.98	-434.94	101.5783
84	CT-L3S2 + Lane Load	50	930.83	44214.425	-116.98	-1105.67	39.8830
84	CT-L3S2 + Lane Load	50	930.83	44214.425	-0.69	-89.37	494.7268
85	CT-L3S2 + Lane Load	50	930.83	44214.425	-12.09	93.98	470.3377
85	CT-L3S2 + Lane Load	50	930.83	44214.425	-135.14	-2594.01	16.9927
86	CT-L3S2 + Lane Load	50	930.83	44214.425	-66.51	-897.36	49.1976
86	CT-L3S2 + Lane Load	50	930.83	44214.425	845.4	2718.62	15.9526
87	CT-L3S2 + Lane Load	50	930.83	44214.425	-12.15	-2324.08	19.0193
87	CT-L3S2 + Lane Load	50	930.83	44214.425	1421.63	2932.41	14.5930
88	CT-L3S2 + Lane Load	50	930.83	44214.425	1009.87	2955	14.6208
88	CT-L3S2 + Lane Load	50	930.83	44214.425	1757.56	4411.38	9.6244
89	CT-L3S2 + Lane Load	50	930.83	44214.425	1395.06	2904.28	14.7435
89	CT-L3S2 + Lane Load	50	930.83	44214.425	1757.56	4411.38	9.6244
90	CT-L3S2 + Lane Load	50	930.83	44214.425	1395.06	2904.28	14.7435
90	CT-L3S2 + Lane Load	50	930.83	44214.425	1713.65	3539.43	12.0078
91	CT-L3S2 + Lane Load	50	930.83	44214.425	1671.56	4335.91	9.8118
91	CT-L3S2 + Lane Load	50	930.83	44214.425	1193.39	4145.42	10.3780
92	CT-L3S2 + Lane Load	50	930.83	44214.425	1640.55	3498.14	12.1704
92	CT-L3S2 + Lane Load	50	930.83	44214.425	1193.39	4145.42	10.3780
93	CT-L3S2 + Lane Load	50	930.83	44214.425	1640.55	3498.14	12.1704
93	CT-L3S2 + Lane Load	50	930.83	44214.425	575.99	2843.24	15.3481
94	CT-L3S2 + Lane Load	50	930.83	44214.425	1141.5	4069.74	10.5837
94	CT-L3S2 + Lane Load	50	930.83	44214.425	-603.15	-1925.49	22.6494
95	CT-L3S2 + Lane Load	50	930.83	44214.425	281.17	2907.09	15.1125
95	CT-L3S2 + Lane Load	50	930.83	44214.425	-603.15	-1925.49	22.6494
96	CT-L3S2 + Lane Load	50	930.83	44214.425	281.17	2907.09	15.1125
96	CT-L3S2 + Lane Load	50	930.83	44214.425	-1808.23	-2181.29	19.4409
97	CT-L3S2 + Lane Load	50	930.83	44214.425	-1399.55	-2099.33	20.3945
97	CT-L3S2 + Lane Load	50	930.83	44214.425	-2828.65	-2367.9	17.4778
98	CT-L3S2 + Lane Load	50	930.83	44214.425	-1822.65	-2183.24	19.4169
98	CT-L3S2 + Lane Load	50	930.83	44214.425	-3954.07	-3505.63	11.4845
99	CT-L3S2 + Lane Load	50	930.83	44214.425	-3953.09	-3502.53	11.4949
99	CT-L3S2 + Lane Load	50	930.83	44214.425	-1821.66	-2144.97	19.7638
100	CT-L3S2 + Lane Load	50	930.83	44214.425	-2827.66	-2326.4	17.7900
100	CT-L3S2 + Lane Load	50	930.83	44214.425	-1398.55	-2062.41	20.7601
101	CT-L3S2 + Lane Load	50	930.83	44214.425	-1807.23	-2142.94	19.7893
101	CT-L3S2 + Lane Load	50	930.83	44214.425	282.18	2881.89	15.2442
102	CT-L3S2 + Lane Load	50	930.83	44214.425	-602.15	-1891.23	23.0603
102	CT-L3S2 + Lane Load	50	930.83	44214.425	282.18	2881.89	15.2442
103	CT-L3S2 + Lane Load	50	930.83	44214.425	-602.15	-1891.23	23.0603
103	CT-L3S2 + Lane Load	50	930.83	44214.425	1142.6	4050.21	10.6345
104	CT-L3S2 + Lane Load	50	930.83	44214.425	577.13	2817.64	15.4872
104	CT-L3S2 + Lane Load	50	930.83	44214.425	1641.66	3484.47	12.2179
105	CT-L3S2 + Lane Load	50	930.83	44214.425	1194.55	4116.56	10.4504
105	CT-L3S2 + Lane Load	50	930.83	44214.425	1641.66	3484.47	12.2179
106	CT-L3S2 + Lane Load	50	930.83	44214.425	1194.55	4116.56	10.4504
106	CT-L3S2 + Lane Load	50	930.83	44214.425	1672.43	4322.64	9.8417
107	CT-L3S2 + Lane Load	50	930.83	44214.425	1714.84	3527.49	12.0481
107	CT-L3S2 + Lane Load	50	930.83	44214.425	1395.64	2894.8	14.7916
108	CT-L3S2 + Lane Load	50	930.83	44214.425	1758.58	4398.03	9.6534

108	CT-L3S2 + Lane Load	50	930.83	44214.425	1395.64	2894.8	14.7916
109	CT-L3S2 + Lane Load	50	930.83	44214.425	1758.58	4398.03	9.6534
109	CT-L3S2 + Lane Load	50	930.83	44214.425	1010.22	2949.85	14.6462
110	CT-L3S2 + Lane Load	50	930.83	44214.425	1422.34	2922.98	14.6399
110	CT-L3S2 + Lane Load	50	930.83	44214.425	-12.25	-2324.38	19.0168
111	CT-L3S2 + Lane Load	50	930.83	44214.425	845.77	2714.01	15.9795
111	CT-L3S2 + Lane Load	50	930.83	44214.425	-66.58	-897.25	49.2035
112	CT-L3S2 + Lane Load	50	930.83	44214.425	-135.21	-2593.87	16.9936
112	CT-L3S2 + Lane Load	50	930.83	44214.425	-12.11	94.02	470.1374
113	CT-L3S2 + Lane Load	50	930.83	44214.425	-0.68	-89.38	494.6716
113	CT-L3S2 + Lane Load	50	930.83	44214.425	-116.97	-1105.8	39.8783
114	CT-L3S2 + Lane Load	50	930.83	44214.425	-33.95	-435.02	101.5596
114	CT-L3S2 + Lane Load	50	930.83	44214.425	953.53	2225.1	19.4422
115	CT-L3S2 + Lane Load	50	930.83	44214.425	-1.02	-960.61	46.0264
115	CT-L3S2 + Lane Load	50	930.83	44214.425	1563.01	3414.7	12.4905
116	CT-L3S2 + Lane Load	50	930.83	44214.425	1069.45	2397.38	17.9967
116	CT-L3S2 + Lane Load	50	930.83	44214.425	1802.46	3950.53	10.7358
117	CT-L3S2 + Lane Load	50	930.83	44214.425	1506.9	3335.91	12.8024
117	CT-L3S2 + Lane Load	50	930.83	44214.425	1802.46	3950.53	10.7358
118	CT-L3S2 + Lane Load	50	930.83	44214.425	1506.9	3335.91	12.8024
118	CT-L3S2 + Lane Load	50	930.83	44214.425	1715.13	3832.3	11.0898
119	CT-L3S2 + Lane Load	50	930.83	44214.425	1723.17	3867.47	10.9868
119	CT-L3S2 + Lane Load	50	930.83	44214.425	1186.94	3535.52	12.1701
120	CT-L3S2 + Lane Load	50	930.83	44214.425	1663.62	3793.08	11.2180
120	CT-L3S2 + Lane Load	50	930.83	44214.425	1186.94	3535.52	12.1701
121	CT-L3S2 + Lane Load	50	930.83	44214.425	1663.62	3793.08	11.2180
121	CT-L3S2 + Lane Load	50	930.83	44214.425	562.52	3025.36	14.4287
122	CT-L3S2 + Lane Load	50	930.83	44214.425	1148.86	3481.49	12.3699
122	CT-L3S2 + Lane Load	50	930.83	44214.425	-617.18	-2082.39	20.9362
123	CT-L3S2 + Lane Load	50	930.83	44214.425	272.43	2751.08	15.9726
123	CT-L3S2 + Lane Load	50	930.83	44214.425	-617.18	-2082.39	20.9362
124	CT-L3S2 + Lane Load	50	930.83	44214.425	272.43	2751.08	15.9726
124	CT-L3S2 + Lane Load	50	930.83	44214.425	-1809.06	-2339.67	18.1245
125	CT-L3S2 + Lane Load	50	930.83	44214.425	-1402.75	-2256.66	18.9713
125	CT-L3S2 + Lane Load	50	930.83	44214.425	-2826.46	-2527.58	16.3745
126	CT-L3S2 + Lane Load	50	930.83	44214.425	-1824.86	-2340.83	18.1088
126	CT-L3S2 + Lane Load	50	930.83	44214.425	-3948.63	-3276.89	12.2878
127	CT-L3S2 + Lane Load	50	930.83	44214.425	-3947.65	-3270.76	12.3111
127	CT-L3S2 + Lane Load	50	930.83	44214.425	-1823.98	-2301.48	18.4188
128	CT-L3S2 + Lane Load	50	930.83	44214.425	-2825.51	-2485.22	16.6540
128	CT-L3S2 + Lane Load	50	930.83	44214.425	-1401.87	-2218.6	19.2971
129	CT-L3S2 + Lane Load	50	930.83	44214.425	-1808.15	-2300.21	18.4358
129	CT-L3S2 + Lane Load	50	930.83	44214.425	273.22	2721.53	16.1458
130	CT-L3S2 + Lane Load	50	930.83	44214.425	-616.31	-2047.12	21.2973
130	CT-L3S2 + Lane Load	50	930.83	44214.425	273.22	2721.53	16.1458
131	CT-L3S2 + Lane Load	50	930.83	44214.425	-616.31	-2047.12	21.2973
131	CT-L3S2 + Lane Load	50	930.83	44214.425	1149.64	3452.23	12.4745
132	CT-L3S2 + Lane Load	50	930.83	44214.425	563.42	2995.28	14.5733
132	CT-L3S2 + Lane Load	50	930.83	44214.425	1664.29	3778.91	11.2599
133	CT-L3S2 + Lane Load	50	930.83	44214.425	1187.78	3506.15	12.2718
133	CT-L3S2 + Lane Load	50	930.83	44214.425	1664.29	3778.91	11.2599
134	CT-L3S2 + Lane Load	50	930.83	44214.425	1187.78	3506.15	12.2718
134	CT-L3S2 + Lane Load	50	930.83	44214.425	1723.65	3854.55	11.0235
135	CT-L3S2 + Lane Load	50	930.83	44214.425	1715.88	3818.45	11.1298
135	CT-L3S2 + Lane Load	50	930.83	44214.425	1507.13	3324.7	12.8455
136	CT-L3S2 + Lane Load	50	930.83	44214.425	1803.05	3936.31	10.7744
136	CT-L3S2 + Lane Load	50	930.83	44214.425	1507.13	3324.7	12.8455
137	CT-L3S2 + Lane Load	50	930.83	44214.425	1803.05	3936.31	10.7744
137	CT-L3S2 + Lane Load	50	930.83	44214.425	1069.61	2391.08	18.0441
138	CT-L3S2 + Lane Load	50	930.83	44214.425	1563.33	3403.19	12.5327
138	CT-L3S2 + Lane Load	50	930.83	44214.425	-1.05	-960.67	46.0235
139	CT-L3S2 + Lane Load	50	930.83	44214.425	953.7	2219.07	19.4950
139	CT-L3S2 + Lane Load	50	930.83	44214.425	-33.98	-434.94	101.5783
140	CT-L3S2 + Lane Load	50	930.83	44214.425	-117	-1105.66	39.8834
140	CT-L3S2 + Lane Load	50	930.83	44214.425	-0.68	-89.37	494.7269
141	CT-L3S2 + Lane Load	50	930.83	44214.425	58.93	166.57	265.0867
141	CT-L3S2 + Lane Load	50	930.83	44214.425	109.06	-1263.46	34.9084
142	CT-L3S2 + Lane Load	50	930.83	44214.425	155.03	-388.55	113.3944
142	CT-L3S2 + Lane Load	50	930.83	44214.425	1370.13	2793.12	15.3392
143	CT-L3S2 + Lane Load	50	930.83	44214.425	152.32	-1182.31	37.2678
143	CT-L3S2 + Lane Load	50	930.83	44214.425	1944.11	4204.58	10.0534
144	CT-L3S2 + Lane Load	50	930.83	44214.425	1278.47	2647.65	16.2166
144	CT-L3S2 + Lane Load	50	930.83	44214.425	1902.22	4092.86	10.3381
145	CT-L3S2 + Lane Load	50	930.83	44214.425	1833.31	4031.81	10.5117
145	CT-L3S2 + Lane Load	50	930.83	44214.425	1902.22	4092.86	10.3381

146	CT-L3S2 + Lane Load	50	930.83	44214.425	1833.31	4031.81	10.5117
146	CT-L3S2 + Lane Load	50	930.83	44214.425	1706.67	4081.24	10.4154
147	CT-L3S2 + Lane Load	50	930.83	44214.425	1886.67	4075.56	10.3858
147	CT-L3S2 + Lane Load	50	930.83	44214.425	1169.6	3491.29	12.3292
148	CT-L3S2 + Lane Load	50	930.83	44214.425	1713.96	4072.36	10.4363
148	CT-L3S2 + Lane Load	50	930.83	44214.425	1169.6	3491.29	12.3292
149	CT-L3S2 + Lane Load	50	930.83	44214.425	1713.96	4072.36	10.4363
149	CT-L3S2 + Lane Load	50	930.83	44214.425	522.96	3152.86	13.8577
150	CT-L3S2 + Lane Load	50	930.83	44214.425	1164.64	3498.46	12.3054
150	CT-L3S2 + Lane Load	50	930.83	44214.425	-666.53	-2258.78	19.2794
151	CT-L3S2 + Lane Load	50	930.83	44214.425	247.3	2799.85	15.7034
151	CT-L3S2 + Lane Load	50	930.83	44214.425	-666.53	-2258.78	19.2794
152	CT-L3S2 + Lane Load	50	930.83	44214.425	247.3	2799.85	15.7034
152	CT-L3S2 + Lane Load	50	930.83	44214.425	-1800.28	-2480.47	17.0992
153	CT-L3S2 + Lane Load	50	930.83	44214.425	-1407.95	-2407.75	17.7786
153	CT-L3S2 + Lane Load	50	930.83	44214.425	-2817.36	-2667.78	15.5174
154	CT-L3S2 + Lane Load	50	930.83	44214.425	-1820.09	-2488.19	17.0382
154	CT-L3S2 + Lane Load	50	930.83	44214.425	-3942.87	-3413.03	11.7994
155	CT-L3S2 + Lane Load	50	930.83	44214.425	-3941.88	-3412.16	11.8027
155	CT-L3S2 + Lane Load	50	930.83	44214.425	-1819.32	-2447.94	17.3187
156	CT-L3S2 + Lane Load	50	930.83	44214.425	-2816.45	-2624.76	15.7721
156	CT-L3S2 + Lane Load	50	930.83	44214.425	-1407.2	-2369	18.0697
157	CT-L3S2 + Lane Load	50	930.83	44214.425	-1799.47	-2440.53	17.3794
157	CT-L3S2 + Lane Load	50	930.83	44214.425	247.85	2769.14	15.8773
158	CT-L3S2 + Lane Load	50	930.83	44214.425	-665.8	-2222.34	19.5958
158	CT-L3S2 + Lane Load	50	930.83	44214.425	247.85	2769.14	15.8773
159	CT-L3S2 + Lane Load	50	930.83	44214.425	-665.8	-2222.34	19.5958
159	CT-L3S2 + Lane Load	50	930.83	44214.425	1165.09	3469.27	12.4088
160	CT-L3S2 + Lane Load	50	930.83	44214.425	523.6	3121.43	13.9971
160	CT-L3S2 + Lane Load	50	930.83	44214.425	1714.21	4056.17	10.4779
161	CT-L3S2 + Lane Load	50	930.83	44214.425	1170.12	3462.07	12.4331
161	CT-L3S2 + Lane Load	50	930.83	44214.425	1714.21	4056.17	10.4779
162	CT-L3S2 + Lane Load	50	930.83	44214.425	1170.12	3462.07	12.4331
162	CT-L3S2 + Lane Load	50	930.83	44214.425	1886.84	4061.12	10.4226
163	CT-L3S2 + Lane Load	50	930.83	44214.425	1706.98	4065.06	10.4568
163	CT-L3S2 + Lane Load	50	930.83	44214.425	1833.32	4018.22	10.5472
164	CT-L3S2 + Lane Load	50	930.83	44214.425	1902.42	4078.26	10.3750
164	CT-L3S2 + Lane Load	50	930.83	44214.425	1833.32	4018.22	10.5472
165	CT-L3S2 + Lane Load	50	930.83	44214.425	1902.42	4078.26	10.3750
165	CT-L3S2 + Lane Load	50	930.83	44214.425	1278.54	2638.87	16.2706
166	CT-L3S2 + Lane Load	50	930.83	44214.425	1944.18	4190.32	10.0876
166	CT-L3S2 + Lane Load	50	930.83	44214.425	152.41	-1182.79	37.2526
167	CT-L3S2 + Lane Load	50	930.83	44214.425	1370.27	2783.68	15.3912
167	CT-L3S2 + Lane Load	50	930.83	44214.425	155.1	-388.73	113.3417
168	CT-L3S2 + Lane Load	50	930.83	44214.425	109.15	-1263.96	34.8945
168	CT-L3S2 + Lane Load	50	930.83	44214.425	58.95	166.36	265.4212
169	CT-L3S2 + Lane Load	50	930.83	44214.425	-27.98	-146.96	300.6699
169	CT-L3S2 + Lane Load	50	930.83	44214.425	2763.91	5382.36	7.7012
170	CT-L3S2 + Lane Load	50	930.83	44214.425	1347.53	2636.59	16.2585
170	CT-L3S2 + Lane Load	50	930.83	44214.425	2357.71	4922.79	8.5026
171	CT-L3S2 + Lane Load	50	930.83	44214.425	2521.66	4871.39	8.5587
171	CT-L3S2 + Lane Load	50	930.83	44214.425	1919.32	4481.04	9.4387
172	CT-L3S2 + Lane Load	50	930.83	44214.425	2233.93	4655.8	9.0168
172	CT-L3S2 + Lane Load	50	930.83	44214.425	1843.96	4705.98	9.0035
173	CT-L3S2 + Lane Load	50	930.83	44214.425	2117.39	4687.04	8.9816
173	CT-L3S2 + Lane Load	50	930.83	44214.425	1843.96	4705.98	9.0035
174	CT-L3S2 + Lane Load	50	930.83	44214.425	2117.39	4687.04	8.9816
174	CT-L3S2 + Lane Load	50	930.83	44214.425	1593.26	4410.84	9.6628
175	CT-L3S2 + Lane Load	50	930.83	44214.425	1999.48	4829.08	8.7418
175	CT-L3S2 + Lane Load	50	930.83	44214.425	1034.92	4018.08	10.7463
176	CT-L3S2 + Lane Load	50	930.83	44214.425	1682.13	4477.28	9.4996
176	CT-L3S2 + Lane Load	50	930.83	44214.425	1034.92	4018.08	10.7463
177	CT-L3S2 + Lane Load	50	930.83	44214.425	1682.13	4477.28	9.4996
177	CT-L3S2 + Lane Load	50	930.83	44214.425	431.21	3418.28	12.8086
178	CT-L3S2 + Lane Load	50	930.83	44214.425	1116.72	4077.61	10.5694
178	CT-L3S2 + Lane Load	50	930.83	44214.425	-703.26	-2351.06	18.5070
179	CT-L3S2 + Lane Load	50	930.83	44214.425	233.07	3167.46	13.8854
179	CT-L3S2 + Lane Load	50	930.83	44214.425	-703.26	-2351.06	18.5070
180	CT-L3S2 + Lane Load	50	930.83	44214.425	233.07	3167.46	13.8854
180	CT-L3S2 + Lane Load	50	930.83	44214.425	-1715.31	-2594.19	16.3824
181	CT-L3S2 + Lane Load	50	930.83	44214.425	-1320.56	-2509.26	17.0942
181	CT-L3S2 + Lane Load	50	930.83	44214.425	-2623.01	-2768.69	15.0221
182	CT-L3S2 + Lane Load	50	930.83	44214.425	-1668.68	-2587.54	16.4425
182	CT-L3S2 + Lane Load	50	930.83	44214.425	-3675.61	-3675.6	11.0292
183	CT-L3S2 + Lane Load	50	930.83	44214.425	-3674.64	-3682.11	11.0099

183	CT-L3S2 + Lane Load	50	930.83	44214.425	-1668.05	-2556.84	16.6402
184	CT-L3S2 + Lane Load	50	930.83	44214.425	-2622.16	-2735.24	15.2061
184	CT-L3S2 + Lane Load	50	930.83	44214.425	-1319.96	-2479.4	17.3003
185	CT-L3S2 + Lane Load	50	930.83	44214.425	-1714.61	-2563.42	16.5793
185	CT-L3S2 + Lane Load	50	930.83	44214.425	233.34	3142.1	13.9974
186	CT-L3S2 + Lane Load	50	930.83	44214.425	-702.69	-2323.02	18.7307
186	CT-L3S2 + Lane Load	50	930.83	44214.425	233.34	3142.1	13.9974
187	CT-L3S2 + Lane Load	50	930.83	44214.425	-702.69	-2323.02	18.7307
187	CT-L3S2 + Lane Load	50	930.83	44214.425	1116.83	4050.26	10.6407
188	CT-L3S2 + Lane Load	50	930.83	44214.425	431.57	3391.76	12.9086
188	CT-L3S2 + Lane Load	50	930.83	44214.425	1681.98	4463.77	9.5284
189	CT-L3S2 + Lane Load	50	930.83	44214.425	1035.1	3993.83	10.8115
189	CT-L3S2 + Lane Load	50	930.83	44214.425	1681.98	4463.77	9.5284
190	CT-L3S2 + Lane Load	50	930.83	44214.425	1035.1	3993.83	10.8115
190	CT-L3S2 + Lane Load	50	930.83	44214.425	1999.37	4814.72	8.7679
191	CT-L3S2 + Lane Load	50	930.83	44214.425	1593.16	4397.43	9.6923
191	CT-L3S2 + Lane Load	50	930.83	44214.425	2117.21	4674.84	9.0051
192	CT-L3S2 + Lane Load	50	930.83	44214.425	1843.78	4694.04	9.0265
192	CT-L3S2 + Lane Load	50	930.83	44214.425	2117.21	4674.84	9.0051
193	CT-L3S2 + Lane Load	50	930.83	44214.425	1843.78	4694.04	9.0265
193	CT-L3S2 + Lane Load	50	930.83	44214.425	2234.09	4639.82	9.0478
194	CT-L3S2 + Lane Load	50	930.83	44214.425	1919.04	4469.46	9.4632
194	CT-L3S2 + Lane Load	50	930.83	44214.425	2522.53	4856.34	8.5850
195	CT-L3S2 + Lane Load	50	930.83	44214.425	2357.96	4906.95	8.5300
195	CT-L3S2 + Lane Load	50	930.83	44214.425	1348.01	2628.77	16.3066
196	CT-L3S2 + Lane Load	50	930.83	44214.425	2764.84	5366.39	7.7239
196	CT-L3S2 + Lane Load	50	930.83	44214.425	-27.99	-147.74	299.0824

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

SWING SPAN – LOAD COMBINATION ANALYSIS

PROJECT TITLE : Load Rating and Stuctural Analysis

MIDAS	Company	Close, jensen, and Miller PC	Client	CT DOT
	Author	Danielle Coutu	File Name	Swing Span Girder 7 Analysis

```
**********************************************************************************************
**           MIDAS/Civil V.8.5.1    Modeling, Integrated Design & Analysis Software              **
**                             CIVIL STRUCTURE DESIGN SYSTEM                                    **
**********************************************************************************************

                    XXX   XXX     XX    XXXXXXXX      XXXXXXX    XXXXXXXX
                    XXXX XXXX     XX    XX     XX     XX   XX    XX    XX
                    XX XXX XX     XX    XX     XX     XX   XX    XX
                    XX  X  XX     XX    XX     XX     XXXXXXX    XXXXXXXX
                    XXX    XX    XXX    XXX    XX     XX   XX         XXX
                    XXX    XX    XXX    XXX    XX    XXX   XX    XX   XXX
                    XXX    XX    XXX    XXX    XX    XXX   XX    XX   XXX
                    XXX    XX    XXX    XXXXXXXX    XXX   XX    XXXXXXXX  /Civil

                                    VERSION 8.5.1

                  COPYRIGHT (C) SINCE 1989. MIDAS Information Technology Co.,Ltd.
                                    ALL RIGHTS RESERVED.             MIDAS TEAM

**********************************************************************************************


                                  ANALYSIS RESULT OUTPUT
                                  _____________________
```

LOAD SET FOR DISPLACMENT OUTPUT - Strength I HL-93 Inv.

<< LOAD COMB/CASE/ENVEL ABBREVIATION TABLE >>

ABBREVIATION	FULL NAME	TYPE	DESCRIPTION
Self W~1	Self Weight	Static	
Guide ~1	Guide Rail	Static	
Wearin~1	Wearing Surface	Static	
S1 HL-~1	S1 HL-93 INV	Gen.Comb	

<< SELECTED LOAD CASE/COMBINATION DETAIL LIST >>

[Selected Load Combinations]

L. COMB	TYPE	COMBINATION DETAIL
S1 HL-~1	Gen.Comb	1.250 x Self W~1 + 1.250 x Guide ~1 + 1.250 x Sidewalk + 1.500 x Wearin~1 + 1.750 x HL-93

LOAD SET FOR REACTION OUTPUT - Strength I HL-93 Inv.

<< LOAD COMB/CASE/ENVEL ABBREVIATION TABLE >>

ABBREVIATION	FULL NAME	TYPE	DESCRIPTION
No Abbreviation was defined in this Load Set. All names are less than 8 char.'s			

<< SELECTED LOAD CASE/COMBINATION DETAIL LIST >>

[Selected Load Combinations]

L. COMB	TYPE	COMBINATION DETAIL
S1 HL-~1	Gen.Comb	1.250 x Self W~1 + 1.250 x Guide ~1 + 1.250 x Sidewalk + 1.500 x Wearin~1 + 1.750 x HL-93

LOAD SET FOR ELEMENT OUTPUT - Strength I HL-93 Inv.

<< LOAD COMB/CASE/ENVEL ABBREVIATION TABLE >>

ABBREVIATION	FULL NAME	TYPE	DESCRIPTION
No Abbreviation was defined in this Load Set. All names are less than 8 char.'s			

<< SELECTED LOAD CASE/COMBINATION DETAIL LIST >>

[Selected Load Combinations]

L. COMB	TYPE	COMBINATION DETAIL
S1 HL-~1	Gen.Comb	1.250 x Self W~1 + 1.250 x Guide ~1 + 1.250 x Sidewalk + 1.500 x Wearin~1 + 1.750 x HL-93

NODE DISPLACEMENT AND ROTATIONS DEFAULT PRINTOUT Unit System : kips , in

NODE	LC		UX	UY	UZ	RX	RY	RZ
35	S1 HL-~1	Max	0.051	0.001	-0.157	-0.0	0.0	-0.0
		Min	0.051	0.001	-0.157	-0.0	0.0	-0.0
36	S1 HL-~1	Max	0.046	-0.000	-0.156	-0.0	0.0	-0.0
		Min	0.046	-0.000	-0.156	-0.0	0.0	-0.0
55	S1 HL-~1	Max	0.058	0.001	-0.207	-0.0	0.0	-0.0
		Min	0.058	0.001	-0.207	-0.0	0.0	-0.0
56	S1 HL-~1	Max	0.035	0.000	-0.207	-0.0	0.0	0.0
		Min	0.035	0.000	-0.207	-0.0	0.0	0.0
63	S1 HL-~1	Max	0.043	0.001	-0.182	-0.0	-0.0	-0.0
		Min	0.043	0.001	-0.182	-0.0	-0.0	-0.0
64	S1 HL-~1	Max	0.057	0.000	-0.182	-0.0	-0.0	-0.0
		Min	0.057	0.000	-0.182	-0.0	-0.0	-0.0
81	S1 HL-~1	Max	0.041	-0.001	-0.278	0.0	-0.0	0.0
		Min	0.041	-0.001	-0.278	0.0	-0.0	0.0
82	S1 HL-~1	Max	0.061	0.000	-0.277	0.0	-0.0	0.0
		Min	0.061	0.000	-0.277	0.0	-0.0	0.0
95	S1 HL-~1	Max	0.046	-0.001	-0.343	0.0	-0.0	0.0
		Min	0.046	-0.001	-0.343	0.0	-0.0	0.0
96	S1 HL-~1	Max	0.050	0.002	-0.343	0.0	-0.0	-0.0
		Min	0.050	0.002	-0.343	0.0	-0.0	-0.0
688	S1 HL-~1	Max	0.051	-0.000	-0.465	-0.0	-0.0	0.0
		Min	0.051	-0.000	-0.465	-0.0	-0.0	0.0
689	S1 HL-~1	Max	0.047	-0.003	-0.398	-0.0	0.0	0.0
		Min	0.047	-0.003	-0.398	-0.0	0.0	0.0
690	S1 HL-~1	Max	0.046	-0.004	-0.263	0.0	0.0	0.0
		Min	0.046	-0.004	-0.263	0.0	0.0	0.0
691	S1 HL-~1	Max	0.031	0.025	-0.004	0.0	0.0	0.0
		Min	0.031	0.025	-0.004	0.0	0.0	0.0
692	S1 HL-~1	Max	0.065	0.023	-0.206	0.0	-0.0	-0.0
		Min	0.065	0.023	-0.206	0.0	-0.0	-0.0
693	S1 HL-~1	Max	0.048	0.001	-0.157	0.0	0.0	-0.0
		Min	0.048	0.001	-0.157	0.0	0.0	-0.0
700	S1 HL-~1	Max	0.055	-0.000	-0.251	-0.0	0.0	0.0
		Min	0.055	-0.000	-0.251	-0.0	0.0	0.0
701	S1 HL-~1	Max	0.049	-0.001	-0.343	0.0	0.0	0.0
		Min	0.049	-0.001	-0.343	0.0	0.0	0.0

702 S1 HL-~1	Max	0.042	-0.001	-0.315	-0.0	-0.0	0.0
	Min	0.042	-0.001	-0.315	-0.0	-0.0	0.0
703 S1 HL-~1	Max	0.046	-0.002	-0.413	-0.0	-0.0	-0.0
	Min	0.046	-0.002	-0.413	-0.0	-0.0	-0.0
704 S1 HL-~1	Max	0.052	-0.003	-0.465	0.0	0.0	-0.0
	Min	0.052	-0.003	-0.465	0.0	0.0	-0.0
705 S1 HL-~1	Max	0.059	-0.002	-0.398	-0.0	0.0	-0.0
	Min	0.059	-0.002	-0.398	-0.0	0.0	-0.0
712 S1 HL-~1	Max	0.021	-0.010	-0.250	-0.0	0.0	0.0
	Min	0.021	-0.010	-0.250	-0.0	0.0	0.0
713 S1 HL-~1	Max	0.042	0.005	-0.342	0.0	0.0	0.0
	Min	0.042	0.005	-0.342	0.0	0.0	0.0
714 S1 HL-~1	Max	0.058	0.000	-0.315	0.0	-0.0	-0.0
	Min	0.058	0.000	-0.315	0.0	-0.0	-0.0
715 S1 HL-~1	Max	0.072	-0.012	-0.413	-0.0	-0.0	-0.0
	Min	0.072	-0.012	-0.413	-0.0	-0.0	-0.0
716 S1 HL-~1	Max	0.050	0.004	-0.465	0.0	0.0	-0.0
	Min	0.050	0.004	-0.465	0.0	0.0	-0.0
717 S1 HL-~1	Max	0.035	-0.001	-0.397	0.0	0.0	0.0
	Min	0.035	-0.001	-0.397	0.0	0.0	0.0
719 S1 HL-~1	Max	0.046	0.000	-0.207	0.0	0.0	0.0
	Min	0.046	0.000	-0.207	0.0	0.0	0.0
721 S1 HL-~1	Max	0.050	0.001	-0.182	0.0	-0.0	-0.0
	Min	0.050	0.001	-0.182	0.0	-0.0	-0.0
723 S1 HL-~1	Max	0.051	-0.000	-0.278	0.0	-0.0	0.0
	Min	0.051	-0.000	-0.278	0.0	-0.0	0.0
725 S1 HL-~1	Max	0.048	0.000	-0.343	0.0	-0.0	-0.0
	Min	0.048	0.000	-0.343	0.0	-0.0	-0.0
727 S1 HL-~1	Max	0.041	0.001	-0.306	0.0	0.0	-0.0
	Min	0.041	0.001	-0.306	0.0	0.0	-0.0
729 S1 HL-~1	Max	0.033	-0.007	-0.134	-0.0	0.0	-0.0
	Min	0.033	-0.007	-0.134	-0.0	0.0	-0.0
731 S1 HL-~1	Max	0.046	-0.001	-0.343	0.0	0.0	-0.0
	Min	0.046	-0.001	-0.343	0.0	0.0	-0.0
733 S1 HL-~1	Max	0.049	-0.001	-0.449	0.0	0.0	0.0
	Min	0.049	-0.001	-0.449	0.0	0.0	0.0
735 S1 HL-~1	Max	0.055	-0.001	-0.451	0.0	-0.0	0.0
	Min	0.055	-0.001	-0.451	0.0	-0.0	0.0

737	S1 HL-~1	Max	0.064	-0.009	-0.319	-0.0	-0.0	0.0
		Min	0.064	-0.009	-0.319	-0.0	-0.0	0.0
1013	S1 HL-~1	Max	0.050	0.002	-0.344	0.0	-0.0	0.0
		Min	0.050	0.002	-0.344	0.0	-0.0	0.0
1015	S1 HL-~1	Max	0.006	-0.018	-0.128	-0.0	0.0	0.0
		Min	0.006	-0.018	-0.128	-0.0	0.0	0.0
1087	S1 HL-~1	Max	0.061	0.000	-0.221	0.0	-0.0	0.0
		Min	0.061	0.000	-0.221	0.0	-0.0	0.0
1121	S1 HL-~1	Max	0.032	-0.000	-0.263	0.0	0.0	0.0
		Min	0.032	-0.000	-0.263	0.0	0.0	0.0
1148	S1 HL-~1	Max	0.043	0.001	-0.449	0.0	0.0	0.0
		Min	0.043	0.001	-0.449	0.0	0.0	0.0
1152	S1 HL-~1	Max	0.087	-0.020	-0.314	-0.0	-0.0	0.0
		Min	0.087	-0.020	-0.314	-0.0	-0.0	0.0
1153	S1 HL-~1	Max	0.002	-0.000	-0.024	-0.0	0.0	0.0
		Min	0.002	-0.000	-0.024	-0.0	0.0	0.0
1177	S1 HL-~1	Max	0.090	-0.002	-0.226	-0.0	-0.0	0.0
		Min	0.090	-0.002	-0.226	-0.0	-0.0	0.0
1206	S1 HL-~1	Max	0.061	0.000	-0.278	0.0	-0.0	0.0
		Min	0.061	0.000	-0.278	0.0	-0.0	0.0
1207	S1 HL-~1	Max	0.031	0.003	-0.306	0.0	0.0	0.0
		Min	0.031	0.003	-0.306	0.0	0.0	0.0
1208	S1 HL-~1	Max	0.032	-0.000	-0.343	0.0	0.0	0.0
		Min	0.032	-0.000	-0.343	0.0	0.0	0.0
1332	S1 HL-~1	Max	0.061	0.001	-0.451	0.0	-0.0	0.0
		Min	0.061	0.001	-0.451	0.0	-0.0	0.0
1383	S1 HL-~1	Max	0.062	-0.002	-0.005	-0.0	0.0	0.0
		Min	0.062	-0.002	-0.005	-0.0	0.0	0.0
1384	S1 HL-~1	Max	0.093	-0.002	-0.202	-0.0	-0.0	0.0
		Min	0.093	-0.002	-0.202	-0.0	-0.0	0.0
1492	S1 HL-~1	Max	0.039	-0.004	-0.207	-0.0	-0.0	-0.0
		Min	0.039	-0.004	-0.207	-0.0	-0.0	-0.0
1493	S1 HL-~1	Max	-0.000	0.000	0.000	-0.0	0.0	-0.0
		Min	-0.000	0.000	0.000	-0.0	0.0	-0.0
1591	S1 HL-~1	Max	0.059	-0.004	-0.413	0.0	-0.0	-0.0
		Min	0.059	-0.004	-0.413	0.0	-0.0	-0.0
1599	S1 HL-~1	Max	0.002	-0.012	-0.071	-0.0	0.0	-0.0
		Min	0.002	-0.012	-0.071	-0.0	0.0	-0.0
1614	S1 HL-~1	Max	0.042	0.001	-0.193	-0.0	-0.0	0.0
		Min	0.042	0.001	-0.193	-0.0	-0.0	0.0

1615 S1 HL-~1	Max	0.059	0.000	-0.194	0.0	-0.0	0.0
	Min	0.059	0.000	-0.194	0.0	-0.0	0.0
1621 S1 HL-~1	Max	0.041	0.000	-0.220	-0.0	-0.0	0.0
	Min	0.041	0.000	-0.220	-0.0	-0.0	0.0
1662 S1 HL-~1	Max	0.042	0.001	-0.448	0.0	0.0	0.0
	Min	0.042	0.001	-0.448	0.0	0.0	0.0
1697 S1 HL-~1	Max	0.053	-0.001	-0.306	0.0	0.0	-0.0
	Min	0.053	-0.001	-0.306	0.0	0.0	-0.0
1705 S1 HL-~1	Max	0.030	0.003	-0.306	0.0	0.0	0.0
	Min	0.030	0.003	-0.306	0.0	0.0	0.0
1718 S1 HL-~1	Max	0.063	0.001	-0.451	0.0	-0.0	-0.0
	Min	0.063	0.001	-0.451	0.0	-0.0	-0.0
1766 S1 HL-~1	Max	0.086	-0.021	-0.323	-0.0	-0.0	0.0
	Min	0.086	-0.021	-0.323	-0.0	-0.0	0.0
1801 S1 HL-~1	Max	0.060	0.003	-0.134	-0.0	0.0	0.0
	Min	0.060	0.003	-0.134	-0.0	0.0	0.0
1809 S1 HL-~1	Max	0.006	-0.018	-0.133	-0.0	0.0	0.0
	Min	0.006	-0.018	-0.133	-0.0	0.0	0.0
1862 S1 HL-~1	Max	0.061	0.000	-0.219	0.0	-0.0	0.0
	Min	0.061	0.000	-0.219	0.0	-0.0	0.0
1870 S1 HL-~1	Max	0.032	-0.000	-0.262	0.0	0.0	0.0
	Min	0.032	-0.000	-0.262	0.0	0.0	0.0
1905 S1 HL-~1	Max	0.060	-0.001	-0.343	0.0	0.0	-0.0
	Min	0.060	-0.001	-0.343	0.0	0.0	-0.0
1913 S1 HL-~1	Max	0.032	-0.001	-0.343	0.0	0.0	-0.0
	Min	0.032	-0.001	-0.343	0.0	0.0	-0.0
1926 S1 HL-~1	Max	-0.000	-0.012	-0.064	-0.0	0.0	0.0
	Min	-0.000	-0.012	-0.064	-0.0	0.0	0.0
1982 S1 HL-~1	Max	0.003	-0.012	-0.078	-0.0	0.0	0.0
	Min	0.003	-0.012	-0.078	-0.0	0.0	0.0
2030 S1 HL-~1	Max	0.091	-0.014	-0.265	-0.0	-0.0	0.0
	Min	0.091	-0.014	-0.265	-0.0	-0.0	0.0
2086 S1 HL-~1	Max	0.093	-0.014	-0.258	-0.0	-0.0	0.0
	Min	0.093	-0.014	-0.258	-0.0	-0.0	0.0
2087 S1 HL-~1	Max	0.062	0.001	-0.070	-0.0	0.0	-0.0
	Min	0.062	0.001	-0.070	-0.0	0.0	-0.0
2089 S1 HL-~1	Max	0.055	-0.002	-0.449	0.0	0.0	-0.0
	Min	0.055	-0.002	-0.449	0.0	0.0	-0.0

2097 S1 HL-~1	Max	0.043	0.001	-0.449	0.0	0.0	0.0
	Min	0.043	0.001	-0.449	0.0	0.0	0.0
2138 S1 HL-~1	Max	0.089	-0.014	-0.272	-0.0	-0.0	0.0
	Min	0.089	-0.014	-0.272	-0.0	-0.0	0.0
2139 S1 HL-~1	Max	0.039	-0.001	-0.264	-0.0	-0.0	0.0
	Min	0.039	-0.001	-0.264	-0.0	-0.0	0.0
2190 S1 HL-~1	Max	0.034	0.000	-0.225	0.0	0.0	-0.0
	Min	0.034	0.000	-0.225	0.0	0.0	-0.0
2193 S1 HL-~1	Max	0.049	-0.003	-0.451	0.0	-0.0	0.0
	Min	0.049	-0.003	-0.451	0.0	-0.0	0.0
2201 S1 HL-~1	Max	0.062	0.001	-0.451	0.0	-0.0	-0.0
	Min	0.062	0.001	-0.451	0.0	-0.0	-0.0
2242 S1 HL-~1	Max	0.059	0.000	-0.193	0.0	-0.0	0.0
	Min	0.059	0.000	-0.193	0.0	-0.0	0.0
2298 S1 HL-~1	Max	0.034	-0.000	-0.225	0.0	0.0	0.0
	Min	0.034	-0.000	-0.225	0.0	0.0	0.0
2299 S1 HL-~1	Max	0.059	0.000	-0.225	-0.0	0.0	-0.0
	Min	0.059	0.000	-0.225	-0.0	0.0	-0.0
2300 S1 HL-~1	Max	0.046	-0.000	-0.157	-0.0	0.0	-0.0
	Min	0.046	-0.000	-0.157	-0.0	0.0	-0.0
2301 S1 HL-~1	Max	0.041	0.001	-0.319	-0.0	-0.0	-0.0
	Min	0.041	0.001	-0.319	-0.0	-0.0	-0.0
2309 S1 HL-~1	Max	0.087	-0.020	-0.318	-0.0	-0.0	-0.0
	Min	0.087	-0.020	-0.318	-0.0	-0.0	-0.0
2372 S1 HL-~1	Max	0.035	0.000	-0.207	0.0	0.0	-0.0
	Min	0.035	0.000	-0.207	0.0	0.0	-0.0
2402 S1 HL-~1	Max	0.034	0.000	-0.225	0.0	0.0	0.0
	Min	0.034	0.000	-0.225	0.0	0.0	0.0
2404 S1 HL-~1	Max	0.057	0.001	-0.182	0.0	-0.0	0.0
	Min	0.057	0.001	-0.182	0.0	-0.0	0.0
2458 S1 HL-~1	Max	0.059	0.001	-0.193	0.0	-0.0	0.0
	Min	0.059	0.001	-0.193	0.0	-0.0	0.0
2476 S1 HL-~1	Max	0.061	0.000	-0.277	0.0	-0.0	0.0
	Min	0.061	0.000	-0.277	0.0	-0.0	0.0
2485 S1 HL-~1	Max	0.061	0.000	-0.220	0.0	-0.0	0.0
	Min	0.061	0.000	-0.220	0.0	-0.0	0.0
2493 S1 HL-~1	Max	0.060	-0.000	-0.263	-0.0	0.0	-0.0
	Min	0.060	-0.000	-0.263	-0.0	0.0	-0.0
2501 S1 HL-~1	Max	0.032	-0.000	-0.263	0.0	0.0	-0.0
	Min	0.032	-0.000	-0.263	0.0	0.0	-0.0

2509 S1 HL-~1	Max	-0.002	0.000	0.024	-0.0	0.0	0.0
	Min	-0.002	0.000	0.024	-0.0	0.0	0.0
2517 S1 HL-~1	Max	0.095	-0.002	-0.179	-0.0	-0.0	0.0
	Min	0.095	-0.002	-0.179	-0.0	-0.0	0.0
2524 S1 HL-~1	Max	0.050	0.002	-0.343	0.0	-0.0	-0.0
	Min	0.050	0.002	-0.343	0.0	-0.0	-0.0
2580 S1 HL-~1	Max	0.030	0.002	-0.305	0.0	0.0	0.0
	Min	0.030	0.002	-0.305	0.0	0.0	0.0
2613 S1 HL-~1	Max	0.046	-0.001	-0.155	-0.0	0.0	0.0
	Min	0.046	-0.001	-0.155	-0.0	0.0	0.0
2628 S1 HL-~1	Max	0.007	-0.019	-0.138	-0.0	0.0	-0.0
	Min	0.007	-0.019	-0.138	-0.0	0.0	-0.0
2684 S1 HL-~1	Max	0.032	-0.001	-0.343	-0.0	0.0	-0.0
	Min	0.032	-0.001	-0.343	-0.0	0.0	-0.0
2693 S1 HL-~1	Max	0.035	-0.000	-0.207	-0.0	0.0	0.0
	Min	0.035	-0.000	-0.207	-0.0	0.0	0.0
2699 S1 HL-~1	Max	0.038	-0.002	-0.251	0.0	0.0	0.0
	Min	0.038	-0.002	-0.251	0.0	0.0	0.0
2707 S1 HL-~1	Max	0.045	0.001	-0.343	-0.0	0.0	-0.0
	Min	0.045	0.001	-0.343	-0.0	0.0	-0.0
2715 S1 HL-~1	Max	0.050	-0.002	-0.315	-0.0	0.0	-0.0
	Min	0.050	-0.002	-0.315	-0.0	0.0	-0.0
2723 S1 HL-~1	Max	0.051	-0.004	-0.220	0.0	-0.0	-0.0
	Min	0.051	-0.004	-0.220	0.0	-0.0	-0.0
2725 S1 HL-~1	Max	0.057	0.000	-0.182	-0.0	-0.0	0.0
	Min	0.057	0.000	-0.182	-0.0	-0.0	0.0
3540 S1 HL-~1	Max	0.019	-0.010	-0.254	-0.0	0.0	0.0
	Min	0.019	-0.010	-0.254	-0.0	0.0	0.0
3541 S1 HL-~1	Max	0.042	0.005	-0.340	0.0	0.0	0.0
	Min	0.042	0.005	-0.340	0.0	0.0	0.0
3542 S1 HL-~1	Max	0.057	0.000	-0.314	0.0	-0.0	0.0
	Min	0.057	0.000	-0.314	0.0	-0.0	0.0
3543 S1 HL-~1	Max	0.073	-0.012	-0.417	-0.0	-0.0	0.0
	Min	0.073	-0.012	-0.417	-0.0	-0.0	0.0
3544 S1 HL-~1	Max	0.050	0.004	-0.463	0.0	0.0	0.0
	Min	0.050	0.004	-0.463	0.0	0.0	0.0
3545 S1 HL-~1	Max	0.035	-0.001	-0.397	0.0	0.0	0.0
	Min	0.035	-0.001	-0.397	0.0	0.0	0.0

3552 S1 HL-~1	Max	0.022	-0.010	-0.246	-0.0	0.0	0.0
	Min	0.022	-0.010	-0.246	-0.0	0.0	0.0
3553 S1 HL-~1	Max	0.042	0.006	-0.345	0.0	0.0	0.0
	Min	0.042	0.006	-0.345	0.0	0.0	0.0
3554 S1 HL-~1	Max	0.057	0.000	-0.316	0.0	-0.0	0.0
	Min	0.057	0.000	-0.316	0.0	-0.0	0.0
3555 S1 HL-~1	Max	0.070	-0.012	-0.409	-0.0	-0.0	0.0
	Min	0.070	-0.012	-0.409	-0.0	-0.0	0.0
3556 S1 HL-~1	Max	0.051	0.004	-0.467	0.0	0.0	0.0
	Min	0.051	0.004	-0.467	0.0	0.0	0.0
3557 S1 HL-~1	Max	0.035	-0.001	-0.399	0.0	0.0	0.0
	Min	0.035	-0.001	-0.399	0.0	0.0	0.0
3728 S1 HL-~1	Max	0.051	0.001	-0.157	0.0	0.0	-0.0
	Min	0.051	0.001	-0.157	0.0	0.0	-0.0
3736 S1 HL-~1	Max	0.058	0.001	-0.208	-0.0	0.0	-0.0
	Min	0.058	0.001	-0.208	-0.0	0.0	-0.0
3739 S1 HL-~1	Max	0.043	0.001	-0.182	-0.0	-0.0	0.0
	Min	0.043	0.001	-0.182	-0.0	-0.0	0.0
3744 S1 HL-~1	Max	0.041	0.000	-0.221	0.0	-0.0	0.0
	Min	0.041	0.000	-0.221	0.0	-0.0	0.0
3747 S1 HL-~1	Max	0.041	-0.000	-0.277	0.0	-0.0	0.0
	Min	0.041	-0.000	-0.277	0.0	-0.0	0.0
3753 S1 HL-~1	Max	0.046	-0.001	-0.341	0.0	-0.0	-0.0
	Min	0.046	-0.001	-0.341	0.0	-0.0	-0.0
3759 S1 HL-~1	Max	0.053	-0.001	-0.304	0.0	0.0	-0.0
	Min	0.053	-0.001	-0.304	0.0	0.0	-0.0
3765 S1 HL-~1	Max	0.059	0.003	-0.147	-0.0	0.0	0.0
	Min	0.059	0.003	-0.147	-0.0	0.0	0.0
3771 S1 HL-~1	Max	0.060	-0.001	-0.343	0.0	0.0	-0.0
	Min	0.060	-0.001	-0.343	0.0	0.0	-0.0
3776 S1 HL-~1	Max	0.060	-0.000	-0.264	0.0	0.0	0.0
	Min	0.060	-0.000	-0.264	0.0	0.0	0.0
3782 S1 HL-~1	Max	0.055	-0.002	-0.447	0.0	0.0	0.0
	Min	0.055	-0.002	-0.447	0.0	0.0	0.0
3788 S1 HL-~1	Max	0.048	-0.002	-0.449	0.0	-0.0	0.0
	Min	0.048	-0.002	-0.449	0.0	-0.0	0.0
3794 S1 HL-~1	Max	0.042	0.001	-0.332	-0.0	-0.0	-0.0
	Min	0.042	0.001	-0.332	-0.0	-0.0	-0.0
3806 S1 HL-~1	Max	0.060	0.001	-0.099	-0.0	0.0	0.0
	Min	0.060	0.001	-0.099	-0.0	0.0	0.0

3812 S1 HL-~1	Max	0.041	-0.001	-0.294	-0.0	-0.0	0.0
	Min	0.041	-0.001	-0.294	-0.0	-0.0	0.0
3818 S1 HL-~1	Max	0.059	0.000	-0.226	-0.0	0.0	0.0
	Min	0.059	0.000	-0.226	-0.0	0.0	0.0
3824 S1 HL-~1	Max	0.043	0.001	-0.194	0.0	-0.0	0.0
	Min	0.043	0.001	-0.194	0.0	-0.0	0.0
3841 S1 HL-~1	Max	0.041	-0.003	-0.254	-0.0	-0.0	0.0
	Min	0.041	-0.003	-0.254	-0.0	-0.0	0.0
3847 S1 HL-~1	Max	0.060	-0.002	-0.051	-0.0	0.0	0.0
	Min	0.060	-0.002	-0.051	-0.0	0.0	0.0
3849 S1 HL-~1	Max	0.056	0.000	-0.251	0.0	0.0	0.0
	Min	0.056	0.000	-0.251	0.0	0.0	0.0
3854 S1 HL-~1	Max	0.049	-0.001	-0.342	0.0	0.0	0.0
	Min	0.049	-0.001	-0.342	0.0	0.0	0.0
3859 S1 HL-~1	Max	0.043	-0.001	-0.316	0.0	-0.0	0.0
	Min	0.043	-0.001	-0.316	0.0	-0.0	0.0
3864 S1 HL-~1	Max	0.059	-0.002	-0.398	0.0	0.0	0.0
	Min	0.059	-0.002	-0.398	0.0	0.0	0.0
3869 S1 HL-~1	Max	0.052	-0.002	-0.464	0.0	0.0	0.0
	Min	0.052	-0.002	-0.464	0.0	0.0	0.0
3874 S1 HL-~1	Max	0.045	-0.001	-0.414	0.0	-0.0	0.0
	Min	0.045	-0.001	-0.414	0.0	-0.0	0.0
4356 S1 HL-~1	Max	0.051	0.001	-0.157	0.0	0.0	-0.0
	Min	0.051	0.001	-0.157	0.0	0.0	-0.0
4364 S1 HL-~1	Max	0.058	0.001	-0.207	-0.0	0.0	0.0
	Min	0.058	0.001	-0.207	-0.0	0.0	0.0
4367 S1 HL-~1	Max	0.043	0.001	-0.182	-0.0	-0.0	-0.0
	Min	0.043	0.001	-0.182	-0.0	-0.0	-0.0
4375 S1 HL-~1	Max	0.041	-0.001	-0.277	0.0	-0.0	-0.0
	Min	0.041	-0.001	-0.277	0.0	-0.0	-0.0
4381 S1 HL-~1	Max	0.046	-0.001	-0.343	0.0	-0.0	-0.0
	Min	0.046	-0.001	-0.343	0.0	-0.0	-0.0
4387 S1 HL-~1	Max	0.053	-0.001	-0.305	0.0	0.0	-0.0
	Min	0.053	-0.001	-0.305	0.0	0.0	-0.0
4393 S1 HL-~1	Max	0.060	0.003	-0.138	-0.0	0.0	0.0
	Min	0.060	0.003	-0.138	-0.0	0.0	0.0
4399 S1 HL-~1	Max	0.060	-0.001	-0.343	0.0	0.0	0.0
	Min	0.060	-0.001	-0.343	0.0	0.0	0.0

4410 S1 HL-~1	Max	0.055	-0.002	-0.448	0.0	0.0	0.0
	Min	0.055	-0.002	-0.448	0.0	0.0	0.0
4416 S1 HL-~1	Max	0.048	-0.003	-0.451	0.0	-0.0	0.0
	Min	0.048	-0.003	-0.451	0.0	-0.0	0.0
4422 S1 HL-~1	Max	0.041	0.001	-0.323	-0.0	-0.0	-0.0
	Min	0.041	0.001	-0.323	-0.0	-0.0	-0.0
4432 S1 HL-~1	Max	0.041	0.000	-0.221	-0.0	-0.0	0.0
	Min	0.041	0.000	-0.221	-0.0	-0.0	0.0
4433 S1 HL-~1	Max	0.060	-0.000	-0.263	-0.0	0.0	0.0
	Min	0.060	-0.000	-0.263	-0.0	0.0	0.0
4440 S1 HL-~1	Max	0.061	0.001	-0.079	-0.0	0.0	0.0
	Min	0.061	0.001	-0.079	-0.0	0.0	0.0
4452 S1 HL-~1	Max	0.040	-0.001	-0.273	-0.0	-0.0	0.0
	Min	0.040	-0.001	-0.273	-0.0	-0.0	0.0
4470 S1 HL-~1	Max	0.059	0.000	-0.225	-0.0	0.0	0.0
	Min	0.059	0.000	-0.225	-0.0	0.0	0.0
4476 S1 HL-~1	Max	0.043	0.001	-0.194	-0.0	-0.0	0.0
	Min	0.043	0.001	-0.194	-0.0	-0.0	0.0
4511 S1 HL-~1	Max	0.062	-0.002	-0.020	-0.0	0.0	0.0
	Min	0.062	-0.002	-0.020	-0.0	0.0	0.0
4517 S1 HL-~1	Max	0.039	-0.004	-0.223	-0.0	-0.0	0.0
	Min	0.039	-0.004	-0.223	-0.0	-0.0	0.0
4556 S1 HL-~1	Max	0.055	0.000	-0.251	-0.0	0.0	0.0
	Min	0.055	0.000	-0.251	-0.0	0.0	0.0
4557 S1 HL-~1	Max	0.049	-0.001	-0.342	0.0	0.0	0.0
	Min	0.049	-0.001	-0.342	0.0	0.0	0.0
4558 S1 HL-~1	Max	0.043	-0.001	-0.315	-0.0	-0.0	0.0
	Min	0.043	-0.001	-0.315	-0.0	-0.0	0.0
4559 S1 HL-~1	Max	0.046	-0.002	-0.414	-0.0	-0.0	0.0
	Min	0.046	-0.002	-0.414	-0.0	-0.0	0.0
4560 S1 HL-~1	Max	0.052	-0.003	-0.465	0.0	0.0	0.0
	Min	0.052	-0.003	-0.465	0.0	0.0	0.0
4561 S1 HL-~1	Max	0.059	-0.002	-0.398	-0.0	0.0	0.0
	Min	0.059	-0.002	-0.398	-0.0	0.0	0.0
4784 S1 HL-~1	Max	0.046	0.002	-0.163	-0.0	-0.0	0.0
	Min	0.046	0.002	-0.163	-0.0	-0.0	0.0
4785 S1 HL-~1	Max	0.053	-0.000	-0.163	-0.0	-0.0	-0.0
	Min	0.053	-0.000	-0.163	-0.0	-0.0	-0.0
4795 S1 HL-~1	Max	0.053	-0.000	-0.163	-0.0	-0.0	0.0
	Min	0.053	-0.000	-0.163	-0.0	-0.0	0.0

4799 S1 HL-~1	Max	0.053	0.000	-0.164	-0.0	-0.0	0.0
	Min	0.053	0.000	-0.164	-0.0	-0.0	0.0
4806 S1 HL-~1	Max	0.049	0.001	-0.162	-0.0	0.0	-0.0
	Min	0.049	0.001	-0.162	-0.0	0.0	-0.0
4817 S1 HL-~1	Max	0.046	0.001	-0.164	0.0	-0.0	0.0
	Min	0.046	0.001	-0.164	0.0	-0.0	0.0
4844 S1 HL-~1	Max	0.046	0.001	-0.163	-0.0	-0.0	0.0
	Min	0.046	0.001	-0.163	-0.0	-0.0	0.0
4852 S1 HL-~1	Max	0.055	0.001	-0.175	-0.0	0.0	-0.0
	Min	0.055	0.001	-0.175	-0.0	0.0	-0.0
4853 S1 HL-~1	Max	0.040	-0.000	-0.176	-0.0	0.0	0.0
	Min	0.040	-0.000	-0.176	-0.0	0.0	0.0
4866 S1 HL-~1	Max	0.040	-0.000	-0.175	-0.0	0.0	0.0
	Min	0.040	-0.000	-0.175	-0.0	0.0	0.0
4873 S1 HL-~1	Max	0.040	-0.000	-0.177	-0.0	0.0	0.0
	Min	0.040	-0.000	-0.177	-0.0	0.0	0.0
4881 S1 HL-~1	Max	0.048	0.001	-0.175	-0.0	0.0	-0.0
	Min	0.048	0.001	-0.175	-0.0	0.0	-0.0
4888 S1 HL-~1	Max	0.055	0.001	-0.177	0.0	0.0	0.0
	Min	0.055	0.001	-0.177	0.0	0.0	0.0
4918 S1 HL-~1	Max	0.055	0.001	-0.176	-0.0	0.0	0.0
	Min	0.055	0.001	-0.176	-0.0	0.0	0.0
4934 S1 HL-~1	Max	0.032	-0.008	-0.070	-0.0	0.0	-0.0
	Min	0.032	-0.008	-0.070	-0.0	0.0	-0.0
4940 S1 HL-~1	Max	0.064	-0.010	-0.264	-0.0	0.0	0.0
	Min	0.064	-0.010	-0.264	-0.0	0.0	0.0
4946 S1 HL-~1	Max	0.046	0.000	-0.225	-0.0	0.0	-0.0
	Min	0.046	0.000	-0.225	-0.0	0.0	-0.0
4952 S1 HL-~1	Max	0.051	0.001	-0.193	-0.0	0.0	0.0
	Min	0.051	0.001	-0.193	-0.0	0.0	0.0
4991 S1 HL-~1	Max	0.060	-0.001	-0.324	0.0	0.0	0.0
	Min	0.060	-0.001	-0.324	0.0	0.0	0.0
4992 S1 HL-~1	Max	0.060	-0.001	-0.323	-0.0	0.0	0.0
	Min	0.060	-0.001	-0.323	-0.0	0.0	0.0
4993 S1 HL-~1	Max	0.060	-0.001	-0.323	-0.0	0.0	-0.0
	Min	0.060	-0.001	-0.323	-0.0	0.0	-0.0
5007 S1 HL-~1	Max	0.046	-0.000	-0.323	-0.0	0.0	0.0
	Min	0.046	-0.000	-0.323	-0.0	0.0	0.0

5008 S1 HL-~1	Max	0.031	-0.000	-0.323	0.0	0.0	-0.0
	Min	0.031	-0.000	-0.323	0.0	0.0	-0.0
5021 S1 HL-~1	Max	0.031	-0.000	-0.323	0.0	0.0	0.0
	Min	0.031	-0.000	-0.323	0.0	0.0	0.0
5022 S1 HL-~1	Max	0.031	-0.000	-0.323	0.0	0.0	0.0
	Min	0.031	-0.000	-0.323	0.0	0.0	0.0
5046 S1 HL-~1	Max	0.041	-0.000	-0.264	0.0	-0.0	0.0
	Min	0.041	-0.000	-0.264	0.0	-0.0	0.0
5047 S1 HL-~1	Max	0.041	-0.000	-0.263	-0.0	-0.0	0.0
	Min	0.041	-0.000	-0.263	-0.0	-0.0	0.0
5048 S1 HL-~1	Max	0.041	-0.000	-0.263	-0.0	-0.0	0.0
	Min	0.041	-0.000	-0.263	-0.0	-0.0	0.0
5062 S1 HL-~1	Max	0.051	0.001	-0.263	-0.0	0.0	-0.0
	Min	0.051	0.001	-0.263	-0.0	0.0	-0.0
5063 S1 HL-~1	Max	0.061	0.000	-0.263	0.0	-0.0	0.0
	Min	0.061	0.000	-0.263	0.0	-0.0	0.0
5076 S1 HL-~1	Max	0.061	0.000	-0.263	0.0	-0.0	0.0
	Min	0.061	0.000	-0.263	0.0	-0.0	0.0
5077 S1 HL-~1	Max	0.061	0.000	-0.264	0.0	-0.0	0.0
	Min	0.061	0.000	-0.264	0.0	-0.0	0.0
5107 S1 HL-~1	Max	0.063	-0.002	0.022	-0.0	0.0	0.0
	Min	0.063	-0.002	0.022	-0.0	0.0	0.0
5108 S1 HL-~1	Max	0.063	0.001	-0.054	-0.0	0.0	0.0
	Min	0.063	0.001	-0.054	-0.0	0.0	0.0
5109 S1 HL-~1	Max	0.060	0.002	-0.126	-0.0	0.0	0.0
	Min	0.060	0.002	-0.126	-0.0	0.0	0.0
5110 S1 HL-~1	Max	0.055	-0.000	-0.251	0.0	0.0	0.0
	Min	0.055	-0.000	-0.251	0.0	0.0	0.0
5111 S1 HL-~1	Max	0.052	-0.001	-0.308	0.0	0.0	0.0
	Min	0.052	-0.001	-0.308	0.0	0.0	0.0
5112 S1 HL-~1	Max	0.049	-0.002	-0.345	0.0	0.0	0.0
	Min	0.049	-0.002	-0.345	0.0	0.0	0.0
5113 S1 HL-~1	Max	0.046	-0.002	-0.346	0.0	-0.0	0.0
	Min	0.046	-0.002	-0.346	0.0	-0.0	0.0
5114 S1 HL-~1	Max	0.043	-0.001	-0.316	0.0	-0.0	0.0
	Min	0.043	-0.001	-0.316	0.0	-0.0	0.0
5115 S1 HL-~1	Max	0.041	-0.001	-0.279	0.0	-0.0	0.0
	Min	0.041	-0.001	-0.279	0.0	-0.0	0.0
5116 S1 HL-~1	Max	0.041	-0.000	-0.264	0.0	-0.0	0.0
	Min	0.041	-0.000	-0.264	0.0	-0.0	0.0

5117 S1 HL-~1	Max	0.041	0.000	-0.219	-0.0	-0.0	0.0
	Min	0.041	0.000	-0.219	-0.0	-0.0	0.0
5118 S1 HL-~1	Max	0.043	0.001	-0.193	0.0	-0.0	0.0
	Min	0.043	0.001	-0.193	0.0	-0.0	0.0
5119 S1 HL-~1	Max	0.044	0.001	-0.182	0.0	-0.0	0.0
	Min	0.044	0.001	-0.182	0.0	-0.0	0.0
5120 S1 HL-~1	Max	0.046	0.002	-0.163	0.0	-0.0	0.0
	Min	0.046	0.002	-0.163	0.0	-0.0	0.0
5121 S1 HL-~1	Max	0.051	0.002	-0.154	-0.0	0.0	0.0
	Min	0.051	0.002	-0.154	-0.0	0.0	0.0
5122 S1 HL-~1	Max	0.055	0.002	-0.176	0.0	0.0	0.0
	Min	0.055	0.002	-0.176	0.0	0.0	0.0
5123 S1 HL-~1	Max	0.057	0.001	-0.208	0.0	0.0	0.0
	Min	0.057	0.001	-0.208	0.0	0.0	0.0
5124 S1 HL-~1	Max	0.058	0.001	-0.225	0.0	0.0	0.0
	Min	0.058	0.001	-0.225	0.0	0.0	0.0
5125 S1 HL-~1	Max	0.060	-0.000	-0.262	-0.0	0.0	0.0
	Min	0.060	-0.000	-0.262	-0.0	0.0	0.0
5126 S1 HL-~1	Max	0.060	-0.001	-0.324	0.0	0.0	0.0
	Min	0.060	-0.001	-0.324	0.0	0.0	0.0
5127 S1 HL-~1	Max	0.060	-0.001	-0.344	0.0	0.0	0.0
	Min	0.060	-0.001	-0.344	0.0	0.0	0.0
5128 S1 HL-~1	Max	0.058	-0.002	-0.398	0.0	0.0	0.0
	Min	0.058	-0.002	-0.398	0.0	0.0	0.0
5129 S1 HL-~1	Max	0.055	-0.003	-0.451	0.0	0.0	0.0
	Min	0.055	-0.003	-0.451	0.0	0.0	0.0
5130 S1 HL-~1	Max	0.052	-0.003	-0.468	0.0	0.0	0.0
	Min	0.052	-0.003	-0.468	0.0	0.0	0.0
5131 S1 HL-~1	Max	0.049	-0.003	-0.454	0.0	-0.0	0.0
	Min	0.049	-0.003	-0.454	0.0	-0.0	0.0
5132 S1 HL-~1	Max	0.046	-0.002	-0.414	0.0	-0.0	0.0
	Min	0.046	-0.002	-0.414	0.0	-0.0	0.0
5133 S1 HL-~1	Max	0.041	0.001	-0.311	-0.0	-0.0	0.0
	Min	0.041	0.001	-0.311	-0.0	-0.0	0.0
5134 S1 HL-~1	Max	0.039	-0.001	-0.248	-0.0	-0.0	0.0
	Min	0.039	-0.001	-0.248	-0.0	-0.0	0.0
5135 S1 HL-~1	Max	0.038	-0.004	-0.180	-0.0	-0.0	0.0
	Min	0.038	-0.004	-0.180	-0.0	-0.0	0.0

PROJECT TITLE : Load Rating and Stuctural Analysis

MIDAS	**Company**	Close, jensen, and Miller PC	**Client**	CT DOT
	Author	Danielle Coutu	**File Name**	Swing Span Girder 7 Analysis

REACTION FORCES & MOMENTS DEFAULT PRINTOUT

Unit System : kips , in

Node	LC	FX	FY	FZ	MX	MY	MZ

SUMMATION OF REACTION FORCES

LC	SUM-FX	SUM-FY	SUM-FZ

REACTION FORCES & MOMENTS LOCAL PRINTOUT Unit System : kips , in

Node	LC		FX	FY	FZ	MX	MY	MZ

PLATE ELEMENT FORCES (GLOBAL) DEFAULT PRINTOUT Unit System : kips , in

ELEM	MAT	SEC	LC		NODE	FX	FY	FZ	MX	MY	MZ
4147	3	2	S1 HL-~1	Max	3847	-4.7	6.0	-0.3	1.8	-0.0	0.0
					4511	9.0	-1.6	0.4	1.2	0.1	0.0
					4440	4.4	-3.8	0.2	1.5	0.1	0.0
					3806	-8.8	-0.7	-0.1	1.7	-0.0	0.0
				Min	3847	-4.7	6.0	-0.3	1.8	-0.0	0.0
					4511	9.0	-1.6	0.4	1.2	0.1	0.0
					4440	4.4	-3.8	0.2	1.5	0.1	0.0
					3806	-8.8	-0.7	-0.1	1.7	-0.0	0.0
4148	3	2	S1 HL-~1	Max	4511	-9.0	1.6	-0.5	-1.2	-0.1	0.0
					1383	11.8	1.9	0.5	3.3	0.0	0.0
					2087	9.0	-2.4	0.3	3.8	0.2	-0.0
					4440	-11.8	-1.0	-0.2	-1.4	0.2	0.0
				Min	4511	-9.0	1.6	-0.5	-1.2	-0.1	0.0
					1383	11.8	1.9	0.5	3.3	0.0	0.0
					2087	9.0	-2.4	0.3	3.8	0.2	-0.0
					4440	-11.8	-1.0	-0.2	-1.4	0.2	0.0
4149	3	2	S1 HL-~1	Max	1383	6.6	-2.3	0.1	-2.5	-0.0	0.0
					5107	0.0	0.0	-0.0	0.0	0.0	0.0
					5108	-7.0	-0.1	-0.2	-0.0	0.0	0.0
					2087	0.4	2.4	0.3	-1.3	0.1	-0.0
				Min	1383	6.6	-2.3	0.1	-2.5	-0.0	0.0
					5107	0.0	0.0	-0.0	0.0	0.0	0.0
					5108	-7.0	-0.1	-0.2	-0.0	0.0	0.0
					2087	0.4	2.4	0.3	-1.3	0.1	-0.0
4173	3	2	S1 HL-~1	Max	3806	1.1	-2.5	-0.3	1.0	0.0	0.0
					4440	11.9	5.7	0.4	0.9	-0.1	0.0
					4393	-2.2	1.9	-0.0	0.2	-0.3	0.0
					3765	-10.7	-5.2	0.1	0.5	-0.1	0.0
				Min	3806	1.1	-2.5	-0.3	1.0	0.0	0.0
					4440	11.9	5.7	0.4	0.9	-0.1	0.0
					4393	-2.2	1.9	-0.0	0.2	-0.3	0.0
					3765	-10.7	-5.2	0.1	0.5	-0.1	0.0
4174	3	2	S1 HL-~1	Max	4440	-4.5	-0.9	-0.4	-1.0	-0.2	0.0
					2087	13.5	3.8	0.5	3.0	-0.2	-0.0
					1801	4.1	-0.8	0.2	1.9	-0.1	0.0
					4393	-13.1	-2.1	-0.2	-0.1	-0.1	0.0
				Min	4440	-4.5	-0.9	-0.4	-1.0	-0.2	0.0
					2087	13.5	3.8	0.5	3.0	-0.2	-0.0
					1801	4.1	-0.8	0.2	1.9	-0.1	0.0
					4393	-13.1	-2.1	-0.2	-0.1	-0.1	0.0
4175	3	2	S1 HL-~1	Max	2087	16.2	-3.5	-0.0	-0.3	-0.1	-0.0
					5108	7.0	0.1	0.1	0.0	-0.0	0.0
					5109	-17.2	1.5	-0.1	-0.0	-0.3	0.0
					1801	-6.0	1.9	0.2	-0.5	-0.2	0.0
				Min	2087	16.2	-3.5	-0.0	-0.3	-0.1	-0.0
					5108	7.0	0.1	0.1	0.0	-0.0	0.0
					5109	-17.2	1.5	-0.1	-0.0	-0.3	0.0
					1801	-6.0	1.9	0.2	-0.5	-0.2	0.0
4199	3	2	S1 HL-~1	Max	3765	-8.8	-7.9	0.1	1.3	-0.1	0.0
					4393	25.5	12.1	0.2	-1.3	0.4	0.0
					4556	8.1	5.2	0.2	-1.0	-0.3	0.0
					3849	-24.8	-9.4	0.0	2.5	-0.0	0.0

			Min	3765	-8.8	-7.9	0.1	1.3	-0.1	0.0
				4393	25.5	12.1	0.2	-1.3	0.4	0.0
				4556	8.1	5.2	0.2	-1.0	-0.3	0.0
				3849	-24.8	-9.4	0.0	2.5	-0.0	0.0
4200	3	2 S1 HL-~1	Max	4393	-10.2	-0.8	-0.5	1.2	-0.1	0.0
				1801	20.1	2.6	0.6	2.0	0.2	0.0
				700	10.0	2.9	0.5	1.7	-0.2	0.0
				4556	-19.9	-4.8	-0.4	1.0	0.1	0.0
			Min	4393	-10.2	-0.8	-0.5	1.2	-0.1	0.0
				1801	20.1	2.6	0.6	2.0	0.2	0.0
				700	10.0	2.9	0.5	1.7	-0.2	0.0
				4556	-19.9	-4.8	-0.4	1.0	0.1	0.0
4201	3	2 S1 HL-~1	Max	1801	4.6	3.0	0.2	-2.0	0.1	0.0
				5109	17.2	-1.5	-0.0	0.0	0.3	0.0
				5110	-4.9	2.2	-0.1	0.1	-0.1	0.0
				700	-17.0	-3.7	0.3	-2.3	0.1	0.0
			Min	1801	4.6	3.0	0.2	-2.0	0.1	0.0
				5109	17.2	-1.5	-0.0	0.0	0.3	0.0
				5110	-4.9	2.2	-0.1	0.1	-0.1	0.0
				700	-17.0	-3.7	0.3	-2.3	0.1	0.0
4225	3	2 S1 HL-~1	Max	3849	15.2	-2.2	-0.0	1.7	0.2	0.0
				4556	0.3	-0.2	0.2	-0.6	0.2	0.0
				4387	-15.0	0.8	0.1	-0.5	-0.1	-0.0
				3759	-0.5	1.7	0.1	0.7	-0.1	-0.0
			Min	3849	15.2	-2.2	-0.0	1.7	0.2	0.0
				4556	0.3	-0.2	0.2	-0.6	0.2	0.0
				4387	-15.0	0.8	0.1	-0.5	-0.1	-0.0
				3759	-0.5	1.7	0.1	0.7	-0.1	-0.0
4226	3	2 S1 HL-~1	Max	4556	11.5	-0.1	-0.3	0.6	0.0	0.0
				700	-4.5	-1.2	0.4	1.2	0.1	0.0
				1697	-11.4	0.3	0.3	1.4	-0.0	-0.0
				4387	4.4	1.0	-0.3	0.5	-0.0	-0.0
			Min	4556	11.5	-0.1	-0.3	0.6	0.0	0.0
				700	-4.5	-1.2	0.4	1.2	0.1	0.0
				1697	-11.4	0.3	0.3	1.4	-0.0	-0.0
				4387	4.4	1.0	-0.3	0.5	-0.0	-0.0
4227	3	2 S1 HL-~1	Max	700	7.4	1.8	0.2	-1.8	0.0	0.0
				5110	4.9	-2.2	-0.1	-0.1	0.1	0.0
				5111	-7.1	-1.4	-0.1	-0.0	-0.1	0.0
				1697	-5.1	1.7	0.2	-1.8	-0.0	-0.0
			Min	700	7.4	1.8	0.2	-1.8	0.0	0.0
				5110	4.9	-2.2	-0.1	-0.1	0.1	0.0
				5111	-7.1	-1.4	-0.1	-0.0	-0.1	0.0
				1697	-5.1	1.7	0.2	-1.8	-0.0	-0.0
4251	3	2 S1 HL-~1	Max	3759	16.7	0.2	0.1	0.9	0.1	-0.0
				4387	-0.4	-2.4	0.2	-0.4	0.1	-0.0
				4557	-16.6	0.0	0.3	-0.1	-0.2	0.0
				3854	0.3	2.1	-0.1	2.3	-0.2	0.0
			Min	3759	16.7	0.2	0.1	0.9	0.1	-0.0
				4387	-0.4	-2.4	0.2	-0.4	0.1	-0.0
				4557	-16.6	0.0	0.3	-0.1	-0.2	0.0
				3854	0.3	2.1	-0.1	2.3	-0.2	0.0
4252	3	2 S1 HL-~1	Max	4387	11.0	-1.4	-0.4	0.4	0.0	-0.0
				1697	-3.0	0.5	0.5	2.4	0.0	-0.0
				701	-11.1	0.0	0.6	2.8	-0.0	0.0
				4557	3.0	0.9	-0.4	0.1	-0.0	0.0
			Min	4387	11.0	-1.4	-0.4	0.4	0.0	-0.0

				1697	-3.0	0.5	0.5	2.4	0.0	-0.0
				701	-11.1	0.0	0.6	2.8	-0.0	0.0
				4557	3.0	0.9	-0.4	0.1	-0.0	0.0
4253	3	2 S1 HL-~1	Max	1697	8.8	-1.6	0.3	-2.4	0.0	-0.0
				5111	7.1	1.4	-0.1	0.0	0.1	0.0
				5112	-8.7	0.1	-0.1	0.0	-0.1	0.0
				701	-7.2	0.1	0.3	-2.5	-0.0	0.0
			Min	1697	8.8	-1.6	0.3	-2.4	0.0	-0.0
				5111	7.1	1.4	-0.1	0.0	0.1	0.0
				5112	-8.7	0.1	-0.1	0.0	-0.1	0.0
				701	-7.2	0.1	0.3	-2.5	-0.0	0.0
4277	3	2 S1 HL-~1	Max	3854	12.1	-0.9	-0.1	1.7	0.2	0.0
				4557	4.5	-0.4	0.2	-0.1	0.2	0.0
				4381	-12.1	1.5	0.1	-0.3	-0.1	-0.0
				3753	-4.4	-0.2	0.1	0.7	-0.0	-0.0
			Min	3854	12.1	-0.9	-0.1	1.7	0.2	0.0
				4557	4.5	-0.4	0.2	-0.1	0.2	0.0
				4381	-12.1	1.5	0.1	-0.3	-0.1	-0.0
				3753	-4.4	-0.2	0.1	0.7	-0.0	-0.0
4278	3	2 S1 HL-~1	Max	4557	9.1	-0.5	-0.3	0.1	0.0	0.0
				701	-0.9	-0.3	0.4	2.1	0.0	0.0
				95	-9.1	1.6	0.4	1.8	-0.0	0.0
				4381	0.9	-0.8	-0.3	0.3	-0.0	-0.0
			Min	4557	9.1	-0.5	-0.3	0.1	0.0	0.0
				701	-0.9	-0.3	0.4	2.1	0.0	0.0
				95	-9.1	1.6	0.4	1.8	-0.0	0.0
				4381	0.9	-0.8	-0.3	0.3	-0.0	-0.0
4279	3	2 S1 HL-~1	Max	701	7.4	0.3	0.2	-1.9	0.0	0.0
				5112	8.7	-0.1	-0.1	-0.0	0.1	0.0
				5113	-7.4	0.5	-0.1	0.0	-0.1	0.0
				95	-8.7	-0.7	0.2	-1.8	-0.0	0.0
			Min	701	7.4	0.3	0.2	-1.9	0.0	0.0
				5112	8.7	-0.1	-0.1	-0.0	0.1	0.0
				5113	-7.4	0.5	-0.1	0.0	-0.1	0.0
				95	-8.7	-0.7	0.2	-1.8	-0.0	0.0
4303	3	2 S1 HL-~1	Max	3753	11.7	0.1	0.1	1.1	0.1	-0.0
				4381	1.3	-1.4	0.2	-0.5	0.1	-0.0
				4558	-11.6	1.6	0.3	-0.5	-0.1	0.0
				3859	-1.4	-0.3	-0.1	2.4	-0.2	0.0
			Min	3753	11.7	0.1	0.1	1.1	0.1	-0.0
				4381	1.3	-1.4	0.2	-0.5	0.1	-0.0
				4558	-11.6	1.6	0.3	-0.5	-0.1	0.0
				3859	-1.4	-0.3	-0.1	2.4	-0.2	0.0
4304	3	2 S1 HL-~1	Max	4381	9.9	-0.4	-0.4	0.5	0.0	-0.0
				95	-3.4	-0.5	0.5	2.2	0.0	0.0
				702	-9.9	1.4	0.5	2.4	0.0	0.0
				4558	3.4	-0.6	-0.4	0.5	-0.0	0.0
			Min	4381	9.9	-0.4	-0.4	0.5	0.0	-0.0
				95	-3.4	-0.5	0.5	2.2	0.0	0.0
				702	-9.9	1.4	0.5	2.4	0.0	0.0
				4558	3.4	-0.6	-0.4	0.5	-0.0	0.0
4305	3	2 S1 HL-~1	Max	95	5.4	0.7	0.3	-2.4	0.0	0.0
				5113	7.4	-0.5	-0.1	-0.0	0.1	0.0
				5114	-5.3	1.0	-0.1	-0.0	-0.0	0.0
				702	-7.5	-1.2	0.3	-2.6	0.0	0.0
			Min	95	5.4	0.7	0.3	-2.4	0.0	0.0
				5113	7.4	-0.5	-0.1	-0.0	0.1	0.0

				5114	-5.3	1.0	-0.1	-0.0	-0.0	0.0
				702	-7.5	-1.2	0.3	-2.6	0.0	0.0
4329	3	2 S1 HL-~1	Max	3859	7.6	0.4	-0.1	1.9	0.2	0.0
				4558	0.1	-1.7	0.2	-0.3	0.1	0.0
				4375	-7.6	1.5	0.1	-0.3	-0.0	-0.0
				3747	-0.1	-0.2	0.0	0.8	0.0	0.0
			Min	3859	7.6	0.4	-0.1	1.9	0.2	0.0
				4558	0.1	-1.7	0.2	-0.3	0.1	0.0
				4375	-7.6	1.5	0.1	-0.3	-0.0	-0.0
				3747	-0.1	-0.2	0.0	0.8	0.0	0.0
4330	3	2 S1 HL-~1	Max	4558	8.1	0.7	-0.3	0.3	0.0	0.0
				702	-4.3	-1.7	0.4	1.8	0.0	0.0
				81	-8.1	1.2	0.3	1.6	-0.0	0.0
				4375	4.3	-0.2	-0.3	0.3	0.0	-0.0
			Min	4558	8.1	0.7	-0.3	0.3	0.0	0.0
				702	-4.3	-1.7	0.4	1.8	0.0	0.0
				81	-8.1	1.2	0.3	1.6	-0.0	0.0
				4375	4.3	-0.2	-0.3	0.3	0.0	-0.0
4331	3	2 S1 HL-~1	Max	702	2.1	1.5	0.2	-1.9	-0.0	0.0
				5114	5.3	-1.0	-0.1	0.0	0.0	0.0
				5115	-2.0	-0.1	-0.1	-0.0	-0.0	0.0
				81	-5.4	-0.5	0.2	-1.7	0.0	0.0
			Min	702	2.1	1.5	0.2	-1.9	-0.0	0.0
				5114	5.3	-1.0	-0.1	0.0	0.0	0.0
				5115	-2.0	-0.1	-0.1	-0.0	-0.0	0.0
				81	-5.4	-0.5	0.2	-1.7	0.0	0.0
4355	3	2 S1 HL-~1	Max	3747	3.1	-0.7	0.0	0.2	-0.0	0.0
				4375	0.1	-0.8	0.0	-0.1	0.0	-0.0
				5047	-3.0	1.1	0.1	-0.0	-0.1	0.0
				5046	-0.1	0.4	-0.0	0.4	-0.1	0.0
			Min	3747	3.1	-0.7	0.0	0.2	-0.0	0.0
				4375	0.1	-0.8	0.0	-0.1	0.0	-0.0
				5047	-3.0	1.1	0.1	-0.0	-0.1	0.0
				5046	-0.1	0.4	-0.0	0.4	-0.1	0.0
4356	3	2 S1 HL-~1	Max	4375	3.2	-0.6	-0.1	0.1	0.0	-0.0
				81	-1.6	-0.6	0.1	0.6	-0.0	0.0
				5048	-3.2	1.0	0.1	0.7	0.0	0.0
				5047	1.6	0.2	-0.1	0.0	0.0	0.0
			Min	4375	3.2	-0.6	-0.1	0.1	0.0	-0.0
				81	-1.6	-0.6	0.1	0.6	-0.0	0.0
				5048	-3.2	1.0	0.1	0.7	0.0	0.0
				5047	1.6	0.2	-0.1	0.0	0.0	0.0
4357	3	2 S1 HL-~1	Max	81	1.2	0.4	0.1	-0.5	-0.0	0.0
				5115	2.0	0.1	-0.0	0.0	0.0	0.0
				5116	-1.2	0.2	-0.0	0.0	0.0	0.0
				5048	-2.0	-0.6	0.1	-0.6	0.1	0.0
			Min	81	1.2	0.4	0.1	-0.5	-0.0	0.0
				5115	2.0	0.1	-0.0	0.0	0.0	0.0
				5116	-1.2	0.2	-0.0	0.0	0.0	0.0
				5048	-2.0	-0.6	0.1	-0.6	0.1	0.0
4381	3	2 S1 HL-~1	Max	3744	-1.3	0.0	-0.0	1.4	0.1	0.0
				4432	-8.5	-1.8	0.1	-0.5	0.0	0.0
				4476	1.3	1.2	0.1	-0.3	-0.0	0.0
				3824	8.5	0.6	-0.0	1.3	-0.1	0.0
			Min	3744	-1.3	0.0	-0.0	1.4	0.1	0.0
				4432	-8.5	-1.8	0.1	-0.5	0.0	0.0
				4476	1.3	1.2	0.1	-0.3	-0.0	0.0

				3824	8.5	0.6	-0.0	1.3	-0.1	0.0
4382	3	2 S1 HL-~1	Max	4432	3.5	0.3	-0.2	0.5	0.0	0.0
				1621	-8.4	-1.8	0.3	0.8	-0.0	0.0
				1614	-3.5	1.0	0.3	1.2	0.1	0.0
				4476	8.4	0.5	-0.2	0.3	0.0	0.0
			Min	4432	3.5	0.3	-0.2	0.5	0.0	0.0
				1621	-8.4	-1.8	0.3	0.8	-0.0	0.0
				1614	-3.5	1.0	0.3	1.2	0.1	0.0
				4476	8.4	0.5	-0.2	0.3	0.0	0.0
4383	3	2 S1 HL-~1	Max	1621	-6.4	1.5	0.2	-1.3	-0.1	0.0
				5117	-3.6	-0.8	-0.0	0.0	-0.1	0.0
				5118	6.4	-0.2	-0.1	-0.0	0.1	0.0
				1614	3.5	-0.5	0.2	-1.2	0.1	0.0
			Min	1621	-6.4	1.5	0.2	-1.3	-0.1	0.0
				5117	-3.6	-0.8	-0.0	0.0	-0.1	0.0
				5118	6.4	-0.2	-0.1	-0.0	0.1	0.0
				1614	3.5	-0.5	0.2	-1.2	0.1	0.0
4407	3	2 S1 HL-~1	Max	3824	-5.2	-0.8	-0.0	0.4	0.1	0.0
				4476	-9.2	-1.2	0.1	0.0	0.0	0.0
				4367	5.2	1.2	0.1	0.1	0.2	-0.0
				3739	9.3	0.8	0.0	0.2	0.2	0.0
			Min	3824	-5.2	-0.8	-0.0	0.4	0.1	0.0
				4476	-9.2	-1.2	0.1	0.0	0.0	0.0
				4367	5.2	1.2	0.1	0.1	0.2	-0.0
				3739	9.3	0.8	0.0	0.2	0.2	0.0
4408	3	2 S1 HL-~1	Max	4476	-0.5	-0.4	-0.1	-0.0	-0.0	0.0
				1614	-6.7	-1.1	0.1	0.5	-0.0	0.0
				63	0.6	0.6	0.0	0.2	0.0	-0.0
				4367	6.7	0.9	0.0	-0.1	0.1	-0.0
			Min	4476	-0.5	-0.4	-0.1	-0.0	-0.0	0.0
				1614	-6.7	-1.1	0.1	0.5	-0.0	0.0
				63	0.6	0.6	0.0	0.2	0.0	-0.0
				4367	6.7	0.9	0.0	-0.1	0.1	-0.0
4409	3	2 S1 HL-~1	Max	1614	-8.1	0.6	0.1	-0.6	-0.1	0.0
				5118	-6.4	0.2	-0.0	0.0	-0.1	0.0
				5119	8.0	-0.1	-0.0	-0.0	0.1	0.0
				63	6.4	-0.7	0.1	-0.6	0.1	-0.0
			Min	1614	-8.1	0.6	0.1	-0.6	-0.1	0.0
				5118	-6.4	0.2	-0.0	0.0	-0.1	0.0
				5119	8.0	-0.1	-0.0	-0.0	0.1	0.0
				63	6.4	-0.7	0.1	-0.6	0.1	-0.0
4433	3	2 S1 HL-~1	Max	3739	-6.2	0.2	0.0	0.7	-0.1	0.0
				4367	-15.4	-2.3	0.1	-0.1	-0.1	-0.0
				4844	6.1	1.9	0.1	-0.5	-0.1	0.0
				4817	15.5	0.2	-0.0	1.2	-0.1	0.0
			Min	3739	-6.2	0.2	0.0	0.7	-0.1	0.0
				4367	-15.4	-2.3	0.1	-0.1	-0.1	-0.0
				4844	6.1	1.9	0.1	-0.5	-0.1	0.0
				4817	15.5	0.2	-0.0	1.2	-0.1	0.0
4434	3	2 S1 HL-~1	Max	4367	3.6	0.3	-0.3	0.0	-0.1	-0.0
				63	-14.0	-2.2	0.3	1.7	-0.0	-0.0
				4784	-3.6	2.5	0.7	3.7	0.1	0.0
				4844	14.0	-0.6	-0.7	0.5	0.1	0.0
			Min	4367	3.6	0.3	-0.3	0.0	-0.1	-0.0
				63	-14.0	-2.2	0.3	1.7	-0.0	-0.0
				4784	-3.6	2.5	0.7	3.7	0.1	0.0
				4844	14.0	-0.6	-0.7	0.5	0.1	0.0

4435	3	2 S1 HL-~1	Max	63	-12.0	0.7	0.2	-1.3	-0.1	-0.0
				5119	-8.0	0.1	-0.0	0.0	-0.1	0.0
				5120	11.9	1.0	-0.0	0.0	0.1	0.0
				4784	8.1	-1.8	0.2	-1.1	0.1	0.0
			Min	63	-12.0	0.7	0.2	-1.3	-0.1	-0.0
				5119	-8.0	0.1	-0.0	0.0	-0.1	0.0
				5120	11.9	1.0	-0.0	0.0	0.1	0.0
				4784	8.1	-1.8	0.2	-1.1	0.1	0.0
4459	3	2 S1 HL-~1	Max	4817	-15.1	3.8	-0.0	1.1	0.1	0.0
				4844	-15.4	-3.9	0.2	0.1	0.1	0.0
				4356	15.2	-4.7	0.2	1.1	0.4	-0.0
				3728	15.3	4.7	-0.0	0.3	0.3	-0.0
			Min	4817	-15.1	3.8	-0.0	1.1	0.1	0.0
				4844	-15.4	-3.9	0.2	0.1	0.1	0.0
				4356	15.2	-4.7	0.2	1.1	0.4	-0.0
				3728	15.3	4.7	-0.0	0.3	0.3	-0.0
4460	3	2 S1 HL-~1	Max	4844	-4.7	2.5	0.2	-0.1	-0.1	0.0
				4784	-10.9	-3.2	-0.2	-1.2	-0.2	0.0
				35	4.8	-2.6	-1.5	-8.1	-0.2	-0.0
				4356	10.8	3.3	1.6	-1.1	-0.0	-0.0
			Min	4844	-4.7	2.5	0.2	-0.1	-0.1	0.0
				4784	-10.9	-3.2	-0.2	-1.2	-0.2	0.0
				35	4.8	-2.6	-1.5	-8.1	-0.2	-0.0
				4356	10.8	3.3	1.6	-1.1	-0.0	-0.0
4461	3	2 S1 HL-~1	Max	4784	-19.1	2.5	0.2	-1.3	-0.1	0.0
				5120	-11.9	-1.0	-0.1	-0.0	-0.1	0.0
				5121	18.9	-0.0	-0.1	-0.0	0.3	0.0
				35	12.1	-1.5	0.2	-1.7	0.3	-0.0
			Min	4784	-19.1	2.5	0.2	-1.3	-0.1	0.0
				5120	-11.9	-1.0	-0.1	-0.0	-0.1	0.0
				5121	18.9	-0.0	-0.1	-0.0	0.3	0.0
				35	12.1	-1.5	0.2	-1.7	0.3	-0.0
4485	3	2 S1 HL-~1	Max	3728	-15.3	4.7	-0.0	0.3	-0.3	-0.0
				4356	-15.2	-4.7	0.2	1.1	-0.4	-0.0
				4918	15.4	-3.9	0.2	0.1	-0.1	0.0
				4888	15.1	3.8	-0.0	1.1	-0.1	0.0
			Min	3728	-15.3	4.7	-0.0	0.3	-0.3	-0.0
				4356	-15.2	-4.7	0.2	1.1	-0.4	-0.0
				4918	15.4	-3.9	0.2	0.1	-0.1	0.0
				4888	15.1	3.8	-0.0	1.1	-0.1	0.0
4486	3	2 S1 HL-~1	Max	4356	-10.8	3.3	1.6	-1.1	0.0	-0.0
				35	-4.8	-2.6	-1.5	-8.1	0.2	-0.0
				4852	10.9	-3.2	-0.2	-1.2	0.2	-0.0
				4918	4.7	2.5	0.2	-0.1	0.1	0.0
			Min	4356	-10.8	3.3	1.6	-1.1	0.0	-0.0
				35	-4.8	-2.6	-1.5	-8.1	0.2	-0.0
				4852	10.9	-3.2	-0.2	-1.2	0.2	-0.0
				4918	4.7	2.5	0.2	-0.1	0.1	0.0
4487	3	2 S1 HL-~1	Max	35	-12.1	-1.6	0.2	-1.7	-0.3	-0.0
				5121	-18.9	0.0	-0.1	0.0	-0.3	0.0
				5122	11.9	-1.0	-0.1	-0.0	0.1	0.0
				4852	19.1	2.5	0.2	-1.3	0.1	-0.0
			Min	35	-12.1	-1.6	0.2	-1.7	-0.3	-0.0
				5121	-18.9	0.0	-0.1	0.0	-0.3	0.0
				5122	11.9	-1.0	-0.1	-0.0	0.1	0.0
				4852	19.1	2.5	0.2	-1.3	0.1	-0.0

4511	3	2 S1 HL-~1	Max	4888	-15.5	0.2	-0.0	1.2	0.1	0.0
				4918	-6.1	1.9	0.1	-0.5	0.1	0.0
				4364	15.4	-2.3	0.1	-0.1	0.1	0.0
				3736	6.2	0.2	0.0	0.7	0.1	-0.0
			Min	4888	-15.5	0.2	-0.0	1.2	0.1	0.0
				4918	-6.1	1.9	0.1	-0.5	0.1	0.0
				4364	15.4	-2.3	0.1	-0.1	0.1	0.0
				3736	6.2	0.2	0.0	0.7	0.1	-0.0
4512	3	2 S1 HL-~1	Max	4918	-14.0	-0.6	-0.7	0.5	-0.1	0.0
				4852	3.6	2.5	0.7	3.7	-0.1	-0.0
				55	14.0	-2.2	0.3	1.7	0.0	-0.0
				4364	-3.6	0.3	-0.3	0.0	0.1	0.0
			Min	4918	-14.0	-0.6	-0.7	0.5	-0.1	0.0
				4852	3.6	2.5	0.7	3.7	-0.1	-0.0
				55	14.0	-2.2	0.3	1.7	0.0	-0.0
				4364	-3.6	0.3	-0.3	0.0	0.1	0.0
4513	3	2 S1 HL-~1	Max	4852	-8.1	-1.8	0.2	-1.1	-0.1	-0.0
				5122	-11.9	1.0	-0.0	0.0	-0.1	0.0
				5123	8.0	0.1	-0.0	0.0	0.1	0.0
				55	12.0	0.7	0.2	-1.3	0.1	-0.0
			Min	4852	-8.1	-1.8	0.2	-1.1	-0.1	-0.0
				5122	-11.9	1.0	-0.0	0.0	-0.1	0.0
				5123	8.0	0.1	-0.0	0.0	0.1	0.0
				55	12.0	0.7	0.2	-1.3	0.1	-0.0
4537	3	2 S1 HL-~1	Max	3736	-9.3	0.8	0.0	0.2	-0.2	-0.0
				4364	-5.2	1.2	0.1	0.1	-0.2	0.0
				4470	9.2	-1.2	0.1	0.0	-0.0	0.0
				3818	5.2	-0.8	-0.0	0.4	-0.1	0.0
			Min	3736	-9.3	0.8	0.0	0.2	-0.2	-0.0
				4364	-5.2	1.2	0.1	0.1	-0.2	0.0
				4470	9.2	-1.2	0.1	0.0	-0.0	0.0
				3818	5.2	-0.8	-0.0	0.4	-0.1	0.0
4538	3	2 S1 HL-~1	Max	4364	-6.7	0.9	0.0	-0.1	-0.1	0.0
				55	-0.6	0.6	0.0	0.2	-0.0	-0.0
				2299	6.7	-1.1	0.1	0.5	0.0	-0.0
				4470	0.5	-0.4	-0.1	-0.0	0.0	0.0
			Min	4364	-6.7	0.9	0.0	-0.1	-0.1	0.0
				55	-0.6	0.6	0.0	0.2	-0.0	-0.0
				2299	6.7	-1.1	0.1	0.5	0.0	-0.0
				4470	0.5	-0.4	-0.1	-0.0	0.0	0.0
4539	3	2 S1 HL-~1	Max	55	-6.4	-0.7	0.1	-0.6	-0.1	-0.0
				5123	-8.0	-0.1	-0.0	-0.0	-0.1	0.0
				5124	6.4	0.2	-0.0	0.0	0.1	0.0
				2299	8.1	0.6	0.1	-0.6	0.1	-0.0
			Min	55	-6.4	-0.7	0.1	-0.6	-0.1	-0.0
				5123	-8.0	-0.1	-0.0	-0.0	-0.1	0.0
				5124	6.4	0.2	-0.0	0.0	0.1	0.0
				2299	8.1	0.6	0.1	-0.6	0.1	-0.0
4563	3	2 S1 HL-~1	Max	3818	-8.4	0.6	-0.0	1.3	0.1	0.0
				4470	-1.3	1.2	0.1	-0.3	0.0	0.0
				4433	8.5	-1.8	0.1	-0.5	-0.0	0.0
				3776	1.3	0.1	-0.0	1.4	-0.1	0.0
			Min	3818	-8.4	0.6	-0.0	1.3	0.1	0.0
				4470	-1.3	1.2	0.1	-0.3	0.0	0.0
				4433	8.5	-1.8	0.1	-0.5	-0.0	0.0
				3776	1.3	0.1	-0.0	1.4	-0.1	0.0

4564	3	2 S1 HL-~1	Max	4470	-8.4	0.5	-0.2	0.3	-0.0	0.0
				2299	3.5	1.0	0.3	1.2	-0.1	-0.0
				2493	8.4	-1.8	0.3	0.8	0.0	-0.0
				4433	-3.5	0.3	-0.2	0.5	-0.0	0.0
			Min	4470	-8.4	0.5	-0.2	0.3	-0.0	0.0
				2299	3.5	1.0	0.3	1.2	-0.1	-0.0
				2493	8.4	-1.8	0.3	0.8	0.0	-0.0
				4433	-3.5	0.3	-0.2	0.5	-0.0	0.0
4565	3	2 S1 HL-~1	Max	2299	-3.5	-0.5	0.2	-1.2	-0.1	-0.0
				5124	-6.4	-0.2	-0.1	-0.0	-0.1	0.0
				5125	3.6	-0.8	-0.0	0.0	0.1	0.0
				2493	6.4	1.5	0.2	-1.3	0.1	-0.0
			Min	2299	-3.5	-0.5	0.2	-1.2	-0.1	-0.0
				5124	-6.4	-0.2	-0.1	-0.0	-0.1	0.0
				5125	3.6	-0.8	-0.0	0.0	0.1	0.0
				2493	6.4	1.5	0.2	-1.3	0.1	-0.0
4589	3	2 S1 HL-~1	Max	3776	-5.2	-0.7	-0.0	2.1	0.1	0.0
				4433	2.9	2.0	0.2	-0.7	0.0	0.0
				4992	5.2	-1.4	0.2	-0.3	-0.0	0.0
				4991	-2.9	0.1	-0.0	1.9	-0.1	0.0
			Min	3776	-5.2	-0.7	-0.0	2.1	0.1	0.0
				4433	2.9	2.0	0.2	-0.7	0.0	0.0
				4992	5.2	-1.4	0.2	-0.3	-0.0	0.0
				4991	-2.9	0.1	-0.0	1.9	-0.1	0.0
4590	3	2 S1 HL-~1	Max	4433	-7.8	-0.5	-0.3	0.7	0.0	0.0
				2493	6.7	1.7	0.4	1.3	-0.0	-0.0
				4993	7.8	-1.4	0.4	1.8	0.1	-0.0
				4992	-6.7	0.1	-0.3	0.3	-0.0	0.0
			Min	4433	-7.8	-0.5	-0.3	0.7	0.0	0.0
				2493	6.7	1.7	0.4	1.3	-0.0	-0.0
				4993	7.8	-1.4	0.4	1.8	0.1	-0.0
				4992	-6.7	0.1	-0.3	0.3	-0.0	0.0
4591	3	2 S1 HL-~1	Max	2493	1.2	-1.6	0.2	-2.0	-0.1	-0.0
				5125	-3.6	0.8	-0.1	-0.0	-0.1	0.0
				5126	-1.2	-0.2	-0.1	-0.0	0.0	0.0
				4993	3.6	1.0	0.3	-1.9	0.0	-0.0
			Min	2493	1.2	-1.6	0.2	-2.0	-0.1	-0.0
				5125	-3.6	0.8	-0.1	-0.0	-0.1	0.0
				5126	-1.2	-0.2	-0.1	-0.0	0.0	0.0
				4993	3.6	1.0	0.3	-1.9	0.0	-0.0
4615	3	2 S1 HL-~1	Max	3771	0.1	-0.2	0.0	0.8	-0.0	-0.0
				4399	7.6	1.5	0.1	-0.3	0.0	0.0
				4561	-0.1	-1.7	0.2	-0.3	-0.1	0.0
				3864	-7.6	0.4	-0.1	1.9	-0.2	0.0
			Min	3771	0.1	-0.2	0.0	0.8	-0.0	-0.0
				4399	7.6	1.5	0.1	-0.3	0.0	0.0
				4561	-0.1	-1.7	0.2	-0.3	-0.1	0.0
				3864	-7.6	0.4	-0.1	1.9	-0.2	0.0
4616	3	2 S1 HL-~1	Max	4399	-4.3	-0.2	-0.3	0.3	-0.0	0.0
				1905	8.1	1.2	0.3	1.6	0.0	-0.0
				705	4.3	-1.7	0.4	1.8	-0.0	-0.0
				4561	-8.1	0.7	-0.3	0.3	-0.0	0.0
			Min	4399	-4.3	-0.2	-0.3	0.3	-0.0	0.0
				1905	8.1	1.2	0.3	1.6	0.0	-0.0
				705	4.3	-1.7	0.4	1.8	-0.0	-0.0
				4561	-8.1	0.7	-0.3	0.3	-0.0	0.0
4617	3	2 S1 HL-~1	Max	1905	5.4	-0.5	0.2	-1.7	-0.0	-0.0

				5127	2.0	-0.1	-0.1	-0.0	0.0	0.0
				5128	-5.3	-1.0	-0.1	0.0	-0.0	0.0
				705	-2.1	1.5	0.2	-1.9	0.0	-0.0
			Min	1905	5.4	-0.5	0.2	-1.7	-0.0	-0.0
				5127	2.0	-0.1	-0.1	-0.0	0.0	0.0
				5128	-5.3	-1.0	-0.1	0.0	-0.0	0.0
				705	-2.1	1.5	0.2	-1.9	0.0	-0.0
4641	3	2 S1 HL-~1	Max	3864	1.4	-0.3	-0.1	2.4	0.2	0.0
				4561	11.6	1.6	0.3	-0.5	0.1	0.0
				4410	-1.3	-1.4	0.2	-0.5	-0.1	0.0
				3782	-11.7	0.1	0.1	1.1	-0.1	0.0
			Min	3864	1.4	-0.3	-0.1	2.4	0.2	0.0
				4561	11.6	1.6	0.3	-0.5	0.1	0.0
				4410	-1.3	-1.4	0.2	-0.5	-0.1	0.0
				3782	-11.7	0.1	0.1	1.1	-0.1	0.0
4642	3	2 S1 HL-~1	Max	4561	-3.4	-0.6	-0.4	0.5	0.0	0.0
				705	9.9	1.4	0.5	2.4	-0.0	-0.0
				2089	3.4	-0.5	0.5	2.2	-0.0	-0.0
				4410	-9.9	-0.4	-0.4	0.5	-0.0	0.0
			Min	4561	-3.4	-0.6	-0.4	0.5	0.0	0.0
				705	9.9	1.4	0.5	2.4	-0.0	-0.0
				2089	3.4	-0.5	0.5	2.2	-0.0	-0.0
				4410	-9.9	-0.4	-0.4	0.5	-0.0	0.0
4643	3	2 S1 HL-~1	Max	705	7.5	-1.2	0.3	-2.6	-0.0	-0.0
				5128	5.3	1.0	-0.1	-0.0	0.0	0.0
				5129	-7.4	-0.5	-0.1	-0.0	-0.1	0.0
				2089	-5.4	0.7	0.3	-2.4	-0.0	-0.0
			Min	705	7.5	-1.2	0.3	-2.6	-0.0	-0.0
				5128	5.3	1.0	-0.1	-0.0	0.0	0.0
				5129	-7.4	-0.5	-0.1	-0.0	-0.1	0.0
				2089	-5.4	0.7	0.3	-2.4	-0.0	-0.0
4667	3	2 S1 HL-~1	Max	3782	4.4	-0.2	0.1	0.7	0.0	0.0
				4410	12.1	1.5	0.1	-0.3	0.1	0.0
				4560	-4.5	-0.4	0.2	-0.1	-0.2	0.0
				3869	-12.1	-0.9	-0.1	1.7	-0.2	0.0
			Min	3782	4.4	-0.2	0.1	0.7	0.0	0.0
				4410	12.1	1.5	0.1	-0.3	0.1	0.0
				4560	-4.5	-0.4	0.2	-0.1	-0.2	0.0
				3869	-12.1	-0.9	-0.1	1.7	-0.2	0.0
4668	3	2 S1 HL-~1	Max	4410	-0.9	-0.8	-0.3	0.3	0.0	0.0
				2089	9.1	1.6	0.4	1.8	0.0	-0.0
				704	0.9	-0.3	0.4	2.1	-0.0	-0.0
				4560	-9.1	-0.5	-0.3	0.1	-0.0	0.0
			Min	4410	-0.9	-0.8	-0.3	0.3	0.0	0.0
				2089	9.1	1.6	0.4	1.8	0.0	-0.0
				704	0.9	-0.3	0.4	2.1	-0.0	-0.0
				4560	-9.1	-0.5	-0.3	0.1	-0.0	0.0
4669	3	2 S1 HL-~1	Max	2089	8.7	-0.7	0.2	-1.8	0.0	-0.0
				5129	7.4	0.5	-0.1	0.0	0.1	0.0
				5130	-8.7	-0.1	-0.1	-0.0	-0.1	0.0
				704	-7.4	0.3	0.2	-1.9	-0.0	-0.0
			Min	2089	8.7	-0.7	0.2	-1.8	0.0	-0.0
				5129	7.4	0.5	-0.1	0.0	0.1	0.0
				5130	-8.7	-0.1	-0.1	-0.0	-0.1	0.0
				704	-7.4	0.3	0.2	-1.9	-0.0	-0.0
4693	3	2 S1 HL-~1	Max	3869	-0.3	2.1	-0.1	2.3	0.2	0.0
				4560	16.6	0.0	0.3	-0.1	0.2	0.0

				4416	0.4	-2.4	0.2	-0.4	-0.1	0.0
				3788	-16.7	0.2	0.1	0.9	-0.1	0.0
			Min	3869	-0.3	2.1	-0.1	2.3	0.2	0.0
				4560	16.6	0.0	0.3	-0.1	0.2	0.0
				4416	0.4	-2.4	0.2	-0.4	-0.1	0.0
				3788	-16.7	0.2	0.1	0.9	-0.1	0.0
4694	3	2 S1 HL-~1	Max	4560	-3.0	0.9	-0.4	0.1	0.0	0.0
				704	11.1	0.0	0.6	2.8	0.0	-0.0
				2193	3.0	0.5	0.5	2.4	-0.0	0.0
				4416	-11.0	-1.4	-0.4	0.4	-0.0	0.0
			Min	4560	-3.0	0.9	-0.4	0.1	0.0	0.0
				704	11.1	0.0	0.6	2.8	0.0	-0.0
				2193	3.0	0.5	0.5	2.4	-0.0	0.0
				4416	-11.0	-1.4	-0.4	0.4	-0.0	0.0
4695	3	2 S1 HL-~1	Max	704	7.2	0.1	0.3	-2.5	0.0	-0.0
				5130	8.7	0.1	-0.1	0.0	0.1	0.0
				5131	-7.1	1.4	-0.1	0.0	-0.1	0.0
				2193	-8.8	-1.6	0.3	-2.4	-0.0	0.0
			Min	704	7.2	0.1	0.3	-2.5	0.0	-0.0
				5130	8.7	0.1	-0.1	0.0	0.1	0.0
				5131	-7.1	1.4	-0.1	0.0	-0.1	0.0
				2193	-8.8	-1.6	0.3	-2.4	-0.0	0.0
4719	3	2 S1 HL-~1	Max	3788	0.5	1.7	0.1	0.7	0.1	0.0
				4416	15.0	0.8	0.1	-0.5	0.1	0.0
				4559	-0.3	-0.2	0.2	-0.6	-0.2	0.0
				3874	-15.2	-2.2	-0.0	1.7	-0.2	0.0
			Min	3788	0.5	1.7	0.1	0.7	0.1	0.0
				4416	15.0	0.8	0.1	-0.5	0.1	0.0
				4559	-0.3	-0.2	0.2	-0.6	-0.2	0.0
				3874	-15.2	-2.2	-0.0	1.7	-0.2	0.0
4720	3	2 S1 HL-~1	Max	4416	-4.4	1.0	-0.3	0.5	0.0	0.0
				2193	11.4	0.3	0.3	1.4	0.0	0.0
				703	4.5	-1.2	0.4	1.2	-0.1	-0.0
				4559	-11.5	-0.1	-0.3	0.6	-0.0	0.0
			Min	4416	-4.4	1.0	-0.3	0.5	0.0	0.0
				2193	11.4	0.3	0.3	1.4	0.0	0.0
				703	4.5	-1.2	0.4	1.2	-0.1	-0.0
				4559	-11.5	-0.1	-0.3	0.6	-0.0	0.0
4721	3	2 S1 HL-~1	Max	2193	5.1	1.7	0.2	-1.8	0.0	0.0
				5131	7.1	-1.4	-0.1	-0.0	0.1	0.0
				5132	-4.9	-2.2	-0.1	-0.1	-0.1	0.0
				703	-7.4	1.8	0.2	-1.8	-0.0	-0.0
			Min	2193	5.1	1.7	0.2	-1.8	0.0	0.0
				5131	7.1	-1.4	-0.1	-0.0	0.1	0.0
				5132	-4.9	-2.2	-0.1	-0.1	-0.1	0.0
				703	-7.4	1.8	0.2	-1.8	-0.0	-0.0
4745	3	2 S1 HL-~1	Max	3874	24.8	-9.4	0.0	2.5	0.0	0.0
				4559	-8.1	5.2	0.2	-1.0	0.3	0.0
				4422	-25.5	12.1	0.2	-1.3	-0.4	-0.0
				3794	8.8	-7.9	0.1	1.3	0.1	-0.0
			Min	3874	24.8	-9.4	0.0	2.5	0.0	0.0
				4559	-8.1	5.2	0.2	-1.0	0.3	0.0
				4422	-25.5	12.1	0.2	-1.3	-0.4	-0.0
				3794	8.8	-7.9	0.1	1.3	0.1	-0.0
4746	3	2 S1 HL-~1	Max	4559	19.9	-4.8	-0.4	1.0	-0.1	0.0
				703	-10.0	3.0	0.5	1.7	0.2	-0.0
				2301	-20.1	2.6	0.6	2.0	-0.2	-0.0

				4422	10.2	-0.7	-0.5	1.2	0.1	-0.0
			Min	4559	19.9	-4.8	-0.4	1.0	-0.1	0.0
				703	-10.0	3.0	0.5	1.7	0.2	-0.0
				2301	-20.1	2.6	0.6	2.0	-0.2	-0.0
				4422	10.2	-0.7	-0.5	1.2	0.1	-0.0
4747	3	2 S1 HL-~1	Max	703	17.0	-3.7	0.3	-2.3	-0.1	-0.0
				5132	4.9	2.2	-0.1	0.1	0.1	0.0
				5133	-17.2	-1.5	-0.0	0.0	-0.3	0.0
				2301	-4.6	3.0	0.2	-2.0	-0.1	-0.0
			Min	703	17.0	-3.7	0.3	-2.3	-0.1	-0.0
				5132	4.9	2.2	-0.1	0.1	0.1	0.0
				5133	-17.2	-1.5	-0.0	0.0	-0.3	0.0
				2301	-4.6	3.0	0.2	-2.0	-0.1	-0.0
4771	3	2 S1 HL-~1	Max	3794	10.7	-5.2	0.1	0.5	0.1	-0.0
				4422	2.2	1.9	-0.0	0.2	0.3	-0.0
				4452	-11.9	5.7	0.4	0.9	0.1	0.0
				3812	-1.1	-2.5	-0.3	1.0	-0.0	0.0
			Min	3794	10.7	-5.2	0.1	0.5	0.1	-0.0
				4422	2.2	1.9	-0.0	0.2	0.3	-0.0
				4452	-11.9	5.7	0.4	0.9	0.1	0.0
				3812	-1.1	-2.5	-0.3	1.0	-0.0	0.0
4772	3	2 S1 HL-~1	Max	4422	13.1	-2.1	-0.2	-0.1	0.1	-0.0
				2301	-4.1	-0.8	0.2	1.9	0.1	-0.0
				2139	-13.5	3.8	0.5	3.0	0.2	0.0
				4452	4.5	-0.9	-0.4	-1.0	0.2	0.0
			Min	4422	13.1	-2.1	-0.2	-0.1	0.1	-0.0
				2301	-4.1	-0.8	0.2	1.9	0.1	-0.0
				2139	-13.5	3.8	0.5	3.0	0.2	0.0
				4452	4.5	-0.9	-0.4	-1.0	0.2	0.0
4773	3	2 S1 HL-~1	Max	2301	6.0	1.9	0.2	-0.5	0.2	-0.0
				5133	17.2	1.5	-0.1	-0.0	0.3	0.0
				5134	-7.0	0.1	0.1	0.0	0.0	0.0
				2139	-16.2	-3.5	-0.0	-0.3	0.1	0.0
			Min	2301	6.0	1.9	0.2	-0.5	0.2	-0.0
				5133	17.2	1.5	-0.1	-0.0	0.3	0.0
				5134	-7.0	0.1	0.1	0.0	0.0	0.0
				2139	-16.2	-3.5	-0.0	-0.3	0.1	0.0
4797	3	2 S1 HL-~1	Max	3812	8.8	-0.7	-0.1	1.7	0.0	0.0
				4452	-4.4	-3.8	0.2	1.5	-0.1	0.0
				4517	-9.0	-1.6	0.4	1.2	-0.1	0.0
				3841	4.7	6.0	-0.3	1.8	0.0	0.0
			Min	3812	8.8	-0.7	-0.1	1.7	0.0	0.0
				4452	-4.4	-3.8	0.2	1.5	-0.1	0.0
				4517	-9.0	-1.6	0.4	1.2	-0.1	0.0
				3841	4.7	6.0	-0.3	1.8	0.0	0.0
4798	3	2 S1 HL-~1	Max	4452	11.8	-1.0	-0.2	-1.4	-0.2	0.0
				2139	-9.0	-2.4	0.3	3.8	-0.2	0.0
				1492	-11.8	1.9	0.5	3.3	-0.0	-0.0
				4517	9.0	1.6	-0.5	-1.2	0.1	0.0
			Min	4452	11.8	-1.0	-0.2	-1.4	-0.2	0.0
				2139	-9.0	-2.4	0.3	3.8	-0.2	0.0
				1492	-11.8	1.9	0.5	3.3	-0.0	-0.0
				4517	9.0	1.6	-0.5	-1.2	0.1	0.0
4799	3	2 S1 HL-~1	Max	2139	-0.4	2.4	0.3	-1.3	-0.1	0.0
				5134	7.0	-0.1	-0.2	-0.0	-0.0	0.0
				5135	0.0	0.0	-0.0	0.0	0.0	0.0
				1492	-6.7	-2.3	0.1	-2.5	0.0	-0.0

			Min	2139	-0.4	2.4	0.3	-1.3	-0.1	0.0
				5134	7.0	-0.1	-0.2	-0.0	-0.0	0.0
				5135	0.0	0.0	-0.0	0.0	0.0	0.0
				1492	-6.7	-2.3	0.1	-2.5	0.0	-0.0
5112	3	3 S1 HL-~1	Max	1153	0.0	0.0	0.0	0.0	0.0	0.0
				1493	-7.8	-1.2	0.0	-1.7	0.3	-0.0
				1599	0.6	3.2	-0.2	0.3	-0.0	-0.0
				1982	7.2	-2.0	0.3	0.0	0.2	0.0
			Min	1153	0.0	0.0	0.0	0.0	0.0	0.0
				1493	-7.8	-1.2	0.0	-1.7	0.3	-0.0
				1599	0.6	3.2	-0.2	0.3	-0.0	-0.0
				1982	7.2	-2.0	0.3	0.0	0.2	0.0
5113	3	3 S1 HL-~1	Max	1493	-10.1	1.7	0.1	-1.9	-0.3	-0.0
				2509	0.0	0.0	0.0	0.0	0.0	0.0
				1926	10.3	2.3	-0.3	0.0	-0.3	0.0
				1599	-0.2	-4.0	0.3	0.2	-0.1	-0.0
			Min	1493	-10.1	1.7	0.1	-1.9	-0.3	-0.0
				2509	0.0	0.0	0.0	0.0	0.0	0.0
				1926	10.3	2.3	-0.3	0.0	-0.3	0.0
				1599	-0.2	-4.0	0.3	0.2	-0.1	-0.0
5114	3	3 S1 HL-~1	Max	1982	-7.2	2.0	-0.3	-0.0	-0.2	0.0
				1599	-11.6	-2.5	0.3	1.6	0.1	-0.0
				1809	8.1	-0.1	0.1	1.0	-0.2	0.0
				2628	10.6	0.7	-0.1	0.0	0.0	-0.0
			Min	1982	-7.2	2.0	-0.3	-0.0	-0.2	0.0
				1599	-11.6	-2.5	0.3	1.6	0.1	-0.0
				1809	8.1	-0.1	0.1	1.0	-0.2	0.0
				2628	10.6	0.7	-0.1	0.0	0.0	-0.0
5115	3	3 S1 HL-~1	Max	1599	-14.5	3.2	-0.2	1.3	0.1	-0.0
				1926	-10.3	-2.3	0.3	-0.0	0.3	0.0
				1015	15.6	0.1	0.1	0.1	-0.1	0.0
				1809	9.2	-1.0	-0.0	0.5	0.1	0.0
			Min	1599	-14.5	3.2	-0.2	1.3	0.1	-0.0
				1926	-10.3	-2.3	0.3	-0.0	0.3	0.0
				1015	15.6	0.1	0.1	0.1	-0.1	0.0
				1809	9.2	-1.0	-0.0	0.5	0.1	0.0
5116	3	3 S1 HL-~1	Max	2628	-10.5	5.1	-0.1	-0.0	0.1	-0.0
				1809	-14.3	-5.3	0.2	0.6	0.0	0.0
				712	11.1	0.0	0.1	0.3	-0.0	0.0
				3540	13.6	0.2	0.0	-0.0	-0.0	0.0
			Min	2628	-10.5	5.1	-0.1	-0.0	0.1	-0.0
				1809	-14.3	-5.3	0.2	0.6	0.0	0.0
				712	11.1	0.0	0.1	0.3	-0.0	0.0
				3540	13.6	0.2	0.0	-0.0	-0.0	0.0
5117	3	3 S1 HL-~1	Max	1809	-12.5	-0.0	0.2	-0.7	0.0	0.0
				1015	-15.6	-0.1	-0.1	-0.1	0.1	0.0
				3552	13.0	-2.5	-0.0	-0.0	-0.0	0.0
				712	15.1	2.7	0.1	-0.5	-0.0	0.0
			Min	1809	-12.5	-0.0	0.2	-0.7	0.0	0.0
				1015	-15.6	-0.1	-0.1	-0.1	0.1	0.0
				3552	13.0	-2.5	-0.0	-0.0	-0.0	0.0
				712	15.1	2.7	0.1	-0.5	-0.0	0.0
5118	3	3 S1 HL-~1	Max	3540	-13.6	-0.2	-0.0	0.0	0.0	0.0
				712	-11.3	0.3	0.1	0.1	0.1	0.0
				1705	13.2	-3.2	0.0	0.2	-0.0	0.0
				2580	11.7	3.0	0.0	-0.1	0.0	0.0

			Min	3540	-13.6	-0.2	-0.0	0.0	0.0	0.0
				712	-11.3	0.3	0.1	0.1	0.1	0.0
				1705	13.2	-3.2	0.0	0.2	-0.0	0.0
				2580	11.7	3.0	0.0	-0.1	0.0	0.0
5119	3	3 S1 HL-~1	Max	712	-9.8	-2.8	0.0	-0.2	0.0	0.0
				3552	-13.0	2.5	0.0	0.0	0.0	0.0
				1207	9.5	-0.3	-0.0	0.0	-0.1	0.0
				1705	13.3	0.6	0.1	-0.2	-0.0	0.0
			Min	712	-9.8	-2.8	0.0	-0.2	0.0	0.0
				3552	-13.0	2.5	0.0	0.0	0.0	0.0
				1207	9.5	-0.3	-0.0	0.0	-0.1	0.0
				1705	13.3	0.6	0.1	-0.2	-0.0	0.0
5120	3	3 S1 HL-~1	Max	2580	-11.6	1.6	-0.0	0.1	0.0	0.0
				1705	-10.5	-1.5	0.1	0.4	0.0	0.0
				713	11.4	-1.3	0.1	0.4	-0.0	0.0
				3541	10.7	1.2	-0.0	0.0	-0.0	0.0
			Min	2580	-11.6	1.6	-0.0	0.1	0.0	0.0
				1705	-10.5	-1.5	0.1	0.4	0.0	0.0
				713	11.4	-1.3	0.1	0.4	-0.0	0.0
				3541	10.7	1.2	-0.0	0.0	-0.0	0.0
5121	3	3 S1 HL-~1	Max	1705	-10.9	-0.2	0.1	-0.2	0.0	0.0
				1207	-9.5	0.3	0.0	-0.0	0.1	0.0
				3553	10.6	-0.3	0.0	0.0	-0.1	0.0
				713	9.8	0.3	0.1	-0.2	-0.0	0.0
			Min	1705	-10.9	-0.2	0.1	-0.2	0.0	0.0
				1207	-9.5	0.3	0.0	-0.0	0.1	0.0
				3553	10.6	-0.3	0.0	0.0	-0.1	0.0
				713	9.8	0.3	0.1	-0.2	-0.0	0.0
5122	3	3 S1 HL-~1	Max	3541	-10.7	-1.2	0.0	-0.0	0.0	0.0
				713	-7.9	1.5	0.1	0.3	0.0	0.0
				96	10.7	-3.0	0.1	0.3	-0.0	-0.0
				2524	7.9	2.8	-0.0	0.0	-0.0	-0.0
			Min	3541	-10.7	-1.2	0.0	-0.0	0.0	0.0
				713	-7.9	1.5	0.1	0.3	0.0	0.0
				96	10.7	-3.0	0.1	0.3	-0.0	-0.0
				2524	7.9	2.8	-0.0	0.0	-0.0	-0.0
5123	3	3 S1 HL-~1	Max	713	-8.0	-0.5	0.1	-0.2	0.0	0.0
				3553	-10.6	0.3	-0.0	-0.0	0.1	0.0
				1013	8.1	-1.6	0.0	0.0	-0.0	0.0
				96	10.6	1.8	0.1	-0.3	-0.0	-0.0
			Min	713	-8.0	-0.5	0.1	-0.2	0.0	0.0
				3553	-10.6	0.3	-0.0	-0.0	0.1	0.0
				1013	8.1	-1.6	0.0	0.0	-0.0	0.0
				96	10.6	1.8	0.1	-0.3	-0.0	-0.0
5124	3	3 S1 HL-~1	Max	2524	-7.9	0.2	-0.0	-0.0	0.0	-0.0
				96	-5.7	-0.1	0.1	0.4	0.0	-0.0
				714	8.0	-2.8	0.1	0.3	-0.0	-0.0
				3542	5.6	2.6	-0.0	0.0	-0.0	0.0
			Min	2524	-7.9	0.2	-0.0	-0.0	0.0	-0.0
				96	-5.7	-0.1	0.1	0.4	0.0	-0.0
				714	8.0	-2.8	0.1	0.3	-0.0	-0.0
				3542	5.6	2.6	-0.0	0.0	-0.0	0.0
5125	3	3 S1 HL-~1	Max	96	-5.9	-1.7	0.1	-0.4	0.0	-0.0
				1013	-8.1	1.6	-0.0	-0.0	0.0	0.0
				3554	6.0	-2.6	0.0	0.0	-0.0	0.0
				714	8.0	2.7	0.1	-0.3	-0.0	-0.0
			Min	96	-5.9	-1.7	0.1	-0.4	0.0	-0.0

				1013	-8.1	1.6	-0.0	-0.0	0.0	0.0
				3554	6.0	-2.6	0.0	0.0	-0.0	0.0
				714	8.0	2.7	0.1	-0.3	-0.0	-0.0
5126	3	3 S1 HL-~1	Max	3542	-5.6	-2.6	0.0	-0.0	0.0	0.0
				714	-2.1	2.9	0.1	0.3	0.0	-0.0
				82	5.6	-1.2	0.1	0.3	-0.0	0.0
				2476	2.1	1.0	-0.0	-0.0	-0.0	0.0
			Min	3542	-5.6	-2.6	0.0	-0.0	0.0	0.0
				714	-2.1	2.9	0.1	0.3	0.0	-0.0
				82	5.6	-1.2	0.1	0.3	-0.0	0.0
				2476	2.1	1.0	-0.0	-0.0	-0.0	0.0
5127	3	3 S1 HL-~1	Max	714	-1.9	-2.9	0.1	-0.2	0.0	-0.0
				3554	-6.0	2.6	-0.0	-0.0	0.0	0.0
				1206	1.9	-0.3	-0.0	0.0	0.0	0.0
				82	5.9	0.6	0.1	-0.3	-0.0	0.0
			Min	714	-1.9	-2.9	0.1	-0.2	0.0	-0.0
				3554	-6.0	2.6	-0.0	-0.0	0.0	0.0
				1206	1.9	-0.3	-0.0	0.0	0.0	0.0
				82	5.9	0.6	0.1	-0.3	-0.0	0.0
5128	3	3 S1 HL-~1	Max	2476	-2.2	0.2	-0.0	0.0	0.0	0.0
				82	-1.3	0.0	0.0	0.1	0.0	0.0
				5063	2.2	-1.2	0.0	0.0	0.0	0.0
				5076	1.3	1.0	0.0	-0.0	0.0	0.0
			Min	2476	-2.2	0.2	-0.0	0.0	0.0	0.0
				82	-1.3	0.0	0.0	0.1	0.0	0.0
				5063	2.2	-1.2	0.0	0.0	0.0	0.0
				5076	1.3	1.0	0.0	-0.0	0.0	0.0
5129	3	3 S1 HL-~1	Max	82	-1.3	-0.5	0.0	-0.1	-0.0	0.0
				1206	-1.9	0.3	0.0	-0.0	-0.0	0.0
				5077	1.2	-0.7	-0.0	-0.0	-0.0	0.0
				5063	2.0	0.9	0.0	-0.1	-0.0	0.0
			Min	82	-1.3	-0.5	0.0	-0.1	-0.0	0.0
				1206	-1.9	0.3	0.0	-0.0	-0.0	0.0
				5077	1.2	-0.7	-0.0	-0.0	-0.0	0.0
				5063	2.0	0.9	0.0	-0.1	-0.0	0.0
5130	3	4 S1 HL-~1	Max	1862	4.1	-2.6	0.0	-0.0	-0.1	0.0
				2485	7.8	3.1	0.1	0.4	-0.0	0.0
				2242	-4.0	-0.9	0.1	0.4	0.0	0.0
				2458	-7.9	0.4	-0.1	0.0	0.1	0.0
			Min	1862	4.1	-2.6	0.0	-0.0	-0.1	0.0
				2485	7.8	3.1	0.1	0.4	-0.0	0.0
				2242	-4.0	-0.9	0.1	0.4	0.0	0.0
				2458	-7.9	0.4	-0.1	0.0	0.1	0.0
5131	3	4 S1 HL-~1	Max	2485	8.0	-3.3	0.1	-0.1	-0.0	0.0
				1087	3.8	2.7	-0.0	-0.0	0.0	0.0
				1615	-8.1	-0.2	0.0	-0.0	0.1	0.0
				2242	-3.8	0.8	0.0	-0.2	0.1	0.0
			Min	2485	8.0	-3.3	0.1	-0.1	-0.0	0.0
				1087	3.8	2.7	-0.0	-0.0	0.0	0.0
				1615	-8.1	-0.2	0.0	-0.0	0.1	0.0
				2242	-3.8	0.8	0.0	-0.2	0.1	0.0
5132	3	4 S1 HL-~1	Max	2458	7.9	-0.4	0.1	-0.0	-0.1	0.0
				2242	10.0	0.9	-0.0	-0.0	-0.1	0.0
				64	-8.1	-0.4	0.0	-0.3	0.2	-0.0
				2404	-9.8	-0.1	0.0	-0.0	0.2	0.0
			Min	2458	7.9	-0.4	0.1	-0.0	-0.1	0.0
				2242	10.0	0.9	-0.0	-0.0	-0.1	0.0

				64	-8.1	-0.4	0.0	-0.3	0.2	-0.0
				2404	-9.8	-0.1	0.0	-0.0	0.2	0.0
5133	3	4 S1 HL-~1	Max	2242	10.2	-0.8	0.1	-0.2	-0.1	0.0
				1615	8.1	0.2	-0.0	0.0	-0.1	0.0
				2725	-10.2	-0.6	0.0	-0.0	0.2	0.0
				64	-8.1	1.1	0.0	-0.2	0.2	-0.0
			Min	2242	10.2	-0.8	0.1	-0.2	-0.1	0.0
				1615	8.1	0.2	-0.0	0.0	-0.1	0.0
				2725	-10.2	-0.6	0.0	-0.0	0.2	0.0
				64	-8.1	1.1	0.0	-0.2	0.2	-0.0
5134	3	4 S1 HL-~1	Max	2404	9.8	-1.9	-0.1	0.0	-0.1	0.0
				64	15.6	2.6	0.2	0.8	-0.2	-0.0
				4785	-9.8	-3.8	0.5	2.7	0.2	-0.0
				4799	-15.6	3.1	-0.4	0.0	0.1	0.0
			Min	2404	9.8	-1.9	-0.1	0.0	-0.1	0.0
				64	15.6	2.6	0.2	0.8	-0.2	-0.0
				4785	-9.8	-3.8	0.5	2.7	0.2	-0.0
				4799	-15.6	3.1	-0.4	0.0	0.1	0.0
5135	3	4 S1 HL-~1	Max	64	15.5	-1.2	0.1	-0.3	-0.2	-0.0
				2725	10.2	0.6	-0.0	0.0	-0.2	0.0
				4795	-15.6	-3.0	0.1	0.0	0.1	0.0
				4785	-10.1	3.6	0.0	-0.1	0.0	-0.0
			Min	64	15.5	-1.2	0.1	-0.3	-0.2	-0.0
				2725	10.2	0.6	-0.0	0.0	-0.2	0.0
				4795	-15.6	-3.0	0.1	0.0	0.1	0.0
				4785	-10.1	3.6	0.0	-0.1	0.0	-0.0
5136	3	4 S1 HL-~1	Max	4799	15.6	-3.1	0.4	-0.0	-0.1	0.0
				4785	21.1	3.8	-0.3	-2.3	-0.2	-0.0
				36	-15.6	0.6	-1.5	-9.2	0.2	-0.0
				2300	-21.1	-1.2	1.6	0.0	0.3	-0.0
			Min	4799	15.6	-3.1	0.4	-0.0	-0.1	0.0
				4785	21.1	3.8	-0.3	-2.3	-0.2	-0.0
				36	-15.6	0.6	-1.5	-9.2	0.2	-0.0
				2300	-21.1	-1.2	1.6	0.0	0.3	-0.0
5137	3	4 S1 HL-~1	Max	4785	20.7	-3.5	0.1	-0.2	-0.0	-0.0
				4795	15.6	3.0	-0.1	-0.0	-0.1	0.0
				2613	-20.6	0.0	0.0	-0.0	0.6	0.0
				36	-15.7	0.5	0.1	-0.7	0.5	-0.0
			Min	4785	20.7	-3.5	0.1	-0.2	-0.0	-0.0
				4795	15.6	3.0	-0.1	-0.0	-0.1	0.0
				2613	-20.6	0.0	0.0	-0.0	0.6	0.0
				36	-15.7	0.5	0.1	-0.7	0.5	-0.0
5138	3	4 S1 HL-~1	Max	2300	21.1	-1.2	1.6	-0.0	-0.3	-0.0
				36	15.6	0.6	-1.5	-9.2	-0.2	-0.0
				4853	-21.1	3.8	-0.3	-2.3	0.2	0.0
				4873	-15.6	-3.1	0.4	-0.0	0.1	0.0
			Min	2300	21.1	-1.2	1.6	-0.0	-0.3	-0.0
				36	15.6	0.6	-1.5	-9.2	-0.2	-0.0
				4853	-21.1	3.8	-0.3	-2.3	0.2	0.0
				4873	-15.6	-3.1	0.4	-0.0	0.1	0.0
5139	3	4 S1 HL-~1	Max	36	15.7	0.6	0.1	-0.7	-0.5	-0.0
				2613	20.6	-0.0	-0.0	0.0	-0.6	0.0
				4866	-15.5	3.0	-0.1	-0.0	0.1	0.0
				4853	-20.7	-3.5	0.1	-0.2	0.0	0.0
			Min	36	15.7	0.6	0.1	-0.7	-0.5	-0.0
				2613	20.6	-0.0	-0.0	0.0	-0.6	0.0
				4866	-15.5	3.0	-0.1	-0.0	0.1	0.0

				4853	-20.7	-3.5	0.1	-0.2	0.0	0.0
5140	3	4 S1 HL-~1	Max	4873	15.6	3.1	-0.4	0.0	-0.1	0.0
				4853	9.8	-3.8	0.5	2.7	-0.2	0.0
				56	-15.6	2.6	0.2	0.8	0.2	0.0
				2372	-9.8	-1.9	-0.1	0.0	0.1	-0.0
			Min	4873	15.6	3.1	-0.4	0.0	-0.1	0.0
				4853	9.8	-3.8	0.5	2.7	-0.2	0.0
				56	-15.6	2.6	0.2	0.8	0.2	0.0
				2372	-9.8	-1.9	-0.1	0.0	0.1	-0.0
5141	3	4 S1 HL-~1	Max	4853	10.1	3.6	0.0	-0.1	-0.0	0.0
				4866	15.5	-3.0	0.1	0.0	-0.1	0.0
				2693	-10.2	0.6	-0.0	0.0	0.2	0.0
				56	-15.4	-1.2	0.1	-0.3	0.2	0.0
			Min	4853	10.1	3.6	0.0	-0.1	-0.0	0.0
				4866	15.5	-3.0	0.1	0.0	-0.1	0.0
				2693	-10.2	0.6	-0.0	0.0	0.2	0.0
				56	-15.4	-1.2	0.1	-0.3	0.2	0.0
5142	3	4 S1 HL-~1	Max	2372	9.8	-0.1	0.0	-0.0	-0.2	-0.0
				56	8.1	-0.4	0.0	-0.3	-0.2	0.0
				2190	-10.0	0.9	-0.0	-0.0	0.1	-0.0
				2402	-7.9	-0.4	0.1	-0.0	0.1	0.0
			Min	2372	9.8	-0.1	0.0	-0.0	-0.2	-0.0
				56	8.1	-0.4	0.0	-0.3	-0.2	0.0
				2190	-10.0	0.9	-0.0	-0.0	0.1	-0.0
				2402	-7.9	-0.4	0.1	-0.0	0.1	0.0
5143	3	4 S1 HL-~1	Max	56	8.1	1.1	0.0	-0.2	-0.2	0.0
				2693	10.2	-0.6	0.0	-0.0	-0.2	0.0
				2298	-8.1	0.2	-0.0	0.0	0.1	0.0
				2190	-10.2	-0.8	0.1	-0.2	0.1	-0.0
			Min	56	8.1	1.1	0.0	-0.2	-0.2	0.0
				2693	10.2	-0.6	0.0	-0.0	-0.2	0.0
				2298	-8.1	0.2	-0.0	0.0	0.1	0.0
				2190	-10.2	-0.8	0.1	-0.2	0.1	-0.0
5144	3	4 S1 HL-~1	Max	2402	7.9	0.4	-0.1	0.0	-0.1	0.0
				2190	4.0	-0.9	0.1	0.4	-0.0	-0.0
				2501	-7.8	3.1	0.1	0.4	0.0	-0.0
				1870	-4.1	-2.6	0.0	-0.0	0.1	0.0
			Min	2402	7.9	0.4	-0.1	0.0	-0.1	0.0
				2190	4.0	-0.9	0.1	0.4	-0.0	-0.0
				2501	-7.8	3.1	0.1	0.4	0.0	-0.0
				1870	-4.1	-2.6	0.0	-0.0	0.1	0.0
5145	3	4 S1 HL-~1	Max	2190	3.8	0.8	0.0	-0.2	-0.1	-0.0
				2298	8.1	-0.2	0.0	-0.0	-0.1	0.0
				1121	-3.8	2.7	-0.0	-0.0	-0.0	0.0
				2501	-8.0	-3.3	0.1	-0.1	0.0	-0.0
			Min	2190	3.8	0.8	0.0	-0.2	-0.1	-0.0
				2298	8.1	-0.2	0.0	-0.0	-0.1	0.0
				1121	-3.8	2.7	-0.0	-0.0	-0.0	0.0
				2501	-8.0	-3.3	0.1	-0.1	0.0	-0.0
5146	3	4 S1 HL-~1	Max	1870	4.1	2.6	-0.0	0.0	-0.1	0.0
				2501	-1.3	-3.1	0.1	0.6	-0.0	-0.0
				5008	-4.1	1.4	0.2	0.4	-0.0	-0.0
				5021	1.3	-1.0	-0.0	0.0	0.0	0.0
			Min	1870	4.1	2.6	-0.0	0.0	-0.1	0.0
				2501	-1.3	-3.1	0.1	0.6	-0.0	-0.0
				5008	-4.1	1.4	0.2	0.4	-0.0	-0.0
				5021	1.3	-1.0	-0.0	0.0	0.0	0.0

5147	3	4 S1 HL-~1	Max	2501	-1.2	3.2	0.1	-0.3	-0.1	-0.0
				1121	3.8	-2.7	0.0	0.0	0.0	0.0
				5022	1.2	0.7	0.0	0.0	-0.0	0.0
				5008	-3.9	-1.1	0.1	-0.5	0.0	-0.0
			Min	2501	-1.2	3.2	0.1	-0.3	-0.1	-0.0
				1121	3.8	-2.7	0.0	0.0	0.0	0.0
				5022	1.2	0.7	0.0	0.0	-0.0	0.0
				5008	-3.9	-1.1	0.1	-0.5	0.0	-0.0
5148	3	3 S1 HL-~1	Max	2684	-2.2	1.0	-0.0	-0.0	0.0	-0.0
				1913	-5.6	-1.2	0.1	0.3	0.0	-0.0
				717	2.1	2.9	0.1	0.3	-0.0	0.0
				3545	5.6	-2.6	0.0	-0.0	-0.0	0.0
			Min	2684	-2.2	1.0	-0.0	-0.0	0.0	-0.0
				1913	-5.6	-1.2	0.1	0.3	0.0	-0.0
				717	2.1	2.9	0.1	0.3	-0.0	0.0
				3545	5.6	-2.6	0.0	-0.0	-0.0	0.0
5149	3	3 S1 HL-~1	Max	1913	-5.9	0.6	0.1	-0.3	0.0	-0.0
				1208	-1.9	-0.3	-0.0	0.0	-0.0	0.0
				3557	6.0	2.6	-0.0	-0.0	-0.0	0.0
				717	1.9	-2.9	0.1	-0.2	-0.0	0.0
			Min	1913	-5.9	0.6	0.1	-0.3	0.0	-0.0
				1208	-1.9	-0.3	-0.0	0.0	-0.0	0.0
				3557	6.0	2.6	-0.0	-0.0	-0.0	0.0
				717	1.9	-2.9	0.1	-0.2	-0.0	0.0
5150	3	3 S1 HL-~1	Max	3545	-5.6	2.6	-0.0	0.0	0.0	0.0
				717	-8.0	-2.8	0.1	0.3	0.0	0.0
				2097	5.7	-0.1	0.1	0.4	-0.0	0.0
				1662	7.9	0.2	-0.0	-0.0	-0.0	0.0
			Min	3545	-5.6	2.6	-0.0	0.0	0.0	0.0
				717	-8.0	-2.8	0.1	0.3	0.0	0.0
				2097	5.7	-0.1	0.1	0.4	-0.0	0.0
				1662	7.9	0.2	-0.0	-0.0	-0.0	0.0
5151	3	3 S1 HL-~1	Max	717	-8.0	2.7	0.1	-0.3	0.0	0.0
				3557	-6.0	-2.6	0.0	0.0	0.0	0.0
				1148	8.1	1.6	-0.0	-0.0	-0.0	0.0
				2097	5.9	-1.7	0.1	-0.4	-0.0	0.0
			Min	717	-8.0	2.7	0.1	-0.3	0.0	0.0
				3557	-6.0	-2.6	0.0	0.0	0.0	0.0
				1148	8.1	1.6	-0.0	-0.0	-0.0	0.0
				2097	5.9	-1.7	0.1	-0.4	-0.0	0.0
5152	3	3 S1 HL-~1	Max	1662	-7.9	2.8	-0.0	0.0	0.0	0.0
				2097	-10.7	-3.0	0.1	0.3	0.0	0.0
				716	7.9	1.5	0.1	0.3	-0.0	-0.0
				3544	10.7	-1.2	0.0	-0.0	-0.0	0.0
			Min	1662	-7.9	2.8	-0.0	0.0	0.0	0.0
				2097	-10.7	-3.0	0.1	0.3	0.0	0.0
				716	7.9	1.5	0.1	0.3	-0.0	-0.0
				3544	10.7	-1.2	0.0	-0.0	-0.0	0.0
5153	3	3 S1 HL-~1	Max	2097	-10.6	1.8	0.1	-0.3	0.0	0.0
				1148	-8.1	-1.6	0.0	0.0	0.0	0.0
				3556	10.6	0.3	-0.0	-0.0	-0.1	0.0
				716	8.0	-0.5	0.1	-0.2	-0.0	-0.0
			Min	2097	-10.6	1.8	0.1	-0.3	0.0	0.0
				1148	-8.1	-1.6	0.0	0.0	0.0	0.0
				3556	10.6	0.3	-0.0	-0.0	-0.1	0.0
				716	8.0	-0.5	0.1	-0.2	-0.0	-0.0

5154	3	3 S1 HL-~1	Max	3544	-10.7	1.2	-0.0	0.0	0.0	0.0
				716	-11.4	-1.3	0.1	0.4	0.0	-0.0
				2201	10.5	-1.5	0.1	0.4	-0.0	-0.0
				1718	11.6	1.6	-0.0	0.1	-0.0	-0.0
			Min	3544	-10.7	1.2	-0.0	0.0	0.0	0.0
				716	-11.4	-1.3	0.1	0.4	0.0	-0.0
				2201	10.5	-1.5	0.1	0.4	-0.0	-0.0
				1718	11.6	1.6	-0.0	0.1	-0.0	-0.0
5155	3	3 S1 HL-~1	Max	716	-9.8	0.3	0.1	-0.2	0.0	-0.0
				3556	-10.6	-0.3	0.0	0.0	0.1	0.0
				1332	9.5	0.3	0.0	-0.0	-0.1	0.0
				2201	10.9	-0.2	0.1	-0.2	-0.0	-0.0
			Min	716	-9.8	0.3	0.1	-0.2	0.0	-0.0
				3556	-10.6	-0.3	0.0	0.0	0.1	0.0
				1332	9.5	0.3	0.0	-0.0	-0.1	0.0
				2201	10.9	-0.2	0.1	-0.2	-0.0	-0.0
5156	3	3 S1 HL-~1	Max	1718	-11.7	3.0	0.0	-0.1	-0.0	-0.0
				2201	-13.2	-3.2	0.0	0.2	0.0	-0.0
				715	11.3	0.3	0.1	0.1	-0.1	-0.0
				3543	13.6	-0.1	-0.0	0.0	-0.0	0.0
			Min	1718	-11.7	3.0	0.0	-0.1	-0.0	-0.0
				2201	-13.2	-3.2	0.0	0.2	0.0	-0.0
				715	11.3	0.3	0.1	0.1	-0.1	-0.0
				3543	13.6	-0.1	-0.0	0.0	-0.0	0.0
5157	3	3 S1 HL-~1	Max	2201	-13.3	0.6	0.1	-0.2	0.0	-0.0
				1332	-9.5	-0.3	-0.0	0.0	0.1	0.0
				3555	13.0	2.5	0.0	0.0	-0.0	0.0
				715	9.8	-2.8	0.0	-0.2	-0.0	-0.0
			Min	2201	-13.3	0.6	0.1	-0.2	0.0	-0.0
				1332	-9.5	-0.3	-0.0	0.0	0.1	0.0
				3555	13.0	2.5	0.0	0.0	-0.0	0.0
				715	9.8	-2.8	0.0	-0.2	-0.0	-0.0
5158	3	3 S1 HL-~1	Max	3543	-13.6	0.1	0.0	-0.0	0.0	0.0
				715	-11.1	0.1	0.1	0.3	0.0	-0.0
				2309	14.3	-5.3	0.2	0.6	-0.0	-0.0
				1766	10.4	5.1	-0.1	-0.0	-0.1	0.0
			Min	3543	-13.6	0.1	0.0	-0.0	0.0	0.0
				715	-11.1	0.1	0.1	0.3	0.0	-0.0
				2309	14.3	-5.3	0.2	0.6	-0.0	-0.0
				1766	10.4	5.1	-0.1	-0.0	-0.1	0.0
5159	3	3 S1 HL-~1	Max	715	-15.2	2.7	0.1	-0.5	0.0	-0.0
				3555	-13.0	-2.5	-0.0	-0.0	0.0	0.0
				1152	15.7	-0.1	-0.1	-0.1	-0.1	0.0
				2309	12.5	-0.0	0.2	-0.7	-0.0	-0.0
			Min	715	-15.2	2.7	0.1	-0.5	0.0	-0.0
				3555	-13.0	-2.5	-0.0	-0.0	0.0	0.0
				1152	15.7	-0.1	-0.1	-0.1	-0.1	0.0
				2309	12.5	-0.0	0.2	-0.7	-0.0	-0.0
5160	3	3 S1 HL-~1	Max	1766	-10.6	0.7	-0.1	0.0	-0.0	0.0
				2309	-8.1	-0.1	0.2	1.0	0.2	-0.0
				2030	11.5	-2.5	0.3	1.6	-0.1	0.0
				2138	7.2	2.0	-0.3	-0.0	0.2	0.0
			Min	1766	-10.6	0.7	-0.1	0.0	-0.0	0.0
				2309	-8.1	-0.1	0.2	1.0	0.2	-0.0
				2030	11.5	-2.5	0.3	1.6	-0.1	0.0
				2138	7.2	2.0	-0.3	-0.0	0.2	0.0

5161	3	3 S1 HL-~1	Max	2309	-9.2	-1.0	-0.0	0.5	-0.1	-0.0
				1152	-15.7	0.1	0.1	0.1	0.1	0.0
				2086	10.3	-2.3	0.3	-0.0	-0.3	0.0
				2030	14.6	3.2	-0.2	1.3	-0.1	0.0
			Min	2309	-9.2	-1.0	-0.0	0.5	-0.1	-0.0
				1152	-15.7	0.1	0.1	0.1	0.1	0.0
				2086	10.3	-2.3	0.3	-0.0	-0.3	0.0
				2030	14.6	3.2	-0.2	1.3	-0.1	0.0
5162	3	3 S1 HL-~1	Max	2138	-7.2	-2.0	0.3	0.0	-0.2	0.0
				2030	-0.6	3.2	-0.2	0.3	0.0	0.0
				1384	7.8	-1.2	0.0	-1.7	-0.3	0.0
				1177	0.0	0.0	0.0	0.0	0.0	0.0
			Min	2138	-7.2	-2.0	0.3	0.0	-0.2	0.0
				2030	-0.6	3.2	-0.2	0.3	0.0	0.0
				1384	7.8	-1.2	0.0	-1.7	-0.3	0.0
				1177	0.0	0.0	0.0	0.0	0.0	0.0
5163	3	3 S1 HL-~1	Max	2030	0.2	-4.0	0.3	0.2	0.1	0.0
				2086	-10.3	2.3	-0.3	0.0	0.3	0.0
				2517	0.0	0.0	0.0	0.0	0.0	0.0
				1384	10.1	1.7	0.1	-1.9	0.3	0.0
			Min	2030	0.2	-4.0	0.3	0.2	0.1	0.0
				2086	-10.3	2.3	-0.3	0.0	0.3	0.0
				2517	0.0	0.0	0.0	0.0	0.0	0.0
				1384	10.1	1.7	0.1	-1.9	0.3	0.0
5476	3	1 S1 HL-~1	Max	1383	-18.4	0.4	-0.7	-0.8	0.0	-0.0
				691	18.3	-0.4	20.2	9.3	0.0	-0.8
				4934	20.7	-0.0	-6.2	2.2	0.0	0.2
				2087	-20.6	0.0	-13.2	-2.3	0.0	0.4
			Min	1383	-18.4	0.4	-0.7	-0.8	0.0	-0.0
				691	18.3	-0.4	20.2	9.3	0.0	-0.8
				4934	20.7	-0.0	-6.2	2.2	0.0	0.2
				2087	-20.6	0.0	-13.2	-2.3	0.0	0.4
5477	3	1 S1 HL-~1	Max	691	-23.4	1.2	-28.9	15.5	0.0	2.5
				1493	17.8	-1.1	50.3	3.6	0.0	0.0
				1599	24.9	-0.2	2.7	-0.3	0.0	-0.1
				4934	-19.3	0.1	-24.0	4.5	0.0	0.5
			Min	691	-23.4	1.2	-28.9	15.5	0.0	2.5
				1493	17.8	-1.1	50.3	3.6	0.0	0.0
				1599	24.9	-0.2	2.7	-0.3	0.0	-0.1
				4934	-19.3	0.1	-24.0	4.5	0.0	0.5
5478	3	1 S1 HL-~1	Max	2087	-18.5	-0.3	12.1	-2.8	0.0	-0.4
				4934	24.2	0.3	11.1	-3.0	0.0	-0.1
				729	22.1	0.2	-10.9	-1.4	0.0	-0.2
				1801	-27.8	-0.1	-12.2	-1.5	0.0	-0.1
			Min	2087	-18.5	-0.3	12.1	-2.8	0.0	-0.4
				4934	24.2	0.3	11.1	-3.0	0.0	-0.1
				729	22.1	0.2	-10.9	-1.4	0.0	-0.2
				1801	-27.8	-0.1	-12.2	-1.5	0.0	-0.1
5479	3	1 S1 HL-~1	Max	4934	-25.6	-0.4	19.1	-3.7	0.0	-0.6
				1599	0.8	0.4	-2.9	-3.0	0.0	0.1
				1809	31.5	0.1	-11.4	-1.5	0.0	-0.0
				729	-6.7	-0.1	-4.6	-1.5	0.0	-0.2
			Min	4934	-25.6	-0.4	19.1	-3.7	0.0	-0.6
				1599	0.8	0.4	-2.9	-3.0	0.0	0.1
				1809	31.5	0.1	-11.4	-1.5	0.0	-0.0
				729	-6.7	-0.1	-4.6	-1.5	0.0	-0.2
5480	3	1 S1 HL-~1	Max	1801	4.9	0.1	-1.3	-0.0	0.0	-0.0

				729	-4.4	-0.1	0.9	1.0	0.0	-0.1
				2699	0.8	-0.1	1.9	1.2	0.0	0.1
				700	-1.3	0.1	-1.1	0.5	0.0	-0.0
			Min	1801	4.9	0.1	-1.3	-0.0	0.0	-0.0
				729	-4.4	-0.1	0.9	1.0	0.0	-0.1
				2699	0.8	-0.1	1.9	1.2	0.0	0.1
				700	-1.3	0.1	-1.1	0.5	0.0	-0.0
5481	3	1 S1 HL-~1	Max	729	-11.0	0.1	-2.9	1.9	0.0	0.0
				1809	-22.1	-0.1	2.1	0.1	0.0	0.0
				712	16.6	-0.1	1.1	0.3	0.0	-0.0
				2699	16.5	0.1	0.2	2.4	0.0	-0.1
			Min	729	-11.0	0.1	-2.9	1.9	0.0	0.0
				1809	-22.1	-0.1	2.1	0.1	0.0	0.0
				712	16.6	-0.1	1.1	0.3	0.0	-0.0
				2699	16.5	0.1	0.2	2.4	0.0	-0.1
5482	3	1 S1 HL-~1	Max	700	5.4	0.1	-0.6	0.6	0.0	0.0
				2699	-7.8	-0.1	-1.5	0.7	0.0	-0.0
				727	-1.0	-0.0	0.6	0.4	0.0	-0.0
				1697	3.4	0.0	1.8	0.4	0.0	0.0
			Min	700	5.4	0.1	-0.6	0.6	0.0	0.0
				2699	-7.8	-0.1	-1.5	0.7	0.0	-0.0
				727	-1.0	-0.0	0.6	0.4	0.0	-0.0
				1697	3.4	0.0	1.8	0.4	0.0	0.0
5483	3	1 S1 HL-~1	Max	2699	-8.3	0.1	-0.6	1.4	0.0	0.1
				712	-21.8	-0.1	-1.4	0.1	0.0	0.0
				1705	13.1	-0.0	-0.3	-0.0	0.0	-0.0
				727	17.0	0.0	2.6	0.6	0.0	-0.0
			Min	2699	-8.3	0.1	-0.6	1.4	0.0	0.1
				712	-21.8	-0.1	-1.4	0.1	0.0	0.0
				1705	13.1	-0.0	-0.3	-0.0	0.0	-0.0
				727	17.0	0.0	2.6	0.6	0.0	-0.0
5484	3	1 S1 HL-~1	Max	1697	7.3	-0.0	-1.6	-0.1	0.0	-0.0
				727	-7.3	0.0	-0.1	-0.3	0.0	0.0
				2707	-2.8	0.1	1.6	-0.7	0.0	-0.1
				701	2.8	-0.1	0.5	-0.3	0.0	0.0
			Min	1697	7.3	-0.0	-1.6	-0.1	0.0	-0.0
				727	-7.3	0.0	-0.1	-0.3	0.0	0.0
				2707	-2.8	0.1	1.6	-0.7	0.0	-0.1
				701	2.8	-0.1	0.5	-0.3	0.0	0.0
5485	3	1 S1 HL-~1	Max	727	-8.7	-0.0	0.2	-0.6	0.0	-0.0
				1705	-18.2	0.0	-0.9	-0.3	0.0	0.0
				713	13.1	0.1	0.2	-0.2	0.0	0.0
				2707	13.8	-0.1	0.9	-1.0	0.0	0.0
			Min	727	-8.7	-0.0	0.2	-0.6	0.0	-0.0
				1705	-18.2	0.0	-0.9	-0.3	0.0	0.0
				713	13.1	0.1	0.2	-0.2	0.0	0.0
				2707	13.8	-0.1	0.9	-1.0	0.0	0.0
5486	3	1 S1 HL-~1	Max	701	8.9	-0.0	-2.2	-0.2	0.0	-0.0
				2707	-7.4	0.0	-0.7	-0.4	0.0	-0.0
				725	-4.9	-0.0	2.0	-0.0	-0.0	0.0
				95	3.4	0.0	1.3	0.0	-0.0	-0.0
			Min	701	8.9	-0.0	-2.2	-0.2	0.0	-0.0
				2707	-7.4	0.0	-0.7	-0.4	0.0	-0.0
				725	-4.9	-0.0	2.0	-0.0	-0.0	0.0
				95	3.4	0.0	1.3	0.0	-0.0	-0.0
5487	3	1 S1 HL-~1	Max	2707	-4.2	-0.0	-1.9	-0.6	0.0	-0.1
				713	-18.5	0.0	-0.6	-0.1	0.0	-0.0

				96	8.2	0.0	0.3	-0.0	-0.0	-0.0
				725	14.5	-0.0	2.4	-0.2	-0.0	-0.0
			Min	2707	-4.2	-0.0	-1.9	-0.6	0.0	-0.1
				713	-18.5	0.0	-0.6	-0.1	0.0	-0.0
				96	8.2	0.0	0.3	-0.0	-0.0	-0.0
				725	14.5	-0.0	2.4	-0.2	-0.0	-0.0
5488	3	1 S1 HL-~1	Max	95	12.5	0.0	-2.3	0.3	-0.0	-0.0
				725	-10.7	-0.0	-1.3	0.3	-0.0	-0.0
				2715	-9.5	-0.0	2.8	0.1	0.0	-0.0
				702	7.7	0.0	1.2	0.2	-0.0	0.0
			Min	95	12.5	0.0	-2.3	0.3	-0.0	-0.0
				725	-10.7	-0.0	-1.3	0.3	-0.0	-0.0
				2715	-9.5	-0.0	2.8	0.1	0.0	-0.0
				702	7.7	0.0	1.2	0.2	-0.0	0.0
5489	3	1 S1 HL-~1	Max	725	1.1	-0.0	-1.4	-0.1	-0.0	0.0
				96	-17.8	0.0	-1.4	-0.0	-0.0	-0.0
				714	2.0	0.0	0.5	-0.1	-0.0	0.0
				2715	14.7	-0.0	2.7	-0.5	0.0	-0.0
			Min	725	1.1	-0.0	-1.4	-0.1	-0.0	0.0
				96	-17.8	0.0	-1.4	-0.0	-0.0	-0.0
				714	2.0	0.0	0.5	-0.1	-0.0	0.0
				2715	14.7	-0.0	2.7	-0.5	0.0	-0.0
5490	3	1 S1 HL-~1	Max	702	11.9	0.0	-3.0	0.1	-0.0	-0.0
				2715	-10.9	-0.0	-2.2	0.1	0.0	-0.1
				723	-10.1	-0.0	3.1	0.1	-0.0	-0.0
				81	9.1	0.0	2.3	0.1	-0.0	-0.0
			Min	702	11.9	0.0	-3.0	0.1	-0.0	-0.0
				2715	-10.9	-0.0	-2.2	0.1	0.0	-0.1
				723	-10.1	-0.0	3.1	0.1	-0.0	-0.0
				81	9.1	0.0	2.3	0.1	-0.0	-0.0
5491	3	1 S1 HL-~1	Max	2715	4.6	-0.0	-3.3	-0.5	0.0	-0.1
				714	-14.1	0.0	-0.8	-0.1	-0.0	-0.0
				82	-2.9	0.0	1.9	0.0	-0.0	-0.0
				723	12.4	-0.0	2.5	-0.1	-0.0	-0.0
			Min	2715	4.6	-0.0	-3.3	-0.5	0.0	-0.1
				714	-14.1	0.0	-0.8	-0.1	-0.0	-0.0
				82	-2.9	0.0	1.9	0.0	-0.0	-0.0
				723	12.4	-0.0	2.5	-0.1	-0.0	-0.0
5492	3	1 S1 HL-~1	Max	81	4.7	-0.0	-3.2	-0.0	-0.0	0.0
				723	-4.1	-0.0	-2.8	-0.0	-0.0	-0.0
				5062	-4.0	0.0	3.3	-0.1	0.0	-0.0
				5048	3.4	-0.0	2.8	-0.1	-0.0	0.0
			Min	81	4.7	-0.0	-3.2	-0.0	-0.0	0.0
				723	-4.1	-0.0	-2.8	-0.0	-0.0	-0.0
				5062	-4.0	0.0	3.3	-0.1	0.0	-0.0
				5048	3.4	-0.0	2.8	-0.1	-0.0	0.0
5493	3	1 S1 HL-~1	Max	723	1.9	0.0	-2.6	0.0	-0.0	-0.0
				82	-5.9	-0.0	-2.5	0.0	-0.0	0.0
				5063	-1.0	-0.0	2.3	0.1	-0.0	0.0
				5062	5.1	0.0	3.0	0.0	0.0	-0.0
			Min	723	1.9	0.0	-2.6	0.0	-0.0	-0.0
				82	-5.9	-0.0	-2.5	0.0	-0.0	0.0
				5063	-1.0	-0.0	2.3	0.1	-0.0	0.0
				5062	5.1	0.0	3.0	0.0	0.0	-0.0
5494	3	1 S1 HL-~1	Max	1621	8.3	0.1	-4.1	0.5	-0.0	-0.0
				2723	-11.2	-0.1	-3.8	0.8	-0.0	-0.2
				4952	-10.0	0.0	4.6	-0.1	0.0	-0.1

					1614	12.9	-0.0	3.4	-0.0	-0.0	-0.0
				Min	1621	8.3	0.1	-4.1	0.5	-0.0	-0.0
					2723	-11.2	-0.1	-3.8	0.8	-0.0	-0.2
					4952	-10.0	0.0	4.6	-0.1	0.0	-0.1
					1614	12.9	-0.0	3.4	-0.0	-0.0	-0.0
5495	3	1	S1 HL-~1	Max	2723	12.4	-0.1	-4.1	-0.5	-0.0	-0.1
					2485	-5.1	0.0	-3.1	-0.3	-0.0	0.0
					2242	-14.1	0.0	3.3	-0.2	-0.0	-0.0
					4952	6.8	-0.0	4.0	-0.5	0.0	-0.0
				Min	2723	12.4	-0.1	-4.1	-0.5	-0.0	-0.1
					2485	-5.1	0.0	-3.1	-0.3	-0.0	0.0
					2242	-14.1	0.0	3.3	-0.2	-0.0	-0.0
					4952	6.8	-0.0	4.0	-0.5	0.0	-0.0
5496	3	1	S1 HL-~1	Max	1614	1.9	0.0	-4.1	0.1	-0.0	0.0
					4952	-6.6	-0.0	-4.1	0.2	0.0	0.1
					721	-4.4	-0.1	4.0	0.9	-0.0	0.2
					63	9.1	0.1	4.3	0.4	-0.0	0.0
				Min	1614	1.9	0.0	-4.1	0.1	-0.0	0.0
					4952	-6.6	-0.0	-4.1	0.2	0.0	0.1
					721	-4.4	-0.1	4.0	0.9	-0.0	0.2
					63	9.1	0.1	4.3	0.4	-0.0	0.0
5497	3	1	S1 HL-~1	Max	4952	9.8	0.0	-4.5	0.3	0.0	0.0
					2242	1.7	-0.0	-3.6	0.2	-0.0	0.0
					64	-12.6	-0.1	4.8	0.5	-0.0	0.0
					721	1.1	0.1	3.4	1.0	-0.0	-0.2
				Min	4952	9.8	0.0	-4.5	0.3	0.0	0.0
					2242	1.7	-0.0	-3.6	0.2	-0.0	0.0
					64	-12.6	-0.1	4.8	0.5	-0.0	0.0
					721	1.1	0.1	3.4	1.0	-0.0	-0.2
5498	3	1	S1 HL-~1	Max	63	9.9	-0.1	-4.7	-0.5	-0.0	-0.0
					721	-15.1	0.1	-4.8	-0.9	-0.0	-0.2
					4806	-13.7	0.5	5.7	-5.4	0.0	-0.5
					4784	19.0	-0.4	4.0	-2.6	-0.0	-0.0
				Min	63	9.9	-0.1	-4.7	-0.5	-0.0	-0.0
					721	-15.1	0.1	-4.8	-0.9	-0.0	-0.2
					4806	-13.7	0.5	5.7	-5.4	0.0	-0.5
					4784	19.0	-0.4	4.0	-2.6	-0.0	-0.0
5499	3	1	S1 HL-~1	Max	721	18.4	-0.1	-3.1	-0.9	-0.0	0.2
					64	-2.3	0.1	-4.8	-0.5	-0.0	-0.0
					4785	-21.9	0.5	-1.6	-2.7	-0.0	-0.0
					4806	5.8	-0.5	9.8	-5.4	0.0	0.5
				Min	721	18.4	-0.1	-3.1	-0.9	-0.0	0.2
					64	-2.3	0.1	-4.8	-0.5	-0.0	-0.0
					4785	-21.9	0.5	-1.6	-2.7	-0.0	-0.0
					4806	5.8	-0.5	9.8	-5.4	0.0	0.5
5500	3	1	S1 HL-~1	Max	4784	6.5	0.4	-5.1	2.6	-0.0	0.0
					4806	-16.7	-0.4	-4.3	5.4	0.0	0.5
					693	-11.8	-1.7	6.2	20.9	0.0	1.8
					35	22.0	1.7	3.4	9.8	0.0	0.1
				Min	4784	6.5	0.4	-5.1	2.6	-0.0	0.0
					4806	-16.7	-0.4	-4.3	5.4	0.0	0.5
					693	-11.8	-1.7	6.2	20.9	0.0	1.8
					35	22.0	1.7	3.4	9.8	0.0	0.1
5501	3	1	S1 HL-~1	Max	4806	24.7	0.4	-11.2	5.5	0.0	-0.5
					4785	0.1	-0.4	1.2	2.6	-0.0	0.0
					36	-30.3	-1.7	24.0	10.0	0.0	-0.0
					693	5.5	1.8	-13.9	21.0	0.0	-1.8

			Min	4806	24.7	0.4	-11.2	5.5	0.0	-0.5
				4785	0.1	-0.4	1.2	2.6	-0.0	0.0
				36	-30.3	-1.7	24.0	10.0	0.0	-0.0
				693	5.5	1.8	-13.9	21.0	0.0	-1.8
5502	3	1 S1 HL-~1	Max	35	-22.0	1.7	3.4	9.8	0.0	-0.1
				693	11.8	-1.7	6.2	20.9	0.0	-1.8
				4881	16.7	-0.4	-4.3	5.4	0.0	-0.5
				4852	-6.5	0.4	-5.1	2.6	0.0	-0.0
			Min	35	-22.0	1.7	3.4	9.8	0.0	-0.1
				693	11.8	-1.7	6.2	20.9	0.0	-1.8
				4881	16.7	-0.4	-4.3	5.4	0.0	-0.5
				4852	-6.5	0.4	-5.1	2.6	0.0	-0.0
5503	3	1 S1 HL-~1	Max	693	-5.5	1.8	-13.9	21.0	0.0	1.8
				36	30.3	-1.7	24.0	10.0	0.0	0.0
				4853	-0.1	-0.4	1.2	2.6	0.0	-0.0
				4881	-24.7	0.4	-11.2	5.5	0.0	0.5
			Min	693	-5.5	1.8	-13.9	21.0	0.0	1.8
				36	30.3	-1.7	24.0	10.0	0.0	0.0
				4853	-0.1	-0.4	1.2	2.6	0.0	-0.0
				4881	-24.7	0.4	-11.2	5.5	0.0	0.5
5504	3	1 S1 HL-~1	Max	4852	-19.0	-0.4	4.0	-2.6	0.0	0.0
				4881	13.7	0.5	5.7	-5.4	0.0	0.5
				719	15.1	0.1	-4.8	-0.9	0.0	0.2
				55	-9.8	-0.1	-4.7	-0.5	0.0	0.0
			Min	4852	-19.0	-0.4	4.0	-2.6	0.0	0.0
				4881	13.7	0.5	5.7	-5.4	0.0	0.5
				719	15.1	0.1	-4.8	-0.9	0.0	0.2
				55	-9.8	-0.1	-4.7	-0.5	0.0	0.0
5505	3	1 S1 HL-~1	Max	4881	-5.8	-0.5	9.8	-5.4	0.0	-0.5
				4853	21.9	0.5	-1.6	-2.7	0.0	0.0
				56	2.3	0.1	-4.8	-0.5	0.0	0.0
				719	-18.4	-0.1	-3.1	-0.9	0.0	-0.2
			Min	4881	-5.8	-0.5	9.8	-5.4	0.0	-0.5
				4853	21.9	0.5	-1.6	-2.7	0.0	0.0
				56	2.3	0.1	-4.8	-0.5	0.0	0.0
				719	-18.4	-0.1	-3.1	-0.9	0.0	-0.2
5506	3	1 S1 HL-~1	Max	55	-9.1	0.1	4.3	0.4	0.0	-0.0
				719	4.4	-0.1	4.0	0.9	0.0	-0.2
				4946	6.6	-0.0	-4.1	0.2	0.0	-0.1
				2299	-1.9	0.0	-4.1	0.1	0.0	-0.0
			Min	55	-9.1	0.1	4.3	0.4	0.0	-0.0
				719	4.4	-0.1	4.0	0.9	0.0	-0.2
				4946	6.6	-0.0	-4.1	0.2	0.0	-0.1
				2299	-1.9	0.0	-4.1	0.1	0.0	-0.0
5507	3	1 S1 HL-~1	Max	719	-1.1	0.1	3.4	1.0	0.0	0.2
				56	12.6	-0.1	4.8	0.5	0.0	-0.0
				2190	-1.7	-0.0	-3.6	0.2	0.0	-0.0
				4946	-9.8	0.0	-4.5	0.3	0.0	-0.0
			Min	719	-1.1	0.1	3.4	1.0	0.0	0.2
				56	12.6	-0.1	4.8	0.5	0.0	-0.0
				2190	-1.7	-0.0	-3.6	0.2	0.0	-0.0
				4946	-9.8	0.0	-4.5	0.3	0.0	-0.0
5508	3	1 S1 HL-~1	Max	2299	-12.9	-0.0	3.4	-0.0	0.0	0.0
				4946	10.0	0.0	4.6	-0.1	0.0	0.1
				690	11.2	-0.1	-3.8	0.8	0.0	0.2
				2493	-8.3	0.1	-4.1	0.5	0.0	0.0

			Min	2299	-12.9	-0.0	3.4	-0.0	0.0	0.0
				4946	10.0	0.0	4.6	-0.1	0.0	0.1
				690	11.2	-0.1	-3.8	0.8	0.0	0.2
				2493	-8.3	0.1	-4.1	0.5	0.0	0.0
5509	3	1 S1 HL-~1	Max	4946	-6.8	-0.0	4.0	-0.5	0.0	0.0
				2190	14.1	0.0	3.3	-0.2	0.0	0.0
				2501	5.1	0.0	-3.1	-0.3	0.0	-0.0
				690	-12.4	-0.1	-4.0	-0.5	0.0	0.1
			Min	4946	-6.8	-0.0	4.0	-0.5	0.0	0.0
				2190	14.1	0.0	3.3	-0.2	0.0	0.0
				2501	5.1	0.0	-3.1	-0.3	0.0	-0.0
				690	-12.4	-0.1	-4.0	-0.5	0.0	0.1
5510	3	1 S1 HL-~1	Max	2493	-14.3	0.1	2.9	0.7	0.0	-0.0
				690	13.7	-0.1	4.2	1.2	0.0	-0.1
				5007	13.9	-0.0	-3.0	0.3	0.0	-0.0
				4993	-13.3	0.0	-3.8	0.1	0.0	0.0
			Min	2493	-14.3	0.1	2.9	0.7	0.0	-0.0
				690	13.7	-0.1	4.2	1.2	0.0	-0.1
				5007	13.9	-0.0	-3.0	0.3	0.0	-0.0
				4993	-13.3	0.0	-3.8	0.1	0.0	0.0
5511	3	1 S1 HL-~1	Max	690	-11.5	-0.0	3.6	-0.3	0.0	0.0
				2501	13.3	0.0	2.6	-0.3	0.0	0.0
				5008	11.1	0.0	-2.6	-0.0	0.0	0.0
				5007	-12.9	-0.0	-3.3	-0.2	0.0	-0.0
			Min	690	-11.5	-0.0	3.6	-0.3	0.0	0.0
				2501	13.3	0.0	2.6	-0.3	0.0	0.0
				5008	11.1	0.0	-2.6	-0.0	0.0	0.0
				5007	-12.9	-0.0	-3.3	-0.2	0.0	-0.0
5512	3	1 S1 HL-~1	Max	1905	-9.1	0.0	2.3	0.1	0.0	0.0
				731	10.1	-0.0	3.1	0.1	0.0	0.0
				689	10.9	-0.0	-2.2	0.1	0.0	0.1
				705	-11.9	0.0	-3.0	0.1	0.0	0.0
			Min	1905	-9.1	0.0	2.3	0.1	0.0	0.0
				731	10.1	-0.0	3.1	0.1	0.0	0.0
				689	10.9	-0.0	-2.2	0.1	0.0	0.1
				705	-11.9	0.0	-3.0	0.1	0.0	0.0
5513	3	1 S1 HL-~1	Max	731	-12.4	-0.0	2.5	-0.1	0.0	0.0
				1913	2.9	0.0	1.9	0.0	0.0	0.0
				717	14.1	0.0	-0.8	-0.1	0.0	0.0
				689	-4.6	-0.0	-3.3	-0.5	0.0	0.1
			Min	731	-12.4	-0.0	2.5	-0.1	0.0	0.0
				1913	2.9	0.0	1.9	0.0	0.0	0.0
				717	14.1	0.0	-0.8	-0.1	0.0	0.0
				689	-4.6	-0.0	-3.3	-0.5	0.0	0.1
5514	3	1 S1 HL-~1	Max	705	-7.7	0.0	1.2	0.2	0.0	-0.0
				689	9.5	-0.0	2.8	0.1	0.0	0.0
				733	10.7	-0.0	-1.3	0.3	0.0	0.0
				2089	-12.5	0.0	-2.3	0.3	0.0	0.0
			Min	705	-7.7	0.0	1.2	0.2	0.0	-0.0
				689	9.5	-0.0	2.8	0.1	0.0	0.0
				733	10.7	-0.0	-1.3	0.3	0.0	0.0
				2089	-12.5	0.0	-2.3	0.3	0.0	0.0
5515	3	1 S1 HL-~1	Max	689	-14.7	-0.0	2.7	-0.5	0.0	0.0
				717	-2.0	0.0	0.5	-0.1	0.0	-0.0
				2097	17.8	0.0	-1.4	-0.0	0.0	0.0
				733	-1.1	-0.0	-1.4	-0.1	0.0	-0.0
			Min	689	-14.7	-0.0	2.7	-0.5	0.0	0.0

				717	-2.0	0.0	0.5	-0.1	0.0	-0.0
				2097	17.8	0.0	-1.4	-0.0	0.0	0.0
				733	-1.1	-0.0	-1.4	-0.1	0.0	-0.0
5516	3	1 S1 HL-~1	Max	2089	-3.4	0.0	1.3	0.0	0.0	0.0
				733	4.9	-0.0	2.0	-0.0	0.0	-0.0
				688	7.4	0.0	-0.7	-0.4	-0.0	0.0
				704	-8.9	-0.0	-2.2	-0.2	0.0	0.0
			Min	2089	-3.4	0.0	1.3	0.0	0.0	0.0
				733	4.9	-0.0	2.0	-0.0	0.0	-0.0
				688	7.4	0.0	-0.7	-0.4	-0.0	0.0
				704	-8.9	-0.0	-2.2	-0.2	0.0	0.0
5517	3	1 S1 HL-~1	Max	733	-14.5	-0.0	2.4	-0.2	0.0	0.0
				2097	-8.2	0.0	0.3	-0.0	0.0	0.0
				716	18.5	0.0	-0.6	-0.1	0.0	0.0
				688	4.2	-0.0	-1.9	-0.6	-0.0	0.1
			Min	733	-14.5	-0.0	2.4	-0.2	0.0	0.0
				2097	-8.2	0.0	0.3	-0.0	0.0	0.0
				716	18.5	0.0	-0.6	-0.1	0.0	0.0
				688	4.2	-0.0	-1.9	-0.6	-0.0	0.1
5518	3	1 S1 HL-~1	Max	704	-2.8	-0.1	0.5	-0.3	0.0	-0.0
				688	2.8	0.1	1.6	-0.7	-0.0	0.1
				735	7.3	0.0	-0.1	-0.3	-0.0	-0.0
				2193	-7.3	-0.0	-1.6	-0.1	-0.0	0.0
			Min	704	-2.8	-0.1	0.5	-0.3	0.0	-0.0
				688	2.8	0.1	1.6	-0.7	-0.0	0.1
				735	7.3	0.0	-0.1	-0.3	-0.0	-0.0
				2193	-7.3	-0.0	-1.6	-0.1	-0.0	0.0
5519	3	1 S1 HL-~1	Max	688	-13.8	-0.1	0.9	-1.0	-0.0	-0.0
				716	-13.1	0.1	0.2	-0.2	0.0	-0.0
				2201	18.2	0.0	-0.9	-0.3	-0.0	-0.0
				735	8.7	-0.0	0.2	-0.6	-0.0	0.0
			Min	688	-13.8	-0.1	0.9	-1.0	-0.0	-0.0
				716	-13.1	0.1	0.2	-0.2	0.0	-0.0
				2201	18.2	0.0	-0.9	-0.3	-0.0	-0.0
				735	8.7	-0.0	0.2	-0.6	-0.0	0.0
5520	3	1 S1 HL-~1	Max	2193	-3.4	0.0	1.8	0.4	-0.0	-0.0
				735	1.0	-0.0	0.6	0.4	-0.0	0.0
				1591	7.8	-0.1	-1.5	0.7	-0.0	0.0
				703	-5.4	0.1	-0.6	0.6	-0.0	-0.0
			Min	2193	-3.4	0.0	1.8	0.4	-0.0	-0.0
				735	1.0	-0.0	0.6	0.4	-0.0	0.0
				1591	7.8	-0.1	-1.5	0.7	-0.0	0.0
				703	-5.4	0.1	-0.6	0.6	-0.0	-0.0
5521	3	1 S1 HL-~1	Max	735	-17.0	0.0	2.6	0.6	-0.0	0.0
				2201	-13.1	-0.0	-0.3	-0.0	-0.0	0.0
				715	21.8	-0.1	-1.4	0.1	-0.0	-0.0
				1591	8.3	0.1	-0.6	1.4	-0.0	-0.1
			Min	735	-17.0	0.0	2.6	0.6	-0.0	0.0
				2201	-13.1	-0.0	-0.3	-0.0	-0.0	0.0
				715	21.8	-0.1	-1.4	0.1	-0.0	-0.0
				1591	8.3	0.1	-0.6	1.4	-0.0	-0.1
5522	3	1 S1 HL-~1	Max	703	1.3	0.1	-1.1	0.5	-0.0	0.0
				1591	-0.8	-0.1	1.9	1.2	-0.0	-0.1
				737	4.4	-0.1	0.9	1.0	-0.0	0.1
				2301	-4.9	0.1	-1.3	-0.0	-0.0	0.0
			Min	703	1.3	0.1	-1.1	0.5	-0.0	0.0
				1591	-0.8	-0.1	1.9	1.2	-0.0	-0.1

				737	4.4	-0.1	0.9	1.0	-0.0	0.1
				2301	-4.9	0.1	-1.3	-0.0	-0.0	0.0
5523	3	1 S1 HL-~1	Max	1591	-16.5	0.1	0.2	2.4	-0.0	0.1
				715	-16.6	-0.1	1.1	0.3	-0.0	0.0
				2309	22.1	-0.1	2.1	0.1	-0.0	-0.0
				737	11.0	0.1	-2.9	1.9	-0.0	-0.0
			Min	1591	-16.5	0.1	0.2	2.4	-0.0	0.1
				715	-16.6	-0.1	1.1	0.3	-0.0	0.0
				2309	22.1	-0.1	2.1	0.1	-0.0	-0.0
				737	11.0	0.1	-2.9	1.9	-0.0	-0.0
5524	3	1 S1 HL-~1	Max	2301	27.8	-0.1	-12.2	-1.5	-0.0	0.1
				737	-22.1	0.2	-10.9	-1.4	-0.0	0.2
				4940	-24.2	0.3	11.1	-3.0	0.0	0.1
				2139	18.5	-0.3	12.1	-2.8	-0.0	0.4
			Min	2301	27.8	-0.1	-12.2	-1.5	-0.0	0.1
				737	-22.1	0.2	-10.9	-1.4	-0.0	0.2
				4940	-24.2	0.3	11.1	-3.0	0.0	0.1
				2139	18.5	-0.3	12.1	-2.8	-0.0	0.4
5525	3	1 S1 HL-~1	Max	737	6.7	-0.1	-4.6	-1.5	-0.0	0.2
				2309	-31.5	0.1	-11.4	-1.5	-0.0	0.0
				2030	-0.8	0.4	-2.9	-3.0	-0.0	-0.1
				4940	25.6	-0.4	19.1	-3.7	0.0	0.6
			Min	737	6.7	-0.1	-4.6	-1.5	-0.0	0.2
				2309	-31.5	0.1	-11.4	-1.5	-0.0	0.0
				2030	-0.8	0.4	-2.9	-3.0	-0.0	-0.1
				4940	25.6	-0.4	19.1	-3.7	0.0	0.6
5526	3	1 S1 HL-~1	Max	2139	20.6	0.0	-13.2	-2.3	-0.0	-0.4
				4940	-20.7	-0.0	-6.2	2.2	0.0	-0.2
				692	-18.3	-0.4	20.3	9.3	-0.0	0.8
				1492	18.4	0.4	-0.7	-0.8	-0.0	0.0
			Min	2139	20.6	0.0	-13.2	-2.3	-0.0	-0.4
				4940	-20.7	-0.0	-6.2	2.2	0.0	-0.2
				692	-18.3	-0.4	20.3	9.3	-0.0	0.8
				1492	18.4	0.4	-0.7	-0.8	-0.0	0.0
5527	3	1 S1 HL-~1	Max	4940	19.3	0.1	-24.0	4.5	0.0	-0.5
				2030	-24.9	-0.2	2.7	-0.3	-0.0	0.1
				1384	-17.8	-1.1	50.3	3.6	-0.0	-0.0
				692	23.4	1.2	-28.9	15.5	-0.0	-2.5
			Min	4940	19.3	0.1	-24.0	4.5	0.0	-0.5
				2030	-24.9	-0.2	2.7	-0.3	-0.0	0.1
				1384	-17.8	-1.1	50.3	3.6	-0.0	-0.0
				692	23.4	1.2	-28.9	15.5	-0.0	-2.5
6079	3	2 S1 HL-~1	Max	4991	0.1	0.4	-0.0	0.4	0.1	0.0
				4992	3.0	1.1	0.1	-0.0	0.1	0.0
				4399	-0.1	-0.8	0.0	-0.1	-0.0	0.0
				3771	-3.1	-0.7	0.0	0.2	0.0	-0.0
			Min	4991	0.1	0.4	-0.0	0.4	0.1	0.0
				4992	3.0	1.1	0.1	-0.0	0.1	0.0
				4399	-0.1	-0.8	0.0	-0.1	-0.0	0.0
				3771	-3.1	-0.7	0.0	0.2	0.0	-0.0
6080	3	2 S1 HL-~1	Max	4992	-1.6	0.2	-0.1	0.0	-0.0	0.0
				4993	3.2	1.0	0.1	0.7	-0.0	-0.0
				1905	1.6	-0.6	0.1	0.6	0.0	-0.0
				4399	-3.2	-0.6	-0.1	0.1	-0.0	0.0
			Min	4992	-1.6	0.2	-0.1	0.0	-0.0	0.0
				4993	3.2	1.0	0.1	0.7	-0.0	-0.0
				1905	1.6	-0.6	0.1	0.6	0.0	-0.0

				4399	-3.2	-0.6	-0.1	0.1	-0.0	0.0
6081	3	2 S1 HL-~1	Max	4993	2.0	-0.6	0.1	-0.6	-0.1	-0.0
				5126	1.2	0.2	-0.0	0.0	-0.0	0.0
				5127	-2.0	0.1	-0.0	0.0	-0.0	0.0
				1905	-1.2	0.4	0.1	-0.5	0.0	-0.0
			Min	4993	2.0	-0.6	0.1	-0.6	-0.1	-0.0
				5126	1.2	0.2	-0.0	0.0	-0.0	0.0
				5127	-2.0	0.1	-0.0	0.0	-0.0	0.0
				1905	-1.2	0.4	0.1	-0.5	0.0	-0.0
6094	3	1 S1 HL-~1	Max	4993	-3.4	-0.0	2.8	-0.1	0.0	-0.0
				5007	4.0	0.0	3.3	-0.1	0.0	0.0
				731	4.1	-0.0	-2.8	-0.0	0.0	0.0
				1905	-4.7	-0.0	-3.2	-0.0	0.0	-0.0
			Min	4993	-3.4	-0.0	2.8	-0.1	0.0	-0.0
				5007	4.0	0.0	3.3	-0.1	0.0	0.0
				731	4.1	-0.0	-2.8	-0.0	0.0	0.0
				1905	-4.7	-0.0	-3.2	-0.0	0.0	-0.0
6095	3	1 S1 HL-~1	Max	5007	-5.1	0.0	3.0	0.0	0.0	0.0
				5008	1.0	-0.0	2.3	0.1	0.0	-0.0
				1913	5.9	-0.0	-2.5	0.0	0.0	-0.0
				731	-1.9	0.0	-2.6	0.0	0.0	0.0
			Min	5007	-5.1	0.0	3.0	0.0	0.0	0.0
				5008	1.0	-0.0	2.3	0.1	0.0	-0.0
				1913	5.9	-0.0	-2.5	0.0	0.0	-0.0
				731	-1.9	0.0	-2.6	0.0	0.0	0.0
6108	3	3 S1 HL-~1	Max	5021	-1.3	1.0	0.0	-0.0	-0.0	0.0
				5008	-2.2	-1.2	0.0	0.0	-0.0	-0.0
				1913	1.3	0.0	0.0	0.1	-0.0	-0.0
				2684	2.2	0.2	-0.0	0.0	-0.0	-0.0
			Min	5021	-1.3	1.0	0.0	-0.0	-0.0	0.0
				5008	-2.2	-1.2	0.0	0.0	-0.0	-0.0
				1913	1.3	0.0	0.0	0.1	-0.0	-0.0
				2684	2.2	0.2	-0.0	0.0	-0.0	-0.0
6109	3	3 S1 HL-~1	Max	5008	-2.0	0.9	0.0	-0.1	0.0	-0.0
				5022	-1.2	-0.7	-0.0	-0.0	0.0	0.0
				1208	1.9	0.3	0.0	-0.0	0.0	0.0
				1913	1.3	-0.5	0.0	-0.1	0.0	-0.0
			Min	5008	-2.0	0.9	0.0	-0.1	0.0	-0.0
				5022	-1.2	-0.7	-0.0	-0.0	0.0	0.0
				1208	1.9	0.3	0.0	-0.0	0.0	0.0
				1913	1.3	-0.5	0.0	-0.1	0.0	-0.0
6133	3	2 S1 HL-~1	Max	5046	2.9	0.1	-0.0	1.9	0.1	0.0
				5047	-5.2	-1.4	0.2	-0.3	0.0	0.0
				4432	-2.9	2.0	0.2	-0.7	-0.0	0.0
				3744	5.2	-0.7	-0.0	2.1	-0.1	0.0
			Min	5046	2.9	0.1	-0.0	1.9	0.1	0.0
				5047	-5.2	-1.4	0.2	-0.3	0.0	0.0
				4432	-2.9	2.0	0.2	-0.7	-0.0	0.0
				3744	5.2	-0.7	-0.0	2.1	-0.1	0.0
6134	3	2 S1 HL-~1	Max	5047	6.7	0.1	-0.3	0.3	0.0	0.0
				5048	-7.8	-1.4	0.4	1.8	-0.1	0.0
				1621	-6.7	1.7	0.4	1.3	0.0	0.0
				4432	7.8	-0.5	-0.3	0.7	-0.0	0.0
			Min	5047	6.7	0.1	-0.3	0.3	0.0	0.0
				5048	-7.8	-1.4	0.4	1.8	-0.1	0.0
				1621	-6.7	1.7	0.4	1.3	0.0	0.0
				4432	7.8	-0.5	-0.3	0.7	-0.0	0.0

6135	3	2 S1 HL-~1	Max	5048	-3.6	1.0	0.3	-1.9	-0.0	0.0
				5116	1.2	-0.2	-0.1	-0.0	-0.0	0.0
				5117	3.6	0.8	-0.1	-0.0	0.1	0.0
				1621	-1.2	-1.6	0.2	-2.0	0.1	0.0
			Min	5048	-3.6	1.0	0.3	-1.9	-0.0	0.0
				5116	1.2	-0.2	-0.1	-0.0	-0.0	0.0
				5117	3.6	0.8	-0.1	-0.0	0.1	0.0
				1621	-1.2	-1.6	0.2	-2.0	0.1	0.0
6148	3	1 S1 HL-~1	Max	5048	13.3	0.0	-3.8	0.1	-0.0	-0.0
				5062	-13.9	-0.0	-3.0	0.3	0.0	0.0
				2723	-13.7	-0.1	4.2	1.2	-0.0	0.1
				1621	14.3	0.1	2.9	0.7	-0.0	0.0
			Min	5048	13.3	0.0	-3.8	0.1	-0.0	-0.0
				5062	-13.9	-0.0	-3.0	0.3	0.0	0.0
				2723	-13.7	-0.1	4.2	1.2	-0.0	0.1
				1621	14.3	0.1	2.9	0.7	-0.0	0.0
6149	3	1 S1 HL-~1	Max	5062	12.9	-0.0	-3.3	-0.2	0.0	0.0
				5063	-11.1	0.0	-2.6	-0.0	-0.0	-0.0
				2485	-13.3	0.0	2.6	-0.3	-0.0	-0.0
				2723	11.5	-0.0	3.6	-0.3	-0.0	-0.0
			Min	5062	12.9	-0.0	-3.3	-0.2	0.0	0.0
				5063	-11.1	0.0	-2.6	-0.0	-0.0	-0.0
				2485	-13.3	0.0	2.6	-0.3	-0.0	-0.0
				2723	11.5	-0.0	3.6	-0.3	-0.0	-0.0
6162	3	4 S1 HL-~1	Max	5076	-1.3	-1.0	-0.0	0.0	-0.0	0.0
				5063	4.1	1.4	0.2	0.4	0.0	0.0
				2485	1.3	-3.1	0.1	0.6	0.0	0.0
				1862	-4.1	2.6	-0.0	0.0	0.1	0.0
			Min	5076	-1.3	-1.0	-0.0	0.0	-0.0	0.0
				5063	4.1	1.4	0.2	0.4	0.0	0.0
				2485	1.3	-3.1	0.1	0.6	0.0	0.0
				1862	-4.1	2.6	-0.0	0.0	0.1	0.0
6163	3	4 S1 HL-~1	Max	5063	3.9	-1.1	0.1	-0.5	-0.0	0.0
				5077	-1.2	0.7	0.0	0.0	0.0	0.0
				1087	-3.8	-2.7	0.0	0.0	-0.0	0.0
				2485	1.2	3.2	0.1	-0.3	0.1	0.0
			Min	5063	3.9	-1.1	0.1	-0.5	-0.0	0.0
				5077	-1.2	0.7	0.0	0.0	0.0	0.0
				1087	-3.8	-2.7	0.0	0.0	-0.0	0.0
				2485	1.2	3.2	0.1	-0.3	0.1	0.0

PLATE ELEMENT FORCES (LOCAL, UNIT LENGTH) PRINTOUT Unit System : kips , in

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4147	3	2	S1 HL-~1	Max	Cent	0.1	-0.4	0.4	0.3	-0.6	27.83
					3847	0.3	-0.3	0.4	0.5	-0.5	24.78
					4511	0.3	-0.4	0.4	0.5	-0.6	22.26
					4440	-0.0	-0.4	0.4	0.2	-0.7	31.41
					3806	-0.0	-0.3	0.4	0.2	-0.6	35.38
				Min	Cent	0.1	-0.4	0.4	0.3	-0.6	27.83
					3847	0.3	-0.3	0.4	0.5	-0.5	24.78
					4511	0.3	-0.4	0.4	0.5	-0.6	22.26
					4440	-0.0	-0.4	0.4	0.2	-0.7	31.41
					3806	-0.0	-0.3	0.4	0.2	-0.6	35.38

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	-0.0	-0.1	0.1	-0.1	-42.29
	3847		0.1	0.0	-0.1	0.1	-0.0	-27.34
	4511		-0.1	0.0	-0.1	0.1	-0.1	-54.17
	4440		-0.1	-0.0	-0.1	0.0	-0.1	-56.93
	3806		0.1	0.0	-0.1	0.1	-0.0	-33.09
Min	Cent		0.0	-0.0	-0.1	0.1	-0.1	-42.29
	3847		0.1	0.0	-0.1	0.1	-0.0	-27.34
	4511		-0.1	0.0	-0.1	0.1	-0.1	-54.17
	4440		-0.1	-0.0	-0.1	0.0	-0.1	-56.93
	3806		0.1	0.0	-0.1	0.1	-0.0	-33.09

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	3847		0.0	-0.0
	4511		0.0	0.0
	4440		0.0	0.0
	3806		0.0	-0.0
Min	Cent		0.0	-0.0
	3847		0.0	-0.0
	4511		0.0	0.0
	4440		0.0	0.0
	3806		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4148	3	2	S1 HL-~1	Max	Cent	0.0	-0.5	0.6	0.4	-0.8	33.81
					4511	-0.1	-0.5	0.6	0.4	-0.9	35.35
					1383	-0.1	-0.5	0.6	0.4	-0.9	35.47
					2087	0.1	-0.5	0.6	0.5	-0.8	32.34
					4440	0.1	-0.5	0.6	0.5	-0.8	32.24
				Min	Cent	0.0	-0.5	0.6	0.4	-0.8	33.81
					4511	-0.1	-0.5	0.6	0.4	-0.9	35.35
					1383	-0.1	-0.5	0.6	0.4	-0.9	35.47
					2087	0.1	-0.5	0.6	0.5	-0.8	32.34
					4440	0.1	-0.5	0.6	0.5	-0.8	32.24

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.1	-0.0	-0.1	0.0	-0.2	-62.18
	4511		-0.0	0.0	-0.1	0.1	-0.1	-53.34
	1383		-0.2	-0.0	-0.1	0.0	-0.2	-65.26
	2087		-0.2	-0.1	-0.1	-0.1	-0.3	-68.30
	4440		-0.1	-0.0	-0.1	0.0	-0.1	-56.72
Min	Cent		-0.1	-0.0	-0.1	0.0	-0.2	-62.18
	4511		-0.0	0.0	-0.1	0.1	-0.1	-53.34
	1383		-0.2	-0.0	-0.1	0.0	-0.2	-65.26
	2087		-0.2	-0.1	-0.1	-0.1	-0.3	-68.30
	4440		-0.1	-0.0	-0.1	0.0	-0.1	-56.72

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	4511		0.0	0.0
	1383		0.0	0.0
	2087		0.0	0.0
	4440		0.0	0.0

				Min	Cent	0.0	0.0				
					4511	0.0	0.0				
					1383	0.0	0.0				
					2087	0.0	0.0				
					4440	0.0	0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4149	3	2	S1 HL-~1	Max	Cent	0.0	-0.6	-0.2	0.1	-0.6	-17.51
					1383	-0.2	-0.5	-0.2	-0.1	-0.6	-28.04
					5107	-0.2	-0.6	-0.2	-0.1	-0.7	-20.55
					5108	0.2	-0.6	-0.2	0.2	-0.7	-12.32
					2087	0.2	-0.5	-0.2	0.3	-0.5	-15.18
				Min	Cent	0.0	-0.6	-0.2	0.1	-0.6	-17.51
					1383	-0.2	-0.5	-0.2	-0.1	-0.6	-28.04
					5107	-0.2	-0.6	-0.2	-0.1	-0.7	-20.55
					5108	0.2	-0.6	-0.2	0.2	-0.7	-12.32
					2087	0.2	-0.5	-0.2	0.3	-0.5	-15.18

				NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
			Max	Cent	-0.1	-0.0	-0.1	0.0	-0.1	-54.67
				1383	-0.2	-0.0	-0.1	0.0	-0.2	-71.02
				5107	-0.0	0.0	-0.1	0.1	-0.1	-47.62
				5108	0.0	0.0	-0.1	0.1	-0.1	-46.44
				2087	-0.0	-0.0	-0.1	0.1	-0.1	-43.45
			Min	Cent	-0.1	-0.0	-0.1	0.0	-0.1	-54.67
				1383	-0.2	-0.0	-0.1	0.0	-0.2	-71.02
				5107	-0.0	0.0	-0.1	0.1	-0.1	-47.62
				5108	0.0	0.0	-0.1	0.1	-0.1	-46.44
				2087	-0.0	-0.0	-0.1	0.1	-0.1	-43.45

				NODE	Vxx	Vyy
			Max	Cent	-0.0	0.0
				1383	-0.0	0.0
				5107	-0.0	0.0
				5108	-0.0	0.0
				2087	-0.0	0.0
			Min	Cent	-0.0	0.0
				1383	-0.0	0.0
				5107	-0.0	0.0
				5108	-0.0	0.0
				2087	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4173	3	2	S1 HL-~1	Max	Cent	-0.2	-1.1	0.3	-0.1	-1.2	15.92
					3806	-0.3	-0.8	0.3	-0.1	-0.9	22.35
					4440	-0.3	-1.4	0.3	-0.2	-1.4	12.99
					4393	-0.2	-1.4	0.3	-0.1	-1.4	12.17
					3765	-0.2	-0.8	0.3	-0.1	-0.9	20.28
				Min	Cent	-0.2	-1.1	0.3	-0.1	-1.2	15.92
					3806	-0.3	-0.8	0.3	-0.1	-0.9	22.35
					4440	-0.3	-1.4	0.3	-0.2	-1.4	12.99
					4393	-0.2	-1.4	0.3	-0.1	-1.4	12.17
					3765	-0.2	-0.8	0.3	-0.1	-0.9	20.28

				NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
			Max	Cent	0.0	0.0	-0.1	0.1	-0.1	-46.46
				3806	0.1	0.0	-0.1	0.1	-0.0	-35.18
				4440	-0.1	-0.0	-0.1	0.0	-0.1	-55.40
				4393	0.0	0.1	-0.1	0.1	-0.0	-48.79
				3765	0.0	0.0	-0.1	0.1	-0.1	-47.16
			Min	Cent	0.0	0.0	-0.1	0.1	-0.1	-46.46
				3806	0.1	0.0	-0.1	0.1	-0.0	-35.18
				4440	-0.1	-0.0	-0.1	0.0	-0.1	-55.40
				4393	0.0	0.1	-0.1	0.1	-0.0	-48.79
				3765	0.0	0.0	-0.1	0.1	-0.1	-47.16

				NODE	Vxx	Vyy
			Max	Cent	0.0	-0.0
				3806	0.0	-0.0
				4440	0.0	-0.0

	4393	-0.0	-0.0		
	3765	-0.0	-0.0		
Min	Cent	0.0	-0.0		
	3806	0.0	-0.0		
	4440	0.0	-0.0		
	4393	-0.0	-0.0		
	3765	-0.0	-0.0		

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4174	3	2	S1 HL-~1	Max	Cent	-0.1	-1.5	0.5	0.1	-1.7	17.35
					4440	-0.2	-1.3	0.5	-0.0	-1.5	20.91
					2087	-0.2	-1.7	0.5	-0.1	-1.8	16.97
					1801	0.1	-1.7	0.5	0.2	-1.8	14.73
					4393	0.1	-1.3	0.5	0.2	-1.5	17.74
				Min	Cent	-0.1	-1.5	0.5	0.1	-1.7	17.35
					4440	-0.2	-1.3	0.5	-0.0	-1.5	20.91
					2087	-0.2	-1.7	0.5	-0.1	-1.8	16.97
					1801	0.1	-1.7	0.5	0.2	-1.8	14.73
					4393	0.1	-1.3	0.5	0.2	-1.5	17.74

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.1	-0.0	-0.1	0.0	-0.1	-62.08
	4440		-0.1	-0.0	-0.1	0.0	-0.1	-56.44
	2087		-0.2	-0.1	-0.1	-0.1	-0.2	-71.70
	1801		-0.0	0.0	-0.0	0.1	-0.1	-64.28
	4393		0.0	0.1	-0.1	0.1	-0.0	-49.60
Min	Cent		-0.1	-0.0	-0.1	0.0	-0.1	-62.08
	4440		-0.1	-0.0	-0.1	0.0	-0.1	-56.44
	2087		-0.2	-0.1	-0.1	-0.1	-0.2	-71.70
	1801		-0.0	0.0	-0.0	0.1	-0.1	-64.28
	4393		0.0	0.1	-0.1	0.1	-0.0	-49.60

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	4440		0.0	-0.0
	2087		0.0	-0.0
	1801		0.0	-0.0
	4393		0.0	-0.0
Min	Cent		0.0	-0.0
	4440		0.0	-0.0
	2087		0.0	-0.0
	1801		0.0	-0.0
	4393		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4175	3	2	S1 HL-~1	Max	Cent	-0.0	-1.9	-0.3	-0.0	-2.0	-8.35
					2087	-0.2	-1.7	-0.3	-0.2	-1.7	-10.61
					5108	-0.2	-2.2	-0.3	-0.2	-2.2	-7.96
					5109	0.1	-2.2	-0.3	0.2	-2.2	-6.87
					1801	0.1	-1.7	-0.3	0.2	-1.7	-8.78
				Min	Cent	-0.0	-1.9	-0.3	-0.0	-2.0	-8.35
					2087	-0.2	-1.7	-0.3	-0.2	-1.7	-10.61
					5108	-0.2	-2.2	-0.3	-0.2	-2.2	-7.96
					5109	0.1	-2.2	-0.3	0.2	-2.2	-6.87
					1801	0.1	-1.7	-0.3	0.2	-1.7	-8.78

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	-0.1	0.1	-0.1	-53.12
	2087		-0.0	-0.0	-0.1	0.0	-0.1	-45.77
	5108		-0.0	-0.0	-0.1	0.1	-0.1	-43.46
	5109		0.0	0.1	-0.0	0.1	-0.0	-60.49
	1801		-0.0	0.0	-0.0	0.1	-0.1	-63.13
Min	Cent		-0.0	0.0	-0.1	0.1	-0.1	-53.12
	2087		-0.0	-0.0	-0.1	0.0	-0.1	-45.77
	5108		-0.0	-0.0	-0.1	0.1	-0.1	-43.46
	5109		0.0	0.1	-0.0	0.1	-0.0	-60.49
	1801		-0.0	0.0	-0.0	0.1	-0.1	-63.13

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0

		2087	-0.0	-0.0	
		5108	-0.0	-0.0	
		5109	-0.0	-0.0	
		1801	-0.0	-0.0	
	Min	Cent	-0.0	-0.0	
		2087	-0.0	-0.0	
		5108	-0.0	-0.0	
		5109	-0.0	-0.0	
		1801	-0.0	-0.0	

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4199	3	2	S1 HL-~1	Max	Cent	-0.2	-1.4	0.4	-0.1	-1.5	15.03
					3765	-0.3	-1.2	0.4	-0.1	-1.3	18.28
					4393	-0.3	-1.6	0.4	-0.2	-1.7	14.07
					4556	-0.1	-1.6	0.4	-0.0	-1.7	12.69
					3849	-0.1	-1.2	0.4	0.0	-1.3	16.11
				Min	Cent	-0.2	-1.4	0.4	-0.1	-1.5	15.03
					3765	-0.3	-1.2	0.4	-0.1	-1.3	18.28
					4393	-0.3	-1.6	0.4	-0.2	-1.7	14.07
					4556	-0.1	-1.6	0.4	-0.0	-1.7	12.69
					3849	-0.1	-1.2	0.4	0.0	-1.3	16.11

			NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
		Max	Cent	0.0	0.0	-0.0	0.0	0.0	-41.03
			3765	0.0	0.0	-0.0	0.0	-0.0	-49.18
			4393	0.0	0.0	-0.0	0.1	0.0	-47.92
			4556	0.0	0.0	-0.0	0.0	0.0	-49.79
			3849	0.1	0.0	-0.0	0.1	0.0	-12.97
		Min	Cent	0.0	0.0	-0.0	0.0	0.0	-41.03
			3765	0.0	0.0	-0.0	0.0	-0.0	-49.18
			4393	0.0	0.0	-0.0	0.1	0.0	-47.92
			4556	0.0	0.0	-0.0	0.0	0.0	-49.79
			3849	0.1	0.0	-0.0	0.1	0.0	-12.97

			NODE	Vxx	Vyy
		Max	Cent	0.0	0.0
			3765	-0.0	-0.0
			4393	-0.0	0.0
			4556	0.0	0.0
			3849	0.0	-0.0
		Min	Cent	0.0	0.0
			3765	-0.0	-0.0
			4393	-0.0	0.0
			4556	0.0	0.0
			3849	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4200	3	2	S1 HL-~1	Max	Cent	-0.1	-1.7	0.3	0.0	-1.7	10.74
					4393	0.0	-1.5	0.3	0.1	-1.6	11.04
					1801	0.0	-1.8	0.3	0.1	-1.8	9.71
					700	-0.1	-1.8	0.3	-0.1	-1.8	10.46
					4556	-0.1	-1.5	0.3	-0.1	-1.6	12.00
				Min	Cent	-0.1	-1.7	0.3	0.0	-1.7	10.74
					4393	0.0	-1.5	0.3	0.1	-1.6	11.04
					1801	0.0	-1.8	0.3	0.1	-1.8	9.71
					700	-0.1	-1.8	0.3	-0.1	-1.8	10.46
					4556	-0.1	-1.5	0.3	-0.1	-1.6	12.00

			NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
		Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-65.29
			4393	0.0	0.0	-0.0	0.1	0.0	-48.29
			1801	-0.0	0.0	-0.0	0.0	-0.1	-70.20
			700	-0.0	0.0	-0.0	0.0	-0.0	-76.22
			4556	0.0	0.0	-0.0	0.0	0.0	-48.91
		Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-65.29
			4393	0.0	0.0	-0.0	0.1	0.0	-48.29
			1801	-0.0	0.0	-0.0	0.0	-0.1	-70.20
			700	-0.0	0.0	-0.0	0.0	-0.0	-76.22
			4556	0.0	0.0	-0.0	0.0	0.0	-48.91

			NODE	Vxx	Vyy

	Max	Cent	0.0	0.0
		4393	0.0	0.0
		1801	0.0	0.0
		700	0.0	0.0
		4556	0.0	0.0
	Min	Cent	0.0	0.0
		4393	0.0	0.0
		1801	0.0	0.0
		700	0.0	0.0
		4556	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4201	3	2	S1 HL-~1	Max	Cent	-0.0	-1.8	0.1	0.0	-1.8	4.05
					1801	0.2	-1.8	0.1	0.2	-1.8	3.84
					5109	0.2	-1.9	0.1	0.2	-1.9	3.60
					5110	-0.2	-1.9	0.1	-0.2	-1.9	4.28
					700	-0.2	-1.8	0.1	-0.2	-1.8	4.62
				Min	Cent	-0.0	-1.8	0.1	0.0	-1.8	4.05
					1801	0.2	-1.8	0.1	0.2	-1.8	3.84
					5109	0.2	-1.9	0.1	0.2	-1.9	3.60
					5110	-0.2	-1.9	0.1	-0.2	-1.9	4.28
					700	-0.2	-1.8	0.1	-0.2	-1.8	4.62

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	-0.0	0.0	-0.0	-70.70
	1801		-0.0	0.0	-0.0	0.0	-0.0	-70.42
	5109		0.0	0.0	-0.0	0.1	-0.0	-66.91
	5110		-0.0	0.0	-0.0	0.0	-0.0	-55.79
	700		-0.1	-0.0	-0.0	-0.0	-0.1	-76.56
Min	Cent		-0.0	0.0	-0.0	0.0	-0.0	-70.70
	1801		-0.0	0.0	-0.0	0.0	-0.0	-70.42
	5109		0.0	0.0	-0.0	0.1	-0.0	-66.91
	5110		-0.0	0.0	-0.0	0.0	-0.0	-55.79
	700		-0.1	-0.0	-0.0	-0.0	-0.1	-76.56

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
	1801		-0.0	0.0
	5109		-0.0	0.0
	5110		-0.0	0.0
	700		-0.0	0.0
Min	Cent		-0.0	0.0
	1801		-0.0	0.0
	5109		-0.0	0.0
	5110		-0.0	0.0
	700		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4225	3	2	S1 HL-~1	Max	Cent	-0.0	-1.3	-0.2	0.0	-1.3	-8.81
					3849	-0.1	-1.4	-0.2	-0.0	-1.4	-8.83
					4556	-0.1	-1.2	-0.2	-0.0	-1.3	-9.63
					4387	0.1	-1.2	-0.2	0.1	-1.3	-8.80
					3759	0.1	-1.4	-0.2	0.1	-1.4	-8.12
				Min	Cent	-0.0	-1.3	-0.2	0.0	-1.3	-8.81
					3849	-0.1	-1.4	-0.2	-0.0	-1.4	-8.83
					4556	-0.1	-1.2	-0.2	-0.0	-1.3	-9.63
					4387	0.1	-1.2	-0.2	0.1	-1.3	-8.80
					3759	0.1	-1.4	-0.2	0.1	-1.4	-8.12

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.0	0.0	0.0	-37.87
	3849		0.1	0.0	-0.0	0.1	0.0	-7.48
	4556		0.0	0.0	-0.0	0.0	0.0	-54.68
	4387		0.0	0.0	-0.0	0.0	0.0	-58.74
	3759		-0.0	0.0	-0.0	0.0	-0.0	-84.33
Min	Cent		0.0	0.0	-0.0	0.0	0.0	-37.87
	3849		0.1	0.0	-0.0	0.1	0.0	-7.48
	4556		0.0	0.0	-0.0	0.0	0.0	-54.68
	4387		0.0	0.0	-0.0	0.0	0.0	-58.74
	3759		-0.0	0.0	-0.0	0.0	-0.0	-84.33

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
		3849	0.0	0.0
		4556	0.0	0.0
		4387	-0.0	0.0
		3759	-0.0	0.0
Min	Cent		0.0	0.0
		3849	0.0	0.0
		4556	0.0	0.0
		4387	-0.0	0.0
		3759	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4226	3	2	S1 HL-~1	Max	Cent	0.0	-1.2	-0.2	0.1	-1.2	-10.26
					4556	0.0	-1.2	-0.2	0.1	-1.3	-9.71
					700	0.0	-1.1	-0.2	0.1	-1.1	-10.76
					1697	0.0	-1.1	-0.2	0.0	-1.1	-10.88
					4387	0.0	-1.2	-0.2	0.0	-1.3	-9.81
				Min	Cent	0.0	-1.2	-0.2	0.1	-1.2	-10.26
					4556	0.0	-1.2	-0.2	0.1	-1.3	-9.71
					700	0.0	-1.1	-0.2	0.1	-1.1	-10.76
					1697	0.0	-1.1	-0.2	0.0	-1.1	-10.88
					4387	0.0	-1.2	-0.2	0.0	-1.3	-9.81

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	-0.0	0.0	-0.0	-74.16
		4556	0.0	0.0	-0.0	0.0	0.0	-53.50
		700	-0.0	0.0	-0.0	0.0	-0.0	-77.34
		1697	-0.0	0.0	-0.0	0.0	-0.0	-84.05
		4387	0.0	0.0	-0.0	0.0	0.0	-58.79
Min	Cent		-0.0	0.0	-0.0	0.0	-0.0	-74.16
		4556	0.0	0.0	-0.0	0.0	0.0	-53.50
		700	-0.0	0.0	-0.0	0.0	-0.0	-77.34
		1697	-0.0	0.0	-0.0	0.0	-0.0	-84.05
		4387	0.0	0.0	-0.0	0.0	0.0	-58.79

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
		4556	0.0	0.0
		700	0.0	0.0
		1697	0.0	0.0
		4387	0.0	0.0
Min	Cent		0.0	0.0
		4556	0.0	0.0
		700	0.0	0.0
		1697	0.0	0.0
		4387	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4227	3	2	S1 HL-~1	Max	Cent	0.0	-1.0	-0.0	0.1	-1.0	-1.69
					700	0.1	-1.1	-0.0	0.1	-1.1	-1.56
					5110	0.1	-1.0	-0.0	0.1	-1.0	-1.77
					5111	0.0	-1.0	-0.0	0.0	-1.0	-1.83
					1697	0.0	-1.1	-0.0	0.0	-1.1	-1.61
				Min	Cent	0.0	-1.0	-0.0	0.1	-1.0	-1.69
					700	0.1	-1.1	-0.0	0.1	-1.1	-1.56
					5110	0.1	-1.0	-0.0	0.1	-1.0	-1.77
					5111	0.0	-1.0	-0.0	0.0	-1.0	-1.83
					1697	0.0	-1.1	-0.0	0.0	-1.1	-1.61

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	-0.0	0.0	-0.0	-79.99
		700	-0.1	0.0	-0.0	0.0	-0.1	-80.31
		5110	0.0	0.0	-0.0	0.0	-0.0	-68.80
		5111	-0.0	0.0	-0.0	0.0	-0.0	-75.25
		1697	-0.0	0.0	-0.0	0.0	-0.0	-84.83
Min	Cent		-0.0	0.0	-0.0	0.0	-0.0	-79.99
		700	-0.1	0.0	-0.0	0.0	-0.1	-80.31
		5110	0.0	0.0	-0.0	0.0	-0.0	-68.80

			5111	-0.0	0.0	-0.0	0.0	-0.0	-75.25
			1697	-0.0	0.0	-0.0	0.0	-0.0	-84.83

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	700	-0.0	0.0
	5110	-0.0	0.0
	5111	-0.0	0.0
	1697	-0.0	0.0
Min	Cent	-0.0	0.0
	700	-0.0	0.0
	5110	-0.0	0.0
	5111	-0.0	0.0
	1697	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4251	3	2	S1 HL-~1	Max	Cent	0.0	-1.4	-0.2	0.0	-1.4	-7.18
					3759	0.0	-1.4	-0.2	0.1	-1.4	-6.99
					4387	0.0	-1.3	-0.2	0.1	-1.3	-7.30
					4557	0.0	-1.3	-0.2	0.0	-1.3	-7.39
					3854	0.0	-1.4	-0.2	0.0	-1.4	-7.07
				Min	Cent	0.0	-1.4	-0.2	0.0	-1.4	-7.18
					3759	0.0	-1.4	-0.2	0.1	-1.4	-6.99
					4387	0.0	-1.3	-0.2	0.1	-1.3	-7.30
					4557	0.0	-1.3	-0.2	0.0	-1.3	-7.39
					3854	0.0	-1.4	-0.2	0.0	-1.4	-7.07

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	0.0	0.0	0.0	59.02
	3759	-0.0	0.0	0.0	0.0	-0.0	89.55
	4387	0.0	0.0	0.0	0.0	0.0	73.83
	4557	-0.0	0.0	0.0	0.0	-0.0	83.23
	3854	0.1	0.0	0.0	0.1	0.0	1.49
Min	Cent	0.0	0.0	0.0	0.0	0.0	59.02
	3759	-0.0	0.0	0.0	0.0	-0.0	89.55
	4387	0.0	0.0	0.0	0.0	0.0	73.83
	4557	-0.0	0.0	0.0	0.0	-0.0	83.23
	3854	0.1	0.0	0.0	0.1	0.0	1.49

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	3759	-0.0	-0.0
	4387	-0.0	-0.0
	4557	0.0	-0.0
	3854	0.0	-0.0
Min	Cent	0.0	-0.0
	3759	-0.0	-0.0
	4387	-0.0	-0.0
	4557	0.0	-0.0
	3854	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4252	3	2	S1 HL-~1	Max	Cent	-0.0	-1.3	-0.1	0.0	-1.4	-6.19
					4387	-0.0	-1.3	-0.1	-0.0	-1.4	-6.40
					1697	-0.0	-1.3	-0.1	-0.0	-1.4	-6.37
					701	0.0	-1.3	-0.1	0.1	-1.4	-5.99
					4557	0.0	-1.3	-0.1	0.1	-1.4	-6.03
				Min	Cent	-0.0	-1.3	-0.1	0.0	-1.4	-6.19
					4387	-0.0	-1.3	-0.1	-0.0	-1.4	-6.40
					1697	-0.0	-1.3	-0.1	-0.0	-1.4	-6.37
					701	0.0	-1.3	-0.1	0.1	-1.4	-5.99
					4557	0.0	-1.3	-0.1	0.1	-1.4	-6.03

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	86.77
	4387	0.0	0.0	0.0	0.0	0.0	76.55
	1697	-0.0	0.0	0.0	0.0	-0.0	88.89
	701	-0.1	-0.0	0.0	-0.0	-0.1	88.43
	4557	-0.0	0.0	0.0	0.0	-0.0	83.56
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	86.77

					4387	0.0	0.0	0.0	0.0	0.0	76.55
					1697	-0.0	0.0	0.0	0.0	-0.0	88.89
					701	-0.1	-0.0	0.0	-0.0	-0.1	88.43
					4557	-0.0	0.0	0.0	0.0	-0.0	83.56

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	4387		0.0	-0.0
	1697		0.0	-0.0
	701		0.0	-0.0
	4557		0.0	-0.0
Min	Cent		0.0	-0.0
	4387		0.0	-0.0
	1697		0.0	-0.0
	701		0.0	-0.0
	4557		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4253	3	2	S1 HL-~1	Max	Cent	-0.0	-1.3	-0.0	-0.0	-1.3	-0.72
					1697	-0.1	-1.3	-0.0	-0.1	-1.3	-0.74
					5111	-0.1	-1.3	-0.0	-0.1	-1.3	-0.76
					5112	0.0	-1.3	-0.0	0.0	-1.3	-0.71
					701	0.0	-1.3	-0.0	0.0	-1.3	-0.69
				Min	Cent	-0.0	-1.3	-0.0	-0.0	-1.3	-0.72
					1697	-0.1	-1.3	-0.0	-0.1	-1.3	-0.74
					5111	-0.1	-1.3	-0.0	-0.1	-1.3	-0.76
					5112	0.0	-1.3	-0.0	0.0	-1.3	-0.71
					701	0.0	-1.3	-0.0	0.0	-1.3	-0.69

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	0.0	0.0	-0.0	87.04
	1697		-0.0	0.0	0.0	0.0	-0.0	89.82
	5111		0.0	0.0	0.0	0.0	0.0	89.88
	5112		-0.0	0.0	0.0	0.0	-0.0	83.60
	701		-0.1	0.0	0.0	0.0	-0.1	88.20
Min	Cent		-0.0	0.0	0.0	0.0	-0.0	87.04
	1697		-0.0	0.0	0.0	0.0	-0.0	89.82
	5111		0.0	0.0	0.0	0.0	0.0	89.88
	5112		-0.0	0.0	0.0	0.0	-0.0	83.60
	701		-0.1	0.0	0.0	0.0	-0.1	88.20

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
	1697		-0.0	-0.0
	5111		-0.0	0.0
	5112		-0.0	0.0
	701		-0.0	-0.0
Min	Cent		-0.0	0.0
	1697		-0.0	-0.0
	5111		-0.0	0.0
	5112		-0.0	0.0
	701		-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4277	3	2	S1 HL-~1	Max	Cent	-0.0	-1.4	-0.1	-0.0	-1.4	-4.42
					3854	0.0	-1.4	-0.1	0.0	-1.4	-4.34
					4557	0.0	-1.4	-0.1	0.0	-1.4	-4.34
					4381	-0.0	-1.4	-0.1	-0.0	-1.4	-4.49
					3753	-0.0	-1.4	-0.1	-0.0	-1.4	-4.50
				Min	Cent	-0.0	-1.4	-0.1	-0.0	-1.4	-4.42
					3854	0.0	-1.4	-0.1	0.0	-1.4	-4.34
					4557	0.0	-1.4	-0.1	0.0	-1.4	-4.34
					4381	-0.0	-1.4	-0.1	-0.0	-1.4	-4.49
					3753	-0.0	-1.4	-0.1	-0.0	-1.4	-4.50

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.0	0.0	0.0	-44.46
	3854		0.1	0.0	-0.0	0.1	0.0	-0.75
	4557		-0.0	0.0	-0.0	0.0	-0.0	-83.49
	4381		0.0	0.0	-0.0	0.0	0.0	-55.05

		3753	-0.0	0.0	0.0	0.0	-0.0	89.13
	Min	Cent	0.0	0.0	-0.0	0.0	0.0	-44.46
		3854	0.1	0.0	-0.0	0.1	0.0	-0.75
		4557	-0.0	0.0	-0.0	0.0	-0.0	-83.49
		4381	0.0	0.0	-0.0	0.0	0.0	-55.05
		3753	-0.0	0.0	0.0	0.0	-0.0	89.13

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	3854	0.0	0.0
	4557	0.0	0.0
	4381	-0.0	0.0
	3753	-0.0	0.0
Min	Cent	0.0	0.0
	3854	0.0	0.0
	4557	0.0	0.0
	4381	-0.0	0.0
	3753	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4278	3	2	S1 HL-~1	Max	Cent	-0.0	-1.4	-0.1	-0.0	-1.4	-5.82
					4557	0.0	-1.4	-0.1	0.0	-1.4	-5.58
					701	0.0	-1.4	-0.1	0.0	-1.4	-5.68
					95	-0.1	-1.4	-0.1	-0.0	-1.4	-6.08
					4381	-0.1	-1.4	-0.1	-0.0	-1.4	-5.96
				Min	Cent	-0.0	-1.4	-0.1	-0.0	-1.4	-5.82
					4557	0.0	-1.4	-0.1	0.0	-1.4	-5.58
					701	0.0	-1.4	-0.1	0.0	-1.4	-5.68
					95	-0.1	-1.4	-0.1	-0.0	-1.4	-6.08
					4381	-0.1	-1.4	-0.1	-0.0	-1.4	-5.96

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-86.26
	4557	-0.0	0.0	-0.0	0.0	-0.0	-84.16
	701	-0.1	-0.0	-0.0	-0.0	-0.1	-88.80
	95	-0.0	0.0	-0.0	0.0	-0.0	-89.28
	4381	0.0	0.0	-0.0	0.0	0.0	-60.21
Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-86.26
	4557	-0.0	0.0	-0.0	0.0	-0.0	-84.16
	701	-0.1	-0.0	-0.0	-0.0	-0.1	-88.80
	95	-0.0	0.0	-0.0	0.0	-0.0	-89.28
	4381	0.0	0.0	-0.0	0.0	0.0	-60.21

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	4557	0.0	0.0
	701	0.0	0.0
	95	0.0	0.0
	4381	0.0	0.0
Min	Cent	0.0	0.0
	4557	0.0	0.0
	701	0.0	0.0
	95	0.0	0.0
	4381	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4279	3	2	S1 HL-~1	Max	Cent	-0.0	-1.3	0.0	-0.0	-1.3	0.77
					701	0.0	-1.3	0.0	0.0	-1.3	0.75
					5112	0.0	-1.3	0.0	0.0	-1.3	0.75
					5113	-0.0	-1.3	0.0	-0.0	-1.3	0.79
					95	-0.0	-1.3	0.0	-0.0	-1.3	0.78
				Min	Cent	-0.0	-1.3	0.0	-0.0	-1.3	0.77
					701	0.0	-1.3	0.0	0.0	-1.3	0.75
					5112	0.0	-1.3	0.0	0.0	-1.3	0.75
					5113	-0.0	-1.3	0.0	-0.0	-1.3	0.79
					95	-0.0	-1.3	0.0	-0.0	-1.3	0.78

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-89.53
	701	-0.1	-0.0	-0.0	-0.0	-0.1	-89.05

		5112	0.0	0.0	-0.0	0.0	0.0	-87.53
		5113	-0.0	0.0	0.0	0.0	-0.0	88.16
		95	-0.0	-0.0	0.0	-0.0	-0.0	89.73
	Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-89.53
		701	-0.1	-0.0	-0.0	-0.0	-0.1	-89.05
		5112	0.0	0.0	-0.0	0.0	0.0	-87.53
		5113	-0.0	0.0	0.0	0.0	-0.0	88.16
		95	-0.0	-0.0	0.0	-0.0	-0.0	89.73

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	701	-0.0	0.0
	5112	-0.0	0.0
	5113	-0.0	0.0
	95	-0.0	0.0
Min	Cent	-0.0	0.0
	701	-0.0	0.0
	5112	-0.0	0.0
	5113	-0.0	0.0
	95	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4303	3	2	S1 HL-~1	Max	Cent	-0.0	-1.1	-0.1	0.0	-1.1	-5.62
					3753	0.0	-1.1	-0.1	0.1	-1.1	-5.32
					4381	0.0	-1.1	-0.1	0.1	-1.1	-5.44
					4558	-0.1	-1.1	-0.1	-0.0	-1.1	-5.97
					3859	-0.1	-1.1	-0.1	-0.0	-1.1	-5.83
				Min	Cent	-0.0	-1.1	-0.1	0.0	-1.1	-5.62
					3753	0.0	-1.1	-0.1	0.1	-1.1	-5.32
					4381	0.0	-1.1	-0.1	0.1	-1.1	-5.44
					4558	-0.1	-1.1	-0.1	-0.0	-1.1	-5.97
					3859	-0.1	-1.1	-0.1	-0.0	-1.1	-5.83

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	0.0	0.0	0.0	29.31
	3753	-0.0	0.0	0.0	0.0	-0.0	78.95
	4381	0.0	0.0	0.0	0.0	0.0	51.01
	4558	0.0	0.0	0.0	0.0	0.0	62.15
	3859	0.1	0.0	0.0	0.1	0.0	3.19
Min	Cent	0.0	0.0	0.0	0.0	0.0	29.31
	3753	-0.0	0.0	0.0	0.0	-0.0	78.95
	4381	0.0	0.0	0.0	0.0	0.0	51.01
	4558	0.0	0.0	0.0	0.0	0.0	62.15
	3859	0.1	0.0	0.0	0.1	0.0	3.19

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	3753	-0.0	-0.0
	4381	-0.0	0.0
	4558	0.0	0.0
	3859	0.0	-0.0
Min	Cent	0.0	-0.0
	3753	-0.0	-0.0
	4381	-0.0	0.0
	4558	0.0	0.0
	3859	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4304	3	2	S1 HL-~1	Max	Cent	-0.0	-1.1	-0.1	0.0	-1.1	-7.28
					4381	0.0	-1.1	-0.1	0.0	-1.1	-7.09
					95	0.0	-1.1	-0.1	0.0	-1.1	-7.04
					702	-0.0	-1.1	-0.1	-0.0	-1.1	-7.49
					4558	-0.0	-1.1	-0.1	-0.0	-1.1	-7.53
				Min	Cent	-0.0	-1.1	-0.1	0.0	-1.1	-7.28
					4381	0.0	-1.1	-0.1	0.0	-1.1	-7.09
					95	0.0	-1.1	-0.1	0.0	-1.1	-7.04
					702	-0.0	-1.1	-0.1	-0.0	-1.1	-7.49
					4558	-0.0	-1.1	-0.1	-0.0	-1.1	-7.53

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE

Max	Cent	-0.0	0.0	0.0	0.0	-0.0	78.68
	4381	0.0	0.0	0.0	0.0	0.0	51.15
	95	-0.0	0.0	0.0	0.0	-0.0	83.41
	702	-0.1	-0.0	0.0	-0.0	-0.1	85.56
	4558	0.0	0.0	0.0	0.0	0.0	61.81
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	78.68
	4381	0.0	0.0	0.0	0.0	0.0	51.15
	95	-0.0	0.0	0.0	0.0	-0.0	83.41
	702	-0.1	-0.0	0.0	-0.0	-0.1	85.56
	4558	0.0	0.0	0.0	0.0	0.0	61.81

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	4381	0.0	0.0
	95	0.0	0.0
	702	0.0	0.0
	4558	0.0	0.0
Min	Cent	0.0	0.0
	4381	0.0	0.0
	95	0.0	0.0
	702	0.0	0.0
	4558	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4305	3	2	S1 HL-~1	Max	Cent	-0.0	-1.1	0.0	-0.0	-1.1	1.18
					95	0.0	-1.1	0.0	0.0	-1.1	1.11
					5113	0.0	-1.1	0.0	0.0	-1.1	1.14
					5114	-0.1	-1.1	0.0	-0.1	-1.1	1.26
					702	-0.1	-1.1	0.0	-0.1	-1.1	1.23
				Min	Cent	-0.0	-1.1	0.0	-0.0	-1.1	1.18
					95	0.0	-1.1	0.0	0.0	-1.1	1.11
					5113	0.0	-1.1	0.0	0.0	-1.1	1.14
					5114	-0.1	-1.1	0.0	-0.1	-1.1	1.26
					702	-0.1	-1.1	0.0	-0.1	-1.1	1.23

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	81.10
	95	-0.0	-0.0	0.0	-0.0	-0.0	84.86
	5113	0.0	0.0	0.0	0.0	-0.0	76.04
	5114	0.0	0.0	0.0	0.0	-0.0	65.62
	702	-0.1	-0.0	0.0	-0.0	-0.1	85.62
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	81.10
	95	-0.0	-0.0	0.0	-0.0	-0.0	84.86
	5113	0.0	0.0	0.0	0.0	-0.0	76.04
	5114	0.0	0.0	0.0	0.0	-0.0	65.62
	702	-0.1	-0.0	0.0	-0.0	-0.1	85.62

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	95	-0.0	0.0
	5113	-0.0	0.0
	5114	-0.0	0.0
	702	-0.0	0.0
Min	Cent	-0.0	0.0
	95	-0.0	0.0
	5113	-0.0	0.0
	5114	-0.0	0.0
	702	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4329	3	2	S1 HL-~1	Max	Cent	0.0	-0.6	-0.1	0.0	-0.7	-9.03
					3859	0.1	-0.6	-0.1	0.1	-0.6	-8.14
					4558	0.1	-0.6	-0.1	0.1	-0.7	-8.07
					4375	-0.1	-0.6	-0.1	-0.1	-0.7	-10.13
					3747	-0.1	-0.6	-0.1	-0.1	-0.7	-10.25
				Min	Cent	0.0	-0.6	-0.1	0.0	-0.7	-9.03
					3859	0.1	-0.6	-0.1	0.1	-0.6	-8.14
					4558	0.1	-0.6	-0.1	0.1	-0.7	-8.07
					4375	-0.1	-0.6	-0.1	-0.1	-0.7	-10.13
					3747	-0.1	-0.6	-0.1	-0.1	-0.7	-10.25

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	-0.0	0.0	0.0	-13.64
	3859	0.1	0.0	-0.0	0.1	0.0	-1.62
	4558	0.0	0.0	-0.0	0.0	0.0	-66.40
	4375	0.0	0.0	-0.0	0.0	0.0	-19.19
	3747	-0.0	-0.0	0.0	-0.0	-0.0	20.40
Min	Cent	0.0	0.0	-0.0	0.0	0.0	-13.64
	3859	0.1	0.0	-0.0	0.1	0.0	-1.62
	4558	0.0	0.0	-0.0	0.0	0.0	-66.40
	4375	0.0	0.0	-0.0	0.0	0.0	-19.19
	3747	-0.0	-0.0	0.0	-0.0	-0.0	20.40

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	3859	0.0	0.0
	4558	0.0	0.0
	4375	-0.0	0.0
	3747	-0.0	0.0
Min	Cent	0.0	0.0
	3859	0.0	0.0
	4558	0.0	0.0
	4375	-0.0	0.0
	3747	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4330	3	2	S1 HL-~1	Max	Cent	0.0	-0.6	-0.2	0.1	-0.7	-14.19
					4558	0.1	-0.6	-0.2	0.1	-0.7	-12.74
					702	0.1	-0.6	-0.2	0.1	-0.7	-12.87
					81	-0.1	-0.6	-0.2	-0.0	-0.7	-15.97
					4375	-0.1	-0.6	-0.2	-0.0	-0.7	-15.79
				Min	Cent	0.0	-0.6	-0.2	0.1	-0.7	-14.19
					4558	0.1	-0.6	-0.2	0.1	-0.7	-12.74
					702	0.1	-0.6	-0.2	0.1	-0.7	-12.87
					81	-0.1	-0.6	-0.2	-0.0	-0.7	-15.97
					4375	-0.1	-0.6	-0.2	-0.0	-0.7	-15.79

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-78.77
	4558	0.0	0.0	-0.0	0.0	0.0	-63.30
	702	-0.1	-0.0	-0.0	-0.0	-0.1	-85.57
	81	-0.0	-0.0	-0.0	-0.0	-0.0	-87.55
	4375	0.0	0.0	-0.0	0.0	0.0	-18.95
Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-78.77
	4558	0.0	0.0	-0.0	0.0	0.0	-63.30
	702	-0.1	-0.0	-0.0	-0.0	-0.1	-85.57
	81	-0.0	-0.0	-0.0	-0.0	-0.0	-87.55
	4375	0.0	0.0	-0.0	0.0	0.0	-18.95

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	4558	0.0	0.0
	702	0.0	0.0
	81	0.0	0.0
	4375	0.0	0.0
Min	Cent	0.0	0.0
	4558	0.0	0.0
	702	0.0	0.0
	81	0.0	0.0
	4375	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4331	3	2	S1 HL-~1	Max	Cent	0.0	-0.6	0.0	0.0	-0.6	4.12
					702	0.1	-0.6	0.0	0.1	-0.6	3.70
					5114	0.1	-0.6	0.0	0.1	-0.6	3.81
					5115	-0.0	-0.6	0.0	-0.0	-0.6	4.64
					81	-0.0	-0.6	0.0	-0.0	-0.6	4.48
				Min	Cent	0.0	-0.6	0.0	0.0	-0.6	4.12
					702	0.1	-0.6	0.0	0.1	-0.6	3.70
					5114	0.1	-0.6	0.0	0.1	-0.6	3.81
					5115	-0.0	-0.6	0.0	-0.0	-0.6	4.64

	81	-0.0	-0.6	0.0	-0.0	-0.6	4.48

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-84.04
	702	-0.1	-0.0	-0.0	-0.0	-0.1	-86.89
	5114	-0.0	0.0	-0.0	0.0	-0.0	-68.96
	5115	0.0	0.0	-0.0	0.0	0.0	-85.08
	81	-0.0	-0.0	-0.0	-0.0	-0.0	-87.96
Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-84.04
	702	-0.1	-0.0	-0.0	-0.0	-0.1	-86.89
	5114	-0.0	0.0	-0.0	0.0	-0.0	-68.96
	5115	0.0	0.0	-0.0	0.0	0.0	-85.08
	81	-0.0	-0.0	-0.0	-0.0	-0.0	-87.96

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	702	-0.0	0.0
	5114	-0.0	-0.0
	5115	-0.0	-0.0
	81	-0.0	0.0
Min	Cent	-0.0	-0.0
	702	-0.0	0.0
	5114	-0.0	-0.0
	5115	-0.0	-0.0
	81	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4355	3	2	S1 HL-~1	Max	Cent	-0.0	-0.3	-0.1	0.0	-0.3	-22.21
					3747	0.0	-0.3	-0.1	0.1	-0.3	-19.24
					4375	0.0	-0.3	-0.1	0.1	-0.3	-20.32
					5047	-0.1	-0.3	-0.1	0.0	-0.3	-25.99
					5046	-0.1	-0.3	-0.1	-0.0	-0.3	-24.40
				Min	Cent	-0.0	-0.3	-0.1	0.0	-0.3	-22.21
					3747	0.0	-0.3	-0.1	0.1	-0.3	-19.24
					4375	0.0	-0.3	-0.1	0.1	-0.3	-20.32
					5047	-0.1	-0.3	-0.1	0.0	-0.3	-25.99
					5046	-0.1	-0.3	-0.1	-0.0	-0.3	-24.40

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	0.0	0.0	0.0	31.90
	3747	-0.0	-0.0	0.0	-0.0	-0.0	43.58
	4375	0.0	0.0	0.0	0.0	0.0	42.30
	5047	-0.0	0.0	0.0	0.0	-0.0	48.24
	5046	0.1	0.0	0.0	0.1	0.0	9.08
Min	Cent	0.0	0.0	0.0	0.0	0.0	31.90
	3747	-0.0	-0.0	0.0	-0.0	-0.0	43.58
	4375	0.0	0.0	0.0	0.0	0.0	42.30
	5047	-0.0	0.0	0.0	0.0	-0.0	48.24
	5046	0.1	0.0	0.0	0.1	0.0	9.08

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	3747	-0.0	-0.0
	4375	-0.0	0.0
	5047	0.0	0.0
	5046	0.0	-0.0
Min	Cent	0.0	-0.0
	3747	-0.0	-0.0
	4375	-0.0	0.0
	5047	0.0	0.0
	5046	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4356	3	2	S1 HL-~1	Max	Cent	-0.0	-0.3	-0.2	0.1	-0.4	-28.93
					4375	0.0	-0.3	-0.2	0.1	-0.4	-27.01
					81	0.0	-0.3	-0.2	0.1	-0.4	-25.95
					5048	-0.1	-0.3	-0.2	0.1	-0.4	-31.02
					5047	-0.1	-0.3	-0.2	0.1	-0.4	-32.34
				Min	Cent	-0.0	-0.3	-0.2	0.1	-0.4	-28.93
					4375	0.0	-0.3	-0.2	0.1	-0.4	-27.01

	81	0.0	-0.3	-0.2	0.1	-0.4	-25.95
	5048	-0.1	-0.3	-0.2	0.1	-0.4	-31.02
	5047	-0.1	-0.3	-0.2	0.1	-0.4	-32.34

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	71.88
	4375	0.0	0.0	0.0	0.0	0.0	42.98
	81	-0.0	-0.0	0.0	-0.0	-0.0	80.09
	5048	-0.1	-0.0	0.0	-0.0	-0.1	81.87
	5047	-0.0	0.0	0.0	0.0	-0.0	47.98
Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	71.88
	4375	0.0	0.0	0.0	0.0	0.0	42.98
	81	-0.0	-0.0	0.0	-0.0	-0.0	80.09
	5048	-0.1	-0.0	0.0	-0.0	-0.1	81.87
	5047	-0.0	0.0	0.0	0.0	-0.0	47.98

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	4375	0.0	0.0
	81	0.0	0.0
	5048	0.0	0.0
	5047	0.0	0.0
Min	Cent	0.0	0.0
	4375	0.0	0.0
	81	0.0	0.0
	5048	0.0	0.0
	5047	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4357	3	2	S1 HL-~1	Max	Cent	-0.0	-0.3	0.0	-0.0	-0.3	7.37
					81	0.1	-0.3	0.0	0.1	-0.3	5.89
					5115	0.1	-0.3	0.0	0.1	-0.3	5.98
					5116	-0.1	-0.3	0.0	-0.1	-0.3	9.79
					5048	-0.1	-0.3	0.0	-0.1	-0.3	9.55
				Min	Cent	-0.0	-0.3	0.0	-0.0	-0.3	7.37
					81	0.1	-0.3	0.0	0.1	-0.3	5.89
					5115	0.1	-0.3	0.0	0.1	-0.3	5.98
					5116	-0.1	-0.3	0.0	-0.1	-0.3	9.79
					5048	-0.1	-0.3	0.0	-0.1	-0.3	9.55

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	77.15
	81	-0.0	-0.0	0.0	-0.0	-0.0	83.01
	5115	0.0	0.0	0.0	0.0	-0.0	70.45
	5116	-0.0	-0.0	0.0	0.0	-0.0	42.20
	5048	-0.1	-0.0	0.0	-0.0	-0.1	81.75
Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	77.15
	81	-0.0	-0.0	0.0	-0.0	-0.0	83.01
	5115	0.0	0.0	0.0	0.0	-0.0	70.45
	5116	-0.0	-0.0	0.0	0.0	-0.0	42.20
	5048	-0.1	-0.0	0.0	-0.0	-0.1	81.75

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	81	-0.0	0.0
	5115	-0.0	0.0
	5116	-0.0	0.0
	5048	-0.0	0.0
Min	Cent	-0.0	0.0
	81	-0.0	0.0
	5115	-0.0	0.0
	5116	-0.0	0.0
	5048	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4381	3	2	S1 HL-~1	Max	Cent	0.0	0.8	-0.1	0.8	-0.0	-79.82
					3744	0.1	0.8	-0.1	0.8	0.1	-78.83
					4432	0.1	0.8	-0.1	0.8	0.1	-78.89
					4476	-0.1	0.8	-0.1	0.8	-0.1	-80.67
					3824	-0.1	0.8	-0.1	0.8	-0.1	-80.62

Min	Cent	0.0	0.8	-0.1	0.8	-0.0	-79.82
	3744	0.1	0.8	-0.1	0.8	0.1	-78.83
	4432	0.1	0.8	-0.1	0.8	0.1	-78.89
	4476	-0.1	0.8	-0.1	0.8	-0.1	-80.67
	3824	-0.1	0.8	-0.1	0.8	-0.1	-80.62

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	-0.0	0.0	0.0	-0.42
	3744	0.1	0.0	0.0	0.1	0.0	1.75
	4432	0.0	0.0	-0.0	0.0	0.0	-0.64
	4476	0.0	-0.0	-0.0	0.0	-0.0	-15.51
	3824	0.0	0.0	-0.0	0.0	0.0	-1.22
Min	Cent	0.0	0.0	-0.0	0.0	0.0	-0.42
	3744	0.1	0.0	0.0	0.1	0.0	1.75
	4432	0.0	0.0	-0.0	0.0	0.0	-0.64
	4476	0.0	-0.0	-0.0	0.0	-0.0	-15.51
	3824	0.0	0.0	-0.0	0.0	0.0	-1.22

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	3744	0.0	-0.0
	4432	0.0	0.0
	4476	0.0	0.0
	3824	0.0	-0.0
Min	Cent	0.0	0.0
	3744	0.0	-0.0
	4432	0.0	0.0
	4476	0.0	0.0
	3824	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4382	3	2	S1 HL-~1	Max	Cent	0.0	0.8	-0.2	0.9	-0.1	-74.00
					4432	0.1	0.8	-0.2	0.9	0.0	-72.60
					1621	0.1	0.8	-0.2	0.9	0.0	-72.44
					1614	-0.1	0.8	-0.2	0.9	-0.1	-75.21
					4476	-0.1	0.8	-0.2	0.9	-0.1	-75.33
				Min	Cent	0.0	0.8	-0.2	0.9	-0.1	-74.00
					4432	0.1	0.8	-0.2	0.9	0.0	-72.60
					1621	0.1	0.8	-0.2	0.9	0.0	-72.44
					1614	-0.1	0.8	-0.2	0.9	-0.1	-75.21
					4476	-0.1	0.8	-0.2	0.9	-0.1	-75.33

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-62.70
	4432	0.0	0.0	-0.0	0.0	0.0	-2.46
	1621	-0.0	-0.0	-0.0	-0.0	-0.0	-77.68
	1614	-0.1	-0.0	-0.0	-0.0	-0.1	-81.31
	4476	0.0	-0.0	-0.0	0.0	-0.0	-24.49
Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-62.70
	4432	0.0	0.0	-0.0	0.0	0.0	-2.46
	1621	-0.0	-0.0	-0.0	-0.0	-0.0	-77.68
	1614	-0.1	-0.0	-0.0	-0.0	-0.1	-81.31
	4476	0.0	-0.0	-0.0	0.0	-0.0	-24.49

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	4432	0.0	0.0
	1621	0.0	0.0
	1614	0.0	0.0
	4476	0.0	0.0
Min	Cent	0.0	0.0
	4432	0.0	0.0
	1621	0.0	0.0
	1614	0.0	0.0
	4476	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4383	3	2	S1 HL-~1	Max	Cent	0.0	0.8	0.1	0.8	0.0	85.85
					1621	0.1	0.8	0.1	0.8	0.1	85.27
					5117	0.1	0.8	0.1	0.9	0.1	85.49

	5118	-0.1	0.8	0.1	0.9	-0.1	86.30
	1614	-0.1	0.8	0.1	0.8	-0.1	86.15
Min	Cent	0.0	0.8	0.1	0.8	0.0	85.85
	1621	0.1	0.8	0.1	0.8	0.1	85.27
	5117	0.1	0.8	0.1	0.9	0.1	85.49
	5118	-0.1	0.8	0.1	0.9	-0.1	86.30
	1614	-0.1	0.8	0.1	0.8	-0.1	86.15

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-71.02
	1621	-0.1	-0.0	-0.0	-0.0	-0.1	-84.48
	5117	-0.0	-0.0	-0.0	0.0	-0.0	-18.91
	5118	0.0	-0.0	-0.0	0.0	-0.0	-34.96
	1614	-0.0	-0.0	-0.0	-0.0	-0.0	-77.71
Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-71.02
	1621	-0.1	-0.0	-0.0	-0.0	-0.1	-84.48
	5117	-0.0	-0.0	-0.0	0.0	-0.0	-18.91
	5118	0.0	-0.0	-0.0	0.0	-0.0	-34.96
	1614	-0.0	-0.0	-0.0	-0.0	-0.0	-77.71

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	1621	-0.0	0.0
	5117	-0.0	-0.0
	5118	-0.0	-0.0
	1614	-0.0	0.0
Min	Cent	-0.0	-0.0
	1621	-0.0	0.0
	5117	-0.0	-0.0
	5118	-0.0	-0.0
	1614	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4407	3	2	S1 HL-~1	Max	Cent	0.0	1.2	-0.2	1.2	-0.0	-82.21
					3824	0.1	1.2	-0.2	1.2	0.0	-81.97
					4476	0.1	1.2	-0.2	1.2	0.0	-81.76
					4367	-0.1	1.2	-0.2	1.2	-0.1	-82.43
					3739	-0.1	1.2	-0.2	1.2	-0.1	-82.61
				Min	Cent	0.0	1.2	-0.2	1.2	-0.0	-82.21
					3824	0.1	1.2	-0.2	1.2	0.0	-81.97
					4476	0.1	1.2	-0.2	1.2	0.0	-81.76
					4367	-0.1	1.2	-0.2	1.2	-0.1	-82.43
					3739	-0.1	1.2	-0.2	1.2	-0.1	-82.61

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	-0.0	-0.0	0.0	-0.0	-12.79
	3824	0.0	0.0	-0.0	0.0	0.0	-4.27
	4476	0.0	-0.0	-0.0	0.0	-0.0	-31.56
	4367	-0.0	-0.0	-0.0	-0.0	-0.0	-24.65
	3739	0.0	-0.0	-0.0	0.0	-0.0	-2.66
Min	Cent	0.0	-0.0	-0.0	0.0	-0.0	-12.79
	3824	0.0	0.0	-0.0	0.0	0.0	-4.27
	4476	0.0	-0.0	-0.0	0.0	-0.0	-31.56
	4367	-0.0	-0.0	-0.0	-0.0	-0.0	-24.65
	3739	0.0	-0.0	-0.0	0.0	-0.0	-2.66

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	3824	0.0	0.0
	4476	0.0	0.0
	4367	0.0	0.0
	3739	0.0	0.0
Min	Cent	0.0	0.0
	3824	0.0	0.0
	4476	0.0	0.0
	4367	0.0	0.0
	3739	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4408	3	2	S1 HL-~1	Max	Cent	0.0	1.2	-0.3	1.3	-0.0	-78.34

	4476	0.1	1.2	-0.3	1.2	-0.0	-77.96
	1614	0.1	1.2	-0.3	1.3	-0.0	-78.18
	63	-0.0	1.2	-0.3	1.3	-0.1	-78.69
	4367	-0.0	1.2	-0.3	1.2	-0.1	-78.49
Min	Cent	0.0	1.2	-0.3	1.3	-0.0	-78.34
	4476	0.1	1.2	-0.3	1.2	-0.0	-77.96
	1614	0.1	1.2	-0.3	1.3	-0.0	-78.18
	63	-0.0	1.2	-0.3	1.3	-0.1	-78.69
	4367	-0.0	1.2	-0.3	1.2	-0.1	-78.49

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-46.42
	4476	0.0	-0.0	-0.0	0.0	-0.0	-34.68
	1614	-0.1	-0.0	-0.0	-0.0	-0.1	-79.73
	63	0.0	-0.0	-0.0	0.0	-0.0	-11.49
	4367	-0.0	-0.0	-0.0	-0.0	-0.0	-27.45
Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-46.42
	4476	0.0	-0.0	-0.0	0.0	-0.0	-34.68
	1614	-0.1	-0.0	-0.0	-0.0	-0.1	-79.73
	63	0.0	-0.0	-0.0	0.0	-0.0	-11.49
	4367	-0.0	-0.0	-0.0	-0.0	-0.0	-27.45

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	4476	0.0	0.0
	1614	0.0	0.0
	63	-0.0	0.0
	4367	-0.0	0.0
Min	Cent	0.0	0.0
	4476	0.0	0.0
	1614	0.0	0.0
	63	-0.0	0.0
	4367	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4409	3	2	S1 HL-~1	Max	Cent	-0.0	1.2	0.1	1.2	-0.0	86.81
					1614	0.1	1.2	0.1	1.2	0.0	86.66
					5118	0.1	1.2	0.1	1.2	0.0	86.64
					5119	-0.1	1.2	0.1	1.2	-0.1	86.95
					63	-0.1	1.2	0.1	1.2	-0.1	86.97
				Min	Cent	-0.0	1.2	0.1	1.2	-0.0	86.81
					1614	0.1	1.2	0.1	1.2	0.0	86.66
					5118	0.1	1.2	0.1	1.2	0.0	86.64
					5119	-0.1	1.2	0.1	1.2	-0.1	86.95
					63	-0.1	1.2	0.1	1.2	-0.1	86.97

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-69.00
	1614	-0.0	-0.0	-0.0	-0.0	-0.0	-80.29
	5118	-0.0	-0.0	-0.0	0.0	-0.0	-28.09
	5119	0.0	-0.0	-0.0	0.0	-0.0	-14.69
	63	-0.1	-0.0	-0.0	-0.0	-0.1	-84.53
Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-69.00
	1614	-0.0	-0.0	-0.0	-0.0	-0.0	-80.29
	5118	-0.0	-0.0	-0.0	0.0	-0.0	-28.09
	5119	0.0	-0.0	-0.0	0.0	-0.0	-14.69
	63	-0.1	-0.0	-0.0	-0.0	-0.1	-84.53

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	1614	-0.0	0.0
	5118	-0.0	0.0
	5119	-0.0	0.0
	63	-0.0	0.0
Min	Cent	-0.0	0.0
	1614	-0.0	0.0
	5118	-0.0	0.0
	5119	-0.0	0.0
	63	-0.0	0.0

ELEM	MAT	SEC	LC	NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE

4433	3	2	S1 HL-~1	Max	Cent	0.0	1.8	-0.2	1.8	-0.0	-84.54
					3739	0.1	1.8	-0.2	1.8	0.1	-84.24
					4367	0.1	1.8	-0.2	1.8	0.1	-84.07
					4844	-0.1	1.8	-0.2	1.8	-0.1	-84.80
					4817	-0.1	1.8	-0.2	1.8	-0.1	-84.93
				Min	Cent	0.0	1.8	-0.2	1.8	-0.0	-84.54
					3739	0.1	1.8	-0.2	1.8	0.1	-84.24
					4367	0.1	1.8	-0.2	1.8	0.1	-84.07
					4844	-0.1	1.8	-0.2	1.8	-0.1	-84.80
					4817	-0.1	1.8	-0.2	1.8	-0.1	-84.93

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	-0.0	0.0	0.0	-0.0	8.03
	3739		0.0	-0.0	0.0	0.0	-0.0	1.60
	4367		-0.0	-0.0	0.0	-0.0	-0.0	29.24
	4844		0.0	0.0	0.0	0.0	0.0	8.92
	4817		0.1	0.0	0.0	0.1	0.0	1.28
Min	Cent		0.0	-0.0	0.0	0.0	-0.0	8.03
	3739		0.0	-0.0	0.0	0.0	-0.0	1.60
	4367		-0.0	-0.0	0.0	-0.0	-0.0	29.24
	4844		0.0	0.0	0.0	0.0	0.0	8.92
	4817		0.1	0.0	0.0	0.1	0.0	1.28

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	3739		0.0	-0.0
	4367		0.0	-0.0
	4844		0.0	-0.0
	4817		0.0	-0.0
Min	Cent		0.0	-0.0
	3739		0.0	-0.0
	4367		0.0	-0.0
	4844		0.0	-0.0
	4817		0.0	-0.0

ELEM	MAT	SEC	LC			NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4434	3	2	S1 HL-~1	Max	Cent		-0.0	1.7	-0.3	1.8	-0.1	-79.73
					4367		0.1	1.8	-0.3	1.8	0.1	-79.07
					63		0.1	1.7	-0.3	1.8	0.1	-78.58
					4784		-0.2	1.7	-0.3	1.8	-0.2	-80.32
					4844		-0.2	1.8	-0.3	1.8	-0.2	-80.68
				Min	Cent		-0.0	1.7	-0.3	1.8	-0.1	-79.73
					4367		0.1	1.8	-0.3	1.8	0.1	-79.07
					63		0.1	1.7	-0.3	1.8	0.1	-78.58
					4784		-0.2	1.7	-0.3	1.8	-0.2	-80.32
					4844		-0.2	1.8	-0.3	1.8	-0.2	-80.68

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	-0.0	-0.0	72.46
	4367		-0.0	-0.0	0.0	-0.0	-0.0	34.14
	63		0.0	-0.0	0.0	0.0	-0.0	9.40
	4784		-0.2	-0.1	0.0	-0.1	-0.2	88.04
	4844		0.0	0.0	0.0	0.0	0.0	12.88
Min	Cent		-0.0	-0.0	0.0	-0.0	-0.0	72.46
	4367		-0.0	-0.0	0.0	-0.0	-0.0	34.14
	63		0.0	-0.0	0.0	0.0	-0.0	9.40
	4784		-0.2	-0.1	0.0	-0.1	-0.2	88.04
	4844		0.0	0.0	0.0	0.0	0.0	12.88

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	4367		-0.0	-0.0
	63		-0.0	-0.0
	4784		0.0	-0.0
	4844		0.0	-0.0
Min	Cent		0.0	-0.0
	4367		-0.0	-0.0
	63		-0.0	-0.0
	4784		0.0	-0.0
	4844		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4435	3	2	S1 HL-~1	Max	Cent	-0.0	1.7	0.1	1.7	-0.0	87.59
					63	0.1	1.7	0.1	1.7	0.1	87.48
					5119	0.1	1.6	0.1	1.7	0.1	87.41
					5120	-0.1	1.6	0.1	1.7	-0.1	87.69
					4784	-0.1	1.7	0.1	1.7	-0.1	87.74
				Min	Cent	-0.0	1.7	0.1	1.7	-0.0	87.59
					63	0.1	1.7	0.1	1.7	0.1	87.48
					5119	0.1	1.6	0.1	1.7	0.1	87.41
					5120	-0.1	1.6	0.1	1.7	-0.1	87.69
					4784	-0.1	1.7	0.1	1.7	-0.1	87.74

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	79.56
		63	-0.1	-0.0	-0.0	-0.0	-0.1	-89.09
		5119	0.0	-0.0	0.0	0.0	-0.0	1.08
		5120	-0.0	-0.0	0.0	0.0	-0.0	20.61
		4784	-0.0	-0.0	0.0	-0.0	-0.0	80.72
	Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	79.56
		63	-0.1	-0.0	-0.0	-0.0	-0.1	-89.09
		5119	0.0	-0.0	0.0	0.0	-0.0	1.08
		5120	-0.0	-0.0	0.0	0.0	-0.0	20.61
		4784	-0.0	-0.0	0.0	-0.0	-0.0	80.72

		NODE	Vxx	Vyy
	Max	Cent	-0.0	-0.0
		63	-0.0	-0.0
		5119	-0.0	-0.0
		5120	-0.0	-0.0
		4784	-0.0	-0.0
	Min	Cent	-0.0	-0.0
		63	-0.0	-0.0
		5119	-0.0	-0.0
		5120	-0.0	-0.0
		4784	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4459	3	2	S1 HL-~1	Max	Cent	0.2	2.5	-0.0	2.5	0.2	-89.92
					4817	0.1	2.5	-0.0	2.5	0.1	-89.92
					4844	0.1	2.6	-0.0	2.6	0.1	-89.92
					4356	0.2	2.6	-0.0	2.6	0.2	-89.91
					3728	0.2	2.5	-0.0	2.5	0.2	-89.91
				Min	Cent	0.2	2.5	-0.0	2.5	0.2	-89.92
					4817	0.1	2.5	-0.0	2.5	0.1	-89.92
					4844	0.1	2.6	-0.0	2.6	0.1	-89.92
					4356	0.2	2.6	-0.0	2.6	0.2	-89.91
					3728	0.2	2.5	-0.0	2.5	0.2	-89.91

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	0.0	-0.0	-0.0	0.0	-0.0	-13.41
		4817	0.1	0.0	-0.0	0.1	0.0	-2.85
		4844	0.0	0.0	-0.0	0.0	-0.0	-14.36
		4356	-0.1	-0.1	-0.0	-0.1	-0.1	-64.28
		3728	-0.0	-0.1	-0.0	-0.0	-0.1	-2.90
	Min	Cent	0.0	-0.0	-0.0	0.0	-0.0	-13.41
		4817	0.1	0.0	-0.0	0.1	0.0	-2.85
		4844	0.0	0.0	-0.0	0.0	-0.0	-14.36
		4356	-0.1	-0.1	-0.0	-0.1	-0.1	-64.28
		3728	-0.0	-0.1	-0.0	-0.0	-0.1	-2.90

		NODE	Vxx	Vyy
	Max	Cent	0.0	0.0
		4817	0.0	0.0
		4844	0.0	0.0
		4356	0.0	0.0
		3728	0.0	0.0
	Min	Cent	0.0	0.0
		4817	0.0	0.0
		4844	0.0	0.0
		4356	0.0	0.0

					3728	0.0	0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4460	3	2	S1 HL-~1	Max	Cent	0.1	2.6	-0.1	2.6	0.1	-87.42
					4844	0.1	2.6	-0.1	2.6	0.1	-87.37
					4784	0.1	2.7	-0.1	2.7	0.1	-87.47
					35	0.1	2.7	-0.1	2.7	0.1	-87.46
					4356	0.1	2.6	-0.1	2.6	0.1	-87.36
				Min	Cent	0.1	2.6	-0.1	2.6	0.1	-87.42
					4844	0.1	2.6	-0.1	2.6	0.1	-87.37
					4784	0.1	2.7	-0.1	2.7	0.1	-87.47
					35	0.1	2.7	-0.1	2.7	0.1	-87.46
					4356	0.1	2.6	-0.1	2.6	0.1	-87.36

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	0.1	-0.0	-0.0	0.1	-0.0	-6.36
		4844	0.0	0.0	-0.0	0.0	-0.0	-17.09
		4784	-0.2	-0.1	0.0	-0.1	-0.2	89.36
		35	0.6	0.1	0.0	0.6	0.1	0.05
		4356	-0.1	-0.1	-0.0	-0.1	-0.1	-60.20
	Min	Cent	0.1	-0.0	-0.0	0.1	-0.0	-6.36
		4844	0.0	0.0	-0.0	0.0	-0.0	-17.09
		4784	-0.2	-0.1	0.0	-0.1	-0.2	89.36
		35	0.6	0.1	0.0	0.6	0.1	0.05
		4356	-0.1	-0.1	-0.0	-0.1	-0.1	-60.20

		NODE	Vxx	Vyy
	Max	Cent	-0.0	0.0
		4844	0.0	0.0
		4784	0.0	0.0
		35	-0.1	0.0
		4356	-0.1	0.0
	Min	Cent	-0.0	0.0
		4844	0.0	0.0
		4784	0.0	0.0
		35	-0.1	0.0
		4356	-0.1	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4461	3	2	S1 HL-~1	Max	Cent	0.0	2.6	0.1	2.6	0.0	87.12
					4784	0.2	2.6	0.1	2.6	0.2	87.02
					5120	0.2	2.5	0.1	2.5	0.2	86.90
					5121	-0.1	2.5	0.1	2.5	-0.1	87.22
					35	-0.1	2.6	0.1	2.6	-0.1	87.32
				Min	Cent	0.0	2.6	0.1	2.6	0.0	87.12
					4784	0.2	2.6	0.1	2.6	0.2	87.02
					5120	0.2	2.5	0.1	2.5	0.2	86.90
					5121	-0.1	2.5	0.1	2.5	-0.1	87.22
					35	-0.1	2.6	0.1	2.6	-0.1	87.32

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	39.39
		4784	-0.0	-0.0	0.0	-0.0	-0.0	55.47
		5120	0.0	0.0	0.0	0.0	-0.0	43.96
		5121	-0.0	-0.1	0.0	0.0	-0.1	10.79
		35	-0.1	-0.1	0.0	-0.1	-0.1	66.08
	Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	39.39
		4784	-0.0	-0.0	0.0	-0.0	-0.0	55.47
		5120	0.0	0.0	0.0	0.0	-0.0	43.96
		5121	-0.0	-0.1	0.0	0.0	-0.1	10.79
		35	-0.1	-0.1	0.0	-0.1	-0.1	66.08

		NODE	Vxx	Vyy
	Max	Cent	-0.0	0.0
		4784	-0.0	0.0
		5120	-0.0	0.0
		5121	-0.0	0.0
		35	-0.0	0.0
	Min	Cent	-0.0	0.0
		4784	-0.0	0.0

5120	-0.0	0.0
5121	-0.0	0.0
35	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4485	3	2	S1 HL-~1	Max	Cent	0.2	2.5	0.0	2.5	0.2	89.92
					3728	0.2	2.5	0.0	2.5	0.2	89.91
					4356	0.2	2.6	0.0	2.6	0.2	89.92
					4918	0.1	2.6	0.0	2.6	0.1	89.92
					4888	0.1	2.5	0.0	2.5	0.1	89.92
				Min	Cent	0.2	2.5	0.0	2.5	0.2	89.92
					3728	0.2	2.5	0.0	2.5	0.2	89.91
					4356	0.2	2.6	0.0	2.6	0.2	89.92
					4918	0.1	2.6	0.0	2.6	0.1	89.92
					4888	0.1	2.5	0.0	2.5	0.1	89.92

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	0.0	-0.0	0.0	0.0	-0.0	13.50
		3728	-0.0	-0.1	0.0	-0.0	-0.1	2.97
		4356	-0.1	-0.1	0.0	-0.1	-0.1	64.20
		4918	0.0	0.0	0.0	0.0	-0.0	14.43
		4888	0.1	0.0	0.0	0.1	0.0	2.91
	Min	Cent	0.0	-0.0	0.0	0.0	-0.0	13.50
		3728	-0.0	-0.1	0.0	-0.0	-0.1	2.97
		4356	-0.1	-0.1	0.0	-0.1	-0.1	64.20
		4918	0.0	0.0	0.0	0.0	-0.0	14.43
		4888	0.1	0.0	0.0	0.1	0.0	2.91

		NODE	Vxx	Vyy
	Max	Cent	0.0	-0.0
		3728	0.0	-0.0
		4356	0.0	-0.0
		4918	0.0	-0.0
		4888	0.0	-0.0
	Min	Cent	0.0	-0.0
		3728	0.0	-0.0
		4356	0.0	-0.0
		4918	0.0	-0.0
		4888	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4486	3	2	S1 HL-~1	Max	Cent	0.1	2.6	0.1	2.6	0.1	87.42
					4356	0.1	2.6	0.1	2.6	0.1	87.36
					35	0.1	2.7	0.1	2.7	0.1	87.46
					4852	0.1	2.7	0.1	2.7	0.1	87.47
					4918	0.1	2.6	0.1	2.6	0.1	87.37
				Min	Cent	0.1	2.6	0.1	2.6	0.1	87.42
					4356	0.1	2.6	0.1	2.6	0.1	87.36
					35	0.1	2.7	0.1	2.7	0.1	87.46
					4852	0.1	2.7	0.1	2.7	0.1	87.47
					4918	0.1	2.6	0.1	2.6	0.1	87.37

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	0.1	-0.0	0.0	0.1	-0.0	6.39
		4356	-0.1	-0.1	0.0	-0.1	-0.1	60.15
		35	0.6	0.1	-0.0	0.6	0.1	-0.04
		4852	-0.2	-0.1	-0.0	-0.1	-0.2	-89.38
		4918	0.0	0.0	0.0	0.0	-0.0	17.15
	Min	Cent	0.1	-0.0	0.0	0.1	-0.0	6.39
		4356	-0.1	-0.1	0.0	-0.1	-0.1	60.15
		35	0.6	0.1	-0.0	0.6	0.1	-0.04
		4852	-0.2	-0.1	-0.0	-0.1	-0.2	-89.38
		4918	0.0	0.0	0.0	0.0	-0.0	17.15

		NODE	Vxx	Vyy
	Max	Cent	-0.0	-0.0
		4356	-0.1	-0.0
		35	-0.1	-0.0
		4852	0.0	-0.0
		4918	0.0	-0.0

				Min	Cent	-0.0	-0.0		
					4356	-0.1	-0.0		
					35	-0.1	-0.0		
					4852	0.0	-0.0		
					4918	0.0	-0.0		

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4487	3	2	S1 HL-~1	Max	Cent	0.0	2.6	-0.1	2.6	0.0	-87.12
					35	-0.1	2.6	-0.1	2.6	-0.1	-87.32
					5121	-0.1	2.5	-0.1	2.5	-0.1	-87.22
					5122	0.2	2.5	-0.1	2.5	0.2	-86.89
					4852	0.2	2.6	-0.1	2.6	0.2	-87.01
				Min	Cent	0.0	2.6	-0.1	2.6	0.0	-87.12
					35	-0.1	2.6	-0.1	2.6	-0.1	-87.32
					5121	-0.1	2.5	-0.1	2.5	-0.1	-87.22
					5122	0.2	2.5	-0.1	2.5	0.2	-86.89
					4852	0.2	2.6	-0.1	2.6	0.2	-87.01

				NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
			Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-39.38
				35	-0.1	-0.1	-0.0	-0.1	-0.1	-66.15
				5121	-0.0	-0.1	-0.0	0.0	-0.1	-10.75
				5122	0.0	0.0	-0.0	0.0	-0.0	-43.97
				4852	-0.0	-0.0	-0.0	-0.0	-0.0	-55.51
			Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-39.38
				35	-0.1	-0.1	-0.0	-0.1	-0.1	-66.15
				5121	-0.0	-0.1	-0.0	0.0	-0.1	-10.75
				5122	0.0	0.0	-0.0	0.0	-0.0	-43.97
				4852	-0.0	-0.0	-0.0	-0.0	-0.0	-55.51

				NODE	Vxx	Vyy
			Max	Cent	-0.0	-0.0
				35	-0.0	-0.0
				5121	-0.0	-0.0
				5122	-0.0	-0.0
				4852	-0.0	-0.0
			Min	Cent	-0.0	-0.0
				35	-0.0	-0.0
				5121	-0.0	-0.0
				5122	-0.0	-0.0
				4852	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4511	3	2	S1 HL-~1	Max	Cent	0.0	1.8	0.2	1.8	-0.0	84.54
					4888	-0.1	1.8	0.2	1.8	-0.1	84.93
					4918	-0.1	1.8	0.2	1.8	-0.1	84.81
					4364	0.1	1.8	0.2	1.8	0.1	84.08
					3736	0.1	1.8	0.2	1.8	0.1	84.24
				Min	Cent	0.0	1.8	0.2	1.8	-0.0	84.54
					4888	-0.1	1.8	0.2	1.8	-0.1	84.93
					4918	-0.1	1.8	0.2	1.8	-0.1	84.81
					4364	0.1	1.8	0.2	1.8	0.1	84.08
					3736	0.1	1.8	0.2	1.8	0.1	84.24

				NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
			Max	Cent	0.0	-0.0	-0.0	0.0	-0.0	-7.95
				4888	0.1	0.0	-0.0	0.1	0.0	-1.22
				4918	0.0	0.0	-0.0	0.0	0.0	-8.84
				4364	-0.0	-0.0	-0.0	-0.0	-0.0	-29.12
				3736	0.0	-0.0	-0.0	0.0	-0.0	-1.50
			Min	Cent	0.0	-0.0	-0.0	0.0	-0.0	-7.95
				4888	0.1	0.0	-0.0	0.1	0.0	-1.22
				4918	0.0	0.0	-0.0	0.0	0.0	-8.84
				4364	-0.0	-0.0	-0.0	-0.0	-0.0	-29.12
				3736	0.0	-0.0	-0.0	0.0	-0.0	-1.50

				NODE	Vxx	Vyy
			Max	Cent	0.0	0.0
				4888	0.0	0.0
				4918	0.0	0.0

					4364	0.0	0.0				
					3736	0.0	0.0				
				Min	Cent	0.0	0.0				
					4888	0.0	0.0				
					4918	0.0	0.0				
					4364	0.0	0.0				
					3736	0.0	0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4512	3	2	S1 HL-~1	Max	Cent	-0.0	1.7	0.3	1.8	-0.1	79.74
					4918	-0.2	1.8	0.3	1.8	-0.2	80.68
					4852	-0.2	1.7	0.3	1.8	-0.2	80.33
					55	0.1	1.7	0.3	1.8	0.1	78.58
					4364	0.1	1.8	0.3	1.8	0.1	79.07
				Min	Cent	-0.0	1.7	0.3	1.8	-0.1	79.74
					4918	-0.2	1.8	0.3	1.8	-0.2	80.68
					4852	-0.2	1.7	0.3	1.8	-0.2	80.33
					55	0.1	1.7	0.3	1.8	0.1	78.58
					4364	0.1	1.8	0.3	1.8	0.1	79.07

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-72.55
	4918		0.0	0.0	-0.0	0.0	0.0	-12.81
	4852		-0.2	-0.1	-0.0	-0.1	-0.2	-88.06
	55		0.0	-0.0	-0.0	0.0	-0.0	-9.26
	4364		-0.0	-0.0	-0.0	-0.0	-0.0	-34.07
Min	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-72.55
	4918		0.0	0.0	-0.0	0.0	0.0	-12.81
	4852		-0.2	-0.1	-0.0	-0.1	-0.2	-88.06
	55		0.0	-0.0	-0.0	0.0	-0.0	-9.26
	4364		-0.0	-0.0	-0.0	-0.0	-0.0	-34.07

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	4918		0.0	0.0
	4852		0.0	0.0
	55		-0.0	0.0
	4364		-0.0	0.0
Min	Cent		0.0	0.0
	4918		0.0	0.0
	4852		0.0	0.0
	55		-0.0	0.0
	4364		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4513	3	2	S1 HL-~1	Max	Cent	-0.0	1.7	-0.1	1.7	-0.0	-87.59
					4852	-0.1	1.7	-0.1	1.7	-0.1	-87.74
					5122	-0.1	1.6	-0.1	1.7	-0.1	-87.69
					5123	0.1	1.6	-0.1	1.7	0.1	-87.41
					55	0.1	1.7	-0.1	1.7	0.1	-87.48
				Min	Cent	-0.0	1.7	-0.1	1.7	-0.0	-87.59
					4852	-0.1	1.7	-0.1	1.7	-0.1	-87.74
					5122	-0.1	1.6	-0.1	1.7	-0.1	-87.69
					5123	0.1	1.6	-0.1	1.7	0.1	-87.41
					55	0.1	1.7	-0.1	1.7	0.1	-87.48

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-80.01
	4852		-0.0	-0.0	-0.0	-0.0	-0.0	-80.90
	5122		-0.0	-0.0	-0.0	0.0	-0.0	-20.39
	5123		0.0	-0.0	-0.0	0.0	-0.0	-0.85
	55		-0.1	-0.0	0.0	-0.0	-0.1	88.99
Min	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-80.01
	4852		-0.0	-0.0	-0.0	-0.0	-0.0	-80.90
	5122		-0.0	-0.0	-0.0	0.0	-0.0	-20.39
	5123		0.0	-0.0	-0.0	0.0	-0.0	-0.85
	55		-0.1	-0.0	0.0	-0.0	-0.1	88.99

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0

						4852	-0.0	0.0			
						5122	-0.0	0.0			
						5123	-0.0	0.0			
						55	-0.0	0.0			
					Min	Cent	-0.0	0.0			
						4852	-0.0	0.0			
						5122	-0.0	0.0			
						5123	-0.0	0.0			
						55	-0.0	0.0			

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4537	3	2	S1 HL-~1	Max	Cent	0.0	1.2	0.2	1.2	-0.0	82.21
					3736	-0.1	1.2	0.2	1.2	-0.1	82.61
					4364	-0.1	1.2	0.2	1.2	-0.1	82.44
					4470	0.1	1.2	0.2	1.2	0.0	81.76
					3818	0.1	1.2	0.2	1.2	0.0	81.97
				Min	Cent	0.0	1.2	0.2	1.2	-0.0	82.21
					3736	-0.1	1.2	0.2	1.2	-0.1	82.61
					4364	-0.1	1.2	0.2	1.2	-0.1	82.44
					4470	0.1	1.2	0.2	1.2	0.0	81.76
					3818	0.1	1.2	0.2	1.2	0.0	81.97

				NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
			Max	Cent	0.0	-0.0	0.0	0.0	-0.0	12.90
				3736	0.0	-0.0	0.0	0.0	-0.0	2.75
				4364	-0.0	-0.0	0.0	-0.0	-0.0	24.76
				4470	0.0	-0.0	0.0	0.0	-0.0	31.65
				3818	0.0	0.0	0.0	0.0	0.0	4.35
			Min	Cent	0.0	-0.0	0.0	0.0	-0.0	12.90
				3736	0.0	-0.0	0.0	0.0	-0.0	2.75
				4364	-0.0	-0.0	0.0	-0.0	-0.0	24.76
				4470	0.0	-0.0	0.0	0.0	-0.0	31.65
				3818	0.0	0.0	0.0	0.0	0.0	4.35

				NODE	Vxx	Vyy
			Max	Cent	0.0	-0.0
				3736	0.0	-0.0
				4364	0.0	-0.0
				4470	0.0	-0.0
				3818	0.0	-0.0
			Min	Cent	0.0	-0.0
				3736	0.0	-0.0
				4364	0.0	-0.0
				4470	0.0	-0.0
				3818	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4538	3	2	S1 HL-~1	Max	Cent	0.0	1.2	0.3	1.3	-0.0	78.34
					4364	-0.0	1.2	0.3	1.2	-0.1	78.49
					55	-0.0	1.2	0.3	1.3	-0.1	78.70
					2299	0.1	1.2	0.3	1.3	-0.0	78.19
					4470	0.1	1.2	0.3	1.2	-0.0	77.96
				Min	Cent	0.0	1.2	0.3	1.3	-0.0	78.34
					4364	-0.0	1.2	0.3	1.2	-0.1	78.49
					55	-0.0	1.2	0.3	1.3	-0.1	78.70
					2299	0.1	1.2	0.3	1.3	-0.0	78.19
					4470	0.1	1.2	0.3	1.2	-0.0	77.96

				NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
			Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	46.42
				4364	-0.0	-0.0	0.0	-0.0	-0.0	27.55
				55	0.0	-0.0	0.0	0.0	-0.0	11.61
				2299	-0.1	-0.0	0.0	-0.0	-0.1	79.67
				4470	0.0	-0.0	0.0	0.0	-0.0	34.73
			Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	46.42
				4364	-0.0	-0.0	0.0	-0.0	-0.0	27.55
				55	0.0	-0.0	0.0	0.0	-0.0	11.61
				2299	-0.1	-0.0	0.0	-0.0	-0.1	79.67
				4470	0.0	-0.0	0.0	0.0	-0.0	34.73

				NODE	Vxx	Vyy

Max	Cent	0.0	-0.0
	4364	-0.0	-0.0
	55	-0.0	-0.0
	2299	0.0	-0.0
	4470	0.0	-0.0
Min	Cent	0.0	-0.0
	4364	-0.0	-0.0
	55	-0.0	-0.0
	2299	0.0	-0.0
	4470	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4539	3	2	S1 HL-~1	Max	Cent	-0.0	1.2	-0.1	1.2	-0.0	-86.81
					55	-0.1	1.2	-0.1	1.2	-0.1	-86.97
					5123	-0.1	1.2	-0.1	1.2	-0.1	-86.95
					5124	0.1	1.2	-0.1	1.2	0.0	-86.64
					2299	0.1	1.2	-0.1	1.2	0.0	-86.66
				Min	Cent	-0.0	1.2	-0.1	1.2	-0.0	-86.81
					55	-0.1	1.2	-0.1	1.2	-0.1	-86.97
					5123	-0.1	1.2	-0.1	1.2	-0.1	-86.95
					5124	0.1	1.2	-0.1	1.2	0.0	-86.64
					2299	0.1	1.2	-0.1	1.2	0.0	-86.66

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	-0.0	-0.0	68.84
	55		-0.1	-0.0	0.0	-0.0	-0.1	84.42
	5123		0.0	-0.0	0.0	0.0	-0.0	14.92
	5124		-0.0	-0.0	0.0	0.0	-0.0	28.22
	2299		-0.0	-0.0	0.0	-0.0	-0.0	80.20
Min	Cent		-0.0	-0.0	0.0	-0.0	-0.0	68.84
	55		-0.1	-0.0	0.0	-0.0	-0.1	84.42
	5123		0.0	-0.0	0.0	0.0	-0.0	14.92
	5124		-0.0	-0.0	0.0	0.0	-0.0	28.22
	2299		-0.0	-0.0	0.0	-0.0	-0.0	80.20

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	55		-0.0	-0.0
	5123		-0.0	-0.0
	5124		-0.0	-0.0
	2299		-0.0	-0.0
Min	Cent		-0.0	-0.0
	55		-0.0	-0.0
	5123		-0.0	-0.0
	5124		-0.0	-0.0
	2299		-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4563	3	2	S1 HL-~1	Max	Cent	0.0	0.8	0.1	0.8	-0.0	79.83
					3818	-0.1	0.8	0.1	0.8	-0.1	80.62
					4470	-0.1	0.8	0.1	0.8	-0.1	80.67
					4433	0.1	0.8	0.1	0.8	0.1	78.90
					3776	0.1	0.8	0.1	0.8	0.1	78.83
				Min	Cent	0.0	0.8	0.1	0.8	-0.0	79.83
					3818	-0.1	0.8	0.1	0.8	-0.1	80.62
					4470	-0.1	0.8	0.1	0.8	-0.1	80.67
					4433	0.1	0.8	0.1	0.8	0.1	78.90
					3776	0.1	0.8	0.1	0.8	0.1	78.83

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	0.0	0.0	0.0	0.52
	3818		0.0	0.0	0.0	0.0	0.0	1.30
	4470		0.0	-0.0	0.0	0.0	-0.0	15.77
	4433		0.0	0.0	0.0	0.0	0.0	0.76
	3776		0.1	0.0	-0.0	0.1	0.0	-1.69
Min	Cent		0.0	0.0	0.0	0.0	0.0	0.52
	3818		0.0	0.0	0.0	0.0	0.0	1.30
	4470		0.0	-0.0	0.0	0.0	-0.0	15.77
	4433		0.0	0.0	0.0	0.0	0.0	0.76
	3776		0.1	0.0	-0.0	0.1	0.0	-1.69

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	3818		0.0	0.0
	4470		0.0	-0.0
	4433		0.0	-0.0
	3776		0.0	0.0
Min	Cent		0.0	-0.0
	3818		0.0	0.0
	4470		0.0	-0.0
	4433		0.0	-0.0
	3776		0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4564	3	2	S1 HL-~1	Max	Cent	0.0	0.8	0.2	0.9	-0.1	74.00
					4470	-0.1	0.8	0.2	0.9	-0.1	75.33
					2299	-0.1	0.8	0.2	0.9	-0.1	75.22
					2493	0.1	0.8	0.2	0.9	0.0	72.45
					4433	0.1	0.8	0.2	0.9	0.0	72.60
				Min	Cent	0.0	0.8	0.2	0.9	-0.1	74.00
					4470	-0.1	0.8	0.2	0.9	-0.1	75.33
					2299	-0.1	0.8	0.2	0.9	-0.1	75.22
					2493	0.1	0.8	0.2	0.9	0.0	72.45
					4433	0.1	0.8	0.2	0.9	0.0	72.60

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	-0.0	-0.0	62.53
	4470		0.0	-0.0	0.0	0.0	-0.0	24.64
	2299		-0.1	-0.0	0.0	-0.0	-0.1	81.25
	2493		-0.0	-0.0	0.0	-0.0	-0.0	77.48
	4433		0.0	0.0	0.0	0.0	0.0	2.57
Min	Cent		-0.0	-0.0	0.0	-0.0	-0.0	62.53
	4470		0.0	-0.0	0.0	0.0	-0.0	24.64
	2299		-0.1	-0.0	0.0	-0.0	-0.1	81.25
	2493		-0.0	-0.0	0.0	-0.0	-0.0	77.48
	4433		0.0	0.0	0.0	0.0	0.0	2.57

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	4470		0.0	-0.0
	2299		0.0	-0.0
	2493		0.0	-0.0
	4433		0.0	-0.0
Min	Cent		0.0	-0.0
	4470		0.0	-0.0
	2299		0.0	-0.0
	2493		0.0	-0.0
	4433		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4565	3	2	S1 HL-~1	Max	Cent	0.0	0.8	-0.1	0.8	0.0	-85.85
					2299	-0.1	0.8	-0.1	0.8	-0.1	-86.15
					5124	-0.1	0.8	-0.1	0.9	-0.1	-86.30
					5125	0.1	0.8	-0.1	0.9	0.1	-85.49
					2493	0.1	0.8	-0.1	0.8	0.1	-85.27
				Min	Cent	0.0	0.8	-0.1	0.8	0.0	-85.85
					2299	-0.1	0.8	-0.1	0.8	-0.1	-86.15
					5124	-0.1	0.8	-0.1	0.9	-0.1	-86.30
					5125	0.1	0.8	-0.1	0.9	0.1	-85.49
					2493	0.1	0.8	-0.1	0.8	0.1	-85.27

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	-0.0	-0.0	70.89
	2299		-0.0	-0.0	0.0	-0.0	-0.0	77.63
	5124		0.0	-0.0	0.0	0.0	-0.0	35.05
	5125		-0.0	-0.0	0.0	0.0	-0.0	19.12
	2493		-0.1	-0.0	0.0	-0.0	-0.1	84.41
Min	Cent		-0.0	-0.0	0.0	-0.0	-0.0	70.89
	2299		-0.0	-0.0	0.0	-0.0	-0.0	77.63
	5124		0.0	-0.0	0.0	0.0	-0.0	35.05

			5125	-0.0	-0.0	0.0	0.0	-0.0	19.12
			2493	-0.1	-0.0	0.0	-0.0	-0.1	84.41

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	2299	-0.0	-0.0
	5124	-0.0	0.0
	5125	-0.0	0.0
	2493	-0.0	-0.0
Min	Cent	-0.0	0.0
	2299	-0.0	-0.0
	5124	-0.0	0.0
	5125	-0.0	0.0
	2493	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4589	3	2	S1 HL-~1	Max	Cent	-0.0	0.2	0.1	0.2	-0.1	66.01
					3776	-0.1	0.2	0.1	0.2	-0.1	71.21
					4433	-0.1	0.2	0.1	0.2	-0.1	71.05
					4992	0.1	0.2	0.1	0.3	0.0	58.35
					4991	0.1	0.2	0.1	0.3	0.0	58.70
				Min	Cent	-0.0	0.2	0.1	0.2	-0.1	66.01
					3776	-0.1	0.2	0.1	0.2	-0.1	71.21
					4433	-0.1	0.2	0.1	0.2	-0.1	71.05
					4992	0.1	0.2	0.1	0.3	0.0	58.35
					4991	0.1	0.2	0.1	0.3	0.0	58.70

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	-0.0	0.0	0.0	-0.92
	3776	0.1	0.0	0.0	0.1	0.0	1.04
	4433	0.0	0.0	-0.0	0.0	0.0	-1.11
	4992	-0.0	0.0	-0.0	0.0	-0.0	-54.27
	4991	0.1	0.0	-0.0	0.1	0.0	-2.50
Min	Cent	0.0	0.0	-0.0	0.0	0.0	-0.92
	3776	0.1	0.0	0.0	0.1	0.0	1.04
	4433	0.0	0.0	-0.0	0.0	0.0	-1.11
	4992	-0.0	0.0	-0.0	0.0	-0.0	-54.27
	4991	0.1	0.0	-0.0	0.1	0.0	-2.50

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	3776	0.0	-0.0
	4433	0.0	-0.0
	4992	0.0	-0.0
	4991	0.0	-0.0
Min	Cent	0.0	-0.0
	3776	0.0	-0.0
	4433	0.0	-0.0
	4992	0.0	-0.0
	4991	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4590	3	2	S1 HL-~1	Max	Cent	-0.0	0.2	0.2	0.3	-0.1	58.23
					4433	-0.1	0.2	0.2	0.3	-0.2	62.34
					2493	-0.1	0.2	0.2	0.3	-0.2	62.41
					4993	0.1	0.2	0.2	0.3	-0.1	53.44
					4992	0.1	0.2	0.2	0.3	-0.1	53.34
				Min	Cent	-0.0	0.2	0.2	0.3	-0.1	58.23
					4433	-0.1	0.2	0.2	0.3	-0.2	62.34
					2493	-0.1	0.2	0.2	0.3	-0.2	62.41
					4993	0.1	0.2	0.2	0.3	-0.1	53.44
					4992	0.1	0.2	0.2	0.3	-0.1	53.34

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-71.14
	4433	0.0	0.0	-0.0	0.0	0.0	-2.48
	2493	-0.0	-0.0	-0.0	-0.0	-0.0	-79.16
	4993	-0.1	-0.0	-0.0	-0.0	-0.1	-82.87
	4992	-0.0	0.0	-0.0	0.0	-0.0	-49.64
Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-71.14

				4433	0.0	0.0	-0.0	0.0	0.0	-2.48
				2493	-0.0	-0.0	-0.0	-0.0	-0.0	-79.16
				4993	-0.1	-0.0	-0.0	-0.0	-0.1	-82.87
				4992	-0.0	0.0	-0.0	0.0	-0.0	-49.64

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	4433	0.0	-0.0
	2493	0.0	-0.0
	4993	0.0	-0.0
	4992	0.0	-0.0
Min	Cent	0.0	-0.0
	4433	0.0	-0.0
	2493	0.0	-0.0
	4993	0.0	-0.0
	4992	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4591	3	2	S1 HL-~1	Max	Cent	-0.0	0.2	-0.1	0.2	-0.0	-73.60
					2493	-0.1	0.2	-0.1	0.2	-0.1	-77.21
					5125	-0.1	0.2	-0.1	0.2	-0.1	-77.50
					5126	0.1	0.2	-0.1	0.2	0.0	-67.71
					4993	0.1	0.2	-0.1	0.2	0.0	-66.92
				Min	Cent	-0.0	0.2	-0.1	0.2	-0.0	-73.60
					2493	-0.1	0.2	-0.1	0.2	-0.1	-77.21
					5125	-0.1	0.2	-0.1	0.2	-0.1	-77.50
					5126	0.1	0.2	-0.1	0.2	0.0	-67.71
					4993	0.1	0.2	-0.1	0.2	0.0	-66.92

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-74.80
	2493	-0.1	-0.0	-0.0	-0.0	-0.1	-85.05
	5125	0.0	-0.0	-0.0	0.0	-0.0	-20.84
	5126	0.0	0.0	-0.0	0.0	-0.0	-50.08
	4993	-0.1	-0.0	-0.0	-0.0	-0.1	-81.11
Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-74.80
	2493	-0.1	-0.0	-0.0	-0.0	-0.1	-85.05
	5125	0.0	-0.0	-0.0	0.0	-0.0	-20.84
	5126	0.0	0.0	-0.0	0.0	-0.0	-50.08
	4993	-0.1	-0.0	-0.0	-0.0	-0.1	-81.11

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	2493	-0.0	-0.0
	5125	-0.0	-0.0
	5126	-0.0	-0.0
	4993	-0.0	-0.0
Min	Cent	-0.0	-0.0
	2493	-0.0	-0.0
	5125	-0.0	-0.0
	5126	-0.0	-0.0
	4993	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4615	3	2	S1 HL-~1	Max	Cent	0.0	-0.6	0.1	0.0	-0.7	9.02
					3771	-0.1	-0.6	0.1	-0.1	-0.7	10.23
					4399	-0.1	-0.6	0.1	-0.1	-0.7	10.12
					4561	0.1	-0.6	0.1	0.1	-0.7	8.06
					3864	0.1	-0.6	0.1	0.1	-0.6	8.13
				Min	Cent	0.0	-0.6	0.1	0.0	-0.7	9.02
					3771	-0.1	-0.6	0.1	-0.1	-0.7	10.23
					4399	-0.1	-0.6	0.1	-0.1	-0.7	10.12
					4561	0.1	-0.6	0.1	0.1	-0.7	8.06
					3864	0.1	-0.6	0.1	0.1	-0.6	8.13

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	0.0	0.0	0.0	13.82
	3771	-0.0	-0.0	-0.0	-0.0	-0.0	-18.74
	4399	0.0	0.0	0.0	0.0	0.0	19.51
	4561	0.0	0.0	0.0	0.0	0.0	66.19

		3864	0.1	0.0	0.0	0.1	0.0	1.68
	Min	Cent	0.0	0.0	0.0	0.0	0.0	13.82
		3771	-0.0	-0.0	-0.0	-0.0	-0.0	-18.74
		4399	0.0	0.0	0.0	0.0	0.0	19.51
		4561	0.0	0.0	0.0	0.0	0.0	66.19
		3864	0.1	0.0	0.0	0.1	0.0	1.68

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	3771	-0.0	-0.0
	4399	-0.0	-0.0
	4561	0.0	-0.0
	3864	0.0	-0.0
Min	Cent	0.0	-0.0
	3771	-0.0	-0.0
	4399	-0.0	-0.0
	4561	0.0	-0.0
	3864	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4616	3	2	S1 HL-~1	Max	Cent	0.0	-0.6	0.2	0.1	-0.7	14.18
					4399	-0.1	-0.6	0.2	-0.0	-0.7	15.78
					1905	-0.1	-0.6	0.2	-0.0	-0.7	15.96
					705	0.1	-0.6	0.2	0.1	-0.7	12.86
					4561	0.1	-0.6	0.2	0.1	-0.7	12.73
				Min	Cent	0.0	-0.6	0.2	0.1	-0.7	14.18
					4399	-0.1	-0.6	0.2	-0.0	-0.7	15.78
					1905	-0.1	-0.6	0.2	-0.0	-0.7	15.96
					705	0.1	-0.6	0.2	0.1	-0.7	12.86
					4561	0.1	-0.6	0.2	0.1	-0.7	12.73

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	78.66
	4399	0.0	0.0	0.0	0.0	0.0	19.31
	1905	-0.0	-0.0	0.0	-0.0	-0.0	87.47
	705	-0.1	-0.0	0.0	-0.0	-0.1	85.52
	4561	0.0	0.0	0.0	0.0	0.0	63.12
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	78.66
	4399	0.0	0.0	0.0	0.0	0.0	19.31
	1905	-0.0	-0.0	0.0	-0.0	-0.0	87.47
	705	-0.1	-0.0	0.0	-0.0	-0.1	85.52
	4561	0.0	0.0	0.0	0.0	0.0	63.12

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	4399	0.0	-0.0
	1905	0.0	-0.0
	705	0.0	-0.0
	4561	0.0	-0.0
Min	Cent	0.0	-0.0
	4399	0.0	-0.0
	1905	0.0	-0.0
	705	0.0	-0.0
	4561	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4617	3	2	S1 HL-~1	Max	Cent	0.0	-0.6	-0.0	0.0	-0.6	-4.12
					1905	-0.0	-0.6	-0.0	-0.0	-0.6	-4.48
					5127	-0.0	-0.6	-0.0	-0.0	-0.6	-4.64
					5128	0.1	-0.6	-0.0	0.1	-0.6	-3.81
					705	0.1	-0.6	-0.0	0.1	-0.6	-3.70
				Min	Cent	0.0	-0.6	-0.0	0.0	-0.6	-4.12
					1905	-0.0	-0.6	-0.0	-0.0	-0.6	-4.48
					5127	-0.0	-0.6	-0.0	-0.0	-0.6	-4.64
					5128	0.1	-0.6	-0.0	0.1	-0.6	-3.81
					705	0.1	-0.6	-0.0	0.1	-0.6	-3.70

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	83.94
	1905	-0.0	-0.0	0.0	-0.0	-0.0	87.88

				5127	0.0	0.0	0.0	0.0	0.0	84.82
				5128	-0.0	0.0	0.0	0.0	-0.0	68.67
				705	-0.1	-0.0	0.0	-0.0	-0.1	86.84
			Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	83.94
				1905	-0.0	-0.0	0.0	-0.0	-0.0	87.88
				5127	0.0	0.0	0.0	0.0	0.0	84.82
				5128	-0.0	0.0	0.0	0.0	-0.0	68.67
				705	-0.1	-0.0	0.0	-0.0	-0.1	86.84

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
	1905		-0.0	-0.0
	5127		-0.0	0.0
	5128		-0.0	0.0
	705		-0.0	-0.0
Min	Cent		-0.0	0.0
	1905		-0.0	-0.0
	5127		-0.0	0.0
	5128		-0.0	0.0
	705		-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4641	3	2	S1 HL-~1	Max	Cent	-0.0	-1.1	0.1	0.0	-1.1	5.62
					3864	-0.1	-1.1	0.1	-0.0	-1.1	5.82
					4561	-0.1	-1.1	0.1	-0.0	-1.1	5.97
					4410	0.0	-1.1	0.1	0.1	-1.1	5.43
					3782	0.0	-1.1	0.1	0.1	-1.1	5.31
				Min	Cent	-0.0	-1.1	0.1	0.0	-1.1	5.62
					3864	-0.1	-1.1	0.1	-0.0	-1.1	5.82
					4561	-0.1	-1.1	0.1	-0.0	-1.1	5.97
					4410	0.0	-1.1	0.1	0.1	-1.1	5.43
					3782	0.0	-1.1	0.1	0.1	-1.1	5.31

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.0	0.0	0.0	-29.18
	3864		0.1	0.0	-0.0	0.1	0.0	-3.14
	4561		0.0	0.0	-0.0	0.0	0.0	-62.24
	4410		0.0	0.0	-0.0	0.0	0.0	-51.04
	3782		-0.0	0.0	-0.0	0.0	-0.0	-79.08
Min	Cent		0.0	0.0	-0.0	0.0	0.0	-29.18
	3864		0.1	0.0	-0.0	0.1	0.0	-3.14
	4561		0.0	0.0	-0.0	0.0	0.0	-62.24
	4410		0.0	0.0	-0.0	0.0	0.0	-51.04
	3782		-0.0	0.0	-0.0	0.0	-0.0	-79.08

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	3864		0.0	0.0
	4561		0.0	-0.0
	4410		-0.0	-0.0
	3782		-0.0	0.0
Min	Cent		0.0	0.0
	3864		0.0	0.0
	4561		0.0	-0.0
	4410		-0.0	-0.0
	3782		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4642	3	2	S1 HL-~1	Max	Cent	-0.0	-1.1	0.1	0.0	-1.1	7.28
					4561	-0.0	-1.1	0.1	-0.0	-1.1	7.53
					705	-0.0	-1.1	0.1	-0.0	-1.1	7.48
					2089	0.0	-1.1	0.1	0.0	-1.1	7.04
					4410	0.0	-1.1	0.1	0.0	-1.1	7.08
				Min	Cent	-0.0	-1.1	0.1	0.0	-1.1	7.28
					4561	-0.0	-1.1	0.1	-0.0	-1.1	7.53
					705	-0.0	-1.1	0.1	-0.0	-1.1	7.48
					2089	0.0	-1.1	0.1	0.0	-1.1	7.04
					4410	0.0	-1.1	0.1	0.0	-1.1	7.08

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE

Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-78.74
	4561	0.0	0.0	-0.0	0.0	0.0	-61.89
	705	-0.1	-0.0	-0.0	-0.0	-0.1	-85.59
	2089	-0.0	0.0	-0.0	0.0	-0.0	-83.46
	4410	0.0	0.0	-0.0	0.0	0.0	-51.18
Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-78.74
	4561	0.0	0.0	-0.0	0.0	0.0	-61.89
	705	-0.1	-0.0	-0.0	-0.0	-0.1	-85.59
	2089	-0.0	0.0	-0.0	0.0	-0.0	-83.46
	4410	0.0	0.0	-0.0	0.0	0.0	-51.18

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	4561	0.0	-0.0
	705	0.0	-0.0
	2089	0.0	-0.0
	4410	0.0	-0.0
Min	Cent	0.0	-0.0
	4561	0.0	-0.0
	705	0.0	-0.0
	2089	0.0	-0.0
	4410	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4643	3	2	S1 HL-~1	Max	Cent	-0.0	-1.1	-0.0	-0.0	-1.1	-1.18
					705	-0.1	-1.1	-0.0	-0.1	-1.1	-1.23
					5128	-0.1	-1.1	-0.0	-0.1	-1.1	-1.26
					5129	0.0	-1.1	-0.0	0.0	-1.1	-1.13
					2089	0.0	-1.1	-0.0	0.0	-1.1	-1.11
				Min	Cent	-0.0	-1.1	-0.0	-0.0	-1.1	-1.18
					705	-0.1	-1.1	-0.0	-0.1	-1.1	-1.23
					5128	-0.1	-1.1	-0.0	-0.1	-1.1	-1.26
					5129	0.0	-1.1	-0.0	0.0	-1.1	-1.13
					2089	0.0	-1.1	-0.0	0.0	-1.1	-1.11

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-81.16
	705	-0.1	-0.0	-0.0	-0.0	-0.1	-85.66
	5128	0.0	0.0	-0.0	0.0	-0.0	-65.75
	5129	0.0	0.0	-0.0	0.0	-0.0	-76.14
	2089	-0.0	-0.0	-0.0	-0.0	-0.0	-84.90
Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-81.16
	705	-0.1	-0.0	-0.0	-0.0	-0.1	-85.66
	5128	0.0	0.0	-0.0	0.0	-0.0	-65.75
	5129	0.0	0.0	-0.0	0.0	-0.0	-76.14
	2089	-0.0	-0.0	-0.0	-0.0	-0.0	-84.90

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	705	-0.0	-0.0
	5128	-0.0	-0.0
	5129	-0.0	-0.0
	2089	-0.0	-0.0
Min	Cent	-0.0	-0.0
	705	-0.0	-0.0
	5128	-0.0	-0.0
	5129	-0.0	-0.0
	2089	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4667	3	2	S1 HL-~1	Max	Cent	-0.0	-1.4	0.1	-0.0	-1.4	4.42
					3782	-0.0	-1.4	0.1	-0.0	-1.4	4.50
					4410	-0.0	-1.4	0.1	-0.0	-1.4	4.49
					4560	0.0	-1.4	0.1	0.0	-1.4	4.34
					3869	0.0	-1.4	0.1	0.0	-1.4	4.34
				Min	Cent	-0.0	-1.4	0.1	-0.0	-1.4	4.42
					3782	-0.0	-1.4	0.1	-0.0	-1.4	4.50
					4410	-0.0	-1.4	0.1	-0.0	-1.4	4.49
					4560	0.0	-1.4	0.1	0.0	-1.4	4.34
					3869	0.0	-1.4	0.1	0.0	-1.4	4.34

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	0.0	0.0	0.0	44.41
	3782		-0.0	0.0	-0.0	0.0	-0.0	-89.27
	4410		0.0	0.0	0.0	0.0	0.0	54.84
	4560		-0.0	0.0	0.0	0.0	-0.0	83.39
	3869		0.1	0.0	0.0	0.1	0.0	0.80
Min	Cent		0.0	0.0	0.0	0.0	0.0	44.41
	3782		-0.0	0.0	-0.0	0.0	-0.0	-89.27
	4410		0.0	0.0	0.0	0.0	0.0	54.84
	4560		-0.0	0.0	0.0	0.0	-0.0	83.39
	3869		0.1	0.0	0.0	0.1	0.0	0.80

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	3782		-0.0	-0.0
	4410		-0.0	-0.0
	4560		0.0	-0.0
	3869		0.0	-0.0
Min	Cent		0.0	-0.0
	3782		-0.0	-0.0
	4410		-0.0	-0.0
	4560		0.0	-0.0
	3869		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4668	3	2	S1 HL-~1	Max	Cent	-0.0	-1.4	0.1	-0.0	-1.4	5.82
					4410	-0.1	-1.4	0.1	-0.0	-1.4	5.96
					2089	-0.1	-1.4	0.1	-0.0	-1.4	6.08
					704	0.0	-1.4	0.1	0.0	-1.4	5.68
					4560	0.0	-1.4	0.1	0.0	-1.4	5.58
				Min	Cent	-0.0	-1.4	0.1	-0.0	-1.4	5.82
					4410	-0.1	-1.4	0.1	-0.0	-1.4	5.96
					2089	-0.1	-1.4	0.1	-0.0	-1.4	6.08
					704	0.0	-1.4	0.1	0.0	-1.4	5.68
					4560	0.0	-1.4	0.1	0.0	-1.4	5.58

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	0.0	0.0	-0.0	86.19
	4410		0.0	0.0	0.0	0.0	0.0	59.83
	2089		-0.0	0.0	0.0	0.0	-0.0	89.23
	704		-0.1	-0.0	0.0	-0.0	-0.1	88.77
	4560		-0.0	0.0	0.0	0.0	-0.0	84.06
Min	Cent		-0.0	0.0	0.0	0.0	-0.0	86.19
	4410		0.0	0.0	0.0	0.0	0.0	59.83
	2089		-0.0	0.0	0.0	0.0	-0.0	89.23
	704		-0.1	-0.0	0.0	-0.0	-0.1	88.77
	4560		-0.0	0.0	0.0	0.0	-0.0	84.06

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	4410		0.0	-0.0
	2089		0.0	-0.0
	704		0.0	-0.0
	4560		0.0	-0.0
Min	Cent		0.0	-0.0
	4410		0.0	-0.0
	2089		0.0	-0.0
	704		0.0	-0.0
	4560		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4669	3	2	S1 HL-~1	Max	Cent	-0.0	-1.3	-0.0	-0.0	-1.3	-0.77
					2089	-0.0	-1.3	-0.0	-0.0	-1.3	-0.78
					5129	-0.0	-1.3	-0.0	-0.0	-1.3	-0.79
					5130	0.0	-1.3	-0.0	0.0	-1.3	-0.75
					704	0.0	-1.3	-0.0	0.0	-1.3	-0.75
				Min	Cent	-0.0	-1.3	-0.0	-0.0	-1.3	-0.77
					2089	-0.0	-1.3	-0.0	-0.0	-1.3	-0.78
					5129	-0.0	-1.3	-0.0	-0.0	-1.3	-0.79
					5130	0.0	-1.3	-0.0	0.0	-1.3	-0.75

				704	0.0	-1.3	-0.0	0.0	-1.3	-0.75

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	0.0	0.0	-0.0	89.47
		2089	-0.0	-0.0	-0.0	-0.0	-0.0	-89.77
		5129	-0.0	0.0	-0.0	0.0	-0.0	-88.32
		5130	0.0	0.0	0.0	0.0	0.0	87.40
		704	-0.1	-0.0	0.0	-0.0	-0.1	89.01
Min	Cent		-0.0	0.0	0.0	0.0	-0.0	89.47
		2089	-0.0	-0.0	-0.0	-0.0	-0.0	-89.77
		5129	-0.0	0.0	-0.0	0.0	-0.0	-88.32
		5130	0.0	0.0	0.0	0.0	0.0	87.40
		704	-0.1	-0.0	0.0	-0.0	-0.1	89.01

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
		2089	-0.0	-0.0
		5129	-0.0	-0.0
		5130	-0.0	-0.0
		704	-0.0	-0.0
Min	Cent		-0.0	-0.0
		2089	-0.0	-0.0
		5129	-0.0	-0.0
		5130	-0.0	-0.0
		704	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4693	3	2	S1 HL-~1	Max	Cent	0.0	-1.4	0.2	0.0	-1.4	7.19
					3869	0.0	-1.4	0.2	0.0	-1.4	7.07
					4560	0.0	-1.3	0.2	0.0	-1.3	7.39
					4416	0.0	-1.3	0.2	0.1	-1.3	7.30
					3788	0.0	-1.4	0.2	0.1	-1.4	6.99
				Min	Cent	0.0	-1.4	0.2	0.0	-1.4	7.19
					3869	0.0	-1.4	0.2	0.0	-1.4	7.07
					4560	0.0	-1.3	0.2	0.0	-1.3	7.39
					4416	0.0	-1.3	0.2	0.1	-1.3	7.30
					3788	0.0	-1.4	0.2	0.1	-1.4	6.99

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.0	0.0	0.0	-59.14
		3869	0.1	0.0	-0.0	0.1	0.0	-1.44
		4560	-0.0	0.0	-0.0	0.0	-0.0	-83.30
		4416	0.0	0.0	-0.0	0.0	0.0	-74.02
		3788	-0.0	0.0	-0.0	0.0	-0.0	-89.64
Min	Cent		0.0	0.0	-0.0	0.0	0.0	-59.14
		3869	0.1	0.0	-0.0	0.1	0.0	-1.44
		4560	-0.0	0.0	-0.0	0.0	-0.0	-83.30
		4416	0.0	0.0	-0.0	0.0	0.0	-74.02
		3788	-0.0	0.0	-0.0	0.0	-0.0	-89.64

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
		3869	0.0	0.0
		4560	0.0	0.0
		4416	-0.0	0.0
		3788	-0.0	0.0
Min	Cent		0.0	0.0
		3869	0.0	0.0
		4560	0.0	0.0
		4416	-0.0	0.0
		3788	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4694	3	2	S1 HL-~1	Max	Cent	-0.0	-1.3	0.1	0.0	-1.4	6.20
					4560	0.0	-1.3	0.1	0.1	-1.4	6.03
					704	0.0	-1.3	0.1	0.1	-1.4	6.00
					2193	-0.0	-1.3	0.1	-0.0	-1.4	6.37
					4416	-0.0	-1.3	0.1	-0.0	-1.4	6.41
				Min	Cent	-0.0	-1.3	0.1	0.0	-1.4	6.20
					4560	0.0	-1.3	0.1	0.1	-1.4	6.03

			704	0.0	-1.3	0.1	0.1	-1.4	6.00
			2193	-0.0	-1.3	0.1	-0.0	-1.4	6.37
			4416	-0.0	-1.3	0.1	-0.0	-1.4	6.41

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-86.81
	4560	-0.0	0.0	-0.0	0.0	-0.0	-83.62
	704	-0.1	-0.0	-0.0	-0.0	-0.1	-88.45
	2193	-0.0	0.0	-0.0	0.0	-0.0	-88.92
	4416	0.0	0.0	-0.0	0.0	0.0	-76.76
Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-86.81
	4560	-0.0	0.0	-0.0	0.0	-0.0	-83.62
	704	-0.1	-0.0	-0.0	-0.0	-0.1	-88.45
	2193	-0.0	0.0	-0.0	0.0	-0.0	-88.92
	4416	0.0	0.0	-0.0	0.0	0.0	-76.76

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	4560	0.0	0.0
	704	0.0	0.0
	2193	0.0	0.0
	4416	0.0	0.0
Min	Cent	0.0	0.0
	4560	0.0	0.0
	704	0.0	0.0
	2193	0.0	0.0
	4416	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4695	3	2	S1 HL-~1	Max	Cent	-0.0	-1.3	0.0	-0.0	-1.3	0.73
					704	0.0	-1.3	0.0	0.0	-1.3	0.69
					5130	0.0	-1.3	0.0	0.0	-1.3	0.71
					5131	-0.1	-1.3	0.0	-0.1	-1.3	0.77
					2193	-0.1	-1.3	0.0	-0.1	-1.3	0.74
				Min	Cent	-0.0	-1.3	0.0	-0.0	-1.3	0.73
					704	0.0	-1.3	0.0	0.0	-1.3	0.69
					5130	0.0	-1.3	0.0	0.0	-1.3	0.71
					5131	-0.1	-1.3	0.0	-0.1	-1.3	0.77
					2193	-0.1	-1.3	0.0	-0.1	-1.3	0.74

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-87.07
	704	-0.1	0.0	-0.0	0.0	-0.1	-88.22
	5130	-0.0	0.0	-0.0	0.0	-0.0	-83.68
	5131	0.0	0.0	-0.0	0.0	0.0	-89.95
	2193	-0.0	0.0	-0.0	0.0	-0.0	-89.85
Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-87.07
	704	-0.1	0.0	-0.0	0.0	-0.1	-88.22
	5130	-0.0	0.0	-0.0	0.0	-0.0	-83.68
	5131	0.0	0.0	-0.0	0.0	0.0	-89.95
	2193	-0.0	0.0	-0.0	0.0	-0.0	-89.85

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	704	-0.0	0.0
	5130	-0.0	-0.0
	5131	-0.0	-0.0
	2193	-0.0	0.0
Min	Cent	-0.0	-0.0
	704	-0.0	0.0
	5130	-0.0	-0.0
	5131	-0.0	-0.0
	2193	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4719	3	2	S1 HL-~1	Max	Cent	-0.0	-1.3	0.2	0.0	-1.3	8.82
					3788	0.1	-1.4	0.2	0.1	-1.4	8.12
					4416	0.1	-1.2	0.2	0.1	-1.3	8.80
					4559	-0.1	-1.2	0.2	-0.0	-1.3	9.64
					3874	-0.1	-1.4	0.2	-0.0	-1.4	8.83

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Min	Cent		-0.0	-1.3	0.2	0.0	-1.3	8.82
	3788		0.1	-1.4	0.2	0.1	-1.4	8.12
	4416		0.1	-1.2	0.2	0.1	-1.3	8.80
	4559		-0.1	-1.2	0.2	-0.0	-1.3	9.64
	3874		-0.1	-1.4	0.2	-0.0	-1.4	8.83

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	0.0	0.0	0.0	37.80
	3788		-0.0	0.0	0.0	0.0	-0.0	84.26
	4416		0.0	0.0	0.0	0.0	0.0	58.64
	4559		0.0	0.0	0.0	0.0	0.0	54.48
	3874		0.1	0.0	0.0	0.1	0.0	7.50
Min	Cent		0.0	0.0	0.0	0.0	0.0	37.80
	3788		-0.0	0.0	0.0	0.0	-0.0	84.26
	4416		0.0	0.0	0.0	0.0	0.0	58.64
	4559		0.0	0.0	0.0	0.0	0.0	54.48
	3874		0.1	0.0	0.0	0.1	0.0	7.50

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	3788		-0.0	-0.0
	4416		-0.0	-0.0
	4559		0.0	-0.0
	3874		0.0	-0.0
Min	Cent		0.0	-0.0
	3788		-0.0	-0.0
	4416		-0.0	-0.0
	4559		0.0	-0.0
	3874		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4720	3	2	S1 HL-~1	Max	Cent	0.0	-1.2	0.2	0.1	-1.2	10.27
					4416	0.0	-1.2	0.2	0.0	-1.3	9.82
					2193	0.0	-1.1	0.2	0.0	-1.1	10.89
					703	0.0	-1.1	0.2	0.1	-1.1	10.76
					4559	0.0	-1.2	0.2	0.1	-1.3	9.71
				Min	Cent	0.0	-1.2	0.2	0.1	-1.2	10.27
					4416	0.0	-1.2	0.2	0.0	-1.3	9.82
					2193	0.0	-1.1	0.2	0.0	-1.1	10.89
					703	0.0	-1.1	0.2	0.1	-1.1	10.76
					4559	0.0	-1.2	0.2	0.1	-1.3	9.71

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	0.0	0.0	-0.0	74.06
	4416		0.0	0.0	0.0	0.0	0.0	58.68
	2193		-0.0	0.0	0.0	0.0	-0.0	84.00
	703		-0.0	0.0	0.0	0.0	-0.0	77.23
	4559		0.0	0.0	0.0	0.0	0.0	53.32
Min	Cent		-0.0	0.0	0.0	0.0	-0.0	74.06
	4416		0.0	0.0	0.0	0.0	0.0	58.68
	2193		-0.0	0.0	0.0	0.0	-0.0	84.00
	703		-0.0	0.0	0.0	0.0	-0.0	77.23
	4559		0.0	0.0	0.0	0.0	0.0	53.32

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	4416		0.0	-0.0
	2193		0.0	-0.0
	703		0.0	-0.0
	4559		0.0	-0.0
Min	Cent		0.0	-0.0
	4416		0.0	-0.0
	2193		0.0	-0.0
	703		0.0	-0.0
	4559		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4721	3	2	S1 HL-~1	Max	Cent	0.0	-1.0	0.0	0.1	-1.0	1.69
					2193	0.0	-1.1	0.0	0.0	-1.1	1.61
					5131	0.0	-1.0	0.0	0.0	-1.0	1.83

	5132	0.1	-1.0	0.0	0.1	-1.0	1.76
	703	0.1	-1.1	0.0	0.1	-1.1	1.56
Min	Cent	0.0	-1.0	0.0	0.1	-1.0	1.69
	2193	0.0	-1.1	0.0	0.0	-1.1	1.61
	5131	0.0	-1.0	0.0	0.0	-1.0	1.83
	5132	0.1	-1.0	0.0	0.1	-1.0	1.76
	703	0.1	-1.1	0.0	0.1	-1.1	1.56

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	79.92
	2193	-0.0	0.0	0.0	0.0	-0.0	84.78
	5131	-0.0	0.0	0.0	0.0	-0.0	75.14
	5132	0.0	0.0	0.0	0.0	-0.0	68.73
	703	-0.1	0.0	0.0	0.0	-0.1	80.27
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	79.92
	2193	-0.0	0.0	0.0	0.0	-0.0	84.78
	5131	-0.0	0.0	0.0	0.0	-0.0	75.14
	5132	0.0	0.0	0.0	0.0	-0.0	68.73
	703	-0.1	0.0	0.0	0.0	-0.1	80.27

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	2193	-0.0	-0.0
	5131	-0.0	-0.0
	5132	-0.0	-0.0
	703	-0.0	-0.0
Min	Cent	-0.0	-0.0
	2193	-0.0	-0.0
	5131	-0.0	-0.0
	5132	-0.0	-0.0
	703	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4745	3	2	S1 HL-~1	Max	Cent	-0.2	-1.4	-0.4	-0.1	-1.5	-15.03
					3874	-0.1	-1.2	-0.4	0.0	-1.3	-16.11
					4559	-0.1	-1.6	-0.4	-0.0	-1.7	-12.70
					4422	-0.3	-1.6	-0.4	-0.2	-1.7	-14.08
					3794	-0.3	-1.2	-0.4	-0.1	-1.3	-18.28
				Min	Cent	-0.2	-1.4	-0.4	-0.1	-1.5	-15.03
					3874	-0.1	-1.2	-0.4	0.0	-1.3	-16.11
					4559	-0.1	-1.6	-0.4	-0.0	-1.7	-12.70
					4422	-0.3	-1.6	-0.4	-0.2	-1.7	-14.08
					3794	-0.3	-1.2	-0.4	-0.1	-1.3	-18.28

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	0.0	0.0	0.0	41.00
	3874	0.1	0.0	0.0	0.1	0.0	12.99
	4559	0.0	0.0	0.0	0.0	0.0	49.59
	4422	0.0	0.0	0.0	0.1	0.0	47.92
	3794	0.0	0.0	0.0	0.0	-0.0	49.17
Min	Cent	0.0	0.0	0.0	0.0	0.0	41.00
	3874	0.1	0.0	0.0	0.1	0.0	12.99
	4559	0.0	0.0	0.0	0.0	0.0	49.59
	4422	0.0	0.0	0.0	0.1	0.0	47.92
	3794	0.0	0.0	0.0	0.0	-0.0	49.17

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	3874	0.0	0.0
	4559	0.0	-0.0
	4422	-0.0	-0.0
	3794	-0.0	0.0
Min	Cent	0.0	-0.0
	3874	0.0	0.0
	4559	0.0	-0.0
	4422	-0.0	-0.0
	3794	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4746	3	2	S1 HL-~1	Max	Cent	-0.1	-1.7	-0.3	0.0	-1.7	-10.74

	4559	-0.1	-1.5	-0.3	-0.1	-1.6	-12.00
	703	-0.1	-1.8	-0.3	-0.1	-1.8	-10.46
	2301	0.0	-1.8	-0.3	0.1	-1.8	-9.71
	4422	0.0	-1.5	-0.3	0.1	-1.6	-11.04
Min	Cent	-0.1	-1.7	-0.3	0.0	-1.7	-10.74
	4559	-0.1	-1.5	-0.3	-0.1	-1.6	-12.00
	703	-0.1	-1.8	-0.3	-0.1	-1.8	-10.46
	2301	0.0	-1.8	-0.3	0.1	-1.8	-9.71
	4422	0.0	-1.5	-0.3	0.1	-1.6	-11.04

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	65.25
	4559	0.0	0.0	0.0	0.0	0.0	48.74
	703	-0.0	0.0	0.0	0.0	-0.0	76.14
	2301	-0.0	0.0	0.0	0.0	-0.1	70.21
	4422	0.0	0.0	0.0	0.1	0.0	48.29
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	65.25
	4559	0.0	0.0	0.0	0.0	0.0	48.74
	703	-0.0	0.0	0.0	0.0	-0.0	76.14
	2301	-0.0	0.0	0.0	0.0	-0.1	70.21
	4422	0.0	0.0	0.0	0.1	0.0	48.29

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	4559	0.0	-0.0
	703	0.0	-0.0
	2301	0.0	-0.0
	4422	0.0	-0.0
Min	Cent	0.0	-0.0
	4559	0.0	-0.0
	703	0.0	-0.0
	2301	0.0	-0.0
	4422	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4747	3	2	S1 HL-~1	Max	Cent	-0.0	-1.8	-0.1	0.0	-1.8	-4.05
					703	-0.2	-1.8	-0.1	-0.2	-1.8	-4.62
					5132	-0.2	-1.9	-0.1	-0.2	-1.9	-4.28
					5133	0.2	-1.9	-0.1	0.2	-1.9	-3.60
					2301	0.2	-1.8	-0.1	0.2	-1.8	-3.84
				Min	Cent	-0.0	-1.8	-0.1	0.0	-1.8	-4.05
					703	-0.2	-1.8	-0.1	-0.2	-1.8	-4.62
					5132	-0.2	-1.9	-0.1	-0.2	-1.9	-4.28
					5133	0.2	-1.9	-0.1	0.2	-1.9	-3.60
					2301	0.2	-1.8	-0.1	0.2	-1.8	-3.84

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	70.70
	703	-0.1	-0.0	0.0	-0.0	-0.1	76.56
	5132	-0.0	0.0	0.0	0.0	-0.0	55.77
	5133	0.0	0.0	0.0	0.1	-0.0	66.92
	2301	-0.0	0.0	0.0	0.0	-0.0	70.41
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	70.70
	703	-0.1	-0.0	0.0	-0.0	-0.1	76.56
	5132	-0.0	0.0	0.0	0.0	-0.0	55.77
	5133	0.0	0.0	0.0	0.1	-0.0	66.92
	2301	-0.0	0.0	0.0	0.0	-0.0	70.41

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	703	-0.0	-0.0
	5132	-0.0	-0.0
	5133	-0.0	-0.0
	2301	-0.0	-0.0
Min	Cent	-0.0	-0.0
	703	-0.0	-0.0
	5132	-0.0	-0.0
	5133	-0.0	-0.0
	2301	-0.0	-0.0

ELEM	MAT	SEC	LC	NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE

4771	3	2	S1 HL-~1	Max	Cent	-0.2	-1.1	-0.3	-0.1	-1.2	-15.91
					3794	-0.2	-0.8	-0.3	-0.1	-0.9	-20.27
					4422	-0.2	-1.4	-0.3	-0.1	-1.4	-12.16
					4452	-0.3	-1.4	-0.3	-0.2	-1.4	-12.98
					3812	-0.3	-0.8	-0.3	-0.1	-0.9	-22.35
				Min	Cent	-0.2	-1.1	-0.3	-0.1	-1.2	-15.91
					3794	-0.2	-0.8	-0.3	-0.1	-0.9	-20.27
					4422	-0.2	-1.4	-0.3	-0.1	-1.4	-12.16
					4452	-0.3	-1.4	-0.3	-0.2	-1.4	-12.98
					3812	-0.3	-0.8	-0.3	-0.1	-0.9	-22.35

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	0.1	0.1	-0.1	46.46
	3794		0.0	0.0	0.1	0.1	-0.1	47.16
	4422		0.0	0.1	0.1	0.1	-0.0	48.79
	4452		-0.1	-0.0	0.1	0.0	-0.1	55.41
	3812		0.1	0.0	0.1	0.1	-0.0	35.19
Min	Cent		0.0	0.0	0.1	0.1	-0.1	46.46
	3794		0.0	0.0	0.1	0.1	-0.1	47.16
	4422		0.0	0.1	0.1	0.1	-0.0	48.79
	4452		-0.1	-0.0	0.1	0.0	-0.1	55.41
	3812		0.1	0.0	0.1	0.1	-0.0	35.19

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	3794		-0.0	0.0
	4422		-0.0	0.0
	4452		0.0	0.0
	3812		0.0	0.0
Min	Cent		0.0	0.0
	3794		-0.0	0.0
	4422		-0.0	0.0
	4452		0.0	0.0
	3812		0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4772	3	2	S1 HL-~1	Max	Cent	-0.1	-1.5	-0.5	0.1	-1.7	-17.34
					4422	0.1	-1.3	-0.5	0.2	-1.5	-17.74
					2301	0.1	-1.7	-0.5	0.2	-1.8	-14.72
					2139	-0.2	-1.7	-0.5	-0.1	-1.8	-16.97
					4452	-0.2	-1.3	-0.5	-0.0	-1.5	-20.91
				Min	Cent	-0.1	-1.5	-0.5	0.1	-1.7	-17.34
					4422	0.1	-1.3	-0.5	0.2	-1.5	-17.74
					2301	0.1	-1.7	-0.5	0.2	-1.8	-14.72
					2139	-0.2	-1.7	-0.5	-0.1	-1.8	-16.97
					4452	-0.2	-1.3	-0.5	-0.0	-1.5	-20.91

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.1	-0.0	0.1	0.0	-0.1	62.09
	4422		0.0	0.1	0.1	0.1	-0.0	49.61
	2301		-0.0	0.0	0.0	0.1	-0.1	64.30
	2139		-0.2	-0.1	0.1	-0.1	-0.2	71.71
	4452		-0.1	-0.0	0.1	0.0	-0.1	56.46
Min	Cent		-0.1	-0.0	0.1	0.0	-0.1	62.09
	4422		0.0	0.1	0.1	0.1	-0.0	49.61
	2301		-0.0	0.0	0.0	0.1	-0.1	64.30
	2139		-0.2	-0.1	0.1	-0.1	-0.2	71.71
	4452		-0.1	-0.0	0.1	0.0	-0.1	56.46

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	4422		0.0	0.0
	2301		0.0	0.0
	2139		0.0	0.0
	4452		0.0	0.0
Min	Cent		0.0	0.0
	4422		0.0	0.0
	2301		0.0	0.0
	2139		0.0	0.0
	4452		0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4773	3	2	S1 HL-~1	Max	Cent	-0.0	-1.9	0.3	-0.0	-2.0	8.35
					2301	0.1	-1.7	0.3	0.2	-1.7	8.78
					5133	0.1	-2.2	0.3	0.2	-2.2	6.87
					5134	-0.2	-2.2	0.3	-0.2	-2.2	7.96
					2139	-0.2	-1.7	0.3	-0.2	-1.7	10.61
				Min	Cent	-0.0	-1.9	0.3	-0.0	-2.0	8.35
					2301	0.1	-1.7	0.3	0.2	-1.7	8.78
					5133	0.1	-2.2	0.3	0.2	-2.2	6.87
					5134	-0.2	-2.2	0.3	-0.2	-2.2	7.96
					2139	-0.2	-1.7	0.3	-0.2	-1.7	10.61

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	0.1	0.1	-0.1	53.12
		2301	-0.0	0.0	0.0	0.1	-0.1	63.13
		5133	0.0	0.1	0.0	0.1	-0.0	60.49
		5134	-0.0	-0.0	0.1	0.1	-0.1	43.46
		2139	-0.0	-0.0	0.1	0.0	-0.1	45.77
	Min	Cent	-0.0	0.0	0.1	0.1	-0.1	53.12
		2301	-0.0	0.0	0.0	0.1	-0.1	63.13
		5133	0.0	0.1	0.0	0.1	-0.0	60.49
		5134	-0.0	-0.0	0.1	0.1	-0.1	43.46
		2139	-0.0	-0.0	0.1	0.0	-0.1	45.77

		NODE	Vxx	Vyy
	Max	Cent	-0.0	0.0
		2301	-0.0	0.0
		5133	-0.0	0.0
		5134	-0.0	0.0
		2139	-0.0	0.0
	Min	Cent	-0.0	0.0
		2301	-0.0	0.0
		5133	-0.0	0.0
		5134	-0.0	0.0
		2139	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4797	3	2	S1 HL-~1	Max	Cent	0.1	-0.4	-0.4	0.3	-0.6	-27.83
					3812	-0.0	-0.3	-0.4	0.2	-0.6	-35.38
					4452	-0.0	-0.4	-0.4	0.2	-0.7	-31.40
					4517	0.3	-0.4	-0.4	0.5	-0.6	-22.26
					3841	0.3	-0.3	-0.4	0.5	-0.5	-24.77
				Min	Cent	0.1	-0.4	-0.4	0.3	-0.6	-27.83
					3812	-0.0	-0.3	-0.4	0.2	-0.6	-35.38
					4452	-0.0	-0.4	-0.4	0.2	-0.7	-31.40
					4517	0.3	-0.4	-0.4	0.5	-0.6	-22.26
					3841	0.3	-0.3	-0.4	0.5	-0.5	-24.77

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	0.0	-0.0	0.1	0.1	-0.1	42.32
		3812	0.1	0.0	0.1	0.1	-0.0	33.10
		4452	-0.1	-0.0	0.1	0.0	-0.1	56.94
		4517	-0.1	0.0	0.1	0.1	-0.1	54.21
		3841	0.1	0.0	0.1	0.1	-0.0	27.36
	Min	Cent	0.0	-0.0	0.1	0.1	-0.1	42.32
		3812	0.1	0.0	0.1	0.1	-0.0	33.10
		4452	-0.1	-0.0	0.1	0.0	-0.1	56.94
		4517	-0.1	0.0	0.1	0.1	-0.1	54.21
		3841	0.1	0.0	0.1	0.1	-0.0	27.36

		NODE	Vxx	Vyy
	Max	Cent	0.0	0.0
		3812	0.0	0.0
		4452	0.0	-0.0
		4517	0.0	-0.0
		3841	0.0	0.0
	Min	Cent	0.0	0.0
		3812	0.0	0.0
		4452	0.0	-0.0
		4517	0.0	-0.0

					3841	0.0	0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4798	3	2	S1 HL-~1	Max	Cent	0.0	-0.5	-0.6	0.4	-0.8	-33.81
					4452	0.1	-0.5	-0.6	0.5	-0.8	-32.24
					2139	0.1	-0.5	-0.6	0.5	-0.8	-32.34
					1492	-0.1	-0.5	-0.6	0.4	-0.9	-35.47
					4517	-0.1	-0.5	-0.6	0.4	-0.9	-35.35
				Min	Cent	0.0	-0.5	-0.6	0.4	-0.8	-33.81
					4452	0.1	-0.5	-0.6	0.5	-0.8	-32.24
					2139	0.1	-0.5	-0.6	0.5	-0.8	-32.34
					1492	-0.1	-0.5	-0.6	0.4	-0.9	-35.47
					4517	-0.1	-0.5	-0.6	0.4	-0.9	-35.35

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.1	-0.0	0.1	0.0	-0.2	62.20
		4452	-0.1	-0.0	0.1	0.0	-0.1	56.73
		2139	-0.2	-0.1	0.1	-0.1	-0.3	68.31
		1492	-0.2	-0.0	0.1	0.0	-0.2	65.29
		4517	-0.0	0.0	0.1	0.1	-0.1	53.38
	Min	Cent	-0.1	-0.0	0.1	0.0	-0.2	62.20
		4452	-0.1	-0.0	0.1	0.0	-0.1	56.73
		2139	-0.2	-0.1	0.1	-0.1	-0.3	68.31
		1492	-0.2	-0.0	0.1	0.0	-0.2	65.29
		4517	-0.0	0.0	0.1	0.1	-0.1	53.38

		NODE	Vxx	Vyy
	Max	Cent	0.0	-0.0
		4452	0.0	-0.0
		2139	0.0	-0.0
		1492	0.0	-0.0
		4517	0.0	-0.0
	Min	Cent	0.0	-0.0
		4452	0.0	-0.0
		2139	0.0	-0.0
		1492	0.0	-0.0
		4517	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
4799	3	2	S1 HL-~1	Max	Cent	0.0	-0.6	0.2	0.1	-0.6	17.51
					2139	0.2	-0.5	0.2	0.3	-0.5	15.18
					5134	0.2	-0.6	0.2	0.2	-0.7	12.32
					5135	-0.2	-0.6	0.2	-0.1	-0.7	20.55
					1492	-0.2	-0.5	0.2	-0.1	-0.6	28.04
				Min	Cent	0.0	-0.6	0.2	0.1	-0.6	17.51
					2139	0.2	-0.5	0.2	0.3	-0.5	15.18
					5134	0.2	-0.6	0.2	0.2	-0.7	12.32
					5135	-0.2	-0.6	0.2	-0.1	-0.7	20.55
					1492	-0.2	-0.5	0.2	-0.1	-0.6	28.04

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.1	-0.0	0.1	0.0	-0.1	54.67
		2139	-0.0	-0.0	0.1	0.1	-0.1	43.45
		5134	0.0	0.0	0.1	0.1	-0.1	46.44
		5135	-0.0	0.0	0.1	0.1	-0.1	47.62
		1492	-0.2	-0.0	0.1	0.0	-0.2	71.02
	Min	Cent	-0.1	-0.0	0.1	0.0	-0.1	54.67
		2139	-0.0	-0.0	0.1	0.1	-0.1	43.45
		5134	0.0	0.0	0.1	0.1	-0.1	46.44
		5135	-0.0	0.0	0.1	0.1	-0.1	47.62
		1492	-0.2	-0.0	0.1	0.0	-0.2	71.02

		NODE	Vxx	Vyy
	Max	Cent	-0.0	-0.0
		2139	-0.0	-0.0
		5134	-0.0	-0.0
		5135	-0.0	-0.0
		1492	-0.0	-0.0
	Min	Cent	-0.0	-0.0
		2139	-0.0	-0.0

					5134	-0.0	-0.0				
					5135	-0.0	-0.0				
					1492	-0.0	-0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5112	3	3	S1 HL-~1	Max	Cent	-0.1	1.3	-0.2	1.3	-0.1	-81.75
					1153	0.2	1.0	-0.2	1.1	0.2	-76.69
					1493	0.2	1.6	-0.2	1.6	0.2	-81.88
					1599	-0.3	1.6	-0.2	1.6	-0.3	-84.07
					1982	-0.3	1.0	-0.2	1.0	-0.3	-81.62
				Min	Cent	-0.1	1.3	-0.2	1.3	-0.1	-81.75
					1153	0.2	1.0	-0.2	1.1	0.2	-76.69
					1493	0.2	1.6	-0.2	1.6	0.2	-81.88
					1599	-0.3	1.6	-0.2	1.6	-0.3	-84.07
					1982	-0.3	1.0	-0.2	1.0	-0.3	-81.62

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.2	0.2	-0.1	-44.08
	1153		0.0	0.0	-0.2	0.2	-0.1	-47.13
	1493		0.2	0.1	-0.2	0.3	-0.1	-34.01
	1599		-0.1	-0.0	-0.1	0.1	-0.2	-55.86
	1982		-0.0	-0.0	-0.1	0.1	-0.1	-41.25
Min	Cent		0.0	0.0	-0.2	0.2	-0.1	-44.08
	1153		0.0	0.0	-0.2	0.2	-0.1	-47.13
	1493		0.2	0.1	-0.2	0.3	-0.1	-34.01
	1599		-0.1	-0.0	-0.1	0.1	-0.2	-55.86
	1982		-0.0	-0.0	-0.1	0.1	-0.1	-41.25

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
	1153		-0.0	0.0
	1493		-0.0	-0.0
	1599		0.0	-0.0
	1982		0.0	0.0
Min	Cent		-0.0	0.0
	1153		-0.0	0.0
	1493		-0.0	-0.0
	1599		0.0	-0.0
	1982		0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5113	3	3	S1 HL-~1	Max	Cent	-0.1	1.7	0.3	1.7	-0.1	80.94
					1493	0.3	1.6	0.3	1.6	0.2	78.23
					2509	0.3	1.8	0.3	1.8	0.2	79.63
					1926	-0.4	1.8	0.3	1.8	-0.4	82.65
					1599	-0.4	1.6	0.3	1.6	-0.4	81.96
				Min	Cent	-0.1	1.7	0.3	1.7	-0.1	80.94
					1493	0.3	1.6	0.3	1.6	0.2	78.23
					2509	0.3	1.8	0.3	1.8	0.2	79.63
					1926	-0.4	1.8	0.3	1.8	-0.4	82.65
					1599	-0.4	1.6	0.3	1.6	-0.4	81.96

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	-0.2	0.1	-0.2	-48.40
	1493		-0.2	-0.1	-0.2	0.0	-0.3	-57.03
	2509		-0.0	-0.0	-0.2	0.1	-0.2	-43.42
	1926		0.0	0.1	-0.1	0.2	-0.1	-52.90
	1599		0.1	0.1	-0.1	0.2	-0.1	-38.89
Min	Cent		-0.0	0.0	-0.2	0.1	-0.2	-48.40
	1493		-0.2	-0.1	-0.2	0.0	-0.3	-57.03
	2509		-0.0	-0.0	-0.2	0.1	-0.2	-43.42
	1926		0.0	0.1	-0.1	0.2	-0.1	-52.90
	1599		0.1	0.1	-0.1	0.2	-0.1	-38.89

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	1493		-0.0	-0.0
	2509		-0.0	-0.0
	1926		0.0	-0.0
	1599		0.0	-0.0

		Min	Cent	-0.0	-0.0
			1493	-0.0	-0.0
			2509	-0.0	-0.0
			1926	0.0	-0.0
			1599	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5114	3	3	S1 HL-~1	Max	Cent	0.1	3.1	-0.1	3.1	0.1	-88.21
					1982	0.2	2.7	-0.1	2.7	0.2	-87.75
					1599	0.2	3.6	-0.1	3.6	0.2	-88.37
					1809	-0.1	3.6	-0.1	3.6	-0.1	-88.51
					2628	-0.1	2.7	-0.1	2.7	-0.1	-88.01
				Min	Cent	0.1	3.1	-0.1	3.1	0.1	-88.21
					1982	0.2	2.7	-0.1	2.7	0.2	-87.75
					1599	0.2	3.6	-0.1	3.6	0.2	-88.37
					1809	-0.1	3.6	-0.1	3.6	-0.1	-88.51
					2628	-0.1	2.7	-0.1	2.7	-0.1	-88.01

			NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
		Max	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-73.91
			1982	-0.0	-0.0	-0.0	0.0	-0.1	-35.50
			1599	-0.1	-0.0	-0.0	-0.0	-0.1	-73.01
			1809	-0.0	0.0	0.0	0.0	-0.0	82.08
			2628	0.0	0.0	0.0	0.0	0.0	85.33
		Min	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-73.91
			1982	-0.0	-0.0	-0.0	0.0	-0.1	-35.50
			1599	-0.1	-0.0	-0.0	-0.0	-0.1	-73.01
			1809	-0.0	0.0	0.0	0.0	-0.0	82.08
			2628	0.0	0.0	0.0	0.0	0.0	85.33

			NODE	Vxx	Vyy
		Max	Cent	0.0	-0.0
			1982	0.0	-0.0
			1599	0.0	-0.0
			1809	0.0	-0.0
			2628	0.0	-0.0
		Min	Cent	0.0	-0.0
			1982	0.0	-0.0
			1599	0.0	-0.0
			1809	0.0	-0.0
			2628	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5115	3	3	S1 HL-~1	Max	Cent	0.1	4.1	0.1	4.1	0.1	87.90
					1599	0.3	3.6	0.1	3.6	0.3	87.37
					1926	0.3	4.7	0.1	4.7	0.3	88.03
					1015	-0.2	4.7	0.1	4.7	-0.2	88.25
					1809	-0.2	3.6	0.1	3.6	-0.2	87.75
				Min	Cent	0.1	4.1	0.1	4.1	0.1	87.90
					1599	0.3	3.6	0.1	3.6	0.3	87.37
					1926	0.3	4.7	0.1	4.7	0.3	88.03
					1015	-0.2	4.7	0.1	4.7	-0.2	88.25
					1809	-0.2	3.6	0.1	3.6	-0.2	87.75

			NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
		Max	Cent	0.0	0.0	-0.0	0.0	0.0	-58.99
			1599	0.1	0.1	-0.0	0.1	0.0	-22.81
			1926	0.0	0.1	-0.0	0.1	-0.0	-67.79
			1015	-0.0	-0.0	-0.0	-0.0	-0.0	-26.39
			1809	-0.0	0.0	0.0	0.0	-0.0	88.83
		Min	Cent	0.0	0.0	-0.0	0.0	0.0	-58.99
			1599	0.1	0.1	-0.0	0.1	0.0	-22.81
			1926	0.0	0.1	-0.0	0.1	-0.0	-67.79
			1015	-0.0	-0.0	-0.0	-0.0	-0.0	-26.39
			1809	-0.0	0.0	0.0	0.0	-0.0	88.83

			NODE	Vxx	Vyy
		Max	Cent	0.0	0.0
			1599	0.0	-0.0
			1926	0.0	0.0

	1015	-0.0	0.0
	1809	-0.0	-0.0
Min	Cent	0.0	0.0
	1599	0.0	-0.0
	1926	0.0	0.0
	1015	-0.0	0.0
	1809	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5116	3	3	S1 HL-~1	Max	Cent	0.1	4.1	-0.0	4.1	0.1	-89.53
					2628	0.2	3.8	-0.0	3.8	0.2	-89.47
					1809	0.2	4.4	-0.0	4.4	0.2	-89.55
					712	-0.1	4.4	-0.0	4.4	-0.1	-89.58
					3540	-0.1	3.8	-0.0	3.8	-0.1	-89.52
				Min	Cent	0.1	4.1	-0.0	4.1	0.1	-89.53
					2628	0.2	3.8	-0.0	3.8	0.2	-89.47
					1809	0.2	4.4	-0.0	4.4	0.2	-89.55
					712	-0.1	4.4	-0.0	4.4	-0.1	-89.58
					3540	-0.1	3.8	-0.0	3.8	-0.1	-89.52

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-79.01
		2628	-0.0	0.0	-0.0	0.0	-0.0	-82.85
		1809	-0.0	0.0	-0.0	0.0	-0.0	-85.77
		712	0.0	0.0	-0.0	0.0	0.0	-76.33
		3540	-0.0	0.0	-0.0	0.0	-0.0	-75.12
	Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-79.01
		2628	-0.0	0.0	-0.0	0.0	-0.0	-82.85
		1809	-0.0	0.0	-0.0	0.0	-0.0	-85.77
		712	0.0	0.0	-0.0	0.0	0.0	-76.33
		3540	-0.0	0.0	-0.0	0.0	-0.0	-75.12

		NODE	Vxx	Vyy
	Max	Cent	0.0	0.0
		2628	0.0	0.0
		1809	0.0	0.0
		712	-0.0	0.0
		3540	-0.0	0.0
	Min	Cent	0.0	0.0
		2628	0.0	0.0
		1809	0.0	0.0
		712	-0.0	0.0
		3540	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5117	3	3	S1 HL-~1	Max	Cent	0.0	4.7	-0.0	4.7	0.0	-89.66
					1809	-0.1	4.4	-0.0	4.4	-0.1	-89.65
					1015	-0.1	4.9	-0.0	4.9	-0.1	-89.68
					3552	0.1	4.9	-0.0	4.9	0.1	-89.67
					712	0.1	4.4	-0.0	4.4	0.1	-89.64
				Min	Cent	0.0	4.7	-0.0	4.7	0.0	-89.66
					1809	-0.1	4.4	-0.0	4.4	-0.1	-89.65
					1015	-0.1	4.9	-0.0	4.9	-0.1	-89.68
					3552	0.1	4.9	-0.0	4.9	0.1	-89.67
					712	0.1	4.4	-0.0	4.4	0.1	-89.64

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	0.0	0.0	-0.0	85.85
		1809	-0.0	0.0	-0.0	0.0	-0.0	-84.66
		1015	0.0	0.0	-0.0	0.0	0.0	-83.39
		3552	-0.0	0.0	-0.0	0.0	-0.0	-78.84
		712	-0.0	0.0	-0.0	0.0	-0.0	-84.60
	Min	Cent	-0.0	0.0	0.0	0.0	-0.0	85.85
		1809	-0.0	0.0	-0.0	0.0	-0.0	-84.66
		1015	0.0	0.0	-0.0	0.0	0.0	-83.39
		3552	-0.0	0.0	-0.0	0.0	-0.0	-78.84
		712	-0.0	0.0	-0.0	0.0	-0.0	-84.60

		NODE	Vxx	Vyy
	Max	Cent	-0.0	0.0

					1809	-0.0	0.0				
					1015	-0.0	0.0				
					3552	-0.0	0.0				
					712	-0.0	0.0				
				Min	Cent	-0.0	0.0				
					1809	-0.0	0.0				
					1015	-0.0	0.0				
					3552	-0.0	0.0				
					712	-0.0	0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5118	3	3	S1 HL-~1	Max	Cent	0.0	4.2	0.0	4.2	0.0	89.62
					3540	-0.1	4.4	0.0	4.4	-0.1	89.65
					712	-0.1	3.9	0.0	3.9	-0.1	89.62
					1705	0.2	3.9	0.0	3.9	0.2	89.59
					2580	0.2	4.4	0.0	4.4	0.2	89.63
				Min	Cent	0.0	4.2	0.0	4.2	0.0	89.62
					3540	-0.1	4.4	0.0	4.4	-0.1	89.65
					712	-0.1	3.9	0.0	3.9	-0.1	89.62
					1705	0.2	3.9	0.0	3.9	0.2	89.59
					2580	0.2	4.4	0.0	4.4	0.2	89.63

			NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
		Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-51.75
			3540	0.0	0.0	-0.0	0.0	-0.0	-58.62
			712	0.0	0.0	-0.0	0.0	-0.0	-50.95
			1705	-0.0	0.0	-0.0	0.0	-0.0	-58.53
			2580	-0.0	-0.0	-0.0	0.0	-0.0	-44.60
		Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-51.75
			3540	0.0	0.0	-0.0	0.0	-0.0	-58.62
			712	0.0	0.0	-0.0	0.0	-0.0	-50.95
			1705	-0.0	0.0	-0.0	0.0	-0.0	-58.53
			2580	-0.0	-0.0	-0.0	0.0	-0.0	-44.60

			NODE	Vxx	Vyy
		Max	Cent	0.0	0.0
			3540	-0.0	0.0
			712	-0.0	-0.0
			1705	0.0	-0.0
			2580	0.0	0.0
		Min	Cent	0.0	0.0
			3540	-0.0	0.0
			712	-0.0	-0.0
			1705	0.0	-0.0
			2580	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5119	3	3	S1 HL-~1	Max	Cent	-0.0	3.8	-0.0	3.8	-0.0	-89.28
					712	-0.2	3.9	-0.0	3.9	-0.2	-89.32
					3552	-0.2	3.7	-0.0	3.7	-0.2	-89.28
					1207	0.1	3.7	-0.0	3.7	0.1	-89.22
					1705	0.1	3.9	-0.0	3.9	0.1	-89.28
				Min	Cent	-0.0	3.8	-0.0	3.8	-0.0	-89.28
					712	-0.2	3.9	-0.0	3.9	-0.2	-89.32
					3552	-0.2	3.7	-0.0	3.7	-0.2	-89.28
					1207	0.1	3.7	-0.0	3.7	0.1	-89.22
					1705	0.1	3.9	-0.0	3.9	0.1	-89.28

			NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
		Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-53.53
			712	-0.0	0.0	-0.0	0.0	-0.0	-54.56
			3552	-0.0	0.0	-0.0	0.0	-0.0	-49.87
			1207	0.0	0.0	-0.0	0.0	-0.0	-56.35
			1705	-0.0	0.0	-0.0	0.0	-0.0	-55.95
		Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-53.53
			712	-0.0	0.0	-0.0	0.0	-0.0	-54.56
			3552	-0.0	0.0	-0.0	0.0	-0.0	-49.87
			1207	0.0	0.0	-0.0	0.0	-0.0	-56.35
			1705	-0.0	0.0	-0.0	0.0	-0.0	-55.95

			NODE	Vxx	Vyy

Max	Cent	-0.0	-0.0
	712	-0.0	-0.0
	3552	-0.0	-0.0
	1207	-0.0	-0.0
	1705	-0.0	-0.0
Min	Cent	-0.0	-0.0
	712	-0.0	-0.0
	3552	-0.0	-0.0
	1207	-0.0	-0.0
	1705	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5120	3	3	S1 HL-~1	Max	Cent	0.0	3.7	0.0	3.7	0.0	89.85
					2580	0.0	3.8	0.0	3.8	0.0	89.85
					1705	0.0	3.6	0.0	3.6	0.0	89.84
					713	0.0	3.6	0.0	3.6	0.0	89.84
					3541	0.0	3.8	0.0	3.8	0.0	89.85
				Min	Cent	0.0	3.7	0.0	3.7	0.0	89.85
					2580	0.0	3.8	0.0	3.8	0.0	89.85
					1705	0.0	3.6	0.0	3.6	0.0	89.84
					713	0.0	3.6	0.0	3.6	0.0	89.84
					3541	0.0	3.8	0.0	3.8	0.0	89.85

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	-0.0	0.0	-0.0	-67.01
	2580		0.0	0.0	-0.0	0.0	0.0	-73.16
	1705		-0.0	0.0	-0.0	0.0	-0.0	-76.10
	713		-0.0	0.0	-0.0	0.0	-0.0	-73.89
	3541		-0.0	0.0	-0.0	0.0	-0.0	-63.12
Min	Cent		-0.0	0.0	-0.0	0.0	-0.0	-67.01
	2580		0.0	0.0	-0.0	0.0	0.0	-73.16
	1705		-0.0	0.0	-0.0	0.0	-0.0	-76.10
	713		-0.0	0.0	-0.0	0.0	-0.0	-73.89
	3541		-0.0	0.0	-0.0	0.0	-0.0	-63.12

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	2580		0.0	0.0
	1705		0.0	-0.0
	713		0.0	-0.0
	3541		0.0	0.0
Min	Cent		0.0	0.0
	2580		0.0	0.0
	1705		0.0	-0.0
	713		0.0	-0.0
	3541		0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5121	3	3	S1 HL-~1	Max	Cent	0.0	3.4	0.0	3.4	0.0	89.81
					1705	-0.0	3.6	0.0	3.6	-0.0	89.82
					1207	-0.0	3.3	0.0	3.3	-0.0	89.80
					3553	0.0	3.3	0.0	3.3	0.0	89.80
					713	0.0	3.6	0.0	3.6	0.0	89.81
				Min	Cent	0.0	3.4	0.0	3.4	0.0	89.81
					1705	-0.0	3.6	0.0	3.6	-0.0	89.82
					1207	-0.0	3.3	0.0	3.3	-0.0	89.80
					3553	0.0	3.3	0.0	3.3	0.0	89.80
					713	0.0	3.6	0.0	3.6	0.0	89.81

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	-0.0	0.0	-0.0	-73.31
	1705		-0.0	0.0	-0.0	0.0	-0.0	-69.40
	1207		0.0	0.0	-0.0	0.0	-0.0	-68.10
	3553		-0.0	0.0	-0.0	0.0	-0.0	-72.86
	713		-0.0	0.0	-0.0	0.0	-0.0	-75.93
Min	Cent		-0.0	0.0	-0.0	0.0	-0.0	-73.31
	1705		-0.0	0.0	-0.0	0.0	-0.0	-69.40
	1207		0.0	0.0	-0.0	0.0	-0.0	-68.10
	3553		-0.0	0.0	-0.0	0.0	-0.0	-72.86
	713		-0.0	0.0	-0.0	0.0	-0.0	-75.93

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	1705	-0.0	-0.0
	1207	-0.0	0.0
	3553	-0.0	0.0
	713	-0.0	-0.0
Min	Cent	-0.0	0.0
	1705	-0.0	-0.0
	1207	-0.0	0.0
	3553	-0.0	0.0
	713	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5122	3	3	S1 HL-~1	Max	Cent	0.0	3.1	0.0	3.1	0.0	89.28
					3541	-0.2	3.1	0.0	3.1	-0.2	89.32
					713	-0.2	3.1	0.0	3.1	-0.2	89.32
					96	0.2	3.1	0.0	3.1	0.2	89.23
					2524	0.2	3.1	0.0	3.1	0.2	89.24
				Min	Cent	0.0	3.1	0.0	3.1	0.0	89.28
					3541	-0.2	3.1	0.0	3.1	-0.2	89.32
					713	-0.2	3.1	0.0	3.1	-0.2	89.32
					96	0.2	3.1	0.0	3.1	0.2	89.23
					2524	0.2	3.1	0.0	3.1	0.2	89.24

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	64.57
	3541	-0.0	0.0	0.0	0.0	-0.0	58.59
	713	-0.0	0.0	0.0	0.0	-0.0	67.63
	96	-0.0	0.0	0.0	0.0	-0.0	70.86
	2524	0.0	0.0	0.0	0.0	-0.0	67.52
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	64.57
	3541	-0.0	0.0	0.0	0.0	-0.0	58.59
	713	-0.0	0.0	0.0	0.0	-0.0	67.63
	96	-0.0	0.0	0.0	0.0	-0.0	70.86
	2524	0.0	0.0	0.0	0.0	-0.0	67.52

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	3541	0.0	-0.0
	713	0.0	-0.0
	96	0.0	-0.0
	2524	0.0	-0.0
Min	Cent	0.0	-0.0
	3541	0.0	-0.0
	713	0.0	-0.0
	96	0.0	-0.0
	2524	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5123	3	3	S1 HL-~1	Max	Cent	0.0	3.1	-0.0	3.1	0.0	-89.34
					713	-0.1	3.1	-0.0	3.1	-0.1	-89.36
					3553	-0.1	3.1	-0.0	3.1	-0.1	-89.37
					1013	0.1	3.1	-0.0	3.1	0.1	-89.33
					96	0.1	3.1	-0.0	3.1	0.1	-89.32
				Min	Cent	0.0	3.1	-0.0	3.1	0.0	-89.34
					713	-0.1	3.1	-0.0	3.1	-0.1	-89.36
					3553	-0.1	3.1	-0.0	3.1	-0.1	-89.37
					1013	0.1	3.1	-0.0	3.1	0.1	-89.33
					96	0.1	3.1	-0.0	3.1	0.1	-89.32

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	61.74
	713	-0.0	0.0	0.0	0.0	-0.0	68.32
	3553	0.0	0.0	0.0	0.0	-0.0	71.56
	1013	-0.0	0.0	0.0	0.0	-0.0	53.49
	96	-0.0	0.0	0.0	0.0	-0.0	68.73
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	61.74
	713	-0.0	0.0	0.0	0.0	-0.0	68.32
	3553	0.0	0.0	0.0	0.0	-0.0	71.56

				1013	-0.0	0.0	0.0	0.0	-0.0	53.49
				96	-0.0	0.0	0.0	0.0	-0.0	68.73

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	713	-0.0	-0.0
	3553	-0.0	0.0
	1013	-0.0	0.0
	96	-0.0	-0.0
Min	Cent	-0.0	0.0
	713	-0.0	-0.0
	3553	-0.0	0.0
	1013	-0.0	0.0
	96	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5124	3	3	S1 HL-~1	Max	Cent	0.0	2.3	0.0	2.3	0.0	89.37
					2524	-0.0	2.2	0.0	2.2	-0.0	89.38
					96	-0.0	2.3	0.0	2.3	-0.0	89.41
					714	0.1	2.3	0.0	2.3	0.1	89.36
					3542	0.1	2.2	0.0	2.2	0.1	89.34
				Min	Cent	0.0	2.3	0.0	2.3	0.0	89.37
					2524	-0.0	2.2	0.0	2.2	-0.0	89.38
					96	-0.0	2.3	0.0	2.3	-0.0	89.41
					714	0.1	2.3	0.0	2.3	0.1	89.36
					3542	0.1	2.2	0.0	2.2	0.1	89.34

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-75.50
	2524	-0.0	0.0	-0.0	0.0	-0.0	-79.63
	96	-0.0	0.0	-0.0	0.0	-0.0	-82.63
	714	-0.0	0.0	-0.0	0.0	-0.0	-80.51
	3542	0.0	0.0	-0.0	0.0	-0.0	-70.64
Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-75.50
	2524	-0.0	0.0	-0.0	0.0	-0.0	-79.63
	96	-0.0	0.0	-0.0	0.0	-0.0	-82.63
	714	-0.0	0.0	-0.0	0.0	-0.0	-80.51
	3542	0.0	0.0	-0.0	0.0	-0.0	-70.64

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	2524	0.0	0.0
	96	0.0	0.0
	714	0.0	0.0
	3542	0.0	0.0
Min	Cent	0.0	0.0
	2524	0.0	0.0
	96	0.0	0.0
	714	0.0	0.0
	3542	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5125	3	3	S1 HL-~1	Max	Cent	0.0	2.3	-0.0	2.3	0.0	-89.46
					96	-0.1	2.3	-0.0	2.3	-0.1	-89.48
					1013	-0.1	2.4	-0.0	2.4	-0.1	-89.49
					3554	0.1	2.4	-0.0	2.4	0.1	-89.43
					714	0.1	2.3	-0.0	2.3	0.1	-89.42
				Min	Cent	0.0	2.3	-0.0	2.3	0.0	-89.46
					96	-0.1	2.3	-0.0	2.3	-0.1	-89.48
					1013	-0.1	2.4	-0.0	2.4	-0.1	-89.49
					3554	0.1	2.4	-0.0	2.4	0.1	-89.43
					714	0.1	2.3	-0.0	2.3	0.1	-89.42

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-79.50
	96	-0.0	0.0	-0.0	0.0	-0.0	-82.45
	1013	0.0	0.0	-0.0	0.0	-0.0	-76.76
	3554	-0.0	0.0	-0.0	0.0	-0.0	-78.66
	714	-0.0	0.0	-0.0	0.0	-0.0	-80.17
Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-79.50

96	-0.0	0.0	-0.0	0.0	-0.0	-82.45
1013	0.0	0.0	-0.0	0.0	-0.0	-76.76
3554	-0.0	0.0	-0.0	0.0	-0.0	-78.66
714	-0.0	0.0	-0.0	0.0	-0.0	-80.17

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	96	-0.0	0.0
	1013	-0.0	0.0
	3554	-0.0	0.0
	714	-0.0	0.0
Min	Cent	-0.0	0.0
	96	-0.0	0.0
	1013	-0.0	0.0
	3554	-0.0	0.0
	714	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5126	3	3	S1 HL-~1	Max	Cent	-0.0	1.3	0.0	1.3	-0.0	87.92
					3542	-0.2	1.3	0.0	1.3	-0.2	88.15
					714	-0.2	1.3	0.0	1.3	-0.2	88.14
					82	0.1	1.3	0.0	1.3	0.1	87.62
					2476	0.1	1.3	0.0	1.3	0.1	87.63
				Min	Cent	-0.0	1.3	0.0	1.3	-0.0	87.92
					3542	-0.2	1.3	0.0	1.3	-0.2	88.15
					714	-0.2	1.3	0.0	1.3	-0.2	88.14
					82	0.1	1.3	0.0	1.3	0.1	87.62
					2476	0.1	1.3	0.0	1.3	0.1	87.63

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	63.50
	3542	-0.0	0.0	0.0	0.0	-0.0	57.84
	714	-0.0	0.0	0.0	0.0	-0.0	70.34
	82	-0.0	0.0	0.0	0.0	-0.0	69.95
	2476	-0.0	0.0	0.0	0.0	-0.0	62.89
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	63.50
	3542	-0.0	0.0	0.0	0.0	-0.0	57.84
	714	-0.0	0.0	0.0	0.0	-0.0	70.34
	82	-0.0	0.0	0.0	0.0	-0.0	69.95
	2476	-0.0	0.0	0.0	0.0	-0.0	62.89

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	3542	0.0	-0.0
	714	0.0	0.0
	82	0.0	0.0
	2476	0.0	-0.0
Min	Cent	0.0	0.0
	3542	0.0	-0.0
	714	0.0	0.0
	82	0.0	0.0
	2476	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5127	3	3	S1 HL-~1	Max	Cent	-0.0	1.3	-0.1	1.3	-0.0	-87.59
					714	-0.2	1.3	-0.1	1.3	-0.2	-87.78
					3554	-0.2	1.3	-0.1	1.3	-0.2	-87.83
					1206	0.1	1.3	-0.1	1.3	0.1	-87.37
					82	0.1	1.3	-0.1	1.3	0.1	-87.28
				Min	Cent	-0.0	1.3	-0.1	1.3	-0.0	-87.59
					714	-0.2	1.3	-0.1	1.3	-0.2	-87.78
					3554	-0.2	1.3	-0.1	1.3	-0.2	-87.83
					1206	0.1	1.3	-0.1	1.3	0.1	-87.37
					82	0.1	1.3	-0.1	1.3	0.1	-87.28

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	62.10
	714	-0.0	0.0	0.0	0.0	-0.0	67.84
	3554	0.0	0.0	0.0	0.0	-0.0	69.10
	1206	-0.0	-0.0	0.0	0.0	-0.0	46.10

		82	-0.0	0.0	0.0	0.0	-0.0	71.87
	Min	Cent	-0.0	0.0	0.0	0.0	-0.0	62.10
		714	-0.0	0.0	0.0	0.0	-0.0	67.84
		3554	0.0	0.0	0.0	0.0	-0.0	69.10
		1206	-0.0	-0.0	0.0	0.0	-0.0	46.10
		82	-0.0	0.0	0.0	0.0	-0.0	71.87

		NODE	Vxx	Vyy
	Max	Cent	-0.0	0.0
		714	-0.0	0.0
		3554	-0.0	0.0
		1206	-0.0	0.0
		82	-0.0	0.0
	Min	Cent	-0.0	0.0
		714	-0.0	0.0
		3554	-0.0	0.0
		1206	-0.0	0.0
		82	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5128	3	3	S1 HL-~1	Max	Cent	0.0	0.6	0.0	0.6	0.0	86.36
					2476	-0.1	0.6	0.0	0.6	-0.1	87.02
					82	-0.1	0.6	0.0	0.6	-0.1	87.04
					5063	0.2	0.6	0.0	0.6	0.2	85.34
					5076	0.2	0.6	0.0	0.6	0.2	85.27
				Min	Cent	0.0	0.6	0.0	0.6	0.0	86.36
					2476	-0.1	0.6	0.0	0.6	-0.1	87.02
					82	-0.1	0.6	0.0	0.6	-0.1	87.04
					5063	0.2	0.6	0.0	0.6	0.2	85.34
					5076	0.2	0.6	0.0	0.6	0.2	85.27

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-55.63
		2476	0.0	0.0	-0.0	0.0	0.0	-70.74
		82	-0.0	0.0	-0.0	0.0	-0.0	-70.10
		5063	-0.0	0.0	-0.0	0.0	-0.0	-51.01
		5076	-0.0	-0.0	-0.0	0.0	-0.0	-31.37
	Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-55.63
		2476	0.0	0.0	-0.0	0.0	0.0	-70.74
		82	-0.0	0.0	-0.0	0.0	-0.0	-70.10
		5063	-0.0	0.0	-0.0	0.0	-0.0	-51.01
		5076	-0.0	-0.0	-0.0	0.0	-0.0	-31.37

		NODE	Vxx	Vyy
	Max	Cent	0.0	0.0
		2476	0.0	0.0
		82	0.0	0.0
		5063	0.0	0.0
		5076	0.0	0.0
	Min	Cent	0.0	0.0
		2476	0.0	0.0
		82	0.0	0.0
		5063	0.0	0.0
		5076	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5129	3	3	S1 HL-~1	Max	Cent	0.0	0.5	-0.0	0.5	0.0	-86.79
					82	-0.1	0.6	-0.0	0.6	-0.1	-87.64
					1206	-0.1	0.5	-0.0	0.5	-0.1	-87.31
					5077	0.2	0.5	-0.0	0.5	0.2	-84.96
					5063	0.2	0.6	-0.0	0.6	0.2	-86.01
				Min	Cent	0.0	0.5	-0.0	0.5	0.0	-86.79
					82	-0.1	0.6	-0.0	0.6	-0.1	-87.64
					1206	-0.1	0.5	-0.0	0.5	-0.1	-87.31
					5077	0.2	0.5	-0.0	0.5	0.2	-84.96
					5063	0.2	0.6	-0.0	0.6	0.2	-86.01

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-59.95
		82	-0.0	0.0	-0.0	0.0	-0.0	-72.73

			1206	-0.0	-0.0	-0.0	0.0	-0.0	-42.83
			5077	0.0	0.0	-0.0	0.0	0.0	-64.08
			5063	-0.0	0.0	-0.0	0.0	-0.0	-57.96
		Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-59.95
			82	-0.0	0.0	-0.0	0.0	-0.0	-72.73
			1206	-0.0	-0.0	-0.0	0.0	-0.0	-42.83
			5077	0.0	0.0	-0.0	0.0	0.0	-64.08
			5063	-0.0	0.0	-0.0	0.0	-0.0	-57.96

		NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	82	-0.0	0.0
	1206	-0.0	-0.0
	5077	-0.0	-0.0
	5063	-0.0	0.0
Min	Cent	-0.0	-0.0
	82	-0.0	0.0
	1206	-0.0	-0.0
	5077	-0.0	-0.0
	5063	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5130	3	4	S1 HL-~1	Max	Cent	-0.0	-2.0	0.1	-0.0	-2.0	2.33
					1862	-0.3	-2.0	0.1	-0.3	-2.0	2.59
					2485	-0.3	-2.0	0.1	-0.3	-2.0	2.68
					2242	0.2	-2.0	0.1	0.2	-2.0	2.13
					2458	0.2	-2.0	0.1	0.2	-2.0	2.07
				Min	Cent	-0.0	-2.0	0.1	-0.0	-2.0	2.33
					1862	-0.3	-2.0	0.1	-0.3	-2.0	2.59
					2485	-0.3	-2.0	0.1	-0.3	-2.0	2.68
					2242	0.2	-2.0	0.1	0.2	-2.0	2.13
					2458	0.2	-2.0	0.1	0.2	-2.0	2.07

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	0.0	0.0	-0.0	36.84
	1862	-0.0	-0.0	0.0	0.0	-0.0	27.99
	2485	-0.0	-0.0	0.0	-0.0	-0.0	46.23
	2242	-0.0	-0.0	0.0	0.0	-0.0	36.89
	2458	0.0	-0.0	0.0	0.0	-0.0	34.29
Min	Cent	-0.0	-0.0	0.0	0.0	-0.0	36.84
	1862	-0.0	-0.0	0.0	0.0	-0.0	27.99
	2485	-0.0	-0.0	0.0	-0.0	-0.0	46.23
	2242	-0.0	-0.0	0.0	0.0	-0.0	36.89
	2458	0.0	-0.0	0.0	0.0	-0.0	34.29

		NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	1862	0.0	-0.0
	2485	0.0	0.0
	2242	0.0	0.0
	2458	0.0	-0.0
Min	Cent	0.0	0.0
	1862	0.0	-0.0
	2485	0.0	0.0
	2242	0.0	0.0
	2458	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5131	3	4	S1 HL-~1	Max	Cent	-0.1	-2.0	-0.1	-0.0	-2.0	-2.62
					2485	-0.3	-2.0	-0.1	-0.3	-2.0	-3.00
					1087	-0.3	-2.0	-0.1	-0.3	-2.0	-2.92
					1615	0.2	-2.0	-0.1	0.2	-2.0	-2.33
					2242	0.2	-2.0	-0.1	0.2	-2.0	-2.38
				Min	Cent	-0.1	-2.0	-0.1	-0.0	-2.0	-2.62
					2485	-0.3	-2.0	-0.1	-0.3	-2.0	-3.00
					1087	-0.3	-2.0	-0.1	-0.3	-2.0	-2.92
					1615	0.2	-2.0	-0.1	0.2	-2.0	-2.33
					2242	0.2	-2.0	-0.1	0.2	-2.0	-2.38

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE

Max	Cent	-0.0	-0.0	0.0	0.0	-0.0	35.41
	2485	-0.0	-0.0	0.0	0.0	-0.0	35.76
	1087	0.0	-0.0	0.0	0.0	-0.0	41.18
	1615	-0.0	-0.0	0.0	0.0	-0.0	28.58
	2242	-0.0	-0.0	0.0	0.0	-0.0	35.30
Min	Cent	-0.0	-0.0	0.0	0.0	-0.0	35.41
	2485	-0.0	-0.0	0.0	0.0	-0.0	35.76
	1087	0.0	-0.0	0.0	0.0	-0.0	41.18
	1615	-0.0	-0.0	0.0	0.0	-0.0	28.58
	2242	-0.0	-0.0	0.0	0.0	-0.0	35.30

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	2485	-0.0	0.0
	1087	-0.0	0.0
	1615	-0.0	0.0
	2242	-0.0	0.0
Min	Cent	-0.0	0.0
	2485	-0.0	0.0
	1087	-0.0	0.0
	1615	-0.0	0.0
	2242	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5132	3	4	S1 HL-~1	Max	Cent	-0.0	-3.0	0.1	-0.0	-3.0	1.54
					2458	-0.1	-2.9	0.1	-0.1	-2.9	1.64
					2242	-0.1	-3.1	0.1	-0.1	-3.1	1.54
					64	0.1	-3.1	0.1	0.1	-3.1	1.44
					2404	0.1	-2.9	0.1	0.1	-2.9	1.53
				Min	Cent	-0.0	-3.0	0.1	-0.0	-3.0	1.54
					2458	-0.1	-2.9	0.1	-0.1	-2.9	1.64
					2242	-0.1	-3.1	0.1	-0.1	-3.1	1.54
					64	0.1	-3.1	0.1	0.1	-3.1	1.44
					2404	0.1	-2.9	0.1	0.1	-2.9	1.53

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	-0.0	0.0	0.0	-0.0	16.44
	2458	-0.0	-0.0	0.0	0.0	-0.0	23.90
	2242	-0.0	-0.0	0.0	-0.0	-0.0	33.64
	64	0.0	-0.0	0.0	0.0	-0.1	11.39
	2404	-0.0	-0.1	0.0	0.0	-0.1	12.76
Min	Cent	0.0	-0.0	0.0	0.0	-0.0	16.44
	2458	-0.0	-0.0	0.0	0.0	-0.0	23.90
	2242	-0.0	-0.0	0.0	-0.0	-0.0	33.64
	64	0.0	-0.0	0.0	0.0	-0.1	11.39
	2404	-0.0	-0.1	0.0	0.0	-0.1	12.76

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	2458	0.0	0.0
	2242	0.0	0.0
	64	-0.0	0.0
	2404	-0.0	0.0
Min	Cent	-0.0	0.0
	2458	0.0	0.0
	2242	0.0	0.0
	64	-0.0	0.0
	2404	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5133	3	4	S1 HL-~1	Max	Cent	0.0	-3.1	-0.1	0.0	-3.1	-1.67
					2242	-0.2	-3.1	-0.1	-0.2	-3.1	-1.76
					1615	-0.2	-3.0	-0.1	-0.2	-3.1	-1.77
					2725	0.2	-3.0	-0.1	0.2	-3.1	-1.58
					64	0.2	-3.1	-0.1	0.2	-3.1	-1.58
				Min	Cent	0.0	-3.1	-0.1	0.0	-3.1	-1.67
					2242	-0.2	-3.1	-0.1	-0.2	-3.1	-1.76
					1615	-0.2	-3.0	-0.1	-0.2	-3.1	-1.77
					2725	0.2	-3.0	-0.1	0.2	-3.1	-1.58
					64	0.2	-3.1	-0.1	0.2	-3.1	-1.58

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	0.0	-0.1	24.65
	2242		-0.0	-0.0	0.0	0.0	-0.0	33.72
	1615		0.0	-0.0	0.0	0.0	-0.0	32.72
	2725		-0.0	-0.1	0.0	0.0	-0.1	16.31
	64		-0.0	-0.1	0.0	-0.0	-0.1	21.28
Min	Cent		-0.0	-0.0	0.0	0.0	-0.1	24.65
	2242		-0.0	-0.0	0.0	0.0	-0.0	33.72
	1615		0.0	-0.0	0.0	0.0	-0.0	32.72
	2725		-0.0	-0.1	0.0	0.0	-0.1	16.31
	64		-0.0	-0.1	0.0	-0.0	-0.1	21.28

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
	2242		-0.0	0.0
	1615		-0.0	0.0
	2725		-0.0	0.0
	64		-0.0	0.0
Min	Cent		-0.0	0.0
	2242		-0.0	0.0
	1615		-0.0	0.0
	2725		-0.0	0.0
	64		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5134	3	4	S1 HL-~1	Max	Cent	0.0	-4.2	0.1	0.0	-4.2	1.45
					2404	-0.3	-4.2	0.1	-0.3	-4.2	1.57
					64	-0.3	-4.2	0.1	-0.3	-4.2	1.57
					4785	0.3	-4.2	0.1	0.3	-4.2	1.35
					4799	0.3	-4.2	0.1	0.3	-4.2	1.35
				Min	Cent	0.0	-4.2	0.1	0.0	-4.2	1.45
					2404	-0.3	-4.2	0.1	-0.3	-4.2	1.57
					64	-0.3	-4.2	0.1	-0.3	-4.2	1.57
					4785	0.3	-4.2	0.1	0.3	-4.2	1.35
					4799	0.3	-4.2	0.1	0.3	-4.2	1.35

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	-0.0	-0.1	34.55
	2404		-0.0	-0.1	0.0	0.0	-0.1	18.81
	64		0.0	-0.0	0.0	0.0	-0.0	11.66
	4785		-0.2	-0.1	0.0	-0.1	-0.2	81.54
	4799		0.0	-0.0	0.0	0.0	-0.0	32.76
Min	Cent		-0.0	-0.0	0.0	-0.0	-0.1	34.55
	2404		-0.0	-0.1	0.0	0.0	-0.1	18.81
	64		0.0	-0.0	0.0	0.0	-0.0	11.66
	4785		-0.2	-0.1	0.0	-0.1	-0.2	81.54
	4799		0.0	-0.0	0.0	0.0	-0.0	32.76

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	2404		-0.0	-0.0
	64		-0.0	-0.0
	4785		0.0	-0.0
	4799		0.0	-0.0
Min	Cent		0.0	-0.0
	2404		-0.0	-0.0
	64		-0.0	-0.0
	4785		0.0	-0.0
	4799		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5135	3	4	S1 HL-~1	Max	Cent	0.0	-4.3	-0.1	0.0	-4.3	-1.31
					64	-0.2	-4.2	-0.1	-0.2	-4.2	-1.40
					2725	-0.2	-4.3	-0.1	-0.2	-4.3	-1.36
					4795	0.3	-4.3	-0.1	0.3	-4.3	-1.23
					4785	0.3	-4.2	-0.1	0.3	-4.2	-1.26
				Min	Cent	0.0	-4.3	-0.1	0.0	-4.3	-1.31
					64	-0.2	-4.2	-0.1	-0.2	-4.2	-1.40
					2725	-0.2	-4.3	-0.1	-0.2	-4.3	-1.36
					4795	0.3	-4.3	-0.1	0.3	-4.3	-1.23

				4785	0.3	-4.2	-0.1	0.3	-4.2	-1.26

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	-0.0	-0.0	17.31
		64	-0.0	-0.1	0.0	-0.0	-0.1	17.07
		2725	0.0	-0.1	0.0	0.0	-0.1	12.66
		4795	-0.0	-0.0	0.0	0.0	-0.0	26.09
		4785	0.0	-0.0	0.0	0.0	-0.0	21.64
Min	Cent		-0.0	-0.0	0.0	-0.0	-0.0	17.31
		64	-0.0	-0.1	0.0	-0.0	-0.1	17.07
		2725	0.0	-0.1	0.0	0.0	-0.1	12.66
		4795	-0.0	-0.0	0.0	0.0	-0.0	26.09
		4785	0.0	-0.0	0.0	0.0	-0.0	21.64

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
		64	-0.0	-0.0
		2725	-0.0	-0.0
		4795	0.0	-0.0
		4785	0.0	-0.0
Min	Cent		-0.0	-0.0
		64	-0.0	-0.0
		2725	-0.0	-0.0
		4795	0.0	-0.0
		4785	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5136	3	4	S1 HL-~1	Max	Cent	-0.1	-6.1	0.1	-0.1	-6.1	0.96
					4799	-0.2	-6.1	0.1	-0.2	-6.1	0.98
					4785	-0.2	-6.1	0.1	-0.2	-6.1	0.98
					36	0.1	-6.1	0.1	0.1	-6.1	0.94
					2300	0.1	-6.1	0.1	0.1	-6.1	0.94
				Min	Cent	-0.1	-6.1	0.1	-0.1	-6.1	0.96
					4799	-0.2	-6.1	0.1	-0.2	-6.1	0.98
					4785	-0.2	-6.1	0.1	-0.2	-6.1	0.98
					36	0.1	-6.1	0.1	0.1	-6.1	0.94
					2300	0.1	-6.1	0.1	0.1	-6.1	0.94

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.1	-0.1	0.0	0.1	-0.1	1.87
		4799	-0.0	-0.0	0.0	-0.0	-0.0	3.78
		4785	-0.2	-0.1	0.0	-0.1	-0.2	79.56
		36	0.6	0.0	0.0	0.6	0.0	1.19
		2300	0.0	-0.2	-0.0	0.0	-0.2	-1.63
Min	Cent		0.1	-0.1	0.0	0.1	-0.1	1.87
		4799	-0.0	-0.0	0.0	-0.0	-0.0	3.78
		4785	-0.2	-0.1	0.0	-0.1	-0.2	79.56
		36	0.6	0.0	0.0	0.6	0.0	1.19
		2300	0.0	-0.2	-0.0	0.0	-0.2	-1.63

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
		4799	0.0	0.0
		4785	0.0	0.0
		36	-0.1	0.0
		2300	-0.1	0.0
Min	Cent		-0.0	0.0
		4799	0.0	0.0
		4785	0.0	0.0
		36	-0.1	0.0
		2300	-0.1	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5137	3	4	S1 HL-~1	Max	Cent	-0.1	-6.0	-0.1	-0.1	-6.0	-0.89
					4785	-0.3	-6.1	-0.1	-0.3	-6.1	-0.91
					4795	-0.3	-6.0	-0.1	-0.3	-6.0	-0.93
					2613	0.1	-6.0	-0.1	0.1	-6.0	-0.87
					36	0.1	-6.1	-0.1	0.1	-6.1	-0.85
				Min	Cent	-0.1	-6.0	-0.1	-0.1	-6.0	-0.89
					4785	-0.3	-6.1	-0.1	-0.3	-6.1	-0.91

	4795	-0.3	-6.0	-0.1	-0.3	-6.0	-0.93
	2613	0.1	-6.0	-0.1	0.1	-6.0	-0.87
	36	0.1	-6.1	-0.1	0.1	-6.1	-0.85

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.1	0.0	0.0	-0.1	19.18
	4785	0.0	-0.0	0.0	0.0	-0.0	33.31
	4795	0.0	-0.0	0.0	0.0	-0.0	41.37
	2613	-0.0	-0.2	0.0	0.0	-0.2	8.14
	36	-0.0	-0.2	0.0	-0.0	-0.2	10.40
Min	Cent	-0.0	-0.1	0.0	0.0	-0.1	19.18
	4785	0.0	-0.0	0.0	0.0	-0.0	33.31
	4795	0.0	-0.0	0.0	0.0	-0.0	41.37
	2613	-0.0	-0.2	0.0	0.0	-0.2	8.14
	36	-0.0	-0.2	0.0	-0.0	-0.2	10.40

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	4785	0.0	0.0
	4795	0.0	0.0
	2613	-0.0	0.0
	36	-0.0	0.0
Min	Cent	-0.0	0.0
	4785	0.0	0.0
	4795	0.0	0.0
	2613	-0.0	0.0
	36	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5138	3	4	S1 HL-~1	Max	Cent	-0.1	-6.1	-0.1	-0.1	-6.1	-0.96
					2300	0.1	-6.1	-0.1	0.1	-6.1	-0.94
					36	0.1	-6.1	-0.1	0.1	-6.1	-0.94
					4853	-0.2	-6.1	-0.1	-0.2	-6.1	-0.99
					4873	-0.2	-6.1	-0.1	-0.2	-6.1	-0.98
				Min	Cent	-0.1	-6.1	-0.1	-0.1	-6.1	-0.96
					2300	0.1	-6.1	-0.1	0.1	-6.1	-0.94
					36	0.1	-6.1	-0.1	0.1	-6.1	-0.94
					4853	-0.2	-6.1	-0.1	-0.2	-6.1	-0.99
					4873	-0.2	-6.1	-0.1	-0.2	-6.1	-0.98

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.1	-0.1	-0.0	0.1	-0.1	-1.80
	2300	-0.0	-0.2	0.0	0.0	-0.2	1.68
	36	0.6	0.0	-0.0	0.6	0.0	-1.17
	4853	-0.2	-0.1	-0.0	-0.1	-0.2	-79.66
	4873	-0.0	-0.0	-0.0	-0.0	-0.0	-3.31
Min	Cent	0.1	-0.1	-0.0	0.1	-0.1	-1.80
	2300	-0.0	-0.2	0.0	0.0	-0.2	1.68
	36	0.6	0.0	-0.0	0.6	0.0	-1.17
	4853	-0.2	-0.1	-0.0	-0.1	-0.2	-79.66
	4873	-0.0	-0.0	-0.0	-0.0	-0.0	-3.31

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	2300	-0.1	-0.0
	36	-0.1	-0.0
	4853	0.0	-0.0
	4873	0.0	-0.0
Min	Cent	-0.0	-0.0
	2300	-0.1	-0.0
	36	-0.1	-0.0
	4853	0.0	-0.0
	4873	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5139	3	4	S1 HL-~1	Max	Cent	-0.1	-6.0	0.1	-0.1	-6.0	0.89
					36	0.1	-6.1	0.1	0.1	-6.1	0.85
					2613	0.1	-6.0	0.1	0.1	-6.0	0.87
					4866	-0.3	-6.0	0.1	-0.3	-6.0	0.93
					4853	-0.3	-6.1	0.1	-0.3	-6.1	0.91

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Min	Cent		-0.1	-6.0	0.1	-0.1	-6.0	0.89
		36	0.1	-6.1	0.1	0.1	-6.1	0.85
		2613	0.1	-6.0	0.1	0.1	-6.0	0.87
		4866	-0.3	-6.0	0.1	-0.3	-6.0	0.93
		4853	-0.3	-6.1	0.1	-0.3	-6.1	0.91

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.1	-0.0	0.0	-0.1	-19.11
		36	-0.0	-0.2	-0.0	-0.0	-0.2	-10.34
		2613	-0.0	-0.2	-0.0	0.0	-0.2	-8.09
		4866	0.0	-0.0	-0.0	0.0	-0.0	-41.36
		4853	0.0	-0.0	-0.0	0.0	-0.0	-33.25
Min	Cent		-0.0	-0.1	-0.0	0.0	-0.1	-19.11
		36	-0.0	-0.2	-0.0	-0.0	-0.2	-10.34
		2613	-0.0	-0.2	-0.0	0.0	-0.2	-8.09
		4866	0.0	-0.0	-0.0	0.0	-0.0	-41.36
		4853	0.0	-0.0	-0.0	0.0	-0.0	-33.25

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
		36	-0.0	-0.0
		2613	-0.0	-0.0
		4866	0.0	-0.0
		4853	0.0	-0.0
Min	Cent		-0.0	-0.0
		36	-0.0	-0.0
		2613	-0.0	-0.0
		4866	0.0	-0.0
		4853	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5140	3	4	S1 HL-~1	Max	Cent	0.0	-4.2	-0.1	0.0	-4.2	-1.45
					4873	0.3	-4.2	-0.1	0.3	-4.2	-1.35
					4853	0.3	-4.2	-0.1	0.3	-4.2	-1.35
					56	-0.3	-4.2	-0.1	-0.3	-4.2	-1.56
					2372	-0.3	-4.2	-0.1	-0.3	-4.2	-1.56
				Min	Cent	0.0	-4.2	-0.1	0.0	-4.2	-1.45
					4873	0.3	-4.2	-0.1	0.3	-4.2	-1.35
					4853	0.3	-4.2	-0.1	0.3	-4.2	-1.35
					56	-0.3	-4.2	-0.1	-0.3	-4.2	-1.56
					2372	-0.3	-4.2	-0.1	-0.3	-4.2	-1.56

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	-0.0	-0.1	-34.46
		4873	0.0	-0.0	-0.0	0.0	-0.0	-32.64
		4853	-0.2	-0.1	-0.0	-0.1	-0.2	-81.64
		56	0.0	-0.0	-0.0	0.0	-0.0	-11.56
		2372	-0.0	-0.1	-0.0	0.0	-0.1	-18.72
Min	Cent		-0.0	-0.0	-0.0	-0.0	-0.1	-34.46
		4873	0.0	-0.0	-0.0	0.0	-0.0	-32.64
		4853	-0.2	-0.1	-0.0	-0.1	-0.2	-81.64
		56	0.0	-0.0	-0.0	0.0	-0.0	-11.56
		2372	-0.0	-0.1	-0.0	0.0	-0.1	-18.72

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
		4873	0.0	0.0
		4853	0.0	0.0
		56	-0.0	0.0
		2372	-0.0	0.0
Min	Cent		0.0	0.0
		4873	0.0	0.0
		4853	0.0	0.0
		56	-0.0	0.0
		2372	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5141	3	4	S1 HL-~1	Max	Cent	0.0	-4.3	0.1	0.0	-4.3	1.30
					4853	0.3	-4.2	0.1	0.3	-4.2	1.25
					4866	0.3	-4.3	0.1	0.3	-4.3	1.22

		2693	-0.2	-4.3	0.1	-0.2	-4.3	1.36
		56	-0.2	-4.2	0.1	-0.2	-4.2	1.40
	Min	Cent	0.0	-4.3	0.1	0.0	-4.3	1.30
		4853	0.3	-4.2	0.1	0.3	-4.2	1.25
		4866	0.3	-4.3	0.1	0.3	-4.3	1.22
		2693	-0.2	-4.3	0.1	-0.2	-4.3	1.36
		56	-0.2	-4.2	0.1	-0.2	-4.2	1.40

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-17.13
	4853	0.0	-0.0	-0.0	0.0	-0.0	-21.44
	4866	-0.0	-0.0	-0.0	0.0	-0.0	-25.90
	2693	0.0	-0.1	-0.0	0.0	-0.1	-12.53
	56	-0.0	-0.1	-0.0	-0.0	-0.1	-16.91
Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-17.13
	4853	0.0	-0.0	-0.0	0.0	-0.0	-21.44
	4866	-0.0	-0.0	-0.0	0.0	-0.0	-25.90
	2693	0.0	-0.1	-0.0	0.0	-0.1	-12.53
	56	-0.0	-0.1	-0.0	-0.0	-0.1	-16.91

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	4853	0.0	0.0
	4866	0.0	0.0
	2693	-0.0	0.0
	56	-0.0	0.0
Min	Cent	-0.0	0.0
	4853	0.0	0.0
	4866	0.0	0.0
	2693	-0.0	0.0
	56	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5142	3	4	S1 HL-~1	Max	Cent	-0.0	-3.0	-0.1	-0.0	-3.0	-1.54
					2372	0.1	-2.9	-0.1	0.1	-2.9	-1.54
					56	0.1	-3.1	-0.1	0.1	-3.1	-1.45
					2190	-0.1	-3.1	-0.1	-0.1	-3.1	-1.55
					2402	-0.1	-2.9	-0.1	-0.1	-2.9	-1.65
				Min	Cent	-0.0	-3.0	-0.1	-0.0	-3.0	-1.54
					2372	0.1	-2.9	-0.1	0.1	-2.9	-1.54
					56	0.1	-3.1	-0.1	0.1	-3.1	-1.45
					2190	-0.1	-3.1	-0.1	-0.1	-3.1	-1.55
					2402	-0.1	-2.9	-0.1	-0.1	-2.9	-1.65

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	-0.0	-0.0	0.0	-0.0	-16.27
	2372	-0.0	-0.1	-0.0	0.0	-0.1	-12.63
	56	0.0	-0.0	-0.0	0.0	-0.1	-11.31
	2190	-0.0	-0.0	-0.0	-0.0	-0.0	-33.51
	2402	-0.0	-0.0	-0.0	0.0	-0.0	-23.72
Min	Cent	0.0	-0.0	-0.0	0.0	-0.0	-16.27
	2372	-0.0	-0.1	-0.0	0.0	-0.1	-12.63
	56	0.0	-0.0	-0.0	0.0	-0.1	-11.31
	2190	-0.0	-0.0	-0.0	-0.0	-0.0	-33.51
	2402	-0.0	-0.0	-0.0	0.0	-0.0	-23.72

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	2372	-0.0	-0.0
	56	-0.0	-0.0
	2190	0.0	-0.0
	2402	0.0	-0.0
Min	Cent	-0.0	-0.0
	2372	-0.0	-0.0
	56	-0.0	-0.0
	2190	0.0	-0.0
	2402	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5143	3	4	S1 HL-~1	Max	Cent	0.0	-3.1	0.1	0.0	-3.1	1.67

	56	0.2	-3.1	0.1	0.2	-3.1	1.58
	2693	0.2	-3.0	0.1	0.2	-3.1	1.59
	2298	-0.2	-3.0	0.1	-0.2	-3.1	1.77
	2190	-0.2	-3.1	0.1	-0.2	-3.1	1.77
Min	Cent	0.0	-3.1	0.1	0.0	-3.1	1.67
	56	0.2	-3.1	0.1	0.2	-3.1	1.58
	2693	0.2	-3.0	0.1	0.2	-3.1	1.59
	2298	-0.2	-3.0	0.1	-0.2	-3.1	1.77
	2190	-0.2	-3.1	0.1	-0.2	-3.1	1.77

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	0.0	-0.1	-24.54
	56	-0.0	-0.1	-0.0	-0.0	-0.1	-21.16
	2693	-0.0	-0.1	-0.0	0.0	-0.1	-16.20
	2298	0.0	-0.0	-0.0	0.0	-0.0	-32.63
	2190	-0.0	-0.0	-0.0	0.0	-0.0	-33.62
Min	Cent	-0.0	-0.0	-0.0	0.0	-0.1	-24.54
	56	-0.0	-0.1	-0.0	-0.0	-0.1	-21.16
	2693	-0.0	-0.1	-0.0	0.0	-0.1	-16.20
	2298	0.0	-0.0	-0.0	0.0	-0.0	-32.63
	2190	-0.0	-0.0	-0.0	0.0	-0.0	-33.62

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	56	-0.0	-0.0
	2693	-0.0	-0.0
	2298	-0.0	-0.0
	2190	-0.0	-0.0
Min	Cent	-0.0	-0.0
	56	-0.0	-0.0
	2693	-0.0	-0.0
	2298	-0.0	-0.0
	2190	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5144	3	4	S1 HL-~1	Max	Cent	-0.0	-2.0	-0.1	-0.0	-2.0	-2.33
					2402	0.2	-2.0	-0.1	0.2	-2.0	-2.07
					2190	0.2	-2.0	-0.1	0.2	-2.0	-2.12
					2501	-0.3	-2.0	-0.1	-0.3	-2.0	-2.68
					1870	-0.3	-2.0	-0.1	-0.3	-2.0	-2.59
				Min	Cent	-0.0	-2.0	-0.1	-0.0	-2.0	-2.33
					2402	0.2	-2.0	-0.1	0.2	-2.0	-2.07
					2190	0.2	-2.0	-0.1	0.2	-2.0	-2.12
					2501	-0.3	-2.0	-0.1	-0.3	-2.0	-2.68
					1870	-0.3	-2.0	-0.1	-0.3	-2.0	-2.59

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-36.78
	2402	0.0	-0.0	-0.0	0.0	-0.0	-34.21
	2190	-0.0	-0.0	-0.0	0.0	-0.0	-36.84
	2501	-0.0	-0.0	-0.0	-0.0	-0.0	-46.24
	1870	-0.0	-0.0	-0.0	0.0	-0.0	-27.86
Min	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-36.78
	2402	0.0	-0.0	-0.0	0.0	-0.0	-34.21
	2190	-0.0	-0.0	-0.0	0.0	-0.0	-36.84
	2501	-0.0	-0.0	-0.0	-0.0	-0.0	-46.24
	1870	-0.0	-0.0	-0.0	0.0	-0.0	-27.86

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	2402	0.0	0.0
	2190	0.0	-0.0
	2501	0.0	-0.0
	1870	0.0	0.0
Min	Cent	0.0	-0.0
	2402	0.0	0.0
	2190	0.0	-0.0
	2501	0.0	-0.0
	1870	0.0	0.0

ELEM	MAT	SEC	LC	NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE

5145	3	4	S1 HL-~1	Max	Cent	-0.1	-2.0	0.1	-0.0	-2.0	2.62
					2190	0.2	-2.0	0.1	0.2	-2.0	2.38
					2298	0.2	-2.0	0.1	0.2	-2.0	2.33
					1121	-0.3	-2.0	0.1	-0.3	-2.0	2.92
					2501	-0.3	-2.0	0.1	-0.3	-2.0	3.00
				Min	Cent	-0.1	-2.0	0.1	-0.0	-2.0	2.62
					2190	0.2	-2.0	0.1	0.2	-2.0	2.38
					2298	0.2	-2.0	0.1	0.2	-2.0	2.33
					1121	-0.3	-2.0	0.1	-0.3	-2.0	2.92
					2501	-0.3	-2.0	0.1	-0.3	-2.0	3.00

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	0.0	-0.0	-35.35
	2190		-0.0	-0.0	-0.0	0.0	-0.0	-35.23
	2298		-0.0	-0.0	-0.0	0.0	-0.0	-28.48
	1121		0.0	-0.0	-0.0	0.0	-0.0	-41.15
	2501		-0.0	-0.0	-0.0	0.0	-0.0	-35.68
Min	Cent		-0.0	-0.0	-0.0	0.0	-0.0	-35.35
	2190		-0.0	-0.0	-0.0	0.0	-0.0	-35.23
	2298		-0.0	-0.0	-0.0	0.0	-0.0	-28.48
	1121		0.0	-0.0	-0.0	0.0	-0.0	-41.15
	2501		-0.0	-0.0	-0.0	0.0	-0.0	-35.68

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	2190		-0.0	-0.0
	2298		-0.0	-0.0
	1121		-0.0	-0.0
	2501		-0.0	-0.0
Min	Cent		-0.0	-0.0
	2190		-0.0	-0.0
	2298		-0.0	-0.0
	1121		-0.0	-0.0
	2501		-0.0	-0.0

ELEM	MAT	SEC	LC			NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5146	3	4	S1 HL-~1	Max	Cent		0.0	-0.5	-0.1	0.0	-0.5	-8.68
					1870		0.2	-0.5	-0.1	0.2	-0.5	-6.59
					2501		0.2	-0.5	-0.1	0.2	-0.5	-6.45
					5008		-0.1	-0.5	-0.1	-0.1	-0.5	-12.60
					5021		-0.1	-0.5	-0.1	-0.1	-0.5	-13.09
				Min	Cent		0.0	-0.5	-0.1	0.0	-0.5	-8.68
					1870		0.2	-0.5	-0.1	0.2	-0.5	-6.59
					2501		0.2	-0.5	-0.1	0.2	-0.5	-6.45
					5008		-0.1	-0.5	-0.1	-0.1	-0.5	-12.60
					5021		-0.1	-0.5	-0.1	-0.1	-0.5	-13.09

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	0.0	-0.0	43.59
	1870		-0.0	-0.0	0.0	0.0	-0.0	16.91
	2501		-0.0	-0.0	0.0	-0.0	-0.0	47.15
	5008		-0.0	0.0	0.0	0.0	-0.0	54.79
	5021		0.0	0.0	0.0	0.0	-0.0	52.66
Min	Cent		-0.0	-0.0	0.0	0.0	-0.0	43.59
	1870		-0.0	-0.0	0.0	0.0	-0.0	16.91
	2501		-0.0	-0.0	0.0	-0.0	-0.0	47.15
	5008		-0.0	0.0	0.0	0.0	-0.0	54.79
	5021		0.0	0.0	0.0	0.0	-0.0	52.66

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	1870		0.0	-0.0
	2501		0.0	-0.0
	5008		0.0	-0.0
	5021		0.0	-0.0
Min	Cent		0.0	-0.0
	1870		0.0	-0.0
	2501		0.0	-0.0
	5008		0.0	-0.0
	5021		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5147	3	4	S1 HL-~1	Max	Cent	0.0	-0.4	0.1	0.0	-0.5	8.26
					2501	0.2	-0.5	0.1	0.2	-0.5	6.06
					1121	0.2	-0.4	0.1	0.2	-0.4	6.44
					5022	-0.1	-0.4	0.1	-0.1	-0.4	12.80
					5008	-0.1	-0.5	0.1	-0.1	-0.5	11.42
				Min	Cent	0.0	-0.4	0.1	0.0	-0.5	8.26
					2501	0.2	-0.5	0.1	0.2	-0.5	6.06
					1121	0.2	-0.4	0.1	0.2	-0.4	6.44
					5022	-0.1	-0.4	0.1	-0.1	-0.4	12.80
					5008	-0.1	-0.5	0.1	-0.1	-0.5	11.42

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	-0.0	0.0	0.0	-0.0	43.39
		2501	-0.0	-0.0	0.0	0.0	-0.0	23.63
		1121	0.0	-0.0	0.0	0.0	-0.0	30.29
		5022	-0.0	-0.0	0.0	0.0	-0.0	42.27
		5008	-0.0	-0.0	0.0	0.0	-0.0	63.04
	Min	Cent	-0.0	-0.0	0.0	0.0	-0.0	43.39
		2501	-0.0	-0.0	0.0	0.0	-0.0	23.63
		1121	0.0	-0.0	0.0	0.0	-0.0	30.29
		5022	-0.0	-0.0	0.0	0.0	-0.0	42.27
		5008	-0.0	-0.0	0.0	0.0	-0.0	63.04

		NODE	Vxx	Vyy
	Max	Cent	-0.0	-0.0
		2501	-0.0	-0.0
		1121	-0.0	-0.0
		5022	-0.0	-0.0
		5008	-0.0	-0.0
	Min	Cent	-0.0	-0.0
		2501	-0.0	-0.0
		1121	-0.0	-0.0
		5022	-0.0	-0.0
		5008	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5148	3	3	S1 HL-~1	Max	Cent	-0.0	1.3	-0.0	1.3	-0.0	-87.92
					2684	0.1	1.3	-0.0	1.3	0.1	-87.63
					1913	0.1	1.3	-0.0	1.3	0.1	-87.62
					717	-0.2	1.3	-0.0	1.3	-0.2	-88.14
					3545	-0.2	1.3	-0.0	1.3	-0.2	-88.15
				Min	Cent	-0.0	1.3	-0.0	1.3	-0.0	-87.92
					2684	0.1	1.3	-0.0	1.3	0.1	-87.63
					1913	0.1	1.3	-0.0	1.3	0.1	-87.62
					717	-0.2	1.3	-0.0	1.3	-0.2	-88.14
					3545	-0.2	1.3	-0.0	1.3	-0.2	-88.15

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-63.69
		2684	-0.0	0.0	-0.0	0.0	-0.0	-62.98
		1913	-0.0	0.0	-0.0	0.0	-0.0	-70.16
		717	-0.0	0.0	-0.0	0.0	-0.0	-70.48
		3545	-0.0	0.0	-0.0	0.0	-0.0	-58.05
	Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-63.69
		2684	-0.0	0.0	-0.0	0.0	-0.0	-62.98
		1913	-0.0	0.0	-0.0	0.0	-0.0	-70.16
		717	-0.0	0.0	-0.0	0.0	-0.0	-70.48
		3545	-0.0	0.0	-0.0	0.0	-0.0	-58.05

		NODE	Vxx	Vyy
	Max	Cent	0.0	-0.0
		2684	0.0	0.0
		1913	0.0	-0.0
		717	0.0	-0.0
		3545	0.0	0.0
	Min	Cent	0.0	-0.0
		2684	0.0	0.0
		1913	0.0	-0.0
		717	0.0	-0.0

					3545	0.0	0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5149	3	3	S1 HL-~1	Max	Cent	-0.0	1.3	0.1	1.3	-0.0	87.59
					1913	0.1	1.3	0.1	1.3	0.1	87.28
					1208	0.1	1.3	0.1	1.3	0.1	87.37
					3557	-0.2	1.3	0.1	1.3	-0.2	87.84
					717	-0.2	1.3	0.1	1.3	-0.2	87.78
				Min	Cent	-0.0	1.3	0.1	1.3	-0.0	87.59
					1913	0.1	1.3	0.1	1.3	0.1	87.28
					1208	0.1	1.3	0.1	1.3	0.1	87.37
					3557	-0.2	1.3	0.1	1.3	-0.2	87.84
					717	-0.2	1.3	0.1	1.3	-0.2	87.78

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-62.23
		1913	-0.0	0.0	-0.0	0.0	-0.0	-72.06
		1208	-0.0	-0.0	-0.0	0.0	-0.0	-46.13
		3557	0.0	0.0	-0.0	0.0	-0.0	-69.26
		717	-0.0	0.0	-0.0	0.0	-0.0	-68.01
	Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-62.23
		1913	-0.0	0.0	-0.0	0.0	-0.0	-72.06
		1208	-0.0	-0.0	-0.0	0.0	-0.0	-46.13
		3557	0.0	0.0	-0.0	0.0	-0.0	-69.26
		717	-0.0	0.0	-0.0	0.0	-0.0	-68.01

		NODE	Vxx	Vyy
	Max	Cent	-0.0	-0.0
		1913	-0.0	-0.0
		1208	-0.0	-0.0
		3557	-0.0	-0.0
		717	-0.0	-0.0
	Min	Cent	-0.0	-0.0
		1913	-0.0	-0.0
		1208	-0.0	-0.0
		3557	-0.0	-0.0
		717	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5150	3	3	S1 HL-~1	Max	Cent	0.0	2.3	-0.0	2.3	0.0	-89.37
					3545	0.1	2.2	-0.0	2.2	0.1	-89.34
					717	0.1	2.3	-0.0	2.3	0.1	-89.37
					2097	-0.0	2.3	-0.0	2.3	-0.0	-89.41
					1662	-0.0	2.2	-0.0	2.2	-0.0	-89.38
				Min	Cent	0.0	2.3	-0.0	2.3	0.0	-89.37
					3545	0.1	2.2	-0.0	2.2	0.1	-89.34
					717	0.1	2.3	-0.0	2.3	0.1	-89.37
					2097	-0.0	2.3	-0.0	2.3	-0.0	-89.41
					1662	-0.0	2.2	-0.0	2.2	-0.0	-89.38

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	0.0	0.0	-0.0	75.43
		3545	0.0	0.0	0.0	0.0	-0.0	70.54
		717	-0.0	0.0	0.0	0.0	-0.0	80.45
		2097	-0.0	0.0	0.0	0.0	-0.0	82.63
		1662	-0.0	0.0	0.0	0.0	-0.0	79.62
	Min	Cent	-0.0	0.0	0.0	0.0	-0.0	75.43
		3545	0.0	0.0	0.0	0.0	-0.0	70.54
		717	-0.0	0.0	0.0	0.0	-0.0	80.45
		2097	-0.0	0.0	0.0	0.0	-0.0	82.63
		1662	-0.0	0.0	0.0	0.0	-0.0	79.62

		NODE	Vxx	Vyy
	Max	Cent	0.0	-0.0
		3545	0.0	-0.0
		717	0.0	-0.0
		2097	0.0	-0.0
		1662	0.0	-0.0
	Min	Cent	0.0	-0.0
		3545	0.0	-0.0

					717	0.0	-0.0				
					2097	0.0	-0.0				
					1662	0.0	-0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5151	3	3	S1 HL-~1	Max	Cent	0.0	2.3	0.0	2.3	0.0	89.46
					717	0.1	2.3	0.0	2.3	0.1	89.42
					3557	0.1	2.4	0.0	2.4	0.1	89.43
					1148	-0.1	2.4	0.0	2.4	-0.1	89.49
					2097	-0.1	2.3	0.0	2.3	-0.1	89.48
				Min	Cent	0.0	2.3	0.0	2.3	0.0	89.46
					717	0.1	2.3	0.0	2.3	0.1	89.42
					3557	0.1	2.4	0.0	2.4	0.1	89.43
					1148	-0.1	2.4	0.0	2.4	-0.1	89.49
					2097	-0.1	2.3	0.0	2.3	-0.1	89.48

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	0.0	0.0	-0.0	79.50
		717	-0.0	0.0	0.0	0.0	-0.0	80.12
		3557	-0.0	0.0	0.0	0.0	-0.0	78.56
		1148	0.0	0.0	0.0	0.0	-0.0	76.75
		2097	-0.0	0.0	0.0	0.0	-0.0	82.43
	Min	Cent	-0.0	0.0	0.0	0.0	-0.0	79.50
		717	-0.0	0.0	0.0	0.0	-0.0	80.12
		3557	-0.0	0.0	0.0	0.0	-0.0	78.56
		1148	0.0	0.0	0.0	0.0	-0.0	76.75
		2097	-0.0	0.0	0.0	0.0	-0.0	82.43

		NODE	Vxx	Vyy
	Max	Cent	-0.0	-0.0
		717	-0.0	-0.0
		3557	-0.0	-0.0
		1148	-0.0	-0.0
		2097	-0.0	-0.0
	Min	Cent	-0.0	-0.0
		717	-0.0	-0.0
		3557	-0.0	-0.0
		1148	-0.0	-0.0
		2097	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5152	3	3	S1 HL-~1	Max	Cent	0.0	3.1	-0.0	3.1	0.0	-89.28
					1662	0.2	3.1	-0.0	3.1	0.2	-89.24
					2097	0.2	3.1	-0.0	3.1	0.2	-89.23
					716	-0.2	3.1	-0.0	3.1	-0.2	-89.31
					3544	-0.2	3.1	-0.0	3.1	-0.2	-89.32
				Min	Cent	0.0	3.1	-0.0	3.1	0.0	-89.28
					1662	0.2	3.1	-0.0	3.1	0.2	-89.24
					2097	0.2	3.1	-0.0	3.1	0.2	-89.23
					716	-0.2	3.1	-0.0	3.1	-0.2	-89.31
					3544	-0.2	3.1	-0.0	3.1	-0.2	-89.32

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-64.64
		1662	0.0	0.0	-0.0	0.0	-0.0	-67.54
		2097	-0.0	0.0	-0.0	0.0	-0.0	-70.94
		716	-0.0	0.0	-0.0	0.0	-0.0	-67.67
		3544	-0.0	0.0	-0.0	0.0	-0.0	-58.67
	Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-64.64
		1662	0.0	0.0	-0.0	0.0	-0.0	-67.54
		2097	-0.0	0.0	-0.0	0.0	-0.0	-70.94
		716	-0.0	0.0	-0.0	0.0	-0.0	-67.67
		3544	-0.0	0.0	-0.0	0.0	-0.0	-58.67

		NODE	Vxx	Vyy
	Max	Cent	0.0	0.0
		1662	0.0	0.0
		2097	0.0	0.0
		716	0.0	0.0
		3544	0.0	0.0

				Min	Cent	0.0	0.0			
					1662	0.0	0.0			
					2097	0.0	0.0			
					716	0.0	0.0			
					3544	0.0	0.0			

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5153	3	3	S1 HL-~1	Max	Cent	0.0	3.1	0.0	3.1	0.0	89.35
					2097	0.1	3.1	0.0	3.1	0.1	89.32
					1148	0.1	3.1	0.0	3.1	0.1	89.33
					3556	-0.1	3.1	0.0	3.1	-0.1	89.37
					716	-0.1	3.1	0.0	3.1	-0.1	89.36
				Min	Cent	0.0	3.1	0.0	3.1	0.0	89.35
					2097	0.1	3.1	0.0	3.1	0.1	89.32
					1148	0.1	3.1	0.0	3.1	0.1	89.33
					3556	-0.1	3.1	0.0	3.1	-0.1	89.37
					716	-0.1	3.1	0.0	3.1	-0.1	89.36

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-61.78
		2097	-0.0	0.0	-0.0	0.0	-0.0	-68.78
		1148	-0.0	0.0	-0.0	0.0	-0.0	-53.52
		3556	0.0	0.0	-0.0	0.0	-0.0	-71.62
		716	-0.0	0.0	-0.0	0.0	-0.0	-68.39
	Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-61.78
		2097	-0.0	0.0	-0.0	0.0	-0.0	-68.78
		1148	-0.0	0.0	-0.0	0.0	-0.0	-53.52
		3556	0.0	0.0	-0.0	0.0	-0.0	-71.62
		716	-0.0	0.0	-0.0	0.0	-0.0	-68.39

		NODE	Vxx	Vyy
	Max	Cent	-0.0	-0.0
		2097	-0.0	0.0
		1148	-0.0	-0.0
		3556	-0.0	-0.0
		716	-0.0	0.0
	Min	Cent	-0.0	-0.0
		2097	-0.0	0.0
		1148	-0.0	-0.0
		3556	-0.0	-0.0
		716	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5154	3	3	S1 HL-~1	Max	Cent	0.0	3.7	-0.0	3.7	0.0	-89.85
					3544	0.0	3.8	-0.0	3.8	0.0	-89.85
					716	0.0	3.6	-0.0	3.6	0.0	-89.84
					2201	0.0	3.6	-0.0	3.6	0.0	-89.84
					1718	0.0	3.8	-0.0	3.8	0.0	-89.85
				Min	Cent	0.0	3.7	-0.0	3.7	0.0	-89.85
					3544	0.0	3.8	-0.0	3.8	0.0	-89.85
					716	0.0	3.6	-0.0	3.6	0.0	-89.84
					2201	0.0	3.6	-0.0	3.6	0.0	-89.84
					1718	0.0	3.8	-0.0	3.8	0.0	-89.85

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	0.0	0.0	0.0	-0.0	66.97
		3544	-0.0	0.0	0.0	0.0	-0.0	63.06
		716	-0.0	0.0	0.0	0.0	-0.0	73.84
		2201	-0.0	0.0	0.0	0.0	-0.0	76.10
		1718	0.0	0.0	0.0	0.0	0.0	73.14
	Min	Cent	-0.0	0.0	0.0	0.0	-0.0	66.97
		3544	-0.0	0.0	0.0	0.0	-0.0	63.06
		716	-0.0	0.0	0.0	0.0	-0.0	73.84
		2201	-0.0	0.0	0.0	0.0	-0.0	76.10
		1718	0.0	0.0	0.0	0.0	0.0	73.14

		NODE	Vxx	Vyy
	Max	Cent	0.0	-0.0
		3544	0.0	-0.0
		716	0.0	0.0

	2201	0.0	0.0
	1718	0.0	-0.0
Min	Cent	0.0	-0.0
	3544	0.0	-0.0
	716	0.0	0.0
	2201	0.0	0.0
	1718	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5155	3	3	S1 HL-~1	Max	Cent	0.0	3.4	-0.0	3.4	0.0	-89.81
					716	0.0	3.6	-0.0	3.6	0.0	-89.81
					3556	0.0	3.2	-0.0	3.2	0.0	-89.80
					1332	-0.0	3.2	-0.0	3.2	-0.0	-89.80
					2201	-0.0	3.6	-0.0	3.6	-0.0	-89.82
				Min	Cent	0.0	3.4	-0.0	3.4	0.0	-89.81
					716	0.0	3.6	-0.0	3.6	0.0	-89.81
					3556	0.0	3.2	-0.0	3.2	0.0	-89.80
					1332	-0.0	3.2	-0.0	3.2	-0.0	-89.80
					2201	-0.0	3.6	-0.0	3.6	-0.0	-89.82

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	0.0	0.0	-0.0	73.28
	716		-0.0	0.0	0.0	0.0	-0.0	75.90
	3556		-0.0	0.0	0.0	0.0	-0.0	72.80
	1332		0.0	0.0	0.0	0.0	-0.0	68.09
	2201		-0.0	0.0	0.0	0.0	-0.0	69.36
Min	Cent		-0.0	0.0	0.0	0.0	-0.0	73.28
	716		-0.0	0.0	0.0	0.0	-0.0	75.90
	3556		-0.0	0.0	0.0	0.0	-0.0	72.80
	1332		0.0	0.0	0.0	0.0	-0.0	68.09
	2201		-0.0	0.0	0.0	0.0	-0.0	69.36

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	716		-0.0	0.0
	3556		-0.0	-0.0
	1332		-0.0	-0.0
	2201		-0.0	0.0
Min	Cent		-0.0	-0.0
	716		-0.0	0.0
	3556		-0.0	-0.0
	1332		-0.0	-0.0
	2201		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5156	3	3	S1 HL-~1	Max	Cent	0.0	4.2	-0.0	4.2	0.0	-89.62
					1718	0.2	4.4	-0.0	4.4	0.2	-89.63
					2201	0.2	3.9	-0.0	3.9	0.2	-89.59
					715	-0.1	3.9	-0.0	3.9	-0.1	-89.62
					3543	-0.1	4.4	-0.0	4.4	-0.1	-89.65
				Min	Cent	0.0	4.2	-0.0	4.2	0.0	-89.62
					1718	0.2	4.4	-0.0	4.4	0.2	-89.63
					2201	0.2	3.9	-0.0	3.9	0.2	-89.59
					715	-0.1	3.9	-0.0	3.9	-0.1	-89.62
					3543	-0.1	4.4	-0.0	4.4	-0.1	-89.65

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	0.0	0.0	-0.0	51.70
	1718		-0.0	-0.0	0.0	0.0	-0.0	44.53
	2201		-0.0	0.0	0.0	0.0	-0.0	58.47
	715		0.0	0.0	0.0	0.0	-0.0	50.88
	3543		0.0	0.0	0.0	0.0	-0.0	58.59
Min	Cent		-0.0	0.0	0.0	0.0	-0.0	51.70
	1718		-0.0	-0.0	0.0	0.0	-0.0	44.53
	2201		-0.0	0.0	0.0	0.0	-0.0	58.47
	715		0.0	0.0	0.0	0.0	-0.0	50.88
	3543		0.0	0.0	0.0	0.0	-0.0	58.59

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0

					1718	0.0	-0.0				
					2201	0.0	0.0				
					715	-0.0	0.0				
					3543	-0.0	-0.0				
				Min	Cent	0.0	-0.0				
					1718	0.0	-0.0				
					2201	0.0	0.0				
					715	-0.0	0.0				
					3543	-0.0	-0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5157	3	3	S1 HL-~1	Max	Cent	-0.0	3.8	0.0	3.8	-0.0	89.27
					2201	0.1	3.9	0.0	3.9	0.1	89.27
					1332	0.1	3.7	0.0	3.7	0.1	89.22
					3555	-0.2	3.7	0.0	3.7	-0.2	89.27
					715	-0.2	3.9	0.0	3.9	-0.2	89.32
				Min	Cent	-0.0	3.8	0.0	3.8	-0.0	89.27
					2201	0.1	3.9	0.0	3.9	0.1	89.27
					1332	0.1	3.7	0.0	3.7	0.1	89.22
					3555	-0.2	3.7	0.0	3.7	-0.2	89.27
					715	-0.2	3.9	0.0	3.9	-0.2	89.32

				NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
			Max	Cent	-0.0	0.0	0.0	0.0	-0.0	53.46
				2201	-0.0	0.0	0.0	0.0	-0.0	55.84
				1332	0.0	0.0	0.0	0.0	-0.0	56.30
				3555	-0.0	0.0	0.0	0.0	-0.0	49.80
				715	-0.0	0.0	0.0	0.0	-0.0	54.53
			Min	Cent	-0.0	0.0	0.0	0.0	-0.0	53.46
				2201	-0.0	0.0	0.0	0.0	-0.0	55.84
				1332	0.0	0.0	0.0	0.0	-0.0	56.30
				3555	-0.0	0.0	0.0	0.0	-0.0	49.80
				715	-0.0	0.0	0.0	0.0	-0.0	54.53

				NODE	Vxx	Vyy
			Max	Cent	-0.0	0.0
				2201	-0.0	0.0
				1332	-0.0	0.0
				3555	-0.0	0.0
				715	-0.0	0.0
			Min	Cent	-0.0	0.0
				2201	-0.0	0.0
				1332	-0.0	0.0
				3555	-0.0	0.0
				715	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5158	3	3	S1 HL-~1	Max	Cent	0.1	4.1	0.0	4.1	0.1	89.53
					3543	-0.1	3.8	0.0	3.8	-0.1	89.51
					715	-0.1	4.4	0.0	4.4	-0.1	89.58
					2309	0.2	4.4	0.0	4.4	0.2	89.55
					1766	0.2	3.8	0.0	3.8	0.2	89.47
				Min	Cent	0.1	4.1	0.0	4.1	0.1	89.53
					3543	-0.1	3.8	0.0	3.8	-0.1	89.51
					715	-0.1	4.4	0.0	4.4	-0.1	89.58
					2309	0.2	4.4	0.0	4.4	0.2	89.55
					1766	0.2	3.8	0.0	3.8	0.2	89.47

				NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
			Max	Cent	-0.0	0.0	0.0	0.0	-0.0	79.19
				3543	-0.0	0.0	0.0	0.0	-0.0	75.34
				715	0.0	0.0	0.0	0.0	0.0	76.50
				2309	-0.0	0.0	0.0	0.0	-0.0	85.89
				1766	-0.0	0.0	0.0	0.0	-0.0	83.00
			Min	Cent	-0.0	0.0	0.0	0.0	-0.0	79.19
				3543	-0.0	0.0	0.0	0.0	-0.0	75.34
				715	0.0	0.0	0.0	0.0	0.0	76.50
				2309	-0.0	0.0	0.0	0.0	-0.0	85.89
				1766	-0.0	0.0	0.0	0.0	-0.0	83.00

				NODE	Vxx	Vyy

Max	Cent	0.0	-0.0
	3543	-0.0	-0.0
	715	-0.0	-0.0
	2309	0.0	-0.0
	1766	0.0	-0.0
Min	Cent	0.0	-0.0
	3543	-0.0	-0.0
	715	-0.0	-0.0
	2309	0.0	-0.0
	1766	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5159	3	3	S1 HL-~1	Max	Cent	0.0	4.7	0.0	4.7	0.0	89.66
					715	0.1	4.4	0.0	4.4	0.1	89.63
					3555	0.1	4.9	0.0	4.9	0.1	89.67
					1152	-0.1	4.9	0.0	4.9	-0.1	89.68
					2309	-0.1	4.4	0.0	4.4	-0.1	89.65
				Min	Cent	0.0	4.7	0.0	4.7	0.0	89.66
					715	0.1	4.4	0.0	4.4	0.1	89.63
					3555	0.1	4.9	0.0	4.9	0.1	89.67
					1152	-0.1	4.9	0.0	4.9	-0.1	89.68
					2309	-0.1	4.4	0.0	4.4	-0.1	89.65

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.0	0.0	-0.0	-85.68
	715		-0.0	0.0	0.0	0.0	-0.0	84.76
	3555		-0.0	0.0	0.0	0.0	-0.0	79.15
	1152		0.0	0.0	0.0	0.0	0.0	83.56
	2309		-0.0	0.0	0.0	0.0	-0.0	84.80
Min	Cent		-0.0	0.0	-0.0	0.0	-0.0	-85.68
	715		-0.0	0.0	0.0	0.0	-0.0	84.76
	3555		-0.0	0.0	0.0	0.0	-0.0	79.15
	1152		0.0	0.0	0.0	0.0	0.0	83.56
	2309		-0.0	0.0	0.0	0.0	-0.0	84.80

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	715		-0.0	-0.0
	3555		-0.0	-0.0
	1152		-0.0	-0.0
	2309		-0.0	-0.0
Min	Cent		-0.0	-0.0
	715		-0.0	-0.0
	3555		-0.0	-0.0
	1152		-0.0	-0.0
	2309		-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5160	3	3	S1 HL-~1	Max	Cent	0.1	3.1	0.1	3.1	0.1	88.21
					1766	-0.1	2.6	0.1	2.7	-0.1	88.01
					2309	-0.1	3.6	0.1	3.6	-0.1	88.52
					2030	0.2	3.6	0.1	3.6	0.2	88.38
					2138	0.2	2.6	0.1	2.7	0.2	87.75
				Min	Cent	0.1	3.1	0.1	3.1	0.1	88.21
					1766	-0.1	2.6	0.1	2.7	-0.1	88.01
					2309	-0.1	3.6	0.1	3.6	-0.1	88.52
					2030	0.2	3.6	0.1	3.6	0.2	88.38
					2138	0.2	2.6	0.1	2.7	0.2	87.75

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	0.0	-0.0	74.20
	1766		0.0	0.0	-0.0	0.0	0.0	-85.01
	2309		-0.0	0.0	-0.0	0.0	-0.0	-81.84
	2030		-0.1	-0.0	0.0	-0.0	-0.1	73.10
	2138		-0.0	-0.0	0.0	0.0	-0.1	35.41
Min	Cent		-0.0	-0.0	0.0	0.0	-0.0	74.20
	1766		0.0	0.0	-0.0	0.0	0.0	-85.01
	2309		-0.0	0.0	-0.0	0.0	-0.0	-81.84
	2030		-0.1	-0.0	0.0	-0.0	-0.1	73.10
	2138		-0.0	-0.0	0.0	0.0	-0.1	35.41

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	1766	0.0	0.0
	2309	0.0	0.0
	2030	0.0	0.0
	2138	0.0	0.0
Min	Cent	0.0	0.0
	1766	0.0	0.0
	2309	0.0	0.0
	2030	0.0	0.0
	2138	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5161	3	3	S1 HL-~1	Max	Cent	0.1	4.1	-0.1	4.1	0.1	-87.90
					2309	-0.2	3.6	-0.1	3.6	-0.2	-87.75
					1152	-0.2	4.7	-0.1	4.7	-0.2	-88.25
					2086	0.3	4.7	-0.1	4.7	0.3	-88.03
					2030	0.3	3.6	-0.1	3.6	0.3	-87.36
				Min	Cent	0.1	4.1	-0.1	4.1	0.1	-87.90
					2309	-0.2	3.6	-0.1	3.6	-0.2	-87.75
					1152	-0.2	4.7	-0.1	4.7	-0.2	-88.25
					2086	0.3	4.7	-0.1	4.7	0.3	-88.03
					2030	0.3	3.6	-0.1	3.6	0.3	-87.36

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	0.0	0.0	0.0	59.29
	2309	-0.0	0.0	-0.0	0.0	-0.0	-88.54
	1152	-0.0	-0.0	0.0	-0.0	-0.0	25.31
	2086	0.0	0.1	0.0	0.1	-0.0	67.89
	2030	0.1	0.1	0.0	0.1	0.0	22.72
Min	Cent	0.0	0.0	0.0	0.0	0.0	59.29
	2309	-0.0	0.0	-0.0	0.0	-0.0	-88.54
	1152	-0.0	-0.0	0.0	-0.0	-0.0	25.31
	2086	0.0	0.1	0.0	0.1	-0.0	67.89
	2030	0.1	0.1	0.0	0.1	0.0	22.72

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	2309	-0.0	0.0
	1152	-0.0	-0.0
	2086	0.0	-0.0
	2030	0.0	0.0
Min	Cent	0.0	-0.0
	2309	-0.0	0.0
	1152	-0.0	-0.0
	2086	0.0	-0.0
	2030	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5162	3	3	S1 HL-~1	Max	Cent	-0.1	1.3	0.2	1.3	-0.1	81.76
					2138	-0.3	1.0	0.2	1.0	-0.3	81.61
					2030	-0.3	1.6	0.2	1.6	-0.3	84.07
					1384	0.2	1.6	0.2	1.6	0.2	81.89
					1177	0.2	1.0	0.2	1.1	0.2	76.68
				Min	Cent	-0.1	1.3	0.2	1.3	-0.1	81.76
					2138	-0.3	1.0	0.2	1.0	-0.3	81.61
					2030	-0.3	1.6	0.2	1.6	-0.3	84.07
					1384	0.2	1.6	0.2	1.6	0.2	81.89
					1177	0.2	1.0	0.2	1.1	0.2	76.68

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	0.2	0.2	-0.1	44.08
	2138	-0.0	-0.0	0.1	0.1	-0.1	41.24
	2030	-0.1	-0.0	0.1	0.1	-0.2	55.86
	1384	0.2	0.1	0.2	0.3	-0.1	34.01
	1177	0.0	0.0	0.2	0.2	-0.1	47.14
Min	Cent	0.0	0.0	0.2	0.2	-0.1	44.08
	2138	-0.0	-0.0	0.1	0.1	-0.1	41.24
	2030	-0.1	-0.0	0.1	0.1	-0.2	55.86

				1384	0.2	0.1	0.2	0.3	-0.1	34.01
				1177	0.0	0.0	0.2	0.2	-0.1	47.14

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	2138	0.0	-0.0
	2030	0.0	0.0
	1384	-0.0	0.0
	1177	-0.0	-0.0
Min	Cent	-0.0	-0.0
	2138	0.0	-0.0
	2030	0.0	0.0
	1384	-0.0	0.0
	1177	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5163	3	3	S1 HL-~1	Max	Cent	-0.1	1.7	-0.3	1.7	-0.1	-80.93
					2030	-0.4	1.6	-0.3	1.6	-0.4	-81.95
					2086	-0.4	1.8	-0.3	1.8	-0.4	-82.66
					2517	0.3	1.8	-0.3	1.8	0.2	-79.63
					1384	0.3	1.6	-0.3	1.6	0.2	-78.21
				Min	Cent	-0.1	1.7	-0.3	1.7	-0.1	-80.93
					2030	-0.4	1.6	-0.3	1.6	-0.4	-81.95
					2086	-0.4	1.8	-0.3	1.8	-0.4	-82.66
					2517	0.3	1.8	-0.3	1.8	0.2	-79.63
					1384	0.3	1.6	-0.3	1.6	0.2	-78.21

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.2	0.1	-0.2	48.40
	2030	0.1	0.1	0.1	0.2	-0.0	38.88
	2086	0.0	0.1	0.1	0.2	-0.1	52.91
	2517	-0.0	-0.0	0.2	0.1	-0.2	43.42
	1384	-0.2	-0.1	0.2	0.0	-0.3	57.03
Min	Cent	-0.0	0.0	0.2	0.1	-0.2	48.40
	2030	0.1	0.1	0.1	0.2	-0.0	38.88
	2086	0.0	0.1	0.1	0.2	-0.1	52.91
	2517	-0.0	-0.0	0.2	0.1	-0.2	43.42
	1384	-0.2	-0.1	0.2	0.0	-0.3	57.03

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	2030	0.0	0.0
	2086	0.0	0.0
	2517	-0.0	0.0
	1384	-0.0	0.0
Min	Cent	-0.0	0.0
	2030	0.0	0.0
	2086	0.0	0.0
	2517	-0.0	0.0
	1384	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5476	3	1	S1 HL-~1	Max	Cent	-0.4	0.0	1.1	0.9	-1.3	50.19
					1383	-1.0	-0.4	1.1	0.5	-1.8	52.67
					691	-1.0	0.4	1.1	1.0	-1.6	61.03
					4934	0.2	0.4	1.1	1.4	-0.8	47.62
					2087	0.2	-0.4	1.1	1.0	-1.2	37.70
				Min	Cent	-0.4	0.0	1.1	0.9	-1.3	50.19
					1383	-1.0	-0.4	1.1	0.5	-1.8	52.67
					691	-1.0	0.4	1.1	1.0	-1.6	61.03
					4934	0.2	0.4	1.1	1.4	-0.8	47.62
					2087	0.2	-0.4	1.1	1.0	-1.2	37.70

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.2	-0.0	0.0	-0.0	-0.2	84.10
	1383	0.1	0.1	-0.0	0.1	0.1	-67.67
	691	-0.9	-0.2	0.1	-0.2	-0.9	84.54
	4934	0.2	0.0	0.1	0.3	-0.0	13.86
	2087	-0.2	-0.1	-0.0	-0.1	-0.2	-82.71
Min	Cent	-0.2	-0.0	0.0	-0.0	-0.2	84.10

					1383	0.1	0.1	-0.0	0.1	0.1	-67.67
					691	-0.9	-0.2	0.1	-0.2	-0.9	84.54
					4934	0.2	0.0	0.1	0.3	-0.0	13.86
					2087	-0.2	-0.1	-0.0	-0.1	-0.2	-82.71

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	1383		0.1	0.0
	691		0.1	0.0
	4934		-0.0	0.0
	2087		-0.0	0.0
Min	Cent		0.0	0.0
	1383		0.1	0.0
	691		0.1	0.0
	4934		-0.0	0.0
	2087		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5477	3	1	S1 HL-~1	Max	Cent	-1.5	0.3	1.2	0.9	-2.1	63.46
					691	-3.7	0.1	1.2	0.4	-4.0	73.75
					1493	-3.7	0.6	1.2	0.9	-4.0	75.32
					1599	0.7	0.6	1.2	1.8	-0.6	43.10
					4934	0.7	0.1	1.2	1.6	-0.8	37.35
				Min	Cent	-1.5	0.3	1.2	0.9	-2.1	63.46
					691	-3.7	0.1	1.2	0.4	-4.0	73.75
					1493	-3.7	0.6	1.2	0.9	-4.0	75.32
					1599	0.7	0.6	1.2	1.8	-0.6	43.10
					4934	0.7	0.1	1.2	1.6	-0.8	37.35

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.2	0.1	-0.0	0.2	0.1	-13.12
	691		1.4	0.5	0.1	1.4	0.5	3.21
	1493		-0.4	-0.2	-0.0	-0.2	-0.5	-78.49
	1599		0.3	0.1	-0.1	0.3	0.1	-24.64
	4934		-0.3	-0.2	0.0	-0.2	-0.3	85.73
Min	Cent		0.2	0.1	-0.0	0.2	0.1	-13.12
	691		1.4	0.5	0.1	1.4	0.5	3.21
	1493		-0.4	-0.2	-0.0	-0.2	-0.5	-78.49
	1599		0.3	0.1	-0.1	0.3	0.1	-24.64
	4934		-0.3	-0.2	0.0	-0.2	-0.3	85.73

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	691		0.1	0.0
	1493		0.1	-0.0
	1599		-0.0	-0.0
	4934		-0.0	0.0
Min	Cent		0.0	0.0
	691		0.1	0.0
	1493		0.1	-0.0
	1599		-0.0	-0.0
	4934		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5478	3	1	S1 HL-~1	Max	Cent	-0.0	-0.3	1.3	1.1	-1.5	41.52
					2087	0.1	-0.9	1.3	1.0	-1.8	34.25
					4934	0.1	0.3	1.3	1.5	-1.1	47.12
					729	-0.1	0.3	1.3	1.4	-1.2	49.25
					1801	-0.1	-0.9	1.3	0.8	-1.9	36.16
				Min	Cent	-0.0	-0.3	1.3	1.1	-1.5	41.52
					2087	0.1	-0.9	1.3	1.0	-1.8	34.25
					4934	0.1	0.3	1.3	1.5	-1.1	47.12
					729	-0.1	0.3	1.3	1.4	-1.2	49.25
					1801	-0.1	-0.9	1.3	0.8	-1.9	36.16

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	-0.0	0.0	0.0	-0.0	15.14
	2087		-0.2	-0.1	0.0	-0.1	-0.2	88.17
	4934		0.3	0.0	-0.0	0.3	0.0	-0.42
	729		-0.0	0.0	-0.0	0.0	-0.0	-82.38

			1801	-0.0	0.0	0.0	0.0	-0.0	83.09
		Min	Cent	0.0	-0.0	0.0	0.0	-0.0	15.14
			2087	-0.2	-0.1	0.0	-0.1	-0.2	88.17
			4934	0.3	0.0	-0.0	0.3	0.0	-0.42
			729	-0.0	0.0	-0.0	0.0	-0.0	-82.38
			1801	-0.0	0.0	0.0	0.0	-0.0	83.09

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
		2087	-0.0	-0.0
		4934	-0.0	-0.0
		729	0.0	-0.0
		1801	0.0	-0.0
Min	Cent		-0.0	-0.0
		2087	-0.0	-0.0
		4934	-0.0	-0.0
		729	0.0	-0.0
		1801	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5479	3	1	S1 HL-~1	Max	Cent	0.4	1.4	0.9	1.9	-0.1	59.28
					4934	1.0	0.4	0.9	1.7	-0.2	35.35
					1599	1.0	2.3	0.9	2.8	0.6	63.13
					1809	-0.2	2.3	0.9	2.6	-0.5	72.60
					729	-0.2	0.4	0.9	1.0	-0.9	54.78
				Min	Cent	0.4	1.4	0.9	1.9	-0.1	59.28
					4934	1.0	0.4	0.9	1.7	-0.2	35.35
					1599	1.0	2.3	0.9	2.8	0.6	63.13
					1809	-0.2	2.3	0.9	2.6	-0.5	72.60
					729	-0.2	0.4	0.9	1.0	-0.9	54.78

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	0.0	-0.0	47.68
		4934	-0.3	-0.1	-0.0	-0.1	-0.3	-89.40
		1599	0.3	0.1	0.0	0.3	0.1	2.40
		1809	-0.0	-0.0	0.0	0.0	-0.0	32.53
		729	0.0	0.0	0.0	0.0	0.0	38.61
Min	Cent		-0.0	-0.0	0.0	0.0	-0.0	47.68
		4934	-0.3	-0.1	-0.0	-0.1	-0.3	-89.40
		1599	0.3	0.1	0.0	0.3	0.1	2.40
		1809	-0.0	-0.0	0.0	0.0	-0.0	32.53
		729	0.0	0.0	0.0	0.0	0.0	38.61

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
		4934	-0.0	-0.0
		1599	-0.0	0.0
		1809	0.0	0.0
		729	0.0	-0.0
Min	Cent		-0.0	-0.0
		4934	-0.0	-0.0
		1599	-0.0	0.0
		1809	0.0	0.0
		729	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5480	3	1	S1 HL-~1	Max	Cent	-0.0	-0.0	-0.0	0.0	-0.1	-43.60
					1801	-0.0	-1.0	-0.0	-0.0	-1.0	-2.21
					729	-0.0	0.9	-0.0	0.9	-0.0	-87.71
					2699	-0.0	0.9	-0.0	0.9	-0.0	-87.77
					700	-0.0	-1.0	-0.0	-0.0	-1.0	-2.27
				Min	Cent	-0.0	-0.0	-0.0	0.0	-0.1	-43.60
					1801	-0.0	-1.0	-0.0	-0.0	-1.0	-2.21
					729	-0.0	0.9	-0.0	0.9	-0.0	-87.71
					2699	-0.0	0.9	-0.0	0.9	-0.0	-87.77
					700	-0.0	-1.0	-0.0	-0.0	-1.0	-2.27

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-69.88
		1801	-0.0	-0.0	-0.0	-0.0	-0.0	-83.54

			729	-0.0	-0.0	-0.0	-0.0	-0.0	-86.68
			2699	-0.0	-0.0	-0.0	-0.0	-0.0	-82.36
			700	0.0	0.0	-0.0	0.0	0.0	-11.05
		Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-69.88
			1801	-0.0	-0.0	-0.0	-0.0	-0.0	-83.54
			729	-0.0	-0.0	-0.0	-0.0	-0.0	-86.68
			2699	-0.0	-0.0	-0.0	-0.0	-0.0	-82.36
			700	0.0	0.0	-0.0	0.0	0.0	-11.05

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	1801		0.0	0.0
	729		0.0	-0.0
	2699		0.0	-0.0
	700		0.0	0.0
Min	Cent		0.0	0.0
	1801		0.0	0.0
	729		0.0	-0.0
	2699		0.0	-0.0
	700		0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5481	3	1	S1 HL-~1	Max	Cent	-0.0	1.8	-0.1	1.8	-0.0	-88.25
					729	-0.1	0.9	-0.1	0.9	-0.1	-86.78
					1809	-0.1	2.8	-0.1	2.8	-0.1	-88.85
					712	0.0	2.8	-0.1	2.8	0.0	-88.80
					2699	0.0	0.9	-0.1	0.9	0.0	-86.31
				Min	Cent	-0.0	1.8	-0.1	1.8	-0.0	-88.25
					729	-0.1	0.9	-0.1	0.9	-0.1	-86.78
					1809	-0.1	2.8	-0.1	2.8	-0.1	-88.85
					712	0.0	2.8	-0.1	2.8	0.0	-88.80
					2699	0.0	0.9	-0.1	0.9	0.0	-86.31

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.0	0.0	0.0	-2.42
	729		0.0	0.0	-0.0	0.0	0.0	-2.40
	1809		-0.0	-0.0	-0.0	-0.0	-0.0	-18.02
	712		-0.0	-0.0	-0.0	-0.0	-0.0	-81.09
	2699		0.1	0.0	-0.0	0.1	0.0	-1.97
Min	Cent		0.0	0.0	-0.0	0.0	0.0	-2.42
	729		0.0	0.0	-0.0	0.0	0.0	-2.40
	1809		-0.0	-0.0	-0.0	-0.0	-0.0	-18.02
	712		-0.0	-0.0	-0.0	-0.0	-0.0	-81.09
	2699		0.1	0.0	-0.0	0.1	0.0	-1.97

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	729		0.0	-0.0
	1809		0.0	-0.0
	712		0.0	-0.0
	2699		0.0	-0.0
Min	Cent		0.0	-0.0
	729		0.0	-0.0
	1809		0.0	-0.0
	712		0.0	-0.0
	2699		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5482	3	1	S1 HL-~1	Max	Cent	0.0	0.1	-0.1	0.2	-0.1	-57.94
					700	0.0	-0.6	-0.1	0.0	-0.6	-10.78
					2699	0.0	0.9	-0.1	0.9	-0.0	-82.12
					727	0.0	0.9	-0.1	0.9	0.0	-82.03
					1697	0.0	-0.6	-0.1	0.0	-0.6	-10.63
				Min	Cent	0.0	0.1	-0.1	0.2	-0.1	-57.94
					700	0.0	-0.6	-0.1	0.0	-0.6	-10.78
					2699	0.0	0.9	-0.1	0.9	-0.0	-82.12
					727	0.0	0.9	-0.1	0.9	0.0	-82.03
					1697	0.0	-0.6	-0.1	0.0	-0.6	-10.63

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE

Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-53.02
	700	0.0	0.0	-0.0	0.0	0.0	-8.38
	2699	-0.0	-0.0	-0.0	-0.0	-0.0	-85.58
	727	-0.0	0.0	-0.0	0.0	-0.0	-66.60
	1697	0.0	0.0	-0.0	0.0	0.0	-13.46
Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-53.02
	700	0.0	0.0	-0.0	0.0	0.0	-8.38
	2699	-0.0	-0.0	-0.0	-0.0	-0.0	-85.58
	727	-0.0	0.0	-0.0	0.0	-0.0	-66.60
	1697	0.0	0.0	-0.0	0.0	0.0	-13.46

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	700	0.0	0.0
	2699	0.0	0.0
	727	0.0	0.0
	1697	0.0	0.0
Min	Cent	0.0	0.0
	700	0.0	0.0
	2699	0.0	0.0
	727	0.0	0.0
	1697	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5483	3	1	S1 HL-~1	Max	Cent	0.0	1.7	-0.1	1.7	0.0	-85.84
					2699	-0.0	0.9	-0.1	0.9	-0.0	-82.46
					712	-0.0	2.5	-0.1	2.5	-0.0	-87.23
					1705	0.1	2.5	-0.1	2.5	0.1	-87.13
					727	0.1	0.9	-0.1	0.9	0.1	-81.72
				Min	Cent	0.0	1.7	-0.1	1.7	0.0	-85.84
					2699	-0.0	0.9	-0.1	0.9	-0.0	-82.46
					712	-0.0	2.5	-0.1	2.5	-0.0	-87.23
					1705	0.1	2.5	-0.1	2.5	0.1	-87.13
					727	0.1	0.9	-0.1	0.9	0.1	-81.72

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	-0.0	0.0	0.0	-21.36
	2699	0.1	0.0	-0.0	0.1	0.0	-2.73
	712	-0.0	-0.0	-0.0	-0.0	-0.0	-59.92
	1705	0.0	0.0	-0.0	0.0	-0.0	-38.01
	727	-0.0	-0.0	-0.0	0.0	-0.0	-63.00
Min	Cent	0.0	0.0	-0.0	0.0	0.0	-21.36
	2699	0.1	0.0	-0.0	0.1	0.0	-2.73
	712	-0.0	-0.0	-0.0	-0.0	-0.0	-59.92
	1705	0.0	0.0	-0.0	0.0	-0.0	-38.01
	727	-0.0	-0.0	-0.0	0.0	-0.0	-63.00

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	2699	0.0	0.0
	712	0.0	-0.0
	1705	-0.0	-0.0
	727	-0.0	0.0
Min	Cent	0.0	-0.0
	2699	0.0	0.0
	712	0.0	-0.0
	1705	-0.0	-0.0
	727	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5484	3	1	S1 HL-~1	Max	Cent	-0.0	-0.0	-0.1	0.1	-0.1	-46.86
					1697	-0.0	-0.7	-0.1	-0.0	-0.8	-8.08
					727	-0.0	0.7	-0.1	0.8	-0.0	-82.32
					2707	-0.0	0.7	-0.1	0.8	-0.0	-82.20
					701	-0.0	-0.7	-0.1	0.0	-0.8	-7.95
				Min	Cent	-0.0	-0.0	-0.1	0.1	-0.1	-46.86
					1697	-0.0	-0.7	-0.1	-0.0	-0.8	-8.08
					727	-0.0	0.7	-0.1	0.8	-0.0	-82.32
					2707	-0.0	0.7	-0.1	0.8	-0.0	-82.20
					701	-0.0	-0.7	-0.1	0.0	-0.8	-7.95

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.0	0.0	0.0	-18.18
	1697		0.0	0.0	-0.0	0.0	0.0	-15.37
	727		-0.0	-0.0	-0.0	-0.0	-0.0	-25.00
	2707		0.0	0.0	0.0	0.0	0.0	3.43
	701		-0.0	-0.0	0.0	-0.0	-0.0	86.14
Min	Cent		0.0	0.0	-0.0	0.0	0.0	-18.18
	1697		0.0	0.0	-0.0	0.0	0.0	-15.37
	727		-0.0	-0.0	-0.0	-0.0	-0.0	-25.00
	2707		0.0	0.0	0.0	0.0	0.0	3.43
	701		-0.0	-0.0	0.0	-0.0	-0.0	86.14

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	1697		0.0	0.0
	727		0.0	-0.0
	2707		-0.0	-0.0
	701		-0.0	0.0
Min	Cent		-0.0	-0.0
	1697		0.0	0.0
	727		0.0	-0.0
	2707		-0.0	-0.0
	701		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5485	3	1	S1 HL-~1	Max	Cent	0.0	1.5	-0.1	1.5	0.0	-87.97
					727	0.0	0.8	-0.1	0.8	0.0	-85.96
					1705	0.0	2.2	-0.1	2.2	0.0	-88.64
					713	0.0	2.2	-0.1	2.2	0.0	-88.65
					2707	0.0	0.8	-0.1	0.8	0.0	-86.02
				Min	Cent	0.0	1.5	-0.1	1.5	0.0	-87.97
					727	0.0	0.8	-0.1	0.8	0.0	-85.96
					1705	0.0	2.2	-0.1	2.2	0.0	-88.64
					713	0.0	2.2	-0.1	2.2	0.0	-88.65
					2707	0.0	0.8	-0.1	0.8	0.0	-86.02

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	-0.0	-0.0	89.63
	727		-0.0	-0.0	-0.0	-0.0	-0.0	-81.40
	1705		0.0	0.0	-0.0	0.0	0.0	-22.26
	713		0.0	0.0	-0.0	0.0	0.0	-16.78
	2707		-0.0	-0.0	-0.0	-0.0	-0.0	-89.58
Min	Cent		-0.0	-0.0	0.0	-0.0	-0.0	89.63
	727		-0.0	-0.0	-0.0	-0.0	-0.0	-81.40
	1705		0.0	0.0	-0.0	0.0	0.0	-22.26
	713		0.0	0.0	-0.0	0.0	0.0	-16.78
	2707		-0.0	-0.0	-0.0	-0.0	-0.0	-89.58

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	727		-0.0	-0.0
	1705		-0.0	0.0
	713		-0.0	0.0
	2707		-0.0	-0.0
Min	Cent		-0.0	-0.0
	727		-0.0	-0.0
	1705		-0.0	0.0
	713		-0.0	0.0
	2707		-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5486	3	1	S1 HL-~1	Max	Cent	-0.0	-0.1	-0.2	0.1	-0.2	-39.41
					701	-0.0	-0.8	-0.2	0.0	-0.8	-12.68
					2707	-0.0	0.6	-0.2	0.6	-0.1	-75.57
					725	0.0	0.6	-0.2	0.6	-0.0	-74.88
					95	0.0	-0.8	-0.2	0.0	-0.8	-12.17
				Min	Cent	-0.0	-0.1	-0.2	0.1	-0.2	-39.41
					701	-0.0	-0.8	-0.2	0.0	-0.8	-12.68
					2707	-0.0	0.6	-0.2	0.6	-0.1	-75.57
					725	0.0	0.6	-0.2	0.6	-0.0	-74.88

	95	0.0	-0.8	-0.2	0.0	-0.8	-12.17

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	-0.0	-0.0	0.0	-0.0	-4.98
	701	-0.0	-0.0	0.0	-0.0	-0.0	83.58
	2707	0.0	0.0	0.0	0.0	0.0	1.89
	725	-0.0	-0.0	-0.0	-0.0	-0.0	-85.57
	95	0.0	0.0	-0.0	0.0	0.0	-2.15
Min	Cent	0.0	-0.0	-0.0	0.0	-0.0	-4.98
	701	-0.0	-0.0	0.0	-0.0	-0.0	83.58
	2707	0.0	0.0	0.0	0.0	0.0	1.89
	725	-0.0	-0.0	-0.0	-0.0	-0.0	-85.57
	95	0.0	0.0	-0.0	0.0	0.0	-2.15

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	701	-0.0	0.0
	2707	-0.0	-0.0
	725	0.0	-0.0
	95	0.0	0.0
Min	Cent	-0.0	-0.0
	701	-0.0	0.0
	2707	-0.0	-0.0
	725	0.0	-0.0
	95	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5487	3	1	S1 HL-~1	Max	Cent	0.0	1.3	-0.1	1.3	-0.0	-83.60
					2707	-0.1	0.6	-0.1	0.6	-0.1	-78.32
					713	-0.1	1.9	-0.1	1.9	-0.1	-85.93
					96	0.1	1.9	-0.1	1.9	0.1	-85.62
					725	0.1	0.6	-0.1	0.6	0.0	-75.55
				Min	Cent	0.0	1.3	-0.1	1.3	-0.0	-83.60
					2707	-0.1	0.6	-0.1	0.6	-0.1	-78.32
					713	-0.1	1.9	-0.1	1.9	-0.1	-85.93
					96	0.1	1.9	-0.1	1.9	0.1	-85.62
					725	0.1	0.6	-0.1	0.6	0.0	-75.55

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	66.59
	2707	-0.0	-0.0	-0.0	-0.0	-0.0	-87.50
	713	0.0	0.0	0.0	0.0	0.0	22.38
	96	-0.0	-0.0	0.0	0.0	-0.0	45.90
	725	0.0	0.0	0.0	0.0	0.0	17.85
Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	66.59
	2707	-0.0	-0.0	-0.0	-0.0	-0.0	-87.50
	713	0.0	0.0	0.0	0.0	0.0	22.38
	96	-0.0	-0.0	0.0	0.0	-0.0	45.90
	725	0.0	0.0	0.0	0.0	0.0	17.85

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	2707	-0.0	-0.0
	713	-0.0	0.0
	96	0.0	0.0
	725	0.0	-0.0
Min	Cent	-0.0	-0.0
	2707	-0.0	-0.0
	713	-0.0	0.0
	96	0.0	0.0
	725	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5488	3	1	S1 HL-~1	Max	Cent	-0.0	-0.1	-0.2	0.2	-0.3	-39.18
					95	-0.0	-0.6	-0.2	0.1	-0.7	-17.52
					725	-0.0	0.4	-0.2	0.5	-0.1	-67.05
					2715	-0.0	0.4	-0.2	0.5	-0.1	-67.70
					702	-0.0	-0.6	-0.2	0.0	-0.7	-17.95
				Min	Cent	-0.0	-0.1	-0.2	0.2	-0.3	-39.18
					95	-0.0	-0.6	-0.2	0.1	-0.7	-17.52

	725	-0.0	0.4	-0.2	0.5	-0.1	-67.05
	2715	-0.0	0.4	-0.2	0.5	-0.1	-67.70
	702	-0.0	-0.6	-0.2	0.0	-0.7	-17.95

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	0.0	0.0	0.0	63.95
	95	0.0	0.0	-0.0	0.0	0.0	-3.80
	725	-0.0	-0.0	-0.0	-0.0	-0.0	-88.69
	2715	0.0	0.0	0.0	0.0	0.0	53.01
	702	0.0	-0.0	0.0	0.0	-0.0	35.68
Min	Cent	0.0	0.0	0.0	0.0	0.0	63.95
	95	0.0	0.0	-0.0	0.0	0.0	-3.80
	725	-0.0	-0.0	-0.0	-0.0	-0.0	-88.69
	2715	0.0	0.0	0.0	0.0	0.0	53.01
	702	0.0	-0.0	0.0	0.0	-0.0	35.68

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	95	0.0	0.0
	725	0.0	-0.0
	2715	-0.0	-0.0
	702	-0.0	0.0
Min	Cent	0.0	-0.0
	95	0.0	0.0
	725	0.0	-0.0
	2715	-0.0	-0.0
	702	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5489	3	1	S1 HL-~1	Max	Cent	0.0	0.9	-0.2	1.0	-0.0	-80.11
					725	-0.0	0.4	-0.2	0.5	-0.1	-71.33
					96	-0.0	1.4	-0.2	1.5	-0.0	-83.67
					714	0.0	1.4	-0.2	1.5	0.0	-83.38
					2715	0.0	0.4	-0.2	0.5	-0.0	-68.97
				Min	Cent	0.0	0.9	-0.2	1.0	-0.0	-80.11
					725	-0.0	0.4	-0.2	0.5	-0.1	-71.33
					96	-0.0	1.4	-0.2	1.5	-0.0	-83.67
					714	0.0	1.4	-0.2	1.5	0.0	-83.38
					2715	0.0	0.4	-0.2	0.5	-0.0	-68.97

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	82.18
	725	0.0	0.0	0.0	0.0	-0.0	12.33
	96	-0.0	-0.0	0.0	-0.0	-0.0	61.08
	714	0.0	0.0	-0.0	0.0	0.0	-24.82
	2715	-0.0	-0.0	-0.0	-0.0	-0.0	-87.43
Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	82.18
	725	0.0	0.0	0.0	0.0	-0.0	12.33
	96	-0.0	-0.0	0.0	-0.0	-0.0	61.08
	714	0.0	0.0	-0.0	0.0	0.0	-24.82
	2715	-0.0	-0.0	-0.0	-0.0	-0.0	-87.43

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	725	0.0	-0.0
	96	0.0	0.0
	714	-0.0	0.0
	2715	-0.0	-0.0
Min	Cent	-0.0	-0.0
	725	0.0	-0.0
	96	0.0	0.0
	714	-0.0	0.0
	2715	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5490	3	1	S1 HL-~1	Max	Cent	-0.0	-0.1	-0.3	0.3	-0.3	-42.80
					702	-0.0	-0.4	-0.3	0.2	-0.5	-29.74
					2715	-0.0	0.2	-0.3	0.4	-0.2	-56.60
					723	-0.0	0.2	-0.3	0.4	-0.2	-56.77
					81	-0.0	-0.4	-0.3	0.2	-0.5	-29.89

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Min	Cent		-0.0	-0.1	-0.3	0.3	-0.3	-42.80
	702		-0.0	-0.4	-0.3	0.2	-0.5	-29.74
	2715		-0.0	0.2	-0.3	0.4	-0.2	-56.60
	723		-0.0	0.2	-0.3	0.4	-0.2	-56.77
	81		-0.0	-0.4	-0.3	0.2	-0.5	-29.89

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	-0.0	-0.0	0.0	-0.0	-32.03
	702		0.0	0.0	0.0	0.0	-0.0	36.01
	2715		0.0	-0.0	0.0	0.0	-0.0	5.76
	723		-0.0	0.0	-0.0	0.0	-0.0	-76.57
	81		0.0	0.0	-0.0	0.0	0.0	-20.36
Min	Cent		0.0	-0.0	-0.0	0.0	-0.0	-32.03
	702		0.0	0.0	0.0	0.0	-0.0	36.01
	2715		0.0	-0.0	0.0	0.0	-0.0	5.76
	723		-0.0	0.0	-0.0	0.0	-0.0	-76.57
	81		0.0	0.0	-0.0	0.0	0.0	-20.36

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	702		-0.0	0.0
	2715		-0.0	-0.0
	723		0.0	-0.0
	81		0.0	0.0
Min	Cent		0.0	-0.0
	702		-0.0	0.0
	2715		-0.0	-0.0
	723		0.0	-0.0
	81		0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5491	3	1	S1 HL-~1	Max	Cent	-0.0	0.5	-0.2	0.6	-0.1	-69.30
					2715	-0.1	0.2	-0.2	0.4	-0.2	-61.95
					714	-0.1	0.8	-0.2	0.9	-0.1	-75.91
					82	0.1	0.8	-0.2	0.9	-0.0	-73.98
					723	0.1	0.2	-0.2	0.4	-0.1	-55.95
				Min	Cent	-0.0	0.5	-0.2	0.6	-0.1	-69.30
					2715	-0.1	0.2	-0.2	0.4	-0.2	-61.95
					714	-0.1	0.8	-0.2	0.9	-0.1	-75.91
					82	0.1	0.8	-0.2	0.9	-0.0	-73.98
					723	0.1	0.2	-0.2	0.4	-0.1	-55.95

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	-0.0	-0.0	63.49
	2715		-0.0	-0.0	-0.0	-0.0	-0.0	-84.25
	714		0.0	0.0	-0.0	0.0	0.0	-2.39
	82		-0.0	-0.0	0.0	0.0	-0.0	53.42
	723		0.0	0.0	0.0	0.0	0.0	35.00
Min	Cent		-0.0	-0.0	0.0	-0.0	-0.0	63.49
	2715		-0.0	-0.0	-0.0	-0.0	-0.0	-84.25
	714		0.0	0.0	-0.0	0.0	0.0	-2.39
	82		-0.0	-0.0	0.0	0.0	-0.0	53.42
	723		0.0	0.0	0.0	0.0	0.0	35.00

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	2715		-0.0	-0.0
	714		-0.0	0.0
	82		0.0	0.0
	723		0.0	-0.0
Min	Cent		-0.0	-0.0
	2715		-0.0	-0.0
	714		-0.0	0.0
	82		0.0	0.0
	723		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5492	3	1	S1 HL-~1	Max	Cent	-0.0	-0.0	-0.3	0.3	-0.4	-44.16
					81	-0.0	-0.2	-0.3	0.3	-0.4	-38.82
					723	-0.0	0.1	-0.3	0.4	-0.3	-48.74

		5062	-0.0	0.1	-0.3	0.4	-0.3	-49.56
		5048	-0.0	-0.2	-0.3	0.3	-0.4	-39.62
	Min	Cent	-0.0	-0.0	-0.3	0.3	-0.4	-44.16
		81	-0.0	-0.2	-0.3	0.3	-0.4	-38.82
		723	-0.0	0.1	-0.3	0.4	-0.3	-48.74
		5062	-0.0	0.1	-0.3	0.4	-0.3	-49.56
		5048	-0.0	-0.2	-0.3	0.3	-0.4	-39.62

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	-0.0	0.0	-0.0	-40.81
	81	0.0	0.0	-0.0	0.0	0.0	-18.86
	723	-0.0	-0.0	-0.0	-0.0	-0.0	-80.28
	5062	0.0	0.0	0.0	0.0	0.0	0.91
	5048	-0.0	-0.0	-0.0	-0.0	-0.0	-87.20
Min	Cent	0.0	0.0	-0.0	0.0	-0.0	-40.81
	81	0.0	0.0	-0.0	0.0	0.0	-18.86
	723	-0.0	-0.0	-0.0	-0.0	-0.0	-80.28
	5062	0.0	0.0	0.0	0.0	0.0	0.91
	5048	-0.0	-0.0	-0.0	-0.0	-0.0	-87.20

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	81	0.0	0.0
	723	0.0	-0.0
	5062	-0.0	-0.0
	5048	-0.0	0.0
Min	Cent	-0.0	-0.0
	81	0.0	0.0
	723	0.0	-0.0
	5062	-0.0	-0.0
	5048	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5493	3	1	S1 HL-~1	Max	Cent	0.0	0.2	-0.3	0.4	-0.2	-55.09
					723	-0.0	0.1	-0.3	0.3	-0.3	-51.21
					82	-0.0	0.4	-0.3	0.5	-0.2	-62.27
					5063	0.1	0.4	-0.3	0.5	-0.1	-58.62
					5062	0.1	0.1	-0.3	0.4	-0.2	-46.33
				Min	Cent	0.0	0.2	-0.3	0.4	-0.2	-55.09
					723	-0.0	0.1	-0.3	0.3	-0.3	-51.21
					82	-0.0	0.4	-0.3	0.5	-0.2	-62.27
					5063	0.1	0.4	-0.3	0.5	-0.1	-58.62
					5062	0.1	0.1	-0.3	0.4	-0.2	-46.33

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	0.0	0.0	-0.0	61.44
	723	0.0	-0.0	0.0	0.0	-0.0	15.82
	82	-0.0	0.0	0.0	0.0	-0.0	87.67
	5063	-0.0	-0.0	-0.0	-0.0	-0.0	-84.95
	5062	0.0	0.0	0.0	0.0	0.0	70.39
Min	Cent	-0.0	-0.0	0.0	0.0	-0.0	61.44
	723	0.0	-0.0	0.0	0.0	-0.0	15.82
	82	-0.0	0.0	0.0	0.0	-0.0	87.67
	5063	-0.0	-0.0	-0.0	-0.0	-0.0	-84.95
	5062	0.0	0.0	0.0	0.0	0.0	70.39

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	723	0.0	-0.0
	82	0.0	0.0
	5063	0.0	0.0
	5062	0.0	-0.0
Min	Cent	0.0	-0.0
	723	0.0	-0.0
	82	0.0	0.0
	5063	0.0	0.0
	5062	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5494	3	1	S1 HL-~1	Max	Cent	-0.0	0.2	-0.4	0.5	-0.4	-50.61

		1621	0.0	0.4	-0.4	0.7	-0.3	-58.00
		2723	0.0	-0.1	-0.4	0.4	-0.5	-40.58
		4952	-0.0	-0.1	-0.4	0.4	-0.5	-42.41
		1614	-0.0	0.4	-0.4	0.7	-0.3	-59.46
	Min	Cent	-0.0	0.2	-0.4	0.5	-0.4	-50.61
		1621	0.0	0.4	-0.4	0.7	-0.3	-58.00
		2723	0.0	-0.1	-0.4	0.4	-0.5	-40.58
		4952	-0.0	-0.1	-0.4	0.4	-0.5	-42.41
		1614	-0.0	0.4	-0.4	0.7	-0.3	-59.46

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	0.0	-0.0	-47.48
	1621		0.0	0.0	-0.0	0.0	0.0	-4.01
	2723		-0.1	-0.0	0.0	-0.0	-0.1	89.21
	4952		0.0	0.0	-0.0	0.0	0.0	-7.67
	1614		-0.0	-0.0	-0.0	-0.0	-0.0	-72.68
Min	Cent		-0.0	-0.0	-0.0	0.0	-0.0	-47.48
	1621		0.0	0.0	-0.0	0.0	0.0	-4.01
	2723		-0.1	-0.0	0.0	-0.0	-0.1	89.21
	4952		0.0	0.0	-0.0	0.0	0.0	-7.67
	1614		-0.0	-0.0	-0.0	-0.0	-0.0	-72.68

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	1621		0.0	0.0
	2723		0.0	-0.0
	4952		-0.0	-0.0
	1614		-0.0	0.0
Min	Cent		0.0	-0.0
	1621		0.0	0.0
	2723		0.0	-0.0
	4952		-0.0	-0.0
	1614		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5495	3	1	S1 HL-~1	Max	Cent	-0.0	-0.4	-0.4	0.2	-0.7	-31.61
					2723	-0.1	-0.1	-0.4	0.3	-0.5	-42.63
					2485	-0.1	-0.7	-0.4	0.1	-0.9	-25.67
					2242	0.0	-0.7	-0.4	0.2	-0.9	-23.59
					4952	0.0	-0.1	-0.4	0.4	-0.4	-39.08
				Min	Cent	-0.0	-0.4	-0.4	0.2	-0.7	-31.61
					2723	-0.1	-0.1	-0.4	0.3	-0.5	-42.63
					2485	-0.1	-0.7	-0.4	0.1	-0.9	-25.67
					2242	0.0	-0.7	-0.4	0.2	-0.9	-23.59
					4952	0.0	-0.1	-0.4	0.4	-0.4	-39.08

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	0.0	-0.0	52.50
	2723		-0.0	-0.0	0.0	-0.0	-0.0	46.54
	2485		0.0	0.0	0.0	0.0	0.0	1.05
	2242		0.0	-0.0	0.0	0.0	-0.0	25.30
	4952		-0.0	0.0	0.0	0.0	-0.0	79.37
Min	Cent		-0.0	-0.0	0.0	0.0	-0.0	52.50
	2723		-0.0	-0.0	0.0	-0.0	-0.0	46.54
	2485		0.0	0.0	0.0	0.0	0.0	1.05
	2242		0.0	-0.0	0.0	0.0	-0.0	25.30
	4952		-0.0	0.0	0.0	0.0	-0.0	79.37

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	2723		-0.0	-0.0
	2485		-0.0	0.0
	2242		-0.0	0.0
	4952		-0.0	-0.0
Min	Cent		-0.0	-0.0
	2723		-0.0	-0.0
	2485		-0.0	0.0
	2242		-0.0	0.0
	4952		-0.0	-0.0

ELEM	MAT	SEC	LC	NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE

5496	3	1	S1 HL-~1	Max	Cent	0.0	0.3	-0.5	0.6	-0.3	-52.75
					1614	-0.0	0.7	-0.5	0.9	-0.2	-63.47
					4952	-0.0	-0.2	-0.5	0.4	-0.6	-40.59
					721	0.0	-0.2	-0.5	0.4	-0.5	-39.41
					63	0.0	0.7	-0.5	0.9	-0.2	-62.68
				Min	Cent	0.0	0.3	-0.5	0.6	-0.3	-52.75
					1614	-0.0	0.7	-0.5	0.9	-0.2	-63.47
					4952	-0.0	-0.2	-0.5	0.4	-0.6	-40.59
					721	0.0	-0.2	-0.5	0.4	-0.5	-39.41
					63	0.0	0.7	-0.5	0.9	-0.2	-62.68

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	73.48
	1614	-0.0	-0.0	0.0	-0.0	-0.0	73.46
	4952	0.0	0.0	-0.0	0.0	0.0	-12.83
	721	-0.1	-0.0	-0.0	-0.0	-0.1	-87.18
	63	0.1	0.0	0.0	0.1	0.0	6.88
Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	73.48
	1614	-0.0	-0.0	0.0	-0.0	-0.0	73.46
	4952	0.0	0.0	-0.0	0.0	0.0	-12.83
	721	-0.1	-0.0	-0.0	-0.0	-0.1	-87.18
	63	0.1	0.0	0.0	0.1	0.0	6.88

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	1614	-0.0	0.0
	4952	-0.0	0.0
	721	0.0	0.0
	63	0.0	0.0
Min	Cent	0.0	0.0
	1614	-0.0	0.0
	4952	-0.0	0.0
	721	0.0	0.0
	63	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5497	3	1	S1 HL-~1	Max	Cent	-0.0	-0.6	-0.5	0.2	-0.9	-28.37
					4952	-0.0	-0.2	-0.5	0.4	-0.6	-40.31
					2242	-0.0	-1.1	-0.5	0.1	-1.3	-19.91
					64	-0.1	-1.1	-0.5	0.1	-1.3	-20.54
					721	-0.1	-0.2	-0.5	0.3	-0.6	-41.78
				Min	Cent	-0.0	-0.6	-0.5	0.2	-0.9	-28.37
					4952	-0.0	-0.2	-0.5	0.4	-0.6	-40.31
					2242	-0.0	-1.1	-0.5	0.1	-1.3	-19.91
					64	-0.1	-1.1	-0.5	0.1	-1.3	-20.54
					721	-0.1	-0.2	-0.5	0.3	-0.6	-41.78

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	0.0	0.0	0.0	15.88
	4952	-0.0	-0.0	-0.0	-0.0	-0.0	-75.84
	2242	0.0	0.0	0.0	0.0	-0.0	39.38
	64	-0.1	-0.0	0.0	-0.0	-0.1	83.75
	721	0.1	0.0	-0.0	0.1	0.0	-3.57
Min	Cent	0.0	0.0	0.0	0.0	0.0	15.88
	4952	-0.0	-0.0	-0.0	-0.0	-0.0	-75.84
	2242	0.0	0.0	0.0	0.0	-0.0	39.38
	64	-0.1	-0.0	0.0	-0.0	-0.1	83.75
	721	0.1	0.0	-0.0	0.1	0.0	-3.57

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	4952	-0.0	0.0
	2242	-0.0	0.0
	64	0.0	0.0
	721	0.0	0.0
Min	Cent	0.0	0.0
	4952	-0.0	0.0
	2242	-0.0	0.0
	64	0.0	0.0
	721	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5498	3	1	S1 HL-~1	Max	Cent	-0.0	0.3	-0.5	0.7	-0.4	-52.98
					63	0.0	0.9	-0.5	1.2	-0.2	-65.14
					721	0.0	-0.4	-0.5	0.4	-0.7	-34.96
					4806	-0.1	-0.4	-0.5	0.3	-0.8	-37.31
					4784	-0.1	0.9	-0.5	1.2	-0.3	-66.58
				Min	Cent	-0.0	0.3	-0.5	0.7	-0.4	-52.98
					63	0.0	0.9	-0.5	1.2	-0.2	-65.14
					721	0.0	-0.4	-0.5	0.4	-0.7	-34.96
					4806	-0.1	-0.4	-0.5	0.3	-0.8	-37.31
					4784	-0.1	0.9	-0.5	1.2	-0.3	-66.58

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.0	0.0	0.0	-9.09
	63		0.1	0.0	-0.0	0.1	0.0	-8.45
	721		-0.1	-0.0	0.0	-0.0	-0.1	85.29
	4806		0.4	0.1	0.0	0.4	0.1	1.65
	4784		-0.2	-0.1	-0.0	-0.1	-0.2	-86.76
Min	Cent		0.0	0.0	-0.0	0.0	0.0	-9.09
	63		0.1	0.0	-0.0	0.1	0.0	-8.45
	721		-0.1	-0.0	0.0	-0.0	-0.1	85.29
	4806		0.4	0.1	0.0	0.4	0.1	1.65
	4784		-0.2	-0.1	-0.0	-0.1	-0.2	-86.76

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	63		0.0	-0.0
	721		0.0	-0.0
	4806		-0.0	-0.0
	4784		-0.0	-0.0
Min	Cent		-0.0	-0.0
	63		0.0	-0.0
	721		0.0	-0.0
	4806		-0.0	-0.0
	4784		-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5499	3	1	S1 HL-~1	Max	Cent	0.1	-0.9	-0.4	0.3	-1.1	-20.70
					721	-0.1	-0.3	-0.4	0.2	-0.7	-39.68
					64	-0.1	-1.5	-0.4	-0.0	-1.6	-16.99
					4785	0.4	-1.5	-0.4	0.5	-1.6	-12.84
					4806	0.4	-0.3	-0.4	0.6	-0.5	-25.94
				Min	Cent	0.1	-0.9	-0.4	0.3	-1.1	-20.70
					721	-0.1	-0.3	-0.4	0.2	-0.7	-39.68
					64	-0.1	-1.5	-0.4	-0.0	-1.6	-16.99
					4785	0.4	-1.5	-0.4	0.5	-1.6	-12.84
					4806	0.4	-0.3	-0.4	0.6	-0.5	-25.94

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-81.33
	721		0.1	0.0	0.0	0.1	0.0	4.63
	64		-0.1	-0.0	-0.0	-0.0	-0.1	-81.62
	4785		0.2	0.1	-0.0	0.2	0.1	-2.96
	4806		-0.4	-0.1	0.0	-0.1	-0.4	88.31
Min	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-81.33
	721		0.1	0.0	0.0	0.1	0.0	4.63
	64		-0.1	-0.0	-0.0	-0.0	-0.1	-81.62
	4785		0.2	0.1	-0.0	0.2	0.1	-2.96
	4806		-0.4	-0.1	0.0	-0.1	-0.4	88.31

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	721		0.0	-0.0
	64		0.0	0.0
	4785		-0.0	0.0
	4806		-0.0	-0.0
Min	Cent		-0.0	-0.0
	721		0.0	-0.0
	64		0.0	0.0
	4785		-0.0	0.0

					4806	-0.0	-0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5500	3	1	S1 HL-~1	Max	Cent	-0.0	0.6	-0.5	0.9	-0.3	-59.85
					4784	0.0	1.4	-0.5	1.6	-0.2	-71.74
					4806	0.0	-0.3	-0.5	0.4	-0.7	-36.29
					693	-0.1	-0.3	-0.5	0.3	-0.7	-39.07
					35	-0.1	1.4	-0.5	1.6	-0.3	-72.74
				Min	Cent	-0.0	0.6	-0.5	0.9	-0.3	-59.85
					4784	0.0	1.4	-0.5	1.6	-0.2	-71.74
					4806	0.0	-0.3	-0.5	0.4	-0.7	-36.29
					693	-0.1	-0.3	-0.5	0.3	-0.7	-39.07
					35	-0.1	1.4	-0.5	1.6	-0.3	-72.74

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.1	-0.0	0.0	-0.0	-0.1	82.40
		4784	-0.2	-0.1	0.0	-0.0	-0.2	78.93
		4806	0.4	0.1	-0.0	0.4	0.1	-5.71
		693	-1.3	-0.4	-0.0	-0.4	-1.3	-88.42
		35	0.6	0.2	0.0	0.6	0.2	3.27
	Min	Cent	-0.1	-0.0	0.0	-0.0	-0.1	82.40
		4784	-0.2	-0.1	0.0	-0.0	-0.2	78.93
		4806	0.4	0.1	-0.0	0.4	0.1	-5.71
		693	-1.3	-0.4	-0.0	-0.4	-1.3	-88.42
		35	0.6	0.2	0.0	0.6	0.2	3.27

		NODE	Vxx	Vyy
	Max	Cent	0.0	0.0
		4784	-0.0	0.0
		4806	-0.0	0.0
		693	0.1	0.0
		35	0.1	0.0
	Min	Cent	0.0	0.0
		4784	-0.0	0.0
		4806	-0.0	0.0
		693	0.1	0.0
		35	0.1	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5501	3	1	S1 HL-~1	Max	Cent	-0.5	-1.4	-0.6	-0.2	-1.6	-25.42
					4806	0.2	-0.4	-0.6	0.6	-0.8	-29.28
					4785	0.2	-2.3	-0.6	0.4	-2.4	-11.81
					36	-1.2	-2.3	-0.6	-0.9	-2.5	-22.25
					693	-1.2	-0.4	-0.6	-0.1	-1.5	-61.65
				Min	Cent	-0.5	-1.4	-0.6	-0.2	-1.6	-25.42
					4806	0.2	-0.4	-0.6	0.6	-0.8	-29.28
					4785	0.2	-2.3	-0.6	0.4	-2.4	-11.81
					36	-1.2	-2.3	-0.6	-0.9	-2.5	-22.25
					693	-1.2	-0.4	-0.6	-0.1	-1.5	-61.65

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	0.1	0.0	0.0	0.1	0.0	7.62
		4806	-0.4	-0.1	-0.0	-0.1	-0.4	-84.34
		4785	0.2	0.1	0.0	0.2	0.1	10.76
		36	-0.6	-0.2	0.0	-0.2	-0.7	86.82
		693	1.3	0.4	-0.0	1.3	0.4	-1.56
	Min	Cent	0.1	0.0	0.0	0.1	0.0	7.62
		4806	-0.4	-0.1	-0.0	-0.1	-0.4	-84.34
		4785	0.2	0.1	0.0	0.2	0.1	10.76
		36	-0.6	-0.2	0.0	-0.2	-0.7	86.82
		693	1.3	0.4	-0.0	1.3	0.4	-1.56

		NODE	Vxx	Vyy
	Max	Cent	0.0	0.0
		4806	-0.0	0.0
		4785	-0.0	0.0
		36	0.1	0.0
		693	0.1	0.0
	Min	Cent	0.0	0.0
		4806	-0.0	0.0

					4785	-0.0	0.0				
					36	0.1	0.0				
					693	0.1	0.0				

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5502	3	1	S1 HL-~1	Max	Cent	-0.0	0.6	0.5	0.9	-0.3	59.85
					35	-0.1	1.4	0.5	1.6	-0.3	72.74
					693	-0.1	-0.3	0.5	0.3	-0.7	39.07
					4881	0.0	-0.3	0.5	0.4	-0.7	36.29
					4852	0.0	1.4	0.5	1.6	-0.2	71.74
				Min	Cent	-0.0	0.6	0.5	0.9	-0.3	59.85
					35	-0.1	1.4	0.5	1.6	-0.3	72.74
					693	-0.1	-0.3	0.5	0.3	-0.7	39.07
					4881	0.0	-0.3	0.5	0.4	-0.7	36.29
					4852	0.0	1.4	0.5	1.6	-0.2	71.74

			NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
		Max	Cent	-0.1	-0.0	-0.0	-0.0	-0.1	-82.40
			35	0.6	0.2	-0.0	0.6	0.2	-3.27
			693	-1.3	-0.4	0.0	-0.4	-1.3	88.42
			4881	0.4	0.1	0.0	0.4	0.1	5.72
			4852	-0.2	-0.1	-0.0	-0.0	-0.2	-78.93
		Min	Cent	-0.1	-0.0	-0.0	-0.0	-0.1	-82.40
			35	0.6	0.2	-0.0	0.6	0.2	-3.27
			693	-1.3	-0.4	0.0	-0.4	-1.3	88.42
			4881	0.4	0.1	0.0	0.4	0.1	5.72
			4852	-0.2	-0.1	-0.0	-0.0	-0.2	-78.93

			NODE	Vxx	Vyy
		Max	Cent	0.0	-0.0
			35	0.1	-0.0
			693	0.1	-0.0
			4881	-0.0	-0.0
			4852	-0.0	-0.0
		Min	Cent	0.0	-0.0
			35	0.1	-0.0
			693	0.1	-0.0
			4881	-0.0	-0.0
			4852	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5503	3	1	S1 HL-~1	Max	Cent	-0.5	-1.4	0.6	-0.2	-1.6	25.42
					693	-1.2	-0.4	0.6	-0.1	-1.5	61.65
					36	-1.2	-2.3	0.6	-0.9	-2.5	22.26
					4853	0.2	-2.3	0.6	0.4	-2.4	11.82
					4881	0.2	-0.4	0.6	0.6	-0.8	29.27
				Min	Cent	-0.5	-1.4	0.6	-0.2	-1.6	25.42
					693	-1.2	-0.4	0.6	-0.1	-1.5	61.65
					36	-1.2	-2.3	0.6	-0.9	-2.5	22.26
					4853	0.2	-2.3	0.6	0.4	-2.4	11.82
					4881	0.2	-0.4	0.6	0.6	-0.8	29.27

			NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
		Max	Cent	0.1	0.0	-0.0	0.1	0.0	-7.61
			693	1.3	0.4	0.0	1.3	0.4	1.56
			36	-0.6	-0.2	-0.0	-0.2	-0.7	-86.82
			4853	0.2	0.1	-0.0	0.2	0.1	-10.76
			4881	-0.4	-0.1	0.0	-0.1	-0.4	84.34
		Min	Cent	0.1	0.0	-0.0	0.1	0.0	-7.61
			693	1.3	0.4	0.0	1.3	0.4	1.56
			36	-0.6	-0.2	-0.0	-0.2	-0.7	-86.82
			4853	0.2	0.1	-0.0	0.2	0.1	-10.76
			4881	-0.4	-0.1	0.0	-0.1	-0.4	84.34

			NODE	Vxx	Vyy
		Max	Cent	0.0	-0.0
			693	0.1	-0.0
			36	0.1	-0.0
			4853	-0.0	-0.0
			4881	-0.0	-0.0

				Min	Cent	0.0	-0.0			
					693	0.1	-0.0			
					36	0.1	-0.0			
					4853	-0.0	-0.0			
					4881	-0.0	-0.0			

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5504	3	1	S1 HL-~1	Max	Cent	-0.0	0.3	0.5	0.7	-0.4	52.99
					4852	-0.1	0.9	0.5	1.2	-0.3	66.58
					4881	-0.1	-0.4	0.5	0.3	-0.8	37.31
					719	0.0	-0.4	0.5	0.4	-0.7	34.97
					55	0.0	0.9	0.5	1.2	-0.2	65.14
				Min	Cent	-0.0	0.3	0.5	0.7	-0.4	52.99
					4852	-0.1	0.9	0.5	1.2	-0.3	66.58
					4881	-0.1	-0.4	0.5	0.3	-0.8	37.31
					719	0.0	-0.4	0.5	0.4	-0.7	34.97
					55	0.0	0.9	0.5	1.2	-0.2	65.14

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	0.0	0.0	0.0	0.0	0.0	9.11
		4852	-0.2	-0.1	0.0	-0.1	-0.2	86.75
		4881	0.4	0.1	-0.0	0.4	0.1	-1.65
		719	-0.1	-0.0	-0.0	-0.0	-0.1	-85.29
		55	0.1	0.0	0.0	0.1	0.0	8.46
	Min	Cent	0.0	0.0	0.0	0.0	0.0	9.11
		4852	-0.2	-0.1	0.0	-0.1	-0.2	86.75
		4881	0.4	0.1	-0.0	0.4	0.1	-1.65
		719	-0.1	-0.0	-0.0	-0.0	-0.1	-85.29
		55	0.1	0.0	0.0	0.1	0.0	8.46

		NODE	Vxx	Vyy
	Max	Cent	-0.0	0.0
		4852	-0.0	0.0
		4881	-0.0	0.0
		719	0.0	0.0
		55	0.0	0.0
	Min	Cent	-0.0	0.0
		4852	-0.0	0.0
		4881	-0.0	0.0
		719	0.0	0.0
		55	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5505	3	1	S1 HL-~1	Max	Cent	0.1	-0.9	0.4	0.3	-1.1	20.71
					4881	0.4	-0.3	0.4	0.6	-0.5	25.95
					4853	0.4	-1.5	0.4	0.5	-1.6	12.84
					56	-0.1	-1.5	0.4	-0.0	-1.6	17.00
					719	-0.1	-0.3	0.4	0.2	-0.7	39.69
				Min	Cent	0.1	-0.9	0.4	0.3	-1.1	20.71
					4881	0.4	-0.3	0.4	0.6	-0.5	25.95
					4853	0.4	-1.5	0.4	0.5	-1.6	12.84
					56	-0.1	-1.5	0.4	-0.0	-1.6	17.00
					719	-0.1	-0.3	0.4	0.2	-0.7	39.69

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	81.31
		4881	-0.4	-0.1	-0.0	-0.1	-0.4	-88.31
		4853	0.2	0.1	0.0	0.2	0.1	2.96
		56	-0.1	-0.0	0.0	-0.0	-0.1	81.61
		719	0.1	0.0	-0.0	0.1	0.0	-4.63
	Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	81.31
		4881	-0.4	-0.1	-0.0	-0.1	-0.4	-88.31
		4853	0.2	0.1	0.0	0.2	0.1	2.96
		56	-0.1	-0.0	0.0	-0.0	-0.1	81.61
		719	0.1	0.0	-0.0	0.1	0.0	-4.63

		NODE	Vxx	Vyy
	Max	Cent	-0.0	0.0
		4881	-0.0	0.0
		4853	-0.0	-0.0

	56	0.0	-0.0		
	719	0.0	0.0		
Min	Cent	-0.0	0.0		
	4881	-0.0	0.0		
	4853	-0.0	-0.0		
	56	0.0	-0.0		
	719	0.0	0.0		

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5506	3	1	S1 HL-~1	Max	Cent	0.0	0.3	0.5	0.6	-0.3	52.75
					55	0.0	0.7	0.5	0.9	-0.2	62.69
					719	0.0	-0.2	0.5	0.4	-0.5	39.41
					4946	-0.0	-0.2	0.5	0.4	-0.5	40.59
					2299	-0.0	0.7	0.5	0.9	-0.2	63.48
				Min	Cent	0.0	0.3	0.5	0.6	-0.3	52.75
					55	0.0	0.7	0.5	0.9	-0.2	62.69
					719	0.0	-0.2	0.5	0.4	-0.5	39.41
					4946	-0.0	-0.2	0.5	0.4	-0.5	40.59
					2299	-0.0	0.7	0.5	0.9	-0.2	63.48

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-73.52
	55		0.1	0.0	-0.0	0.1	0.0	-6.87
	719		-0.1	-0.0	0.0	-0.0	-0.1	87.18
	4946		0.0	0.0	0.0	0.0	0.0	12.85
	2299		-0.0	-0.0	-0.0	-0.0	-0.0	-73.49
Min	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-73.52
	55		0.1	0.0	-0.0	0.1	0.0	-6.87
	719		-0.1	-0.0	0.0	-0.0	-0.1	87.18
	4946		0.0	0.0	0.0	0.0	0.0	12.85
	2299		-0.0	-0.0	-0.0	-0.0	-0.0	-73.49

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	55		0.0	-0.0
	719		0.0	-0.0
	4946		-0.0	-0.0
	2299		-0.0	-0.0
Min	Cent		0.0	-0.0
	55		0.0	-0.0
	719		0.0	-0.0
	4946		-0.0	-0.0
	2299		-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5507	3	1	S1 HL-~1	Max	Cent	-0.0	-0.6	0.5	0.2	-0.9	28.38
					719	-0.1	-0.2	0.5	0.3	-0.6	41.79
					56	-0.1	-1.1	0.5	0.1	-1.3	20.55
					2190	-0.0	-1.1	0.5	0.1	-1.3	19.92
					4946	-0.0	-0.2	0.5	0.4	-0.6	40.31
				Min	Cent	-0.0	-0.6	0.5	0.2	-0.9	28.38
					719	-0.1	-0.2	0.5	0.3	-0.6	41.79
					56	-0.1	-1.1	0.5	0.1	-1.3	20.55
					2190	-0.0	-1.1	0.5	0.1	-1.3	19.92
					4946	-0.0	-0.2	0.5	0.4	-0.6	40.31

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.0	0.0	0.0	-15.84
	719		0.1	0.0	0.0	0.1	0.0	3.58
	56		-0.1	-0.0	-0.0	-0.0	-0.1	-83.76
	2190		0.0	0.0	-0.0	0.0	-0.0	-39.37
	4946		-0.0	-0.0	0.0	-0.0	-0.0	75.83
Min	Cent		0.0	0.0	-0.0	0.0	0.0	-15.84
	719		0.1	0.0	0.0	0.1	0.0	3.58
	56		-0.1	-0.0	-0.0	-0.0	-0.1	-83.76
	2190		0.0	0.0	-0.0	0.0	-0.0	-39.37
	4946		-0.0	-0.0	0.0	-0.0	-0.0	75.83

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0

						719	0.0	-0.0			
						56	0.0	-0.0			
						2190	-0.0	-0.0			
						4946	-0.0	-0.0			
					Min	Cent	0.0	-0.0			
						719	0.0	-0.0			
						56	0.0	-0.0			
						2190	-0.0	-0.0			
						4946	-0.0	-0.0			

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5508	3	1	S1 HL-~1	Max	Cent	-0.0	0.2	0.4	0.5	-0.4	50.62
					2299	-0.0	0.4	0.4	0.7	-0.3	59.46
					4946	-0.0	-0.1	0.4	0.4	-0.5	42.42
					690	0.0	-0.1	0.4	0.4	-0.5	40.59
					2493	0.0	0.4	0.4	0.7	-0.3	58.00
				Min	Cent	-0.0	0.2	0.4	0.5	-0.4	50.62
					2299	-0.0	0.4	0.4	0.7	-0.3	59.46
					4946	-0.0	-0.1	0.4	0.4	-0.5	42.42
					690	0.0	-0.1	0.4	0.4	-0.5	40.59
					2493	0.0	0.4	0.4	0.7	-0.3	58.00

			NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
		Max	Cent	-0.0	-0.0	0.0	0.0	-0.0	47.48
			2299	-0.0	-0.0	0.0	-0.0	-0.0	72.65
			4946	0.0	0.0	0.0	0.0	0.0	7.69
			690	-0.1	-0.0	-0.0	-0.0	-0.1	-89.22
			2493	0.0	0.0	0.0	0.0	0.0	4.02
		Min	Cent	-0.0	-0.0	0.0	0.0	-0.0	47.48
			2299	-0.0	-0.0	0.0	-0.0	-0.0	72.65
			4946	0.0	0.0	0.0	0.0	0.0	7.69
			690	-0.1	-0.0	-0.0	-0.0	-0.1	-89.22
			2493	0.0	0.0	0.0	0.0	0.0	4.02

			NODE	Vxx	Vyy
		Max	Cent	0.0	0.0
			2299	-0.0	-0.0
			4946	-0.0	0.0
			690	0.0	0.0
			2493	0.0	-0.0
		Min	Cent	0.0	0.0
			2299	-0.0	-0.0
			4946	-0.0	0.0
			690	0.0	0.0
			2493	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5509	3	1	S1 HL-~1	Max	Cent	-0.0	-0.4	0.4	0.2	-0.7	31.62
					4946	0.0	-0.1	0.4	0.4	-0.4	39.09
					2190	0.0	-0.7	0.4	0.2	-0.9	23.60
					2501	-0.1	-0.7	0.4	0.1	-0.9	25.68
					690	-0.1	-0.1	0.4	0.3	-0.5	42.64
				Min	Cent	-0.0	-0.4	0.4	0.2	-0.7	31.62
					4946	0.0	-0.1	0.4	0.4	-0.4	39.09
					2190	0.0	-0.7	0.4	0.2	-0.9	23.60
					2501	-0.1	-0.7	0.4	0.1	-0.9	25.68
					690	-0.1	-0.1	0.4	0.3	-0.5	42.64

			NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
		Max	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-52.50
			4946	-0.0	0.0	-0.0	0.0	-0.0	-79.39
			2190	0.0	-0.0	-0.0	0.0	-0.0	-25.25
			2501	0.0	0.0	-0.0	0.0	0.0	-0.99
			690	-0.0	-0.0	-0.0	-0.0	-0.0	-46.09
		Min	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-52.50
			4946	-0.0	0.0	-0.0	0.0	-0.0	-79.39
			2190	0.0	-0.0	-0.0	0.0	-0.0	-25.25
			2501	0.0	0.0	-0.0	0.0	0.0	-0.99
			690	-0.0	-0.0	-0.0	-0.0	-0.0	-46.09

			NODE	Vxx	Vyy

Max	Cent	-0.0	0.0
	4946	-0.0	0.0
	2190	-0.0	-0.0
	2501	-0.0	-0.0
	690	-0.0	0.0
Min	Cent	-0.0	0.0
	4946	-0.0	0.0
	2190	-0.0	-0.0
	2501	-0.0	-0.0
	690	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5510	3	1	S1 HL-~1	Max	Cent	-0.0	0.0	0.4	0.4	-0.4	46.90
					2493	-0.0	0.1	0.4	0.4	-0.3	49.79
					690	-0.0	-0.0	0.4	0.4	-0.4	44.68
					5007	-0.0	-0.0	0.4	0.4	-0.4	43.97
					4993	-0.0	0.1	0.4	0.4	-0.3	49.10
				Min	Cent	-0.0	0.0	0.4	0.4	-0.4	46.90
					2493	-0.0	0.1	0.4	0.4	-0.3	49.79
					690	-0.0	-0.0	0.4	0.4	-0.4	44.68
					5007	-0.0	-0.0	0.4	0.4	-0.4	43.97
					4993	-0.0	0.1	0.4	0.4	-0.3	49.10

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-67.67
	2493	0.0	0.0	-0.0	0.0	0.0	0.0	-6.42
	690	-0.1	-0.0	-0.0	-0.0	-0.1	-0.1	-87.19
	5007	0.0	0.0	-0.0	0.0	0.0	0.0	-0.18
	4993	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-84.50
Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-67.67
	2493	0.0	0.0	-0.0	0.0	0.0	0.0	-6.42
	690	-0.1	-0.0	-0.0	-0.0	-0.1	-0.1	-87.19
	5007	0.0	0.0	-0.0	0.0	0.0	0.0	-0.18
	4993	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-84.50

		NODE	Vxx	Vyy
Max	Cent	0.0	-0.0	
	2493	0.0	-0.0	
	690	0.0	0.0	
	5007	-0.0	0.0	
	4993	-0.0	-0.0	
Min	Cent	0.0	-0.0	
	2493	0.0	-0.0	
	690	0.0	0.0	
	5007	-0.0	0.0	
	4993	-0.0	-0.0	

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5511	3	1	S1 HL-~1	Max	Cent	0.0	-0.1	0.3	0.3	-0.4	40.80
					690	0.0	-0.0	0.3	0.3	-0.3	42.20
					2501	0.0	-0.2	0.3	0.3	-0.4	36.51
					5008	-0.0	-0.2	0.3	0.2	-0.4	39.41
					5007	-0.0	-0.0	0.3	0.3	-0.4	45.28
				Min	Cent	0.0	-0.1	0.3	0.3	-0.4	40.80
					690	0.0	-0.0	0.3	0.3	-0.3	42.20
					2501	0.0	-0.2	0.3	0.3	-0.4	36.51
					5008	-0.0	-0.2	0.3	0.2	-0.4	39.41
					5007	-0.0	-0.0	0.3	0.3	-0.4	45.28

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	-0.0	60.22
	690	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	77.70
	2501	0.0	0.0	0.0	0.0	0.0	0.0	9.40
	5008	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	88.85
	5007	-0.0	0.0	0.0	0.0	-0.0	-0.0	46.88
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	-0.0	60.22
	690	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	77.70
	2501	0.0	0.0	0.0	0.0	0.0	0.0	9.40
	5008	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	88.85
	5007	-0.0	0.0	0.0	0.0	-0.0	-0.0	46.88

	NODE	Vxx	Vyy
Max	Cent	-0.0	-0.0
	690	-0.0	0.0
	2501	-0.0	-0.0
	5008	0.0	-0.0
	5007	0.0	0.0
Min	Cent	-0.0	-0.0
	690	-0.0	0.0
	2501	-0.0	-0.0
	5008	0.0	-0.0
	5007	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5512	3	1	S1 HL-~1	Max	Cent	-0.0	-0.1	0.3	0.3	-0.3	42.80
					1905	-0.0	-0.4	0.3	0.2	-0.5	29.88
					731	-0.0	0.2	0.3	0.4	-0.2	56.77
					689	-0.0	0.2	0.3	0.4	-0.2	56.61
					705	-0.0	-0.4	0.3	0.2	-0.5	29.73
				Min	Cent	-0.0	-0.1	0.3	0.3	-0.3	42.80
					1905	-0.0	-0.4	0.3	0.2	-0.5	29.88
					731	-0.0	0.2	0.3	0.4	-0.2	56.77
					689	-0.0	0.2	0.3	0.4	-0.2	56.61
					705	-0.0	-0.4	0.3	0.2	-0.5	29.73

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	-0.0	0.0	0.0	-0.0	32.27
	1905	0.0	0.0	0.0	0.0	0.0	20.53
	731	-0.0	0.0	0.0	0.0	-0.0	76.48
	689	0.0	-0.0	-0.0	0.0	-0.0	-5.83
	705	0.0	0.0	-0.0	0.0	-0.0	-35.35
Min	Cent	0.0	-0.0	0.0	0.0	-0.0	32.27
	1905	0.0	0.0	0.0	0.0	0.0	20.53
	731	-0.0	0.0	0.0	0.0	-0.0	76.48
	689	0.0	-0.0	-0.0	0.0	-0.0	-5.83
	705	0.0	0.0	-0.0	0.0	-0.0	-35.35

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	1905	0.0	-0.0
	731	0.0	0.0
	689	-0.0	0.0
	705	-0.0	-0.0
Min	Cent	0.0	0.0
	1905	0.0	-0.0
	731	0.0	0.0
	689	-0.0	0.0
	705	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5513	3	1	S1 HL-~1	Max	Cent	-0.0	0.5	0.2	0.6	-0.1	69.32
					731	0.1	0.2	0.2	0.4	-0.1	55.96
					1913	0.1	0.8	0.2	0.9	-0.0	73.99
					717	-0.1	0.8	0.2	0.9	-0.1	75.92
					689	-0.1	0.2	0.2	0.4	-0.2	61.96
				Min	Cent	-0.0	0.5	0.2	0.6	-0.1	69.32
					731	0.1	0.2	0.2	0.4	-0.1	55.96
					1913	0.1	0.8	0.2	0.9	-0.0	73.99
					717	-0.1	0.8	0.2	0.9	-0.1	75.92
					689	-0.1	0.2	0.2	0.4	-0.2	61.96

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-63.43
	731	0.0	0.0	-0.0	0.0	0.0	-35.53
	1913	-0.0	-0.0	-0.0	0.0	-0.0	-53.31
	717	0.0	0.0	0.0	0.0	0.0	2.69
	689	-0.0	-0.0	0.0	-0.0	-0.0	84.15
Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-63.43
	731	0.0	0.0	-0.0	0.0	0.0	-35.53
	1913	-0.0	-0.0	-0.0	0.0	-0.0	-53.31

					717	0.0	0.0	0.0	0.0	0.0	2.69
					689	-0.0	-0.0	0.0	-0.0	-0.0	84.15

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
		731	0.0	0.0
		1913	0.0	-0.0
		717	-0.0	-0.0
		689	-0.0	0.0
Min	Cent		-0.0	0.0
		731	0.0	0.0
		1913	0.0	-0.0
		717	-0.0	-0.0
		689	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5514	3	1	S1 HL-~1	Max	Cent	-0.0	-0.1	0.2	0.2	-0.3	39.18
					705	-0.0	-0.6	0.2	0.0	-0.7	17.95
					689	-0.0	0.4	0.2	0.5	-0.1	67.71
					733	-0.0	0.4	0.2	0.5	-0.1	67.06
					2089	-0.0	-0.6	0.2	0.1	-0.7	17.51
				Min	Cent	-0.0	-0.1	0.2	0.2	-0.3	39.18
					705	-0.0	-0.6	0.2	0.0	-0.7	17.95
					689	-0.0	0.4	0.2	0.5	-0.1	67.71
					733	-0.0	0.4	0.2	0.5	-0.1	67.06
					2089	-0.0	-0.6	0.2	0.1	-0.7	17.51

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	-0.0	0.0	0.0	-65.43
		705	0.0	-0.0	-0.0	0.0	-0.0	-35.26
		689	0.0	0.0	-0.0	0.0	0.0	-53.99
		733	-0.0	-0.0	0.0	-0.0	-0.0	88.58
		2089	0.0	0.0	0.0	0.0	0.0	3.87
Min	Cent		0.0	0.0	-0.0	0.0	0.0	-65.43
		705	0.0	-0.0	-0.0	0.0	-0.0	-35.26
		689	0.0	0.0	-0.0	0.0	0.0	-53.99
		733	-0.0	-0.0	0.0	-0.0	-0.0	88.58
		2089	0.0	0.0	0.0	0.0	0.0	3.87

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
		705	-0.0	-0.0
		689	-0.0	0.0
		733	0.0	0.0
		2089	0.0	-0.0
Min	Cent		0.0	0.0
		705	-0.0	-0.0
		689	-0.0	0.0
		733	0.0	0.0
		2089	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5515	3	1	S1 HL-~1	Max	Cent	0.0	0.9	0.2	1.0	-0.0	80.12
					689	0.0	0.4	0.2	0.5	-0.0	68.98
					717	0.0	1.4	0.2	1.5	0.0	83.38
					2097	-0.0	1.4	0.2	1.5	-0.0	83.67
					733	-0.0	0.4	0.2	0.5	-0.1	71.34
				Min	Cent	0.0	0.9	0.2	1.0	-0.0	80.12
					689	0.0	0.4	0.2	0.5	-0.0	68.98
					717	0.0	1.4	0.2	1.5	0.0	83.38
					2097	-0.0	1.4	0.2	1.5	-0.0	83.67
					733	-0.0	0.4	0.2	0.5	-0.1	71.34

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-82.16
		689	-0.0	-0.0	0.0	-0.0	-0.0	87.39
		717	0.0	0.0	0.0	0.0	0.0	24.96
		2097	-0.0	-0.0	-0.0	-0.0	-0.0	-60.62
		733	0.0	0.0	-0.0	0.0	-0.0	-12.38
Min	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-82.16

					689	-0.0	-0.0	0.0	-0.0	-0.0	87.39
					717	0.0	0.0	0.0	0.0	0.0	24.96
					2097	-0.0	-0.0	-0.0	-0.0	-0.0	-60.62
					733	0.0	0.0	-0.0	0.0	-0.0	-12.38

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	689	-0.0	0.0
	717	-0.0	-0.0
	2097	0.0	-0.0
	733	0.0	0.0
Min	Cent	-0.0	0.0
	689	-0.0	0.0
	717	-0.0	-0.0
	2097	0.0	-0.0
	733	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5516	3	1	S1 HL-~1	Max	Cent	-0.0	-0.1	0.2	0.1	-0.2	39.41
					2089	0.0	-0.8	0.2	0.0	-0.8	12.17
					733	0.0	0.6	0.2	0.6	-0.0	74.88
					688	-0.0	0.6	0.2	0.6	-0.1	75.57
					704	-0.0	-0.8	0.2	0.0	-0.8	12.68
				Min	Cent	-0.0	-0.1	0.2	0.1	-0.2	39.41
					2089	0.0	-0.8	0.2	0.0	-0.8	12.17
					733	0.0	0.6	0.2	0.6	-0.0	74.88
					688	-0.0	0.6	0.2	0.6	-0.1	75.57
					704	-0.0	-0.8	0.2	0.0	-0.8	12.68

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	-0.0	0.0	0.0	-0.0	5.30
	2089	0.0	0.0	0.0	0.0	0.0	2.24
	733	-0.0	-0.0	0.0	-0.0	-0.0	85.55
	688	0.0	0.0	-0.0	0.0	0.0	-1.92
	704	-0.0	-0.0	-0.0	-0.0	-0.0	-83.59
Min	Cent	0.0	-0.0	0.0	0.0	-0.0	5.30
	2089	0.0	0.0	0.0	0.0	0.0	2.24
	733	-0.0	-0.0	0.0	-0.0	-0.0	85.55
	688	0.0	0.0	-0.0	0.0	0.0	-1.92
	704	-0.0	-0.0	-0.0	-0.0	-0.0	-83.59

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	2089	0.0	-0.0
	733	0.0	0.0
	688	-0.0	0.0
	704	-0.0	-0.0
Min	Cent	-0.0	0.0
	2089	0.0	-0.0
	733	0.0	0.0
	688	-0.0	0.0
	704	-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5517	3	1	S1 HL-~1	Max	Cent	0.0	1.3	0.1	1.3	-0.0	83.60
					733	0.1	0.6	0.1	0.6	0.0	75.55
					2097	0.1	1.9	0.1	1.9	0.1	85.62
					716	-0.1	1.9	0.1	1.9	-0.1	85.93
					688	-0.1	0.6	0.1	0.6	-0.1	78.32
				Min	Cent	0.0	1.3	0.1	1.3	-0.0	83.60
					733	0.1	0.6	0.1	0.6	0.0	75.55
					2097	0.1	1.9	0.1	1.9	0.1	85.62
					716	-0.1	1.9	0.1	1.9	-0.1	85.93
					688	-0.1	0.6	0.1	0.6	-0.1	78.32

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-66.50
	733	0.0	0.0	-0.0	0.0	0.0	-18.22
	2097	-0.0	-0.0	-0.0	0.0	-0.0	-45.65
	716	0.0	0.0	-0.0	0.0	0.0	-22.68

			688	-0.0	-0.0	0.0	-0.0	-0.0	87.49
		Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-66.50
			733	0.0	0.0	-0.0	0.0	0.0	-18.22
			2097	-0.0	-0.0	-0.0	0.0	-0.0	-45.65
			716	0.0	0.0	-0.0	0.0	0.0	-22.68
			688	-0.0	-0.0	0.0	-0.0	-0.0	87.49

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
		733	0.0	0.0
		2097	0.0	-0.0
		716	-0.0	-0.0
		688	-0.0	0.0
Min	Cent		-0.0	0.0
		733	0.0	0.0
		2097	0.0	-0.0
		716	-0.0	-0.0
		688	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5518	3	1	S1 HL-~1	Max	Cent	-0.0	-0.0	0.1	0.1	-0.1	46.87
					704	-0.0	-0.7	0.1	0.0	-0.8	7.95
					688	-0.0	0.7	0.1	0.8	-0.0	82.20
					735	-0.0	0.7	0.1	0.8	-0.0	82.32
					2193	-0.0	-0.7	0.1	-0.0	-0.8	8.08
				Min	Cent	-0.0	-0.0	0.1	0.1	-0.1	46.87
					704	-0.0	-0.7	0.1	0.0	-0.8	7.95
					688	-0.0	0.7	0.1	0.8	-0.0	82.20
					735	-0.0	0.7	0.1	0.8	-0.0	82.32
					2193	-0.0	-0.7	0.1	-0.0	-0.8	8.08

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	0.0	0.0	0.0	18.38
		704	-0.0	-0.0	-0.0	-0.0	-0.0	-86.11
		688	0.0	0.0	-0.0	0.0	0.0	-3.44
		735	-0.0	-0.0	0.0	-0.0	-0.0	23.86
		2193	0.0	0.0	0.0	0.0	0.0	15.64
Min	Cent		0.0	0.0	0.0	0.0	0.0	18.38
		704	-0.0	-0.0	-0.0	-0.0	-0.0	-86.11
		688	0.0	0.0	-0.0	0.0	0.0	-3.44
		735	-0.0	-0.0	0.0	-0.0	-0.0	23.86
		2193	0.0	0.0	0.0	0.0	0.0	15.64

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
		704	-0.0	-0.0
		688	-0.0	0.0
		735	0.0	0.0
		2193	0.0	-0.0
Min	Cent		-0.0	0.0
		704	-0.0	-0.0
		688	-0.0	0.0
		735	0.0	0.0
		2193	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5519	3	1	S1 HL-~1	Max	Cent	0.0	1.5	0.1	1.5	0.0	87.97
					688	0.0	0.8	0.1	0.8	0.0	86.02
					716	0.0	2.2	0.1	2.2	0.0	88.65
					2201	0.0	2.2	0.1	2.2	0.0	88.64
					735	0.0	0.8	0.1	0.8	0.0	85.96
				Min	Cent	0.0	1.5	0.1	1.5	0.0	87.97
					688	0.0	0.8	0.1	0.8	0.0	86.02
					716	0.0	2.2	0.1	2.2	0.0	88.65
					2201	0.0	2.2	0.1	2.2	0.0	88.64
					735	0.0	0.8	0.1	0.8	0.0	85.96

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-89.66
		688	-0.0	-0.0	0.0	-0.0	-0.0	89.56

			716	0.0	0.0	0.0	0.0	0.0	16.88
			2201	0.0	0.0	0.0	0.0	0.0	21.98
			735	-0.0	-0.0	0.0	-0.0	-0.0	81.56
		Min	Cent	-0.0	-0.0	-0.0	-0.0	-0.0	-89.66
			688	-0.0	-0.0	0.0	-0.0	-0.0	89.56
			716	0.0	0.0	0.0	0.0	0.0	16.88
			2201	0.0	0.0	0.0	0.0	0.0	21.98
			735	-0.0	-0.0	0.0	-0.0	-0.0	81.56

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
	688		-0.0	0.0
	716		-0.0	-0.0
	2201		-0.0	-0.0
	735		-0.0	0.0
Min	Cent		-0.0	0.0
	688		-0.0	0.0
	716		-0.0	-0.0
	2201		-0.0	-0.0
	735		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5520	3	1	S1 HL-~1	Max	Cent	0.0	0.1	0.1	0.2	-0.1	57.94
					2193	0.0	-0.6	0.1	0.0	-0.6	10.64
					735	0.0	0.9	0.1	0.9	0.0	82.02
					1591	0.0	0.9	0.1	0.9	-0.0	82.11
					703	0.0	-0.6	0.1	0.0	-0.6	10.80
				Min	Cent	0.0	0.1	0.1	0.2	-0.1	57.94
					2193	0.0	-0.6	0.1	0.0	-0.6	10.64
					735	0.0	0.9	0.1	0.9	0.0	82.02
					1591	0.0	0.9	0.1	0.9	-0.0	82.11
					703	0.0	-0.6	0.1	0.0	-0.6	10.80

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	0.0	0.0	0.0	-0.0	53.16
	2193		0.0	0.0	0.0	0.0	0.0	13.82
	735		0.0	0.0	0.0	0.0	-0.0	64.51
	1591		-0.0	-0.0	0.0	-0.0	-0.0	85.66
	703		0.0	0.0	0.0	0.0	0.0	8.33
Min	Cent		-0.0	0.0	0.0	0.0	-0.0	53.16
	2193		0.0	0.0	0.0	0.0	0.0	13.82
	735		0.0	0.0	0.0	0.0	-0.0	64.51
	1591		-0.0	-0.0	0.0	-0.0	-0.0	85.66
	703		0.0	0.0	0.0	0.0	0.0	8.33

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	2193		0.0	-0.0
	735		0.0	-0.0
	1591		0.0	-0.0
	703		0.0	-0.0
Min	Cent		0.0	-0.0
	2193		0.0	-0.0
	735		0.0	-0.0
	1591		0.0	-0.0
	703		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5521	3	1	S1 HL-~1	Max	Cent	0.0	1.7	0.1	1.7	0.0	85.83
					735	0.1	0.9	0.1	0.9	0.1	81.71
					2201	0.1	2.5	0.1	2.5	0.1	87.13
					715	-0.0	2.5	0.1	2.5	-0.0	87.23
					1591	-0.0	0.9	0.1	0.9	-0.0	82.46
				Min	Cent	0.0	1.7	0.1	1.7	0.0	85.83
					735	0.1	0.9	0.1	0.9	0.1	81.71
					2201	0.1	2.5	0.1	2.5	0.1	87.13
					715	-0.0	2.5	0.1	2.5	-0.0	87.23
					1591	-0.0	0.9	0.1	0.9	-0.0	82.46

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE

Max	Cent	0.0	0.0	0.0	0.0	0.0	21.32
	735	-0.0	-0.0	0.0	0.0	-0.0	63.45
	2201	0.0	0.0	0.0	0.0	-0.0	37.89
	715	-0.0	-0.0	0.0	-0.0	-0.0	60.03
	1591	0.1	0.0	0.0	0.1	0.0	2.70
Min	Cent	0.0	0.0	0.0	0.0	0.0	21.32
	735	-0.0	-0.0	0.0	0.0	-0.0	63.45
	2201	0.0	0.0	0.0	0.0	-0.0	37.89
	715	-0.0	-0.0	0.0	-0.0	-0.0	60.03
	1591	0.1	0.0	0.0	0.1	0.0	2.70

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	735	-0.0	-0.0
	2201	-0.0	0.0
	715	0.0	0.0
	1591	0.0	-0.0
Min	Cent	0.0	0.0
	735	-0.0	-0.0
	2201	-0.0	0.0
	715	0.0	0.0
	1591	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5522	3	1	S1 HL-~1	Max	Cent	-0.0	-0.0	0.0	0.0	-0.1	43.59
					703	-0.0	-1.0	0.0	-0.0	-1.0	2.28
					1591	-0.0	0.9	0.0	0.9	-0.0	87.76
					737	-0.0	0.9	0.0	0.9	-0.0	87.70
					2301	-0.0	-1.0	0.0	-0.0	-1.0	2.22
				Min	Cent	-0.0	-0.0	0.0	0.0	-0.1	43.59
					703	-0.0	-1.0	0.0	-0.0	-1.0	2.28
					1591	-0.0	0.9	0.0	0.9	-0.0	87.76
					737	-0.0	0.9	0.0	0.9	-0.0	87.70
					2301	-0.0	-1.0	0.0	-0.0	-1.0	2.22

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	69.93
	703	0.0	0.0	0.0	0.0	0.0	10.93
	1591	-0.0	-0.0	0.0	-0.0	-0.0	82.46
	737	-0.0	-0.0	0.0	-0.0	-0.0	86.59
	2301	-0.0	-0.0	0.0	-0.0	-0.0	83.63
Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	69.93
	703	0.0	0.0	0.0	0.0	0.0	10.93
	1591	-0.0	-0.0	0.0	-0.0	-0.0	82.46
	737	-0.0	-0.0	0.0	-0.0	-0.0	86.59
	2301	-0.0	-0.0	0.0	-0.0	-0.0	83.63

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	703	0.0	-0.0
	1591	0.0	0.0
	737	0.0	0.0
	2301	0.0	-0.0
Min	Cent	0.0	-0.0
	703	0.0	-0.0
	1591	0.0	0.0
	737	0.0	0.0
	2301	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5523	3	1	S1 HL-~1	Max	Cent	-0.0	1.8	0.1	1.8	-0.0	88.24
					1591	0.0	0.9	0.1	0.9	0.0	86.30
					715	0.0	2.8	0.1	2.8	0.0	88.79
					2309	-0.1	2.8	0.1	2.8	-0.1	88.85
					737	-0.1	0.9	0.1	0.9	-0.1	86.77
				Min	Cent	-0.0	1.8	0.1	1.8	-0.0	88.24
					1591	0.0	0.9	0.1	0.9	0.0	86.30
					715	0.0	2.8	0.1	2.8	0.0	88.79
					2309	-0.1	2.8	0.1	2.8	-0.1	88.85
					737	-0.1	0.9	0.1	0.9	-0.1	86.77

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	0.0	0.0	0.0	2.38
	1591		0.1	0.0	0.0	0.1	0.0	1.97
	715		-0.0	-0.0	0.0	-0.0	-0.0	81.31
	2309		-0.0	-0.0	0.0	-0.0	-0.0	15.59
	737		0.0	0.0	0.0	0.0	0.0	2.39
Min	Cent		0.0	0.0	0.0	0.0	0.0	2.38
	1591		0.1	0.0	0.0	0.1	0.0	1.97
	715		-0.0	-0.0	0.0	-0.0	-0.0	81.31
	2309		-0.0	-0.0	0.0	-0.0	-0.0	15.59
	737		0.0	0.0	0.0	0.0	0.0	2.39

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	1591		0.0	0.0
	715		0.0	0.0
	2309		0.0	0.0
	737		0.0	0.0
Min	Cent		0.0	0.0
	1591		0.0	0.0
	715		0.0	0.0
	2309		0.0	0.0
	737		0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5524	3	1	S1 HL-~1	Max	Cent	-0.0	-0.3	-1.3	1.1	-1.5	-41.51
					2301	-0.1	-0.9	-1.3	0.8	-1.9	-36.16
					737	-0.1	0.3	-1.3	1.4	-1.2	-49.25
					4940	0.1	0.3	-1.3	1.5	-1.1	-47.12
					2139	0.1	-0.9	-1.3	1.0	-1.8	-34.25
				Min	Cent	-0.0	-0.3	-1.3	1.1	-1.5	-41.51
					2301	-0.1	-0.9	-1.3	0.8	-1.9	-36.16
					737	-0.1	0.3	-1.3	1.4	-1.2	-49.25
					4940	0.1	0.3	-1.3	1.5	-1.1	-47.12
					2139	0.1	-0.9	-1.3	1.0	-1.8	-34.25

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	-0.0	-0.0	0.0	-0.0	-15.28
	2301		-0.0	0.0	-0.0	0.0	-0.0	-83.12
	737		-0.0	0.0	0.0	0.0	-0.0	82.40
	4940		0.3	0.0	0.0	0.3	0.0	0.41
	2139		-0.2	-0.1	-0.0	-0.1	-0.2	-88.16
Min	Cent		0.0	-0.0	-0.0	0.0	-0.0	-15.28
	2301		-0.0	0.0	-0.0	0.0	-0.0	-83.12
	737		-0.0	0.0	0.0	0.0	-0.0	82.40
	4940		0.3	0.0	0.0	0.3	0.0	0.41
	2139		-0.2	-0.1	-0.0	-0.1	-0.2	-88.16

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
	2301		0.0	0.0
	737		0.0	0.0
	4940		-0.0	0.0
	2139		-0.0	0.0
Min	Cent		-0.0	0.0
	2301		0.0	0.0
	737		0.0	0.0
	4940		-0.0	0.0
	2139		-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5525	3	1	S1 HL-~1	Max	Cent	0.4	1.4	-0.9	1.9	-0.1	-59.28
					737	-0.2	0.4	-0.9	1.0	-0.9	-54.78
					2309	-0.2	2.4	-0.9	2.6	-0.5	-72.60
					2030	1.0	2.4	-0.9	2.8	0.6	-63.13
					4940	1.0	0.4	-0.9	1.7	-0.2	-35.35
				Min	Cent	0.4	1.4	-0.9	1.9	-0.1	-59.28
					737	-0.2	0.4	-0.9	1.0	-0.9	-54.78
					2309	-0.2	2.4	-0.9	2.6	-0.5	-72.60
					2030	1.0	2.4	-0.9	2.8	0.6	-63.13

				4940	1.0	0.4	-0.9	1.7	-0.2	-35.35

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	0.0	-0.0	-47.68
		737	0.0	0.0	-0.0	0.0	0.0	-39.15
		2309	-0.0	-0.0	-0.0	0.0	-0.0	-32.47
		2030	0.3	0.1	-0.0	0.3	0.1	-2.42
		4940	-0.3	-0.1	0.0	-0.1	-0.3	89.42
Min	Cent		-0.0	-0.0	-0.0	0.0	-0.0	-47.68
		737	0.0	0.0	-0.0	0.0	0.0	-39.15
		2309	-0.0	-0.0	-0.0	0.0	-0.0	-32.47
		2030	0.3	0.1	-0.0	0.3	0.1	-2.42
		4940	-0.3	-0.1	0.0	-0.1	-0.3	89.42

		NODE	Vxx	Vyy
Max	Cent		-0.0	0.0
		737	0.0	0.0
		2309	0.0	-0.0
		2030	-0.0	-0.0
		4940	-0.0	0.0
Min	Cent		-0.0	0.0
		737	0.0	0.0
		2309	0.0	-0.0
		2030	-0.0	-0.0
		4940	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5526	3	1	S1 HL-~1	Max	Cent	-0.4	0.0	-1.1	0.9	-1.3	-50.19
					2139	0.2	-0.4	-1.1	1.0	-1.2	-37.70
					4940	0.2	0.4	-1.1	1.4	-0.8	-47.62
					692	-1.0	0.4	-1.1	1.0	-1.6	-61.03
					1492	-1.0	-0.4	-1.1	0.5	-1.8	-52.67
				Min	Cent	-0.4	0.0	-1.1	0.9	-1.3	-50.19
					2139	0.2	-0.4	-1.1	1.0	-1.2	-37.70
					4940	0.2	0.4	-1.1	1.4	-0.8	-47.62
					692	-1.0	0.4	-1.1	1.0	-1.6	-61.03
					1492	-1.0	-0.4	-1.1	0.5	-1.8	-52.67

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.2	-0.0	-0.0	-0.0	-0.2	-84.09
		2139	-0.2	-0.1	0.0	-0.1	-0.2	82.72
		4940	0.2	0.0	-0.1	0.3	-0.0	-13.87
		692	-0.9	-0.2	-0.1	-0.2	-0.9	-84.54
		1492	0.1	0.1	0.0	0.1	0.1	67.90
Min	Cent		-0.2	-0.0	-0.0	-0.0	-0.2	-84.09
		2139	-0.2	-0.1	0.0	-0.1	-0.2	82.72
		4940	0.2	0.0	-0.1	0.3	-0.0	-13.87
		692	-0.9	-0.2	-0.1	-0.2	-0.9	-84.54
		1492	0.1	0.1	0.0	0.1	0.1	67.90

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
		2139	-0.0	-0.0
		4940	-0.0	-0.0
		692	0.1	-0.0
		1492	0.1	-0.0
Min	Cent		0.0	-0.0
		2139	-0.0	-0.0
		4940	-0.0	-0.0
		692	0.1	-0.0
		1492	0.1	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
5527	3	1	S1 HL-~1	Max	Cent	-1.5	0.3	-1.2	0.9	-2.1	-63.46
					4940	0.7	0.1	-1.2	1.6	-0.8	-37.35
					2030	0.7	0.6	-1.2	1.8	-0.6	-43.10
					1384	-3.7	0.6	-1.2	0.9	-4.0	-75.31
					692	-3.7	0.1	-1.2	0.4	-4.0	-73.75
				Min	Cent	-1.5	0.3	-1.2	0.9	-2.1	-63.46
					4940	0.7	0.1	-1.2	1.6	-0.8	-37.35

			2030	0.7	0.6	-1.2	1.8	-0.6	-43.10
			1384	-3.7	0.6	-1.2	0.9	-4.0	-75.31
			692	-3.7	0.1	-1.2	0.4	-4.0	-73.75

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.2	0.1	0.0	0.2	0.1	13.10
	4940	-0.3	-0.2	-0.0	-0.2	-0.3	-85.71
	2030	0.3	0.1	0.1	0.3	0.1	24.63
	1384	-0.4	-0.2	0.0	-0.2	-0.5	78.49
	692	1.4	0.5	-0.1	1.4	0.5	-3.21
Min	Cent	0.2	0.1	0.0	0.2	0.1	13.10
	4940	-0.3	-0.2	-0.0	-0.2	-0.3	-85.71
	2030	0.3	0.1	0.1	0.3	0.1	24.63
	1384	-0.4	-0.2	0.0	-0.2	-0.5	78.49
	692	1.4	0.5	-0.1	1.4	0.5	-3.21

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	4940	-0.0	-0.0
	2030	-0.0	0.0
	1384	0.1	0.0
	692	0.1	-0.0
Min	Cent	0.0	-0.0
	4940	-0.0	-0.0
	2030	-0.0	0.0
	1384	0.1	0.0
	692	0.1	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6079	3	2	S1 HL-~1	Max	Cent	-0.0	-0.3	0.1	0.0	-0.3	22.19
					4991	-0.1	-0.3	0.1	-0.0	-0.3	24.37
					4992	-0.1	-0.3	0.1	0.0	-0.3	25.97
					4399	0.0	-0.3	0.1	0.1	-0.3	20.31
					3771	0.0	-0.3	0.1	0.1	-0.3	19.22
				Min	Cent	-0.0	-0.3	0.1	0.0	-0.3	22.19
					4991	-0.1	-0.3	0.1	-0.0	-0.3	24.37
					4992	-0.1	-0.3	0.1	0.0	-0.3	25.97
					4399	0.0	-0.3	0.1	0.1	-0.3	20.31
					3771	0.0	-0.3	0.1	0.1	-0.3	19.22

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	-0.0	0.0	0.0	-31.83
	4991	0.1	0.0	-0.0	0.1	0.0	-9.00
	4992	-0.0	0.0	-0.0	0.0	-0.0	-48.26
	4399	0.0	0.0	-0.0	0.0	0.0	-42.28
	3771	-0.0	-0.0	-0.0	-0.0	-0.0	-43.58
Min	Cent	0.0	0.0	-0.0	0.0	0.0	-31.83
	4991	0.1	0.0	-0.0	0.1	0.0	-9.00
	4992	-0.0	0.0	-0.0	0.0	-0.0	-48.26
	4399	0.0	0.0	-0.0	0.0	0.0	-42.28
	3771	-0.0	-0.0	-0.0	-0.0	-0.0	-43.58

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	4991	0.0	0.0
	4992	0.0	-0.0
	4399	-0.0	-0.0
	3771	-0.0	0.0
Min	Cent	0.0	0.0
	4991	0.0	0.0
	4992	0.0	-0.0
	4399	-0.0	-0.0
	3771	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6080	3	2	S1 HL-~1	Max	Cent	-0.0	-0.3	0.2	0.1	-0.4	28.91
					4992	-0.1	-0.3	0.2	0.1	-0.4	32.33
					4993	-0.1	-0.3	0.2	0.1	-0.4	31.01
					1905	0.0	-0.3	0.2	0.1	-0.4	25.94
					4399	0.0	-0.3	0.2	0.1	-0.4	27.00

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Min	Cent		-0.0	-0.3	0.2	0.1	-0.4	28.91
	4992		-0.1	-0.3	0.2	0.1	-0.4	32.33
	4993		-0.1	-0.3	0.2	0.1	-0.4	31.01
	1905		0.0	-0.3	0.2	0.1	-0.4	25.94
	4399		0.0	-0.3	0.2	0.1	-0.4	27.00

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-71.97
	4992		-0.0	0.0	-0.0	0.0	-0.0	-48.00
	4993		-0.1	-0.0	-0.0	-0.0	-0.1	-81.92
	1905		-0.0	-0.0	-0.0	-0.0	-0.0	-80.16
	4399		0.0	0.0	-0.0	0.0	0.0	-42.96
Min	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-71.97
	4992		-0.0	0.0	-0.0	0.0	-0.0	-48.00
	4993		-0.1	-0.0	-0.0	-0.0	-0.1	-81.92
	1905		-0.0	-0.0	-0.0	-0.0	-0.0	-80.16
	4399		0.0	0.0	-0.0	0.0	0.0	-42.96

		NODE	Vxx	Vyy
Max	Cent		0.0	-0.0
	4992		0.0	-0.0
	4993		0.0	-0.0
	1905		0.0	-0.0
	4399		0.0	-0.0
Min	Cent		0.0	-0.0
	4992		0.0	-0.0
	4993		0.0	-0.0
	1905		0.0	-0.0
	4399		0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6081	3	2	S1 HL-~1	Max	Cent	-0.0	-0.3	-0.0	-0.0	-0.3	-7.36
					4993	-0.1	-0.3	-0.0	-0.1	-0.3	-9.55
					5126	-0.1	-0.3	-0.0	-0.1	-0.3	-9.78
					5127	0.1	-0.3	-0.0	0.1	-0.3	-5.98
					1905	0.1	-0.3	-0.0	0.1	-0.3	-5.89
				Min	Cent	-0.0	-0.3	-0.0	-0.0	-0.3	-7.36
					4993	-0.1	-0.3	-0.0	-0.1	-0.3	-9.55
					5126	-0.1	-0.3	-0.0	-0.1	-0.3	-9.78
					5127	0.1	-0.3	-0.0	0.1	-0.3	-5.98
					1905	0.1	-0.3	-0.0	0.1	-0.3	-5.89

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-77.25
	4993		-0.1	-0.0	-0.0	-0.0	-0.1	-81.81
	5126		-0.0	-0.0	-0.0	0.0	-0.0	-42.17
	5127		0.0	0.0	-0.0	0.0	-0.0	-70.60
	1905		-0.0	-0.0	-0.0	-0.0	-0.0	-83.08
Min	Cent		-0.0	-0.0	-0.0	-0.0	-0.0	-77.25
	4993		-0.1	-0.0	-0.0	-0.0	-0.1	-81.81
	5126		-0.0	-0.0	-0.0	0.0	-0.0	-42.17
	5127		0.0	0.0	-0.0	0.0	-0.0	-70.60
	1905		-0.0	-0.0	-0.0	-0.0	-0.0	-83.08

		NODE	Vxx	Vyy
Max	Cent		-0.0	-0.0
	4993		-0.0	-0.0
	5126		-0.0	-0.0
	5127		-0.0	-0.0
	1905		-0.0	-0.0
Min	Cent		-0.0	-0.0
	4993		-0.0	-0.0
	5126		-0.0	-0.0
	5127		-0.0	-0.0
	1905		-0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6094	3	1	S1 HL-~1	Max	Cent	-0.0	-0.0	0.3	0.3	-0.4	44.16
					4993	-0.0	-0.2	0.3	0.3	-0.4	39.61
					5007	-0.0	0.1	0.3	0.4	-0.3	49.56

		731	-0.0	0.1	0.3	0.4	-0.3	48.75
		1905	-0.0	-0.2	0.3	0.3	-0.4	38.81
	Min	Cent	-0.0	-0.0	0.3	0.3	-0.4	44.16
		4993	-0.0	-0.2	0.3	0.3	-0.4	39.61
		5007	-0.0	0.1	0.3	0.4	-0.3	49.56
		731	-0.0	0.1	0.3	0.4	-0.3	48.75
		1905	-0.0	-0.2	0.3	0.3	-0.4	38.81

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	0.0	0.0	0.0	0.0	-0.0	40.68
	4993	-0.0	-0.0	0.0	-0.0	-0.0	87.16
	5007	0.0	0.0	-0.0	0.0	0.0	-0.86
	731	-0.0	-0.0	0.0	-0.0	-0.0	79.93
	1905	0.0	0.0	0.0	0.0	0.0	19.01
Min	Cent	0.0	0.0	0.0	0.0	-0.0	40.68
	4993	-0.0	-0.0	0.0	-0.0	-0.0	87.16
	5007	0.0	0.0	-0.0	0.0	0.0	-0.86
	731	-0.0	-0.0	0.0	-0.0	-0.0	79.93
	1905	0.0	0.0	0.0	0.0	0.0	19.01

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	4993	-0.0	-0.0
	5007	-0.0	0.0
	731	0.0	0.0
	1905	0.0	-0.0
Min	Cent	-0.0	0.0
	4993	-0.0	-0.0
	5007	-0.0	0.0
	731	0.0	0.0
	1905	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6095	3	1	S1 HL-~1	Max	Cent	0.0	0.2	0.3	0.4	-0.2	55.10
					5007	0.1	0.1	0.3	0.4	-0.2	46.34
					5008	0.1	0.4	0.3	0.5	-0.1	58.63
					1913	-0.0	0.4	0.3	0.5	-0.2	62.29
					731	-0.0	0.1	0.3	0.3	-0.3	51.22
				Min	Cent	0.0	0.2	0.3	0.4	-0.2	55.10
					5007	0.1	0.1	0.3	0.4	-0.2	46.34
					5008	0.1	0.4	0.3	0.5	-0.1	58.63
					1913	-0.0	0.4	0.3	0.5	-0.2	62.29
					731	-0.0	0.1	0.3	0.3	-0.3	51.22

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-61.70
	5007	0.0	0.0	-0.0	0.0	0.0	-70.54
	5008	-0.0	-0.0	0.0	-0.0	-0.0	84.87
	1913	-0.0	0.0	-0.0	0.0	-0.0	-87.97
	731	0.0	-0.0	-0.0	0.0	-0.0	-15.80
Min	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-61.70
	5007	0.0	0.0	-0.0	0.0	0.0	-70.54
	5008	-0.0	-0.0	0.0	-0.0	-0.0	84.87
	1913	-0.0	0.0	-0.0	0.0	-0.0	-87.97
	731	0.0	-0.0	-0.0	0.0	-0.0	-15.80

	NODE	Vxx	Vyy
Max	Cent	0.0	0.0
	5007	0.0	0.0
	5008	0.0	-0.0
	1913	0.0	-0.0
	731	0.0	0.0
Min	Cent	0.0	0.0
	5007	0.0	0.0
	5008	0.0	-0.0
	1913	0.0	-0.0
	731	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6108	3	3	S1 HL-~1	Max	Cent	0.0	0.6	-0.0	0.6	0.0	-86.38

	5021	0.2	0.6	-0.0	0.6	0.2	-85.30
	5008	0.2	0.6	-0.0	0.6	0.2	-85.36
	1913	-0.1	0.6	-0.0	0.6	-0.1	-87.06
	2684	-0.1	0.6	-0.0	0.6	-0.1	-87.03
Min	Cent	0.0	0.6	-0.0	0.6	0.0	-86.38
	5021	0.2	0.6	-0.0	0.6	0.2	-85.30
	5008	0.2	0.6	-0.0	0.6	0.2	-85.36
	1913	-0.1	0.6	-0.0	0.6	-0.1	-87.06
	2684	-0.1	0.6	-0.0	0.6	-0.1	-87.03

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	55.53
	5021	-0.0	-0.0	0.0	0.0	-0.0	31.38
	5008	-0.0	0.0	0.0	0.0	-0.0	50.93
	1913	-0.0	0.0	0.0	0.0	-0.0	69.96
	2684	0.0	0.0	0.0	0.0	0.0	70.73
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	55.53
	5021	-0.0	-0.0	0.0	0.0	-0.0	31.38
	5008	-0.0	0.0	0.0	0.0	-0.0	50.93
	1913	-0.0	0.0	0.0	0.0	-0.0	69.96
	2684	0.0	0.0	0.0	0.0	0.0	70.73

	NODE	Vxx	Vyy
Max	Cent	0.0	-0.0
	5021	0.0	-0.0
	5008	0.0	-0.0
	1913	0.0	-0.0
	2684	0.0	-0.0
Min	Cent	0.0	-0.0
	5021	0.0	-0.0
	5008	0.0	-0.0
	1913	0.0	-0.0
	2684	0.0	-0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6109	3	3	S1 HL-~1	Max	Cent	0.0	0.5	0.0	0.5	0.0	86.81
					5008	0.2	0.6	0.0	0.6	0.2	86.04
					5022	0.2	0.5	0.0	0.5	0.2	85.00
					1208	-0.1	0.5	0.0	0.5	-0.1	87.33
					1913	-0.1	0.6	0.0	0.6	-0.1	87.66
				Min	Cent	0.0	0.5	0.0	0.5	0.0	86.81
					5008	0.2	0.6	0.0	0.6	0.2	86.04
					5022	0.2	0.5	0.0	0.5	0.2	85.00
					1208	-0.1	0.5	0.0	0.5	-0.1	87.33
					1913	-0.1	0.6	0.0	0.6	-0.1	87.66

	NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent	-0.0	0.0	0.0	0.0	-0.0	59.78
	5008	-0.0	0.0	0.0	0.0	-0.0	57.82
	5022	0.0	0.0	0.0	0.0	0.0	63.94
	1208	-0.0	-0.0	0.0	0.0	-0.0	42.82
	1913	-0.0	0.0	0.0	0.0	-0.0	72.50
Min	Cent	-0.0	0.0	0.0	0.0	-0.0	59.78
	5008	-0.0	0.0	0.0	0.0	-0.0	57.82
	5022	0.0	0.0	0.0	0.0	0.0	63.94
	1208	-0.0	-0.0	0.0	0.0	-0.0	42.82
	1913	-0.0	0.0	0.0	0.0	-0.0	72.50

	NODE	Vxx	Vyy
Max	Cent	-0.0	0.0
	5008	-0.0	-0.0
	5022	-0.0	0.0
	1208	-0.0	0.0
	1913	-0.0	-0.0
Min	Cent	-0.0	0.0
	5008	-0.0	-0.0
	5022	-0.0	0.0
	1208	-0.0	0.0
	1913	-0.0	-0.0

ELEM	MAT	SEC	LC	NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE

6133	3	2	S1 HL-~1	Max	Cent	-0.0	0.2	-0.1	0.2	-0.1	-66.01
					5046	0.1	0.2	-0.1	0.3	0.0	-58.70
					5047	0.1	0.2	-0.1	0.3	0.0	-58.35
					4432	-0.1	0.2	-0.1	0.2	-0.1	-71.04
					3744	-0.1	0.2	-0.1	0.2	-0.1	-71.20
				Min	Cent	-0.0	0.2	-0.1	0.2	-0.1	-66.01
					5046	0.1	0.2	-0.1	0.3	0.0	-58.70
					5047	0.1	0.2	-0.1	0.3	0.0	-58.35
					4432	-0.1	0.2	-0.1	0.2	-0.1	-71.04
					3744	-0.1	0.2	-0.1	0.2	-0.1	-71.20

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		0.0	0.0	0.0	0.0	0.0	1.02
	5046		0.1	0.0	0.0	0.1	0.0	2.58
	5047		-0.0	0.0	0.0	0.0	-0.0	54.12
	4432		0.0	0.0	0.0	0.0	0.0	1.23
	3744		0.1	0.0	-0.0	0.1	0.0	-0.99
Min	Cent		0.0	0.0	0.0	0.0	0.0	1.02
	5046		0.1	0.0	0.0	0.1	0.0	2.58
	5047		-0.0	0.0	0.0	0.0	-0.0	54.12
	4432		0.0	0.0	0.0	0.0	0.0	1.23
	3744		0.1	0.0	-0.0	0.1	0.0	-0.99

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	5046		0.0	0.0
	5047		0.0	0.0
	4432		0.0	0.0
	3744		0.0	0.0
Min	Cent		0.0	0.0
	5046		0.0	0.0
	5047		0.0	0.0
	4432		0.0	0.0
	3744		0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6134	3	2	S1 HL-~1	Max	Cent	-0.0	0.2	-0.2	0.3	-0.1	-58.23
					5047	0.1	0.2	-0.2	0.3	-0.1	-53.34
					5048	0.1	0.2	-0.2	0.3	-0.1	-53.44
					1621	-0.1	0.2	-0.2	0.3	-0.2	-62.41
					4432	-0.1	0.2	-0.2	0.3	-0.2	-62.33
				Min	Cent	-0.0	0.2	-0.2	0.3	-0.1	-58.23
					5047	0.1	0.2	-0.2	0.3	-0.1	-53.34
					5048	0.1	0.2	-0.2	0.3	-0.1	-53.44
					1621	-0.1	0.2	-0.2	0.3	-0.2	-62.41
					4432	-0.1	0.2	-0.2	0.3	-0.2	-62.33

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
Max	Cent		-0.0	-0.0	0.0	-0.0	-0.0	70.96
	5047		-0.0	0.0	0.0	0.0	-0.0	49.60
	5048		-0.1	-0.0	0.0	-0.0	-0.1	82.82
	1621		-0.0	-0.0	0.0	-0.0	-0.0	78.95
	4432		0.0	0.0	0.0	0.0	0.0	2.60
Min	Cent		-0.0	-0.0	0.0	-0.0	-0.0	70.96
	5047		-0.0	0.0	0.0	0.0	-0.0	49.60
	5048		-0.1	-0.0	0.0	-0.0	-0.1	82.82
	1621		-0.0	-0.0	0.0	-0.0	-0.0	78.95
	4432		0.0	0.0	0.0	0.0	0.0	2.60

		NODE	Vxx	Vyy
Max	Cent		0.0	0.0
	5047		0.0	0.0
	5048		0.0	0.0
	1621		0.0	0.0
	4432		0.0	0.0
Min	Cent		0.0	0.0
	5047		0.0	0.0
	5048		0.0	0.0
	1621		0.0	0.0
	4432		0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6135	3	2	S1 HL-~1	Max	Cent	-0.0	0.2	0.1	0.2	-0.0	73.61
					5048	0.1	0.2	0.1	0.2	0.0	66.93
					5116	0.1	0.2	0.1	0.2	0.0	67.72
					5117	-0.1	0.2	0.1	0.2	-0.1	77.50
					1621	-0.1	0.2	0.1	0.2	-0.1	77.21
				Min	Cent	-0.0	0.2	0.1	0.2	-0.0	73.61
					5048	0.1	0.2	0.1	0.2	0.0	66.93
					5116	0.1	0.2	0.1	0.2	0.0	67.72
					5117	-0.1	0.2	0.1	0.2	-0.1	77.50
					1621	-0.1	0.2	0.1	0.2	-0.1	77.21

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	74.69
		5048	-0.1	-0.0	0.0	-0.0	-0.1	81.05
		5116	0.0	0.0	0.0	0.0	-0.0	50.04
		5117	0.0	-0.0	0.0	0.0	-0.0	21.03
		1621	-0.1	-0.0	0.0	-0.0	-0.1	84.98
	Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	74.69
		5048	-0.1	-0.0	0.0	-0.0	-0.1	81.05
		5116	0.0	0.0	0.0	0.0	-0.0	50.04
		5117	0.0	-0.0	0.0	0.0	-0.0	21.03
		1621	-0.1	-0.0	0.0	-0.0	-0.1	84.98

		NODE	Vxx	Vyy
	Max	Cent	-0.0	0.0
		5048	-0.0	0.0
		5116	-0.0	0.0
		5117	-0.0	0.0
		1621	-0.0	0.0
	Min	Cent	-0.0	0.0
		5048	-0.0	0.0
		5116	-0.0	0.0
		5117	-0.0	0.0
		1621	-0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6148	3	1	S1 HL-~1	Max	Cent	-0.0	0.0	-0.4	0.4	-0.4	-46.90
					5048	-0.0	0.1	-0.4	0.4	-0.3	-49.10
					5062	-0.0	-0.0	-0.4	0.4	-0.4	-43.97
					2723	-0.0	-0.0	-0.4	0.4	-0.4	-44.68
					1621	-0.0	0.1	-0.4	0.4	-0.3	-49.79
				Min	Cent	-0.0	0.0	-0.4	0.4	-0.4	-46.90
					5048	-0.0	0.1	-0.4	0.4	-0.3	-49.10
					5062	-0.0	-0.0	-0.4	0.4	-0.4	-43.97
					2723	-0.0	-0.0	-0.4	0.4	-0.4	-44.68
					1621	-0.0	0.1	-0.4	0.4	-0.3	-49.79

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	-0.0	0.0	-0.0	-0.0	67.57
		5048	-0.0	-0.0	0.0	-0.0	-0.0	84.46
		5062	0.0	0.0	0.0	0.0	0.0	0.23
		2723	-0.1	-0.0	0.0	-0.0	-0.1	87.17
		1621	0.0	0.0	0.0	0.0	0.0	6.43
	Min	Cent	-0.0	-0.0	0.0	-0.0	-0.0	67.57
		5048	-0.0	-0.0	0.0	-0.0	-0.0	84.46
		5062	0.0	0.0	0.0	0.0	0.0	0.23
		2723	-0.1	-0.0	0.0	-0.0	-0.1	87.17
		1621	0.0	0.0	0.0	0.0	0.0	6.43

		NODE	Vxx	Vyy
	Max	Cent	0.0	0.0
		5048	-0.0	0.0
		5062	-0.0	-0.0
		2723	0.0	-0.0
		1621	0.0	0.0
	Min	Cent	0.0	0.0
		5048	-0.0	0.0
		5062	-0.0	-0.0
		2723	0.0	-0.0

					1621	0.0	0.0				
ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6149	3	1	S1 HL-~1	Max	Cent	0.0	-0.1	-0.3	0.3	-0.4	-40.78
					5062	-0.0	-0.0	-0.3	0.3	-0.4	-45.27
					5063	-0.0	-0.2	-0.3	0.2	-0.4	-39.39
					2485	0.0	-0.2	-0.3	0.3	-0.4	-36.49
					2723	0.0	-0.0	-0.3	0.3	-0.3	-42.20
				Min	Cent	0.0	-0.1	-0.3	0.3	-0.4	-40.78
					5062	-0.0	-0.0	-0.3	0.3	-0.4	-45.27
					5063	-0.0	-0.2	-0.3	0.2	-0.4	-39.39
					2485	0.0	-0.2	-0.3	0.3	-0.4	-36.49
					2723	0.0	-0.0	-0.3	0.3	-0.3	-42.20
					NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
				Max	Cent	-0.0	0.0	-0.0	0.0	-0.0	-60.25
					5062	-0.0	0.0	-0.0	0.0	-0.0	-46.70
					5063	-0.0	-0.0	-0.0	-0.0	-0.0	-88.88
					2485	0.0	0.0	-0.0	0.0	0.0	-9.35
					2723	-0.0	-0.0	-0.0	-0.0	-0.0	-77.77
				Min	Cent	-0.0	0.0	-0.0	0.0	-0.0	-60.25
					5062	-0.0	0.0	-0.0	0.0	-0.0	-46.70
					5063	-0.0	-0.0	-0.0	-0.0	-0.0	-88.88
					2485	0.0	0.0	-0.0	0.0	0.0	-9.35
					2723	-0.0	-0.0	-0.0	-0.0	-0.0	-77.77
					NODE	Vxx	Vyy				
				Max	Cent	-0.0	0.0				
					5062	0.0	-0.0				
					5063	0.0	0.0				
					2485	-0.0	0.0				
					2723	-0.0	-0.0				
				Min	Cent	-0.0	0.0				
					5062	0.0	-0.0				
					5063	0.0	0.0				
					2485	-0.0	0.0				
					2723	-0.0	-0.0				
ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6162	3	4	S1 HL-~1	Max	Cent	0.0	-0.5	0.1	0.0	-0.5	8.66
					5076	-0.1	-0.5	0.1	-0.1	-0.5	13.05
					5063	-0.1	-0.5	0.1	-0.1	-0.5	12.55
					2485	0.2	-0.5	0.1	0.2	-0.5	6.44
					1862	0.2	-0.5	0.1	0.2	-0.5	6.58
				Min	Cent	0.0	-0.5	0.1	0.0	-0.5	8.66
					5076	-0.1	-0.5	0.1	-0.1	-0.5	13.05
					5063	-0.1	-0.5	0.1	-0.1	-0.5	12.55
					2485	0.2	-0.5	0.1	0.2	-0.5	6.44
					1862	0.2	-0.5	0.1	0.2	-0.5	6.58
					NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
				Max	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-43.58
					5076	0.0	0.0	-0.0	0.0	-0.0	-52.79
					5063	-0.0	0.0	-0.0	0.0	-0.0	-54.92
					2485	-0.0	-0.0	-0.0	-0.0	-0.0	-47.17
					1862	-0.0	-0.0	-0.0	0.0	-0.0	-16.64
				Min	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-43.58
					5076	0.0	0.0	-0.0	0.0	-0.0	-52.79
					5063	-0.0	0.0	-0.0	0.0	-0.0	-54.92
					2485	-0.0	-0.0	-0.0	-0.0	-0.0	-47.17
					1862	-0.0	-0.0	-0.0	0.0	-0.0	-16.64
					NODE	Vxx	Vyy				
				Max	Cent	0.0	0.0				
					5076	0.0	0.0				
					5063	0.0	0.0				
					2485	0.0	0.0				
					1862	0.0	0.0				
				Min	Cent	0.0	0.0				
					5076	0.0	0.0				

	5063	0.0	0.0
	2485	0.0	0.0
	1862	0.0	0.0

ELEM	MAT	SEC	LC		NODE	Fxx	Fyy	Fxy	Fmax	Fmin	ANGLE
6163	3	4	S1 HL-~1	Max	Cent	0.0	-0.4	-0.1	0.0	-0.5	-8.23
					5063	-0.1	-0.5	-0.1	-0.1	-0.5	-11.37
					5077	-0.1	-0.4	-0.1	-0.1	-0.4	-12.76
					1087	0.2	-0.4	-0.1	0.2	-0.4	-6.43
					2485	0.2	-0.5	-0.1	0.2	-0.5	-6.04
				Min	Cent	0.0	-0.4	-0.1	0.0	-0.5	-8.23
					5063	-0.1	-0.5	-0.1	-0.1	-0.5	-11.37
					5077	-0.1	-0.4	-0.1	-0.1	-0.4	-12.76
					1087	0.2	-0.4	-0.1	0.2	-0.4	-6.43
					2485	0.2	-0.5	-0.1	0.2	-0.5	-6.04

		NODE	Mxx	Myy	Mxy	Mmax	Mmin	ANGLE
	Max	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-43.36
		5063	-0.0	-0.0	-0.0	0.0	-0.0	-63.20
		5077	-0.0	-0.0	-0.0	0.0	-0.0	-42.18
		1087	0.0	-0.0	-0.0	0.0	-0.0	-30.09
		2485	-0.0	-0.0	-0.0	0.0	-0.0	-23.33
	Min	Cent	-0.0	-0.0	-0.0	0.0	-0.0	-43.36
		5063	-0.0	-0.0	-0.0	0.0	-0.0	-63.20
		5077	-0.0	-0.0	-0.0	0.0	-0.0	-42.18
		1087	0.0	-0.0	-0.0	0.0	-0.0	-30.09
		2485	-0.0	-0.0	-0.0	0.0	-0.0	-23.33

		NODE	Vxx	Vyy
	Max	Cent	-0.0	0.0
		5063	-0.0	0.0
		5077	-0.0	0.0
		1087	-0.0	0.0
		2485	-0.0	0.0
	Min	Cent	-0.0	0.0
		5063	-0.0	0.0
		5077	-0.0	0.0
		1087	-0.0	0.0
		2485	-0.0	0.0

PROJECT TITLE : Load Rating and Stuctural Analysis

MIDAS	**Company**	Close, jensen, and Miller PC	**Client**	CT DOT
	Author	Danielle Coutu	**File Name**	Swing Span Girder 7 Analysis

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

SWING SPAN

ALLOWABLE WIND SPEED ANALYSIS OF TRUSS

Company: Close, Jensen, and Miller PC
Engineer: Danielle Coutu

Swing Truss - Fixed Moment Connections

Swing Truss	Factored Dead Load and Wind Load (125 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (100 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (90 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (80 mph) (Strength III, Combine)	Displacement (Strength III)	Allowable Wind Speed
Cross Bracing	13.53 ksi	12.36 ksi	12.05 ksi	11.77 ksi	0.36 in	125 mph
Main Members	13.53 ksi	10.34 ksi	-	-	0.36 in	125 mph

25.5 ksi Steel

Swing Span - Proposed Widening (Fixed Moment Conncetions)

Swing Truss	Factored Dead Load and Wind Load (125 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (100 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (90 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (80 mph) (Strength III, Combine)	Displacement (Strength III)	Allowable Wind Speed
Cross Bracing	16.42 ksi	15.58 ksi	15.29 ksi	15.04 ksi	1.24 in	125 mph
Main Members	15.34 ksi	12.11 ksi	-	-	1.24 in	125 mph

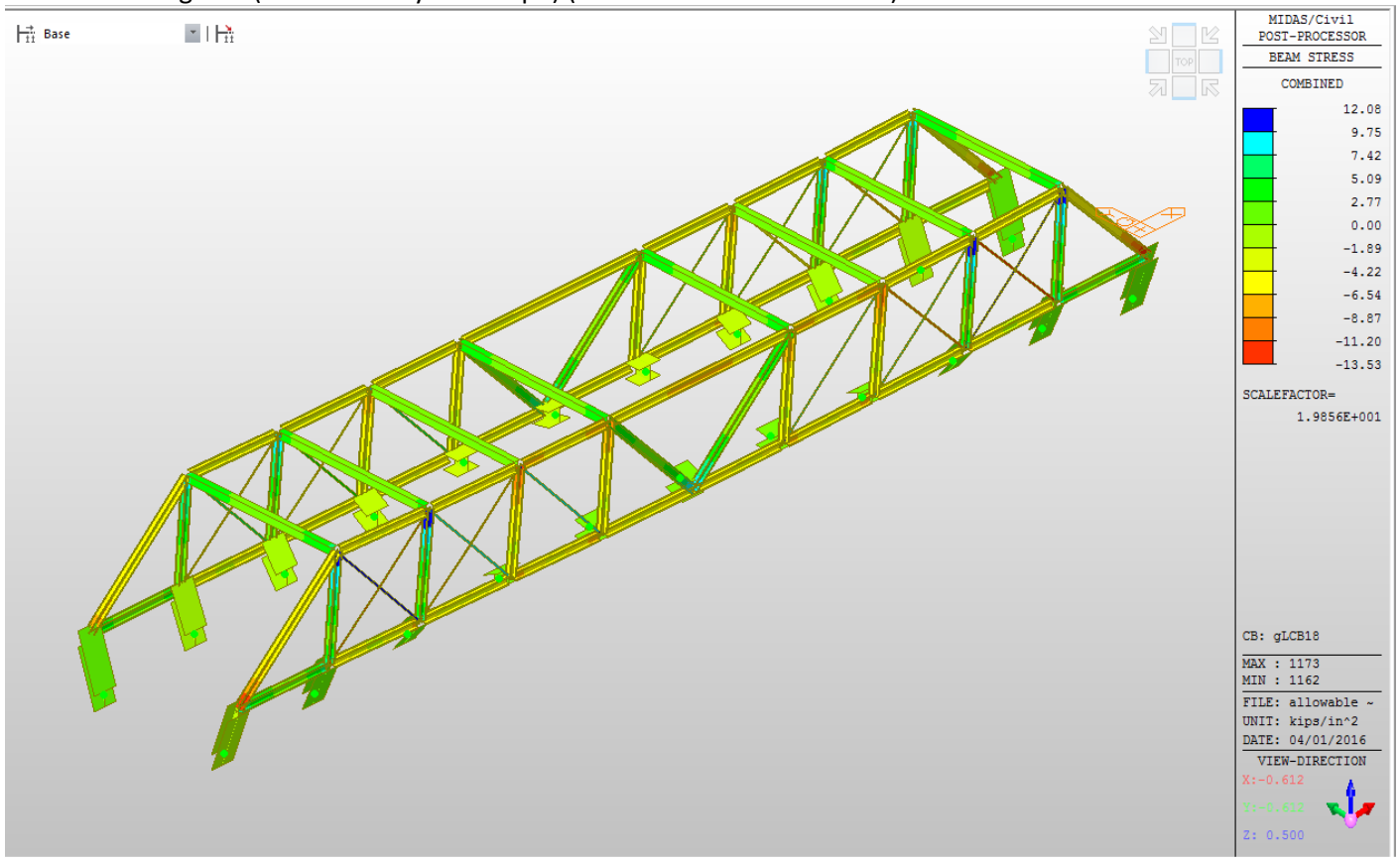
25.5 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ± Sbz ± Sax (Warping).

LRFD ANALYSIS

Swing Truss: Entire Truss

Stresses: Strength III (Wind Velocity= 125 mph) (Fixed Moment Connection)



Stress = 13.53 ksi 25.5 ksi Steel

Windward load = .08 ksf

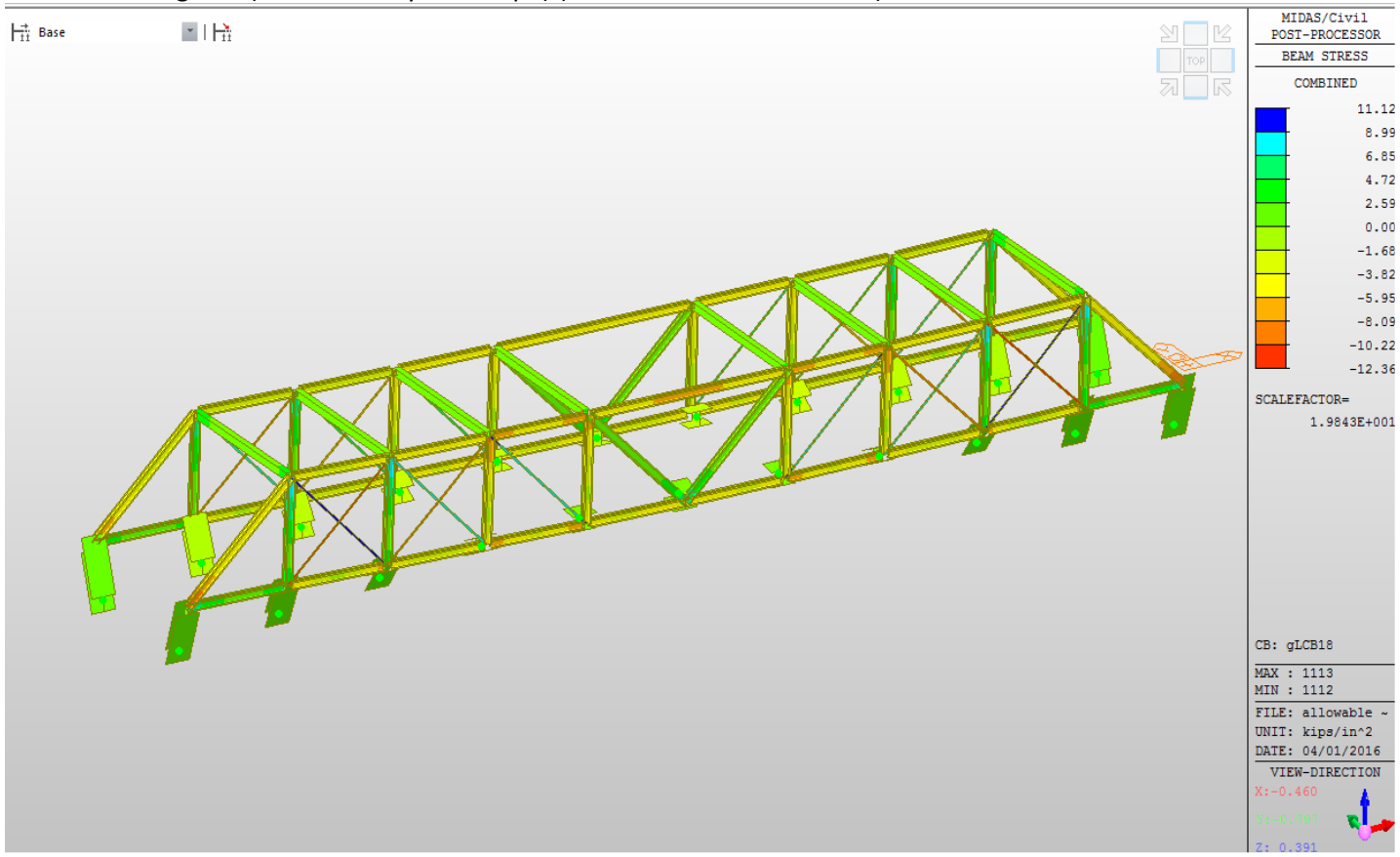
Leeward load = .04 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Swing Truss: Entire Truss

Stresses: Strength III (Wind Velocity= 100 mph) (Fixed Moment Connection)



Stress = 12.36 ksi 25.5 ksi Steel

Windward load = .0512 ksf

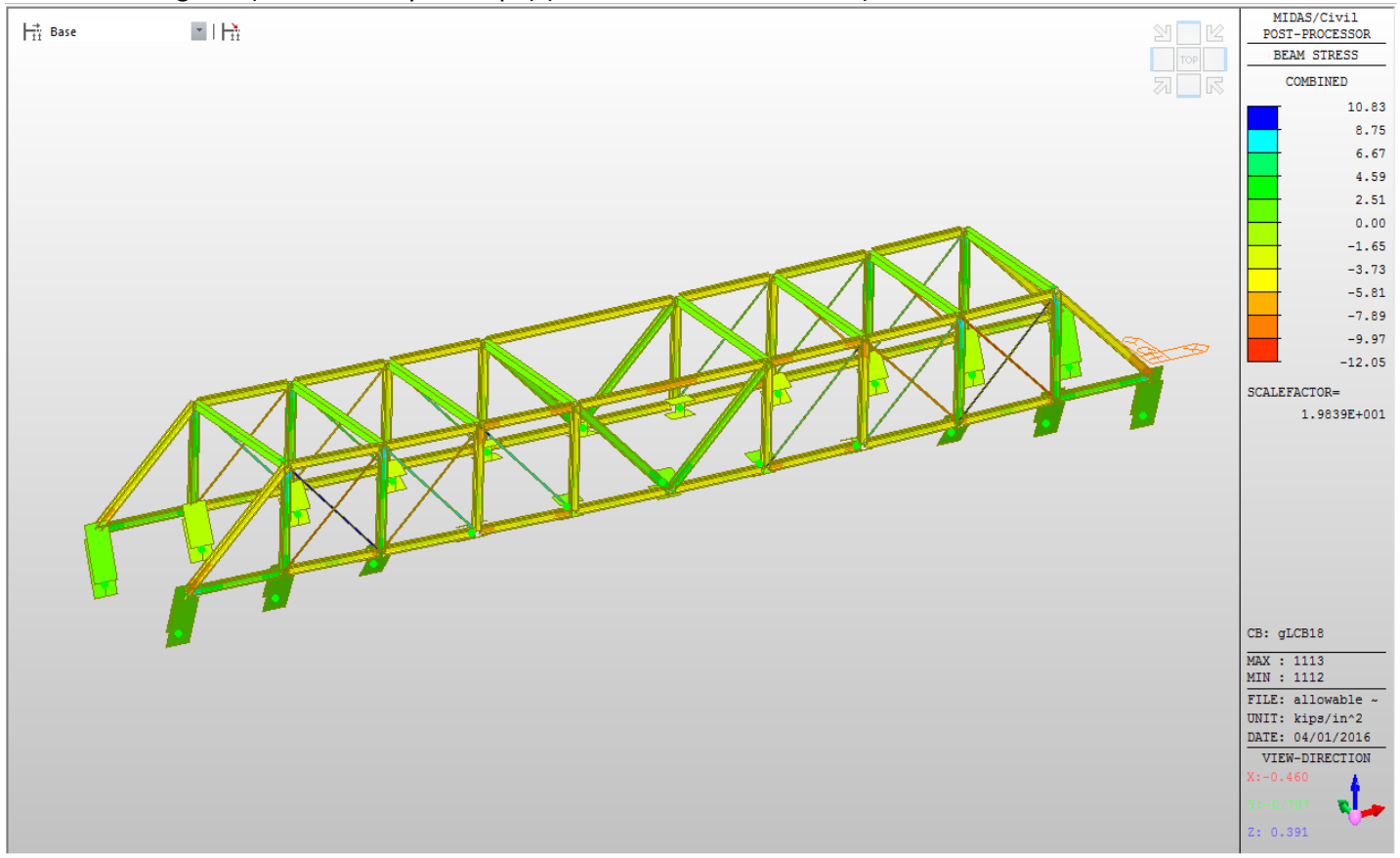
Leeward load = .0256 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Swing Truss: Entire Truss

Stresses: Strength III (Wind Velocity= 90 mph) (Fixed Moment Connection)



Stress = 12.05 ksi 25.5 ksi Steel

Windward load = .0415 ksf

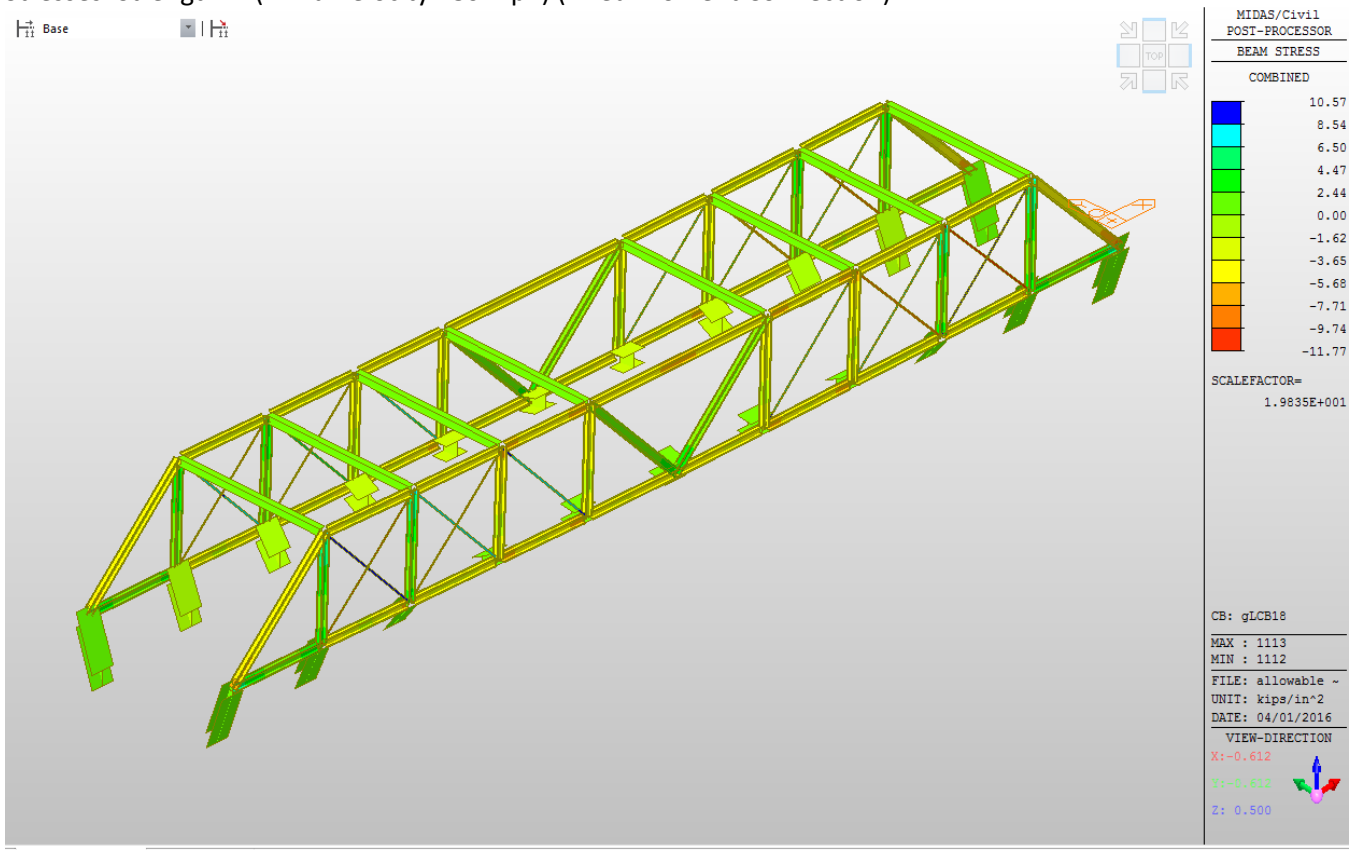
Leeward load = .0207 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Swing Truss: Entire Truss

Stresses: Strength III (Wind Velocity= 80 mph) (Fixed Moment Connection)



Stress = 11.77 ksi 25.5 ksi Steel

Windward load = .0328 ksf

Leeward load = .0164 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

Design wind Velocity

Allowable stress = 12 ksi

wind speed = 125 mph

$P_z = (2.56 \times 10^{-6})(V)^2 K_z G C_D$ (AASHTO 3.8.1.2.1-1)

$V = 125$ mph (AASHTO Figure 3.8.1.2.1-1)

$K_z = 1.0$ (AASHTO Table C3.8.1.2.1-1)

category C

$G = 1.0$ (AASHTO Table 3.8.1.2.1-1)

windward

$C_p = 2.0$ (AASHTO Table 3.8.1.2.1-2)

leeward

$C_p = 1.0$ (AASHTO Table 3.8.1.2.1-2)

windward pressure

$P_D = (2.56 \times 10^{-6})(125)^2 (1.0)(1.0)(2) = .08$ ksf

leeward pressure

$P_D = (2.56 \times 10^{-6})(125)^2 (1.0)(1.0)(1.0) = .04$ ksf

wind speed = 100 mph

$V = 100$ mph

windward pressure

$P_D = (2.56 \times 10^{-6})(100)^2 (1.0)(1.0)(2) = .0512$ ksf

leeward pressure

$P_D = (2.56 \times 10^{-6})(100)^2 (1.0)(1.0)(1.0) = .0256$ ksf

Design wind velocity

wind speed = 90 mph

windward pressure

$P_D = (2.56 \times 10^{-6})(90)^2 (1.0)(1.0)(2.0) = .0415$ ksf

leeward pressure

$P_D = (2.56 \times 10^{-6})(90)^2 (1.0)(1.0)(1.0) = .0207$ ksf

wind speed = 80 mph

windward pressure

$P_D = (2.56 \times 10^{-6})(80)^2 (1.0)(1.0)(2.0) = .0328$ ksf

leeward pressure

$P_D = (2.56 \times 10^{-6})(80)^2 (1.0)(1.0)(1.0) = .0164$ ksf

wind speed = 70 mph

windward pressure

$P_D = (2.56 \times 10^{-6})(70)^2 (1.0)(1.0)(2.0) = .025$ ksf

leeward pressure

$P_D = (2.56 \times 10^{-6})(70)^2 (1.0)(1.0)(1.0) = .0125$ ksf

- Ground Surface Roughness D: Flat, unobstructed areas and water surfaces; this category includes smooth mud flats, salt flats, and unbroken ice.

3.8.1.1.5—Wind Exposure Categories

C3.8.1.1.5

The exposure category of the structure shall be determined as follows:

- Wind Exposure Category B: Wind Exposure Category B shall apply where the Ground Surface Roughness Category B, as defined in Article 3.8.1.1.4, prevails in the upwind direction for a distance greater than 1,500 ft for structures with a mean height of less than or equal to 33 ft, and for a distance greater than 2,600 ft or 20 times the height of the structure, whichever is greater, for structures with a mean height greater than 33 ft.
- Wind Exposure Category C: Wind Exposure Category C shall apply for all cases where Wind Exposure Categories B or D do not apply.
- Wind Exposure Category D: Wind Exposure Category D shall apply where the Ground Surface Roughness Category D, as defined in Article 3.8.1.1.4, prevails in the upwind direction for a distance greater than 5,000 ft or 20 times the height of the structure, whichever is greater. Wind Exposure Category D shall also apply where the structure is within a distance of 600 ft or 20 times the height of the structure, whichever is greater, from a Ground Surface Roughness Category D condition, even if Ground Surface Roughness Category B or C exist immediately upwind of the structure.

Where Ground Surface Roughness Category D prevails in the upwind direction—except when Ground Surface Roughness Category B or C exist for a relatively short distance immediately upwind from the structure—the effect of the presence of Ground Surface Roughness Category B or C may not be significant. Ground Surface Roughness Category D is conservatively specified for these situations.

3.8.1.2—Wind Load on Structures: *WS*

3.8.1.2.1—General

C3.8.1.2.1

The wind pressure shall be determined as:

$$P_Z = 2.56 \times 10^{-6} V^2 K_z G C_D \qquad (3.8.1.2.1\text{-}1)$$

The basis for the development of wind load provisions exists in Wassef (2014).

where:

P_Z = design wind pressure (ksf)
V = design 3-second gust wind speed specified in Table 3.8.1.1.2-1 (mph)
K_Z = pressure exposure and elevation coefficient to be taken equal to K_Z (B), K_Z (C), or K_Z (D) determined using Eqs. 3.8.1.2.1-2, 3.8.1.2.1-3, or 3.8.1.2.1-4, respectively, for Strength III and Service IV load combinations and to be taken as 1.0 for other load combinations

For structure heights less than 33 ft, the proximity to the ground surface causes turbulence for which the effect on wind pressure cannot be accurately determined. Therefore, no reduction in the value of K_Z is shown in Table C3.8.1.2.1-1 for structure heights less than 33 ft.

© 2015 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication is a violation of applicable law.

G = gust effect factor determined using a structure-specific study or as specified in Table 3.8.1.2.1-1 for Strength III and Service IV load combinations and 1.0 for other load combinations

C_D = drag coefficient determined using a structure-specific study or as specified in Table 3.8.1.2.1-2

Strength V and Service I load combinations are based on constant wind speeds that are not functionsp of the bridge type, bridge height, or the wind exposure category at the location of the bridge. Therefore, the pressure exposure and elevation coefficient, K_Z, is taken as 1.0 for these load combinations.

Unlike ASCE 7-10 (2010), which is based on power law wind profiles, these Specifications have always been based on logarithmic wind profiles. Therefore, logarithmic wind profiles were assumed in the development of Eqs. 3.8.1.2.1-2, 3.8.1.2.1-3, and 3.8.1.2.1-4.

The value of K_z at different elevations for different wind exposure categories are shown in Table C3.8.1.2.1-1.

The gust effect factor, G, is a function of the size and dynamic characteristics of the structure including bridge natural frequency and damping. The values specified in Table 3.8.1.2.1-1 are average values for sound barriers and typical bridge structures. For long-span arches, and cable-stayed and suspension bridges, the use of wind tunnel testing to determine a project-specific gust effect factor is warranted.

The 0.85 gust effect factor specified for sound barriers in Table 3.8.1.2.1-1 is consistent with the gust effect factor in ASCE 7-10 (2010) for walls and implies that wind gusts are not likely to engulf the entire barrier. However, the loaded area required to produce the maximum wind load on a sound barrier panel and the panel's vertical supports, if used, is relatively small. A higher gust effect factor may be justifiable because wind gusts may engulf the entire panel.

Table C3.8.1.2.1-1—Pressure Exposure and Elevation Coefficients, K_Z

Structure Height, Z (ft)	Wind Exposure Category B	Wind Exposure Category C	Wind Exposure Category D
≤33	0.71	1.00	1.15
40	0.75	1.05	1.20
50	0.81	1.10	1.25
60	0.85	1.14	1.29
70	0.89	1.18	1.32
80	0.92	1.21	1.35
90	0.95	1.24	1.38
100	0.98	1.27	1.41
120	1.03	1.32	1.45
140	1.07	1.36	1.49
160	1.11	1.40	1.52
180	1.15	1.43	1.55
200	1.18	1.46	1.58
250	1.24	1.52	1.63
300	1.30	1.57	1.68

© 2015 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication is a violation of applicable law.

When the wind speed, K_Z, and G specified for Strength V and Service I load combinations are substituted in Eq. 3.8.1.2.1-1, the resulting wind pressure on bridge structures, P_Z, becomes a multiple of the drag coefficient, C_D, for the structure being considered. The wind pressure in these cases may be calculated using Table C3.8.1.2.1-2.

Table C3.8.1.2.1-2—Wind Pressure on the Bridge Structures for Strength V and Service I Load Combinations

Load Combination	Wind Pressure on the Structure, P_Z, for the Specified Wind Speed (ksf)
Strength V	0.0163 C_D
Service I	0.0125 C_D

The pressure exposure and elevation coefficient, K_Z, for Strength III and Service IV load combinations shall be determined as follows:

$$K_Z(B) = \frac{\left[2.5\ln\left(\frac{Z}{0.9834}\right)+6.87\right]^2}{345.6} \qquad (3.8.1.2.1\text{-}2)$$

$$K_Z(C) = \frac{\left[2.5\ln\left(\frac{Z}{0.0984}\right)+7.35\right]^2}{478.4} \qquad (3.8.1.2.1\text{-}3)$$

$$K_Z(D) = \frac{\left[2.5\ln\left(\frac{Z}{0.0164}\right)+7.65\right]^2}{616.1} \qquad (3.8.1.2.1\text{-}4)$$

where:

K_Z (B), K_Z (C), and K_Z (D) are K_Z for wind exposure Category B, C, and D, respectively.

The structure height, Z, used in determining the pressure exposure and elevation coefficient, K_Z, shall be taken as:

- For bridge superstructures: The average height of the top of the superstructure above the surrounding ground or water surface.

- For bridge substructures not extending above the elevation of the superstructure: Unless otherwise approved by the Owner, the height used in determining the wind pressure on the superstructure.

In the case of a long multi-span bridge with large variation in the ground surface elevation under the bridge, such as a bridge crossing a valley, the structure height, Z, may be varied from a span to span. For each span, the structure height, Z, may be taken as the largest value in the span.

Determining the wind pressure on substructures not extending above the elevation of the superstructure using the structure height used to determine the wind pressure on the superstructure results in slightly conservative values for most substructures. For

© 2015 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication is a violation of applicable law.

- For bridge substructures extending above the elevation of the superstructure: Unless otherwise approved by the Owner, the height of the top of the substructure.

- For ground-mounted sound barriers: The height of the top of the sound barrier above the lower surrounding ground surface.

- For structure- or traffic-barrier-mounted sound barriers: The height of the top of the sound barrier above the low ground or water surface surrounding the support structure.

In no case shall the structure height, Z, used in calculating K_Z be taken less than 33 ft.

extremely tall substructures, using a different height, including varying the height used for different segments of the substructure, may be allowed with the approval of the Owner.

Substructures extending above the elevation of the superstructure are typically associated with cable-stayed bridges and suspension bridges. Wind loads on such structures are typically determined using a structure-specific wind tunnel test.

Where the sound barrier is constructed directly atop an embankment, the height of the sound barrier should be measured from the lower ground surface surrounding the embankment.

Table 3.8.1.2.1-1—Gust Effect Factor, *G*

Structure Type	Gust Effect Factor, G
Sound Barriers	0.85
All other structures	1.00

Table 3.8.1.2.1-2—Drag Coefficient, C_D

Component		Drag Coefficient, C_D	
		Windward	Leeward
I-Girder and Box-Girder Bridge Superstructures		1.3	N/A
Trusses, Columns, and Arches	Sharp-Edged Member	2.0	1.0
	Round Member	1.0	0.5
Bridge Substructure		1.6	N/A
Sound Barriers		1.2	N/A

The term "columns" in Table 3.8.1.2.1-2 refers to columns in superstructures such as spandrel columns in arches.

3.8.1.2.2—Loads on the Superstructure

In the general case of wind analysis, the wind load shall be determined as specified in Article 3.8.1.1 and the wind direction shall be varied. The wind loads shall be taken as the algebraic transverse and longitudinal components of the wind load. The wind direction for design shall be that which produces the maximum force effect in the component under investigation. The transverse and longitudinal components of the wind load shall be applied simultaneously.

C3.8.1.2.2

For superstructure components, the wind load on different members should be calculated separately and used in designing the members themselves. For trusses, the wind loads from different members and from the flooring system are transferred to the top and bottom planes of wind bracing and are used in designing the wind bracing system, including the end portals and cross-frames.

© 2015 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication is a violation of applicable law.

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

FIXED SPAN – EXISTING STRUCTURE ANALYSIS

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

FIXED SPAN – RATING RESULTS

Bridge 01349 - Midas load Rating

	Minimum Rating Factor		
Loading	Strength I Flexure	Strength I Shear	Service II
HL-93 Inventory	1.696	4.458	3.6995
HL-93 Operating	2.199	5.7789	4.8094
HS-20	3.585	6.3236	5.5603
H-20	6.011	9.3539	7.8005
CT-L3S2	4.644	10.6277	6.9014
CT-L73.0	4.577	8.1266	5.0541
CT-L3S2 + 0.2 klf Lane Load	4.379	10.5021	6.7527

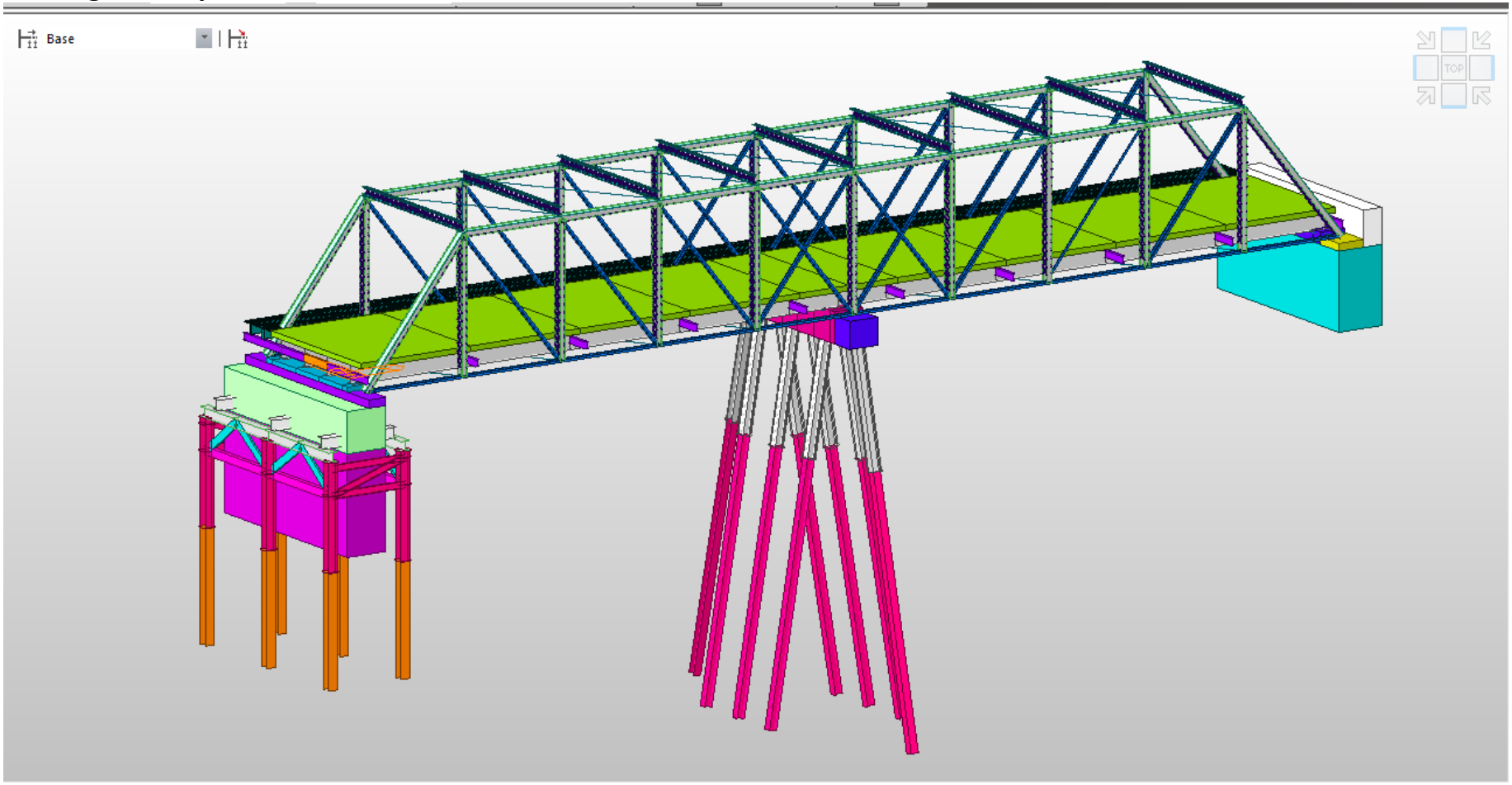
Fixed Span - Strees and Displacement

	Midas Civil 2016 V2.1		
	Displacement (in)	Stress (ksi)	Limit State
Live Load Only			
HL-93	0.88	16.74	Unfactored
HS-20	0.54	12.12	Unfactored
H-20	0.33	7.87	Unfactored
CT-L3S2	0.41	9.33	Unfactored
CT-L73.0	0.58	13.38	Unfactored
Superstructure			
HL-93 Inventory	2.22	28.88	Strength I
HL-93 Operating	1.87	25.26	Strength I
HS-20	1.64	20.95	Strength I
H-20	1.26	17.77	Strength I
CT-L3S2	1.23	18.95	Strength I
CT-L73.0	1.44	19.26	Strength I
CT-L3S2 + Lane Load	1.34	20.36	Strength I
Main Girders			
HL-93 Inventory	2.22	28.88	Strength I
HL-93 Operating	1.87	25.26	Strength I
HS-20	1.64	20.95	Strength I
H-20	1.26	17.77	Strength I
CT-L3S2	1.23	18.95	Strength I
CT-L73.0	1.44	19.26	Strength I
CT-L3S2 + Lane Load	1.34	20.36	Strength I

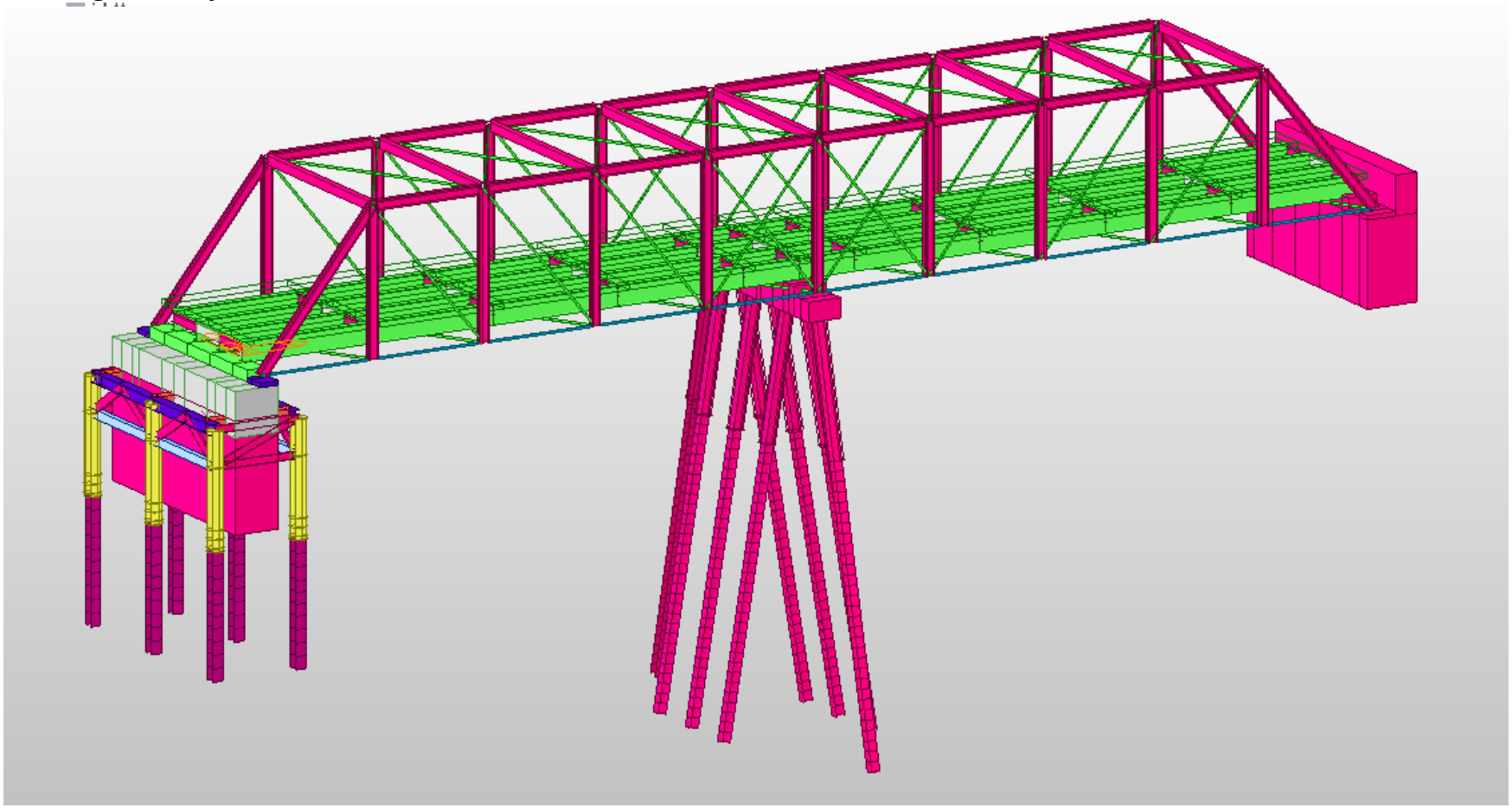
Fixed Span - Rating Factor Results

	Midas Civil 2016 V2.1	
	Rating Factor	Limit State
HL-93 Inv.		
Girder 1	1.32776	Strength I
Girder 2	1.41137	Strength I
Girder 3	1.41699	Strength I
Girder 4	1.36748	Strength I
HL-93 Oper.		
Girder 1	1.72122	Strength I
Girder 2	1.82939	Strength I
Girder 3	1.83667	Strength I
Girder 4	1.77257	Strength I
HS-20		
Girder 1	1.86047	Strength I
Girder 2	1.93039	Strength I
Girder 3	1.93807	Strength I
Girder 4	1.88140	Strength I
H-20		
Girder 1	2.77778	Strength I
Girder 2	2.82970	Strength I
Girder 3	2.84096	Strength I
Girder 4	2.80972	Strength I
CT-L3S2		
Girder 1	3.18421	Strength I
Girder 2	3.31162	Strength I
Girder 3	3.32481	Strength I
Girder 4	3.22010	Strength I
CT-L73.0		
Girder 1	2.29203	Strength I
Girder 2	2.39631	Strength I
Girder 3	2.40584	Strength I
Girder 4	2.31805	Strength I
CT-L3S2 + Lane Load		
Girder 1	3.18421	Strength I
Girder 2	3.31162	Strength I
Girder 3	3.32481	Strength I
Girder 4	3.22010	Strength I

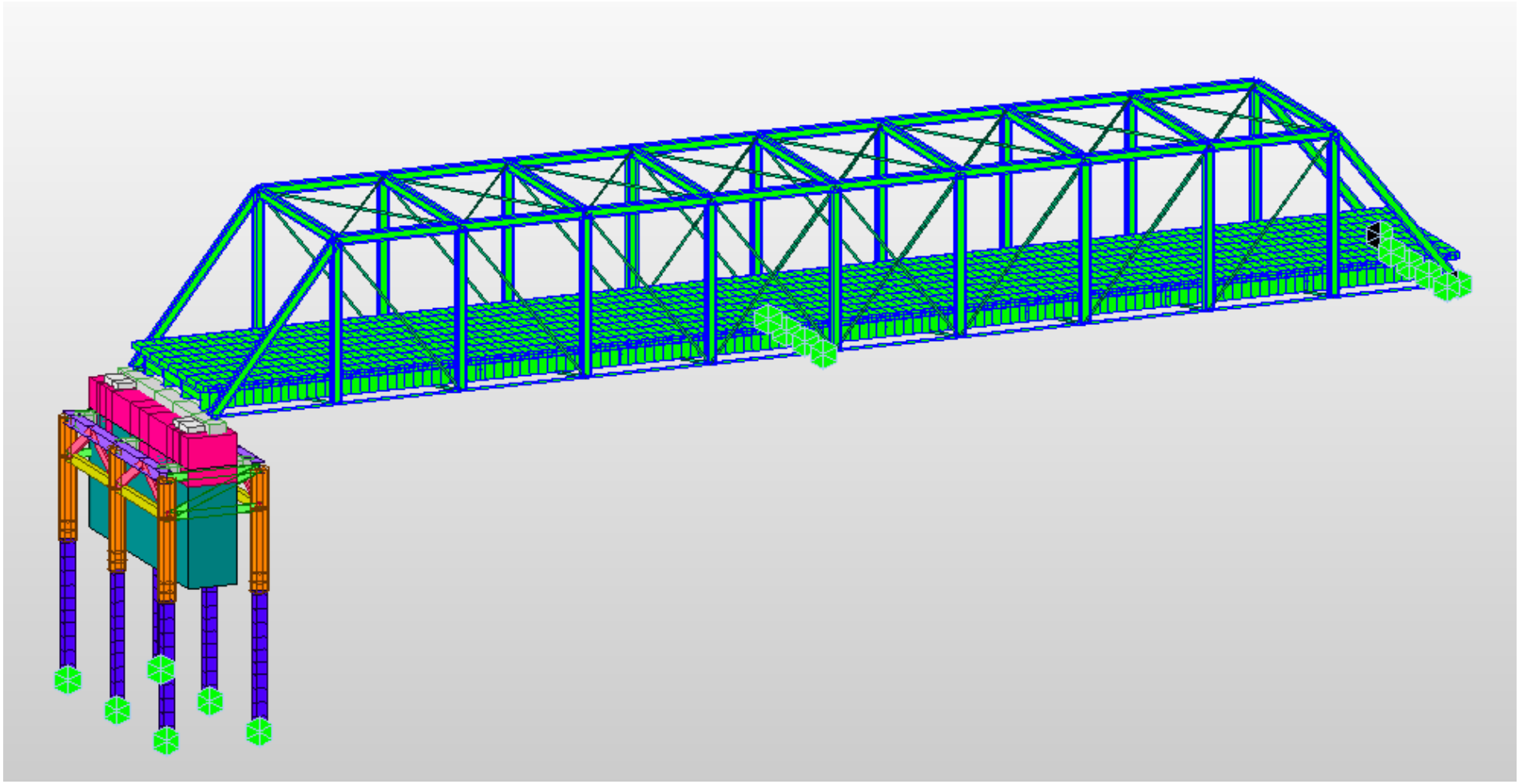
Existing Fixed Span



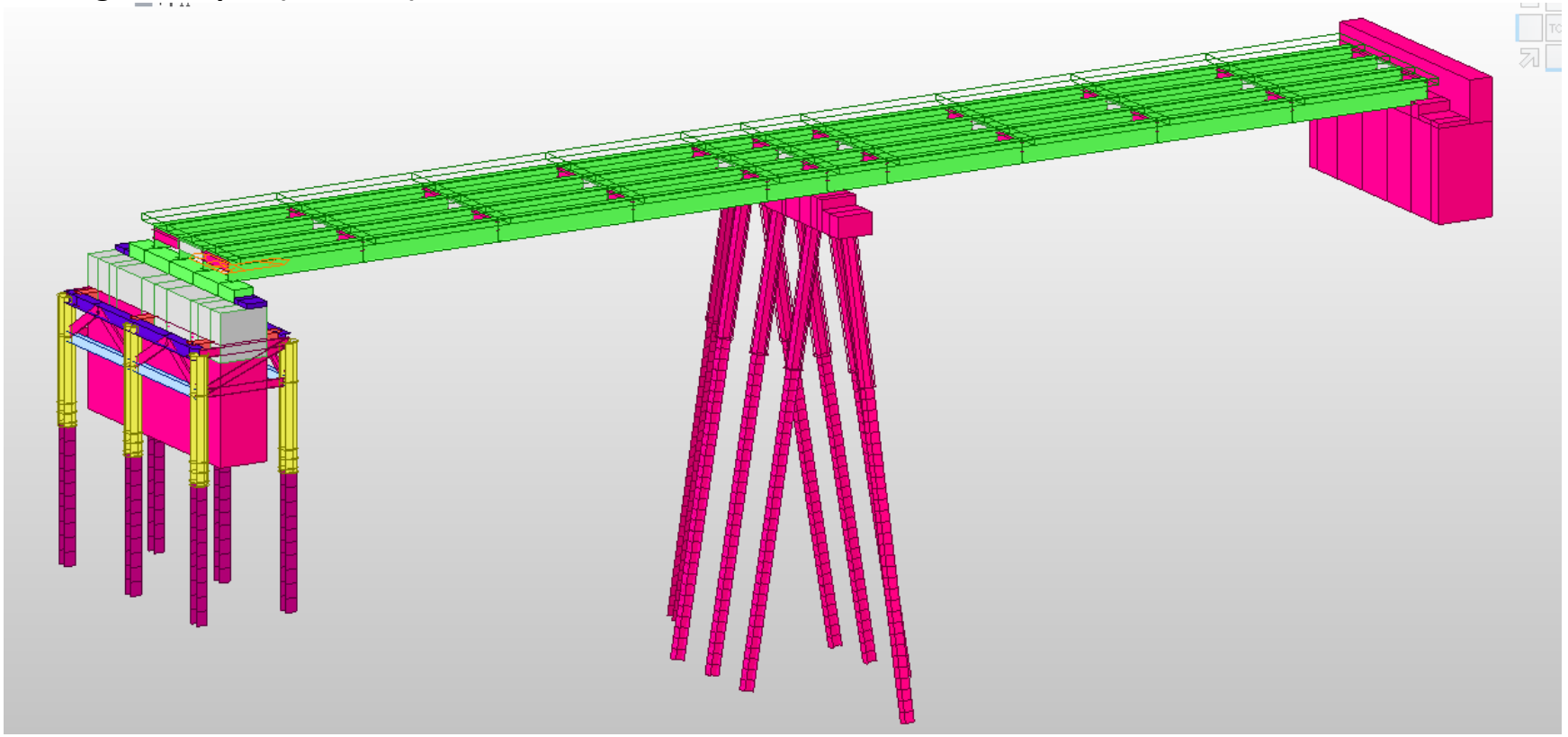
Existing Fixed Span



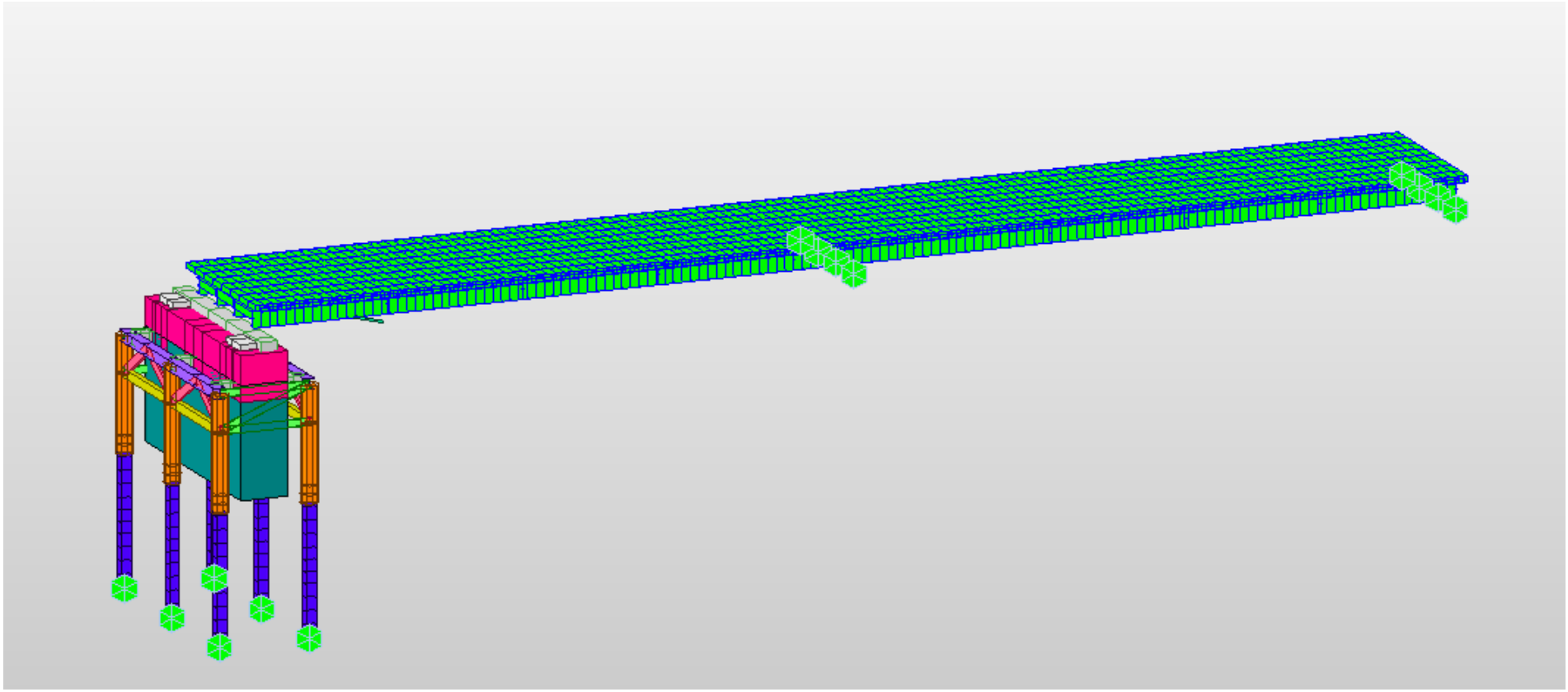
Existing Fixed Span



Existing Fixed Span (No Truss)



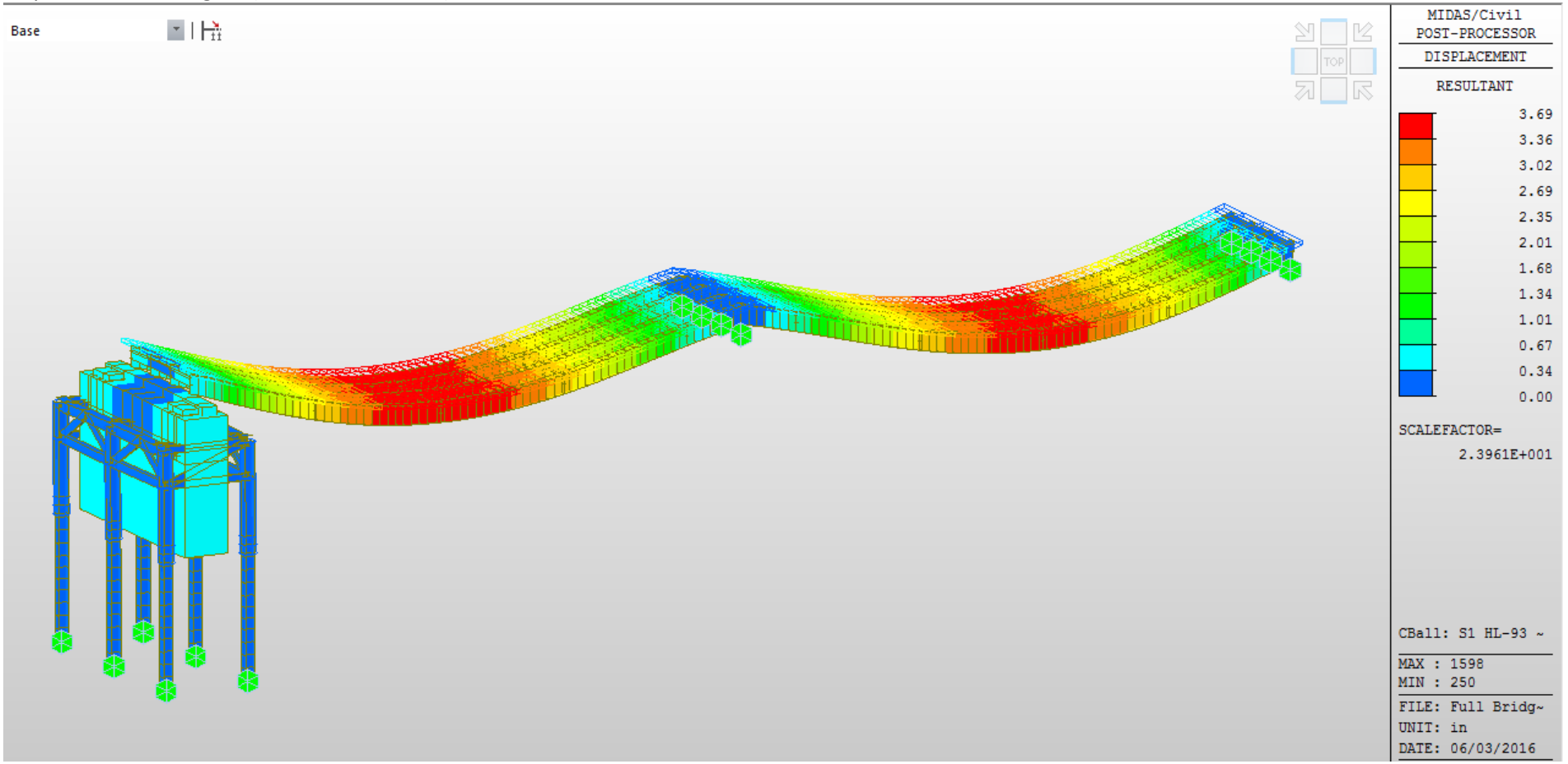
Existing Fixed Span (No Truss)



LRFD ANALYSIS

Fixed Span

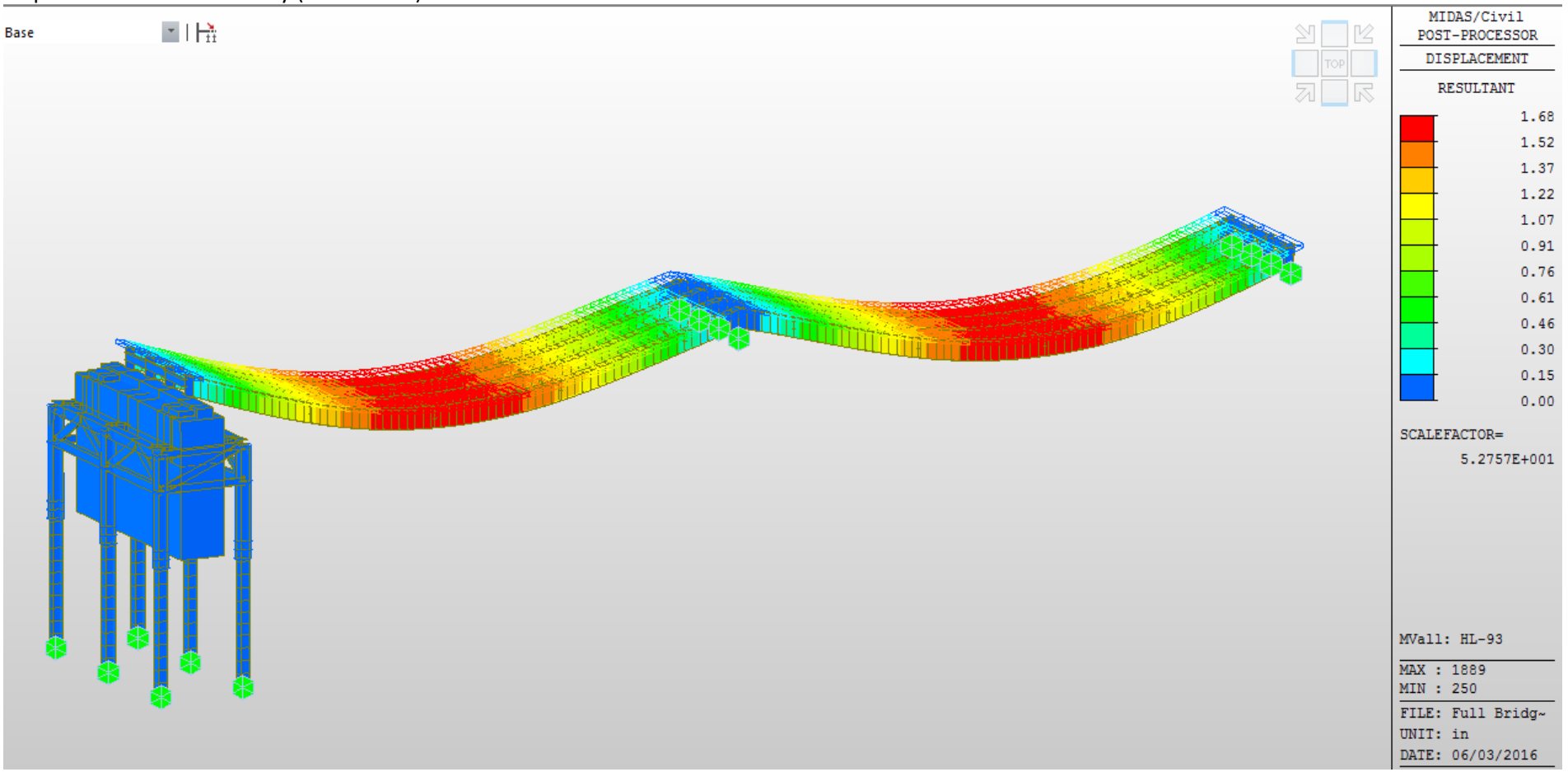
Displacement: Strength I (Factored DL and LL)



LRFD ANALYSIS

Fixed Span

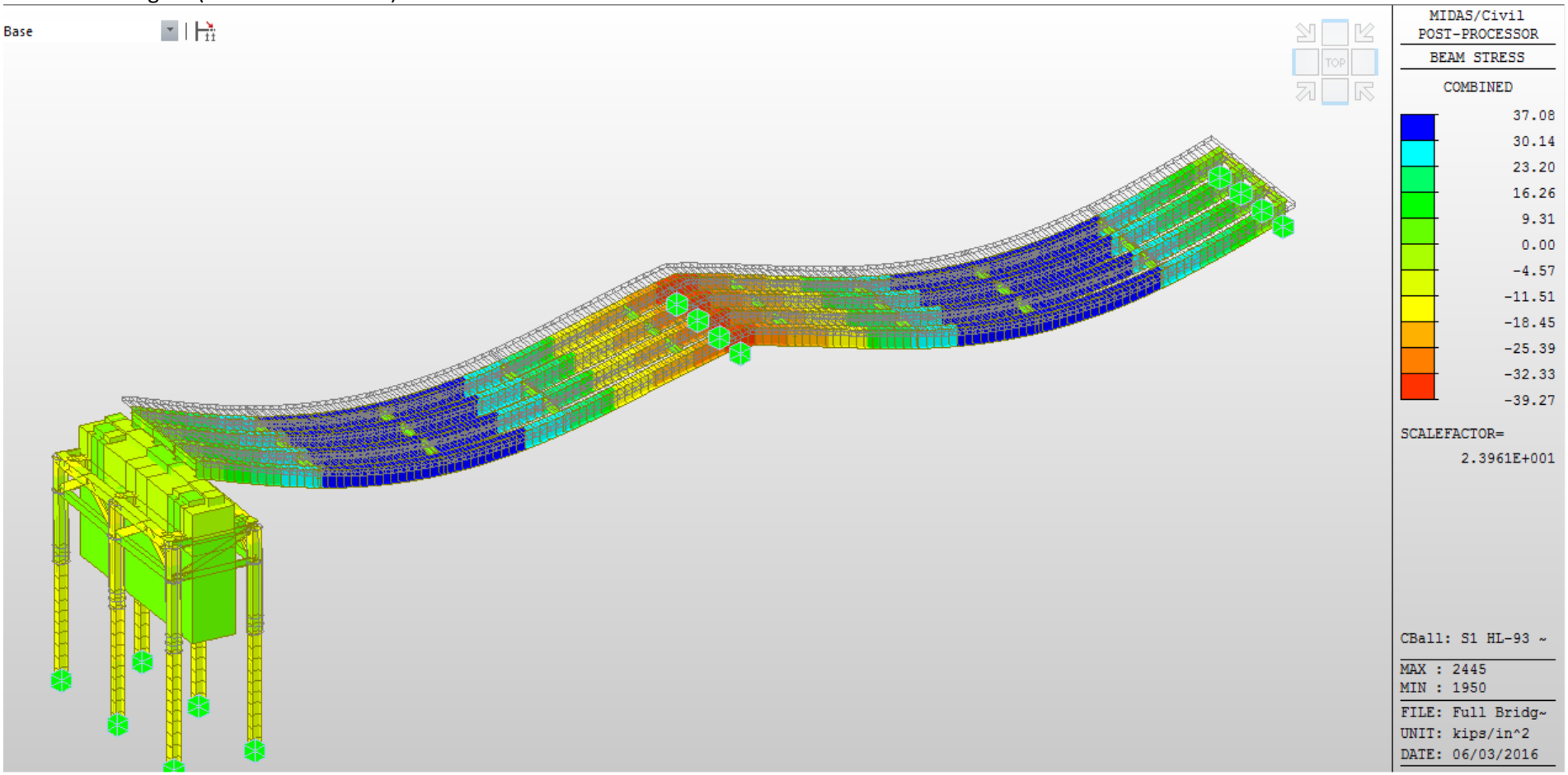
Displacement: Live Load Only (Unfactored)



LRFD ANALYSIS

Fixed Span

Stresses: Strength I (Factored DL and LL)



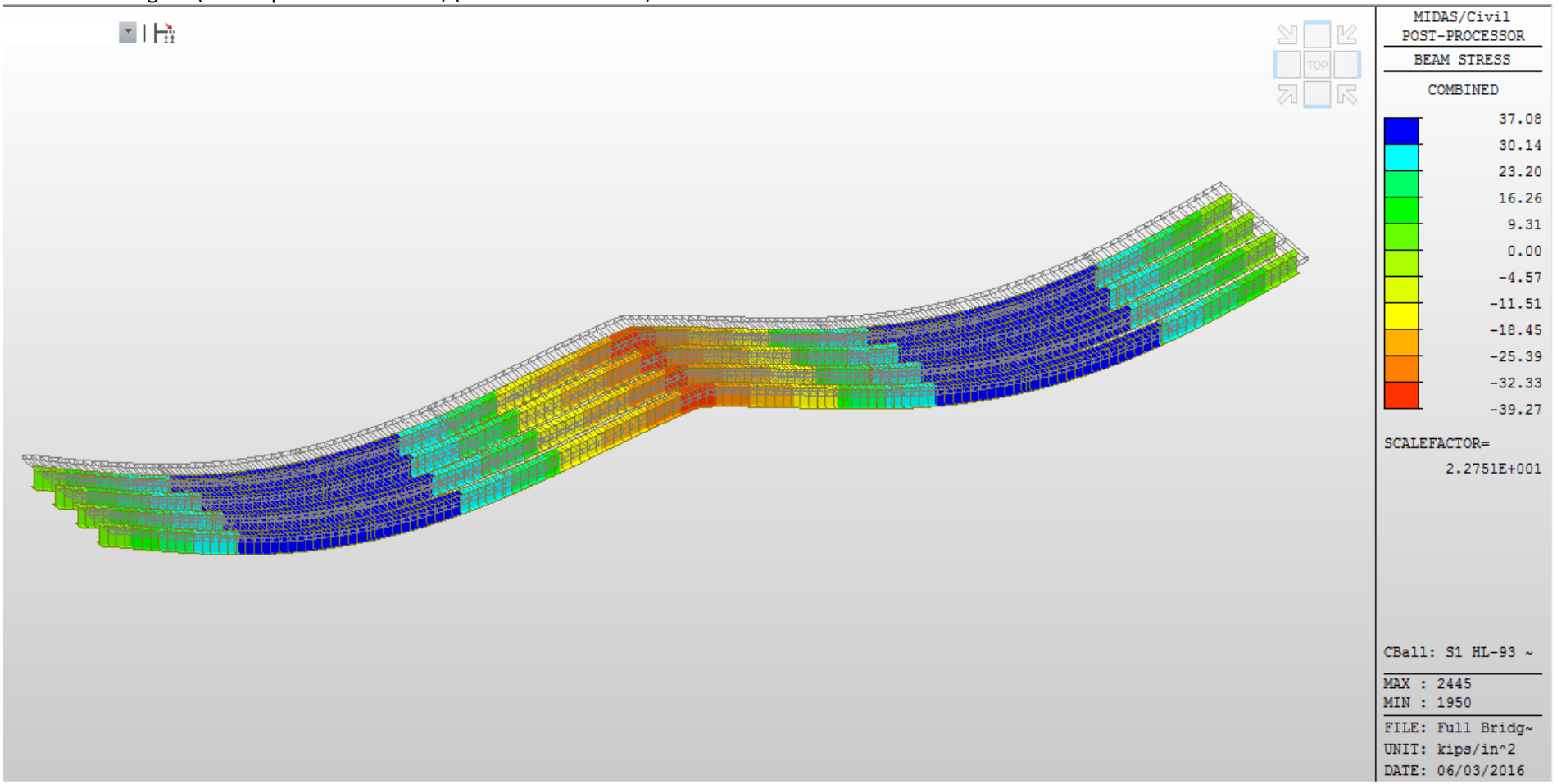
50 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Fixed Span

Stresses: Strength I (Fixed Span Main Girders) (Factored DL and LL)



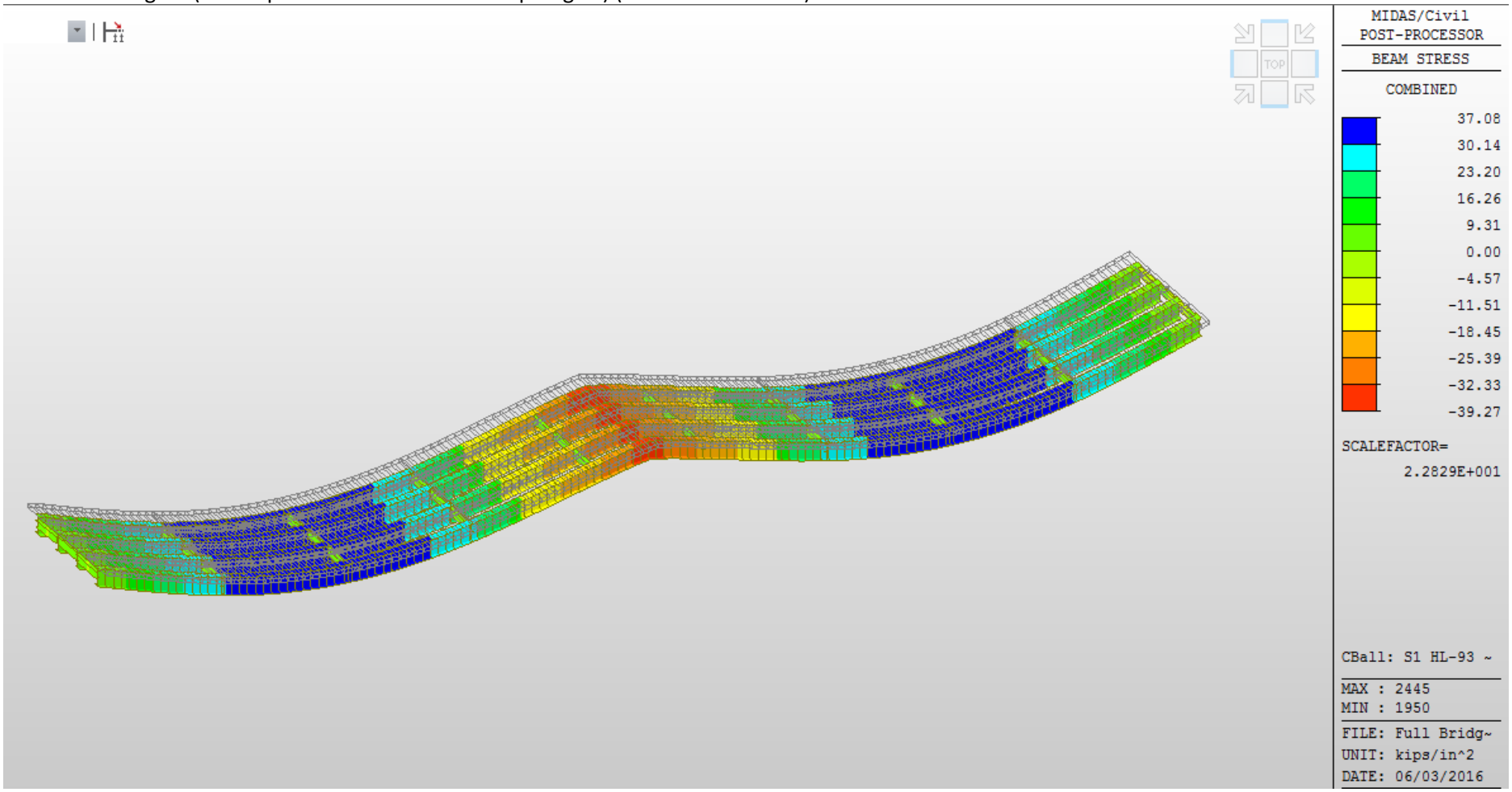
50 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Fixed Span

Stresses: Strength I (Fixed Span Main Girders with Diaphragms) (Factored DL and LL)



50 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

FIXED SPAN – RATING OUTPUT

LOAD RATING FIXED SPAN -GIRDER 1

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=Y_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
538	HL-93 Inventory	50	47.5	0.06	0.59	80.40678
538	HL-93 Inventory	50	47.5	0.53	2.22	21.15766
539	HL-93 Inventory	50	47.5	0.53	2.36	19.90254
539	HL-93 Inventory	50	47.5	1.05	4.3	10.80233
540	HL-93 Inventory	50	47.5	1.07	4.49	10.34076
540	HL-93 Inventory	50	47.5	1.56	6.3	7.292063
541	HL-93 Inventory	50	47.5	1.59	6.49	7.07396
541	HL-93 Inventory	50	47.5	2.06	8.19	5.54823
542	HL-93 Inventory	50	47.5	2.09	8.38	5.418854
542	HL-93 Inventory	50	47.5	2.54	9.97	4.509529
543	HL-93 Inventory	50	47.5	2.57	10.16	4.422244
543	HL-93 Inventory	50	47.5	3.01	11.65	3.818884
544	HL-93 Inventory	50	47.5	3.03	11.83	3.759087
544	HL-93 Inventory	50	47.5	3.45	13.24	3.327039
545	HL-93 Inventory	50	47.5	3.47	13.42	3.280924
545	HL-93 Inventory	50	47.5	3.87	14.75	2.957966
546	HL-93 Inventory	50	47.5	3.89	14.91	2.924883
546	HL-93 Inventory	50	47.5	4.26	16.17	2.674088
547	HL-93 Inventory	50	47.5	4.29	16.32	2.647672
547	HL-93 Inventory	50	47.5	4.64	17.5	2.449143
548	HL-93 Inventory	50	47.5	4.67	17.65	2.426629
548	HL-93 Inventory	50	47.5	4.99	18.76	2.265991
549	HL-93 Inventory	50	47.5	5.02	18.89	2.248809
549	HL-93 Inventory	50	47.5	5.32	19.94	2.115346
550	HL-93 Inventory	50	47.5	5.35	20.06	2.101196
550	HL-93 Inventory	50	47.5	5.63	21.04	1.990019
551	HL-93 Inventory	50	47.5	5.66	21.14	1.979186
551	HL-93 Inventory	50	47.5	5.92	22.07	1.884005
552	HL-93 Inventory	50	47.5	5.94	22.16	1.875451
552	HL-93 Inventory	50	47.5	6.18	23.04	1.793403
553	HL-93 Inventory	50	47.5	6.2	23.08	1.789428
553	HL-93 Inventory	50	47.5	6.37	23.59	1.743535
554	HL-93 Inventory	50	47.5	6.37	23.59	1.743535
554	HL-93 Inventory	50	47.5	6.42	23.91	1.71811
555	HL-93 Inventory	50	47.5	6.44	23.93	1.715838
555	HL-93 Inventory	50	47.5	6.64	24.68	1.655592
556	HL-93 Inventory	50	47.5	6.65	24.73	1.65184
556	HL-93 Inventory	50	47.5	6.83	25.38	1.602443
557	HL-93 Inventory	50	47.5	6.84	25.43	1.598899
557	HL-93 Inventory	50	47.5	7	26.02	1.556495
558	HL-93 Inventory	50	47.5	7.01	26.08	1.552531
558	HL-93 Inventory	50	47.5	7.15	26.61	1.516347
559	HL-93 Inventory	50	47.5	7.16	26.66	1.513128
559	HL-93 Inventory	50	47.5	7.27	27.19	1.479588
560	HL-93 Inventory	50	47.5	7.28	27.24	1.476505
560	HL-93 Inventory	50	47.5	7.38	27.71	1.447853
561	HL-93 Inventory	50	47.5	7.38	27.75	1.445766
561	HL-93 Inventory	50	47.5	7.46	28.16	1.421875
562	HL-93 Inventory	50	47.5	7.46	28.19	1.420362
562	HL-93 Inventory	50	47.5	7.52	28.54	1.400841

Minimum Rating Factor 1.327758

563	HL-93 Inventory	50	47.5	7.52	28.57	1.39937
563	HL-93 Inventory	50	47.5	7.56	28.87	1.383443
564	HL-93 Inventory	50	47.5	7.56	28.88	1.382964
564	HL-93 Inventory	50	47.5	7.58	29.12	1.370879
565	HL-93 Inventory	50	47.5	7.58	29.13	1.370409
565	HL-93 Inventory	50	47.5	7.58	29.32	1.361528
566	HL-93 Inventory	50	47.5	7.57	29.32	1.361869
566	HL-93 Inventory	50	47.5	7.55	29.46	1.356076
567	HL-93 Inventory	50	47.5	7.54	29.45	1.356876
567	HL-93 Inventory	50	47.5	7.5	29.54	1.354096
568	HL-93 Inventory	50	47.5	7.5	29.52	1.355014
568	HL-93 Inventory	50	47.5	7.43	29.56	1.355548
569	HL-93 Inventory	50	47.5	7.43	29.54	1.356466
569	HL-93 Inventory	50	47.5	7.34	29.53	1.359973
570	HL-93 Inventory	50	47.5	7.33	29.51	1.361233
570	HL-93 Inventory	50	47.5	7.28	29.39	1.368493
571	HL-93 Inventory	50	47.5	7.28	29.39	1.368493
571	HL-93 Inventory	50	47.5	7.23	29.41	1.369262
572	HL-93 Inventory	50	47.5	7.22	29.39	1.370534
572	HL-93 Inventory	50	47.5	7.09	29.28	1.380123
573	HL-93 Inventory	50	47.5	7.08	29.27	1.380936
573	HL-93 Inventory	50	47.5	6.93	29.13	1.392722
574	HL-93 Inventory	50	47.5	6.92	29.11	1.394023
574	HL-93 Inventory	50	47.5	6.75	28.92	1.409059
575	HL-93 Inventory	50	47.5	6.73	28.9	1.410727
575	HL-93 Inventory	50	47.5	6.55	28.66	1.428821
576	HL-93 Inventory	50	47.5	6.53	28.63	1.431016
576	HL-93 Inventory	50	47.5	6.33	28.33	1.45323
577	HL-93 Inventory	50	47.5	6.3	28.3	1.45583
577	HL-93 Inventory	50	47.5	6.08	27.94	1.482462
578	HL-93 Inventory	50	47.5	6.05	27.92	1.484599
578	HL-93 Inventory	50	47.5	5.81	27.51	1.515449
579	HL-93 Inventory	50	47.5	5.78	27.48	1.518195
579	HL-93 Inventory	50	47.5	5.52	27.01	1.554239
580	HL-93 Inventory	50	47.5	5.49	26.98	1.557079
580	HL-93 Inventory	50	47.5	5.21	26.46	1.598262
581	HL-93 Inventory	50	47.5	5.18	26.42	1.601817
581	HL-93 Inventory	50	47.5	4.88	25.86	1.648105
582	HL-93 Inventory	50	47.5	4.84	25.81	1.652848
582	HL-93 Inventory	50	47.5	4.52	25.2	1.705556
583	HL-93 Inventory	50	47.5	4.48	25.15	1.710537
583	HL-93 Inventory	50	47.5	4.14	24.48	1.771242
584	HL-93 Inventory	50	47.5	4.1	24.43	1.776504
584	HL-93 Inventory	50	47.5	3.74	23.71	1.845635
585	HL-93 Inventory	50	47.5	3.7	23.66	1.851226
585	HL-93 Inventory	50	47.5	3.32	22.88	1.930944
586	HL-93 Inventory	50	47.5	3.28	22.83	1.936925
586	HL-93 Inventory	50	47.5	2.87	21.98	2.030482
587	HL-93 Inventory	50	47.5	2.83	21.96	2.034153
587	HL-93 Inventory	50	47.5	2.72	21.63	2.070273
588	HL-93 Inventory	50	47.5	2.72	21.63	2.070273
588	HL-93 Inventory	50	47.5	2.41	21.04	2.143061
589	HL-93 Inventory	50	47.5	2.36	20.99	2.150548
589	HL-93 Inventory	50	47.5	1.91	20.04	2.27495
590	HL-93 Inventory	50	47.5	1.86	19.96	2.286573
590	HL-93 Inventory	50	47.5	1.4	18.99	2.427593
591	HL-93 Inventory	50	47.5	1.34	18.88	2.444915
591	HL-93 Inventory	50	47.5	0.86	17.87	2.609961
592	HL-93 Inventory	50	47.5	0.8	17.75	2.630986

592	HL-93 Inventory	50	47.5	0.3	16.7	2.826347
593	HL-93 Inventory	50	47.5	0.24	16.57	2.852142
593	HL-93 Inventory	50	47.5	-0.33	15.49	3.04519
594	HL-93 Inventory	50	47.5	-0.37	15.36	3.068359
594	HL-93 Inventory	50	47.5	-0.94	14.24	3.269663
595	HL-93 Inventory	50	47.5	-0.98	14.1	3.299291
595	HL-93 Inventory	50	47.5	-1.57	-13.17	3.487472
596	HL-93 Inventory	50	47.5	-1.62	-13.19	3.478393
596	HL-93 Inventory	50	47.5	-2.22	-13.49	3.35656
597	HL-93 Inventory	50	47.5	-2.28	-13.5	3.34963
597	HL-93 Inventory	50	47.5	-2.9	-13.85	3.220217
598	HL-93 Inventory	50	47.5	-2.96	-13.86	3.213564
598	HL-93 Inventory	50	47.5	-3.61	-14.25	3.08
599	HL-93 Inventory	50	47.5	-3.66	-14.27	3.072179
599	HL-93 Inventory	50	47.5	-4.33	-14.71	2.934738
600	HL-93 Inventory	50	47.5	-4.39	-14.73	2.92668
600	HL-93 Inventory	50	47.5	-5.09	-15.22	2.786465
601	HL-93 Inventory	50	47.5	-5.15	-15.25	2.777049
601	HL-93 Inventory	50	47.5	-5.86	-15.79	2.637112
602	HL-93 Inventory	50	47.5	-5.93	-15.82	2.627686
602	HL-93 Inventory	50	47.5	-6.66	-16.42	2.487211
603	HL-93 Inventory	50	47.5	-6.74	-16.46	2.476306
603	HL-93 Inventory	50	47.5	-7.49	-17.11	2.338399
604	HL-93 Inventory	50	47.5	-7.57	-17.16	2.326923
604	HL-93 Inventory	50	47.5	-8.34	-17.84	2.195067
605	HL-93 Inventory	50	47.5	-8.43	-17.91	2.181463
605	HL-93 Inventory	50	47.5	-9.22	-18.64	2.053648
606	HL-93 Inventory	50	47.5	-9.33	-18.73	2.037907
606	HL-93 Inventory	50	47.5	-10.13	-19.49	1.917394
607	HL-93 Inventory	50	47.5	-10.25	-19.62	1.898573
607	HL-93 Inventory	50	47.5	-11.07	-20.42	1.784035
608	HL-93 Inventory	50	47.5	-11.2	-20.56	1.765564
608	HL-93 Inventory	50	47.5	-12.06	-21.45	1.652214
609	HL-93 Inventory	50	47.5	-12.18	-21.56	1.638219
609	HL-93 Inventory	50	47.5	-13.08	-23.2	1.483621
610	HL-93 Inventory	50	47.5	-13.17	-23.21	1.479104
610	HL-93 Inventory	50	47.5	-14.14	-25.1	1.329084
611	HL-93 Inventory	50	47.5	-14.16	-25.11	1.327758
611	HL-93 Inventory	50	47.5	-13.19	-23.24	1.476334
612	HL-93 Inventory	50	47.5	-13.1	-23.23	1.480844
612	HL-93 Inventory	50	47.5	-12.2	-21.55	1.638051
613	HL-93 Inventory	50	47.5	-12.08	-21.47	1.649744
613	HL-93 Inventory	50	47.5	-11.22	-20.56	1.764591
614	HL-93 Inventory	50	47.5	-11.09	-20.41	1.783929
614	HL-93 Inventory	50	47.5	-10.27	-19.61	1.898521
615	HL-93 Inventory	50	47.5	-10.14	-19.49	1.91688
615	HL-93 Inventory	50	47.5	-9.34	-18.72	2.038462
616	HL-93 Inventory	50	47.5	-9.24	-18.64	2.052575
616	HL-93 Inventory	50	47.5	-8.45	-17.91	2.180346
617	HL-93 Inventory	50	47.5	-8.36	-17.85	2.192717
617	HL-93 Inventory	50	47.5	-7.58	-17.16	2.32634
618	HL-93 Inventory	50	47.5	-7.5	-17.11	2.337814
618	HL-93 Inventory	50	47.5	-6.75	-16.47	2.474196
619	HL-93 Inventory	50	47.5	-6.68	-16.42	2.485993
619	HL-93 Inventory	50	47.5	-5.94	-15.83	2.625395
620	HL-93 Inventory	50	47.5	-5.87	-15.79	2.636479
620	HL-93 Inventory	50	47.5	-5.16	-15.25	2.776393
621	HL-93 Inventory	50	47.5	-5.1	-15.22	2.785808
621	HL-93 Inventory	50	47.5	-4.41	-14.73	2.925322

622	HL-93 Inventory	50	47.5	-4.34	-14.71	2.934058
622	HL-93 Inventory	50	47.5	-3.68	-14.27	3.070778
623	HL-93 Inventory	50	47.5	-3.62	-14.26	3.077139
623	HL-93 Inventory	50	47.5	-2.97	-13.87	3.210526
624	HL-93 Inventory	50	47.5	-2.91	-13.85	3.219495
624	HL-93 Inventory	50	47.5	-2.29	-13.51	3.34641
625	HL-93 Inventory	50	47.5	-2.23	-13.5	3.353333
625	HL-93 Inventory	50	47.5	-1.63	-13.2	3.475
626	HL-93 Inventory	50	47.5	-1.58	-13.19	3.481425
626	HL-93 Inventory	50	47.5	-0.99	14.14	3.28925
627	HL-93 Inventory	50	47.5	-0.94	14.29	3.258223
627	HL-93 Inventory	50	47.5	-0.38	15.41	3.057755
628	HL-93 Inventory	50	47.5	-0.33	15.54	3.035393
628	HL-93 Inventory	50	47.5	0.23	16.62	2.844164
629	HL-93 Inventory	50	47.5	0.29	16.75	2.818507
629	HL-93 Inventory	50	47.5	0.79	17.8	2.624157
630	HL-93 Inventory	50	47.5	0.85	17.91	2.60469
630	HL-93 Inventory	50	47.5	1.34	18.93	2.438457
631	HL-93 Inventory	50	47.5	1.39	19.03	2.423016
631	HL-93 Inventory	50	47.5	1.85	20.01	2.281359
632	HL-93 Inventory	50	47.5	1.91	20.09	2.269288
632	HL-93 Inventory	50	47.5	2.35	21.04	2.145913
633	HL-93 Inventory	50	47.5	2.4	21.09	2.138454
633	HL-93 Inventory	50	47.5	2.71	21.68	2.065959
634	HL-93 Inventory	50	47.5	2.71	21.68	2.065959
634	HL-93 Inventory	50	47.5	2.82	22.01	2.029986
635	HL-93 Inventory	50	47.5	2.87	22.02	2.026794
635	HL-93 Inventory	50	47.5	3.27	22.88	1.933129
636	HL-93 Inventory	50	47.5	3.31	22.92	1.92801
636	HL-93 Inventory	50	47.5	3.7	23.71	1.847322
637	HL-93 Inventory	50	47.5	3.74	23.76	1.841751
637	HL-93 Inventory	50	47.5	4.1	24.48	1.772876
638	HL-93 Inventory	50	47.5	4.14	24.53	1.767631
638	HL-93 Inventory	50	47.5	4.48	25.2	1.707143
639	HL-93 Inventory	50	47.5	4.52	25.25	1.702178
639	HL-93 Inventory	50	47.5	4.84	25.86	1.649652
640	HL-93 Inventory	50	47.5	4.87	25.91	1.645311
640	HL-93 Inventory	50	47.5	5.17	26.47	1.599169
641	HL-93 Inventory	50	47.5	5.21	26.51	1.595247
641	HL-93 Inventory	50	47.5	5.49	27.03	1.554199
642	HL-93 Inventory	50	47.5	5.52	27.06	1.551367
642	HL-93 Inventory	50	47.5	5.78	27.53	1.515438
643	HL-93 Inventory	50	47.5	5.81	27.56	1.5127
643	HL-93 Inventory	50	47.5	6.05	27.97	1.481945
644	HL-93 Inventory	50	47.5	6.08	28	1.479286
644	HL-93 Inventory	50	47.5	6.3	28.36	1.45275
645	HL-93 Inventory	50	47.5	6.32	28.38	1.451022
645	HL-93 Inventory	50	47.5	6.53	28.68	1.428522
646	HL-93 Inventory	50	47.5	6.55	28.71	1.426332
646	HL-93 Inventory	50	47.5	6.73	28.95	1.40829
647	HL-93 Inventory	50	47.5	6.75	28.98	1.406142
647	HL-93 Inventory	50	47.5	6.91	29.16	1.391975
648	HL-93 Inventory	50	47.5	6.93	29.18	1.390336
648	HL-93 Inventory	50	47.5	7.08	29.33	1.378111
649	HL-93 Inventory	50	47.5	7.09	29.33	1.37777
649	HL-93 Inventory	50	47.5	7.22	29.43	1.368671
650	HL-93 Inventory	50	47.5	7.23	29.45	1.367402
650	HL-93 Inventory	50	47.5	7.28	29.43	1.366633
651	HL-93 Inventory	50	47.5	7.28	29.43	1.366633

651	HL-93 Inventory	50	47.5	7.33	29.55	1.359391
652	HL-93 Inventory	50	47.5	7.34	29.57	1.358133
652	HL-93 Inventory	50	47.5	7.43	29.58	1.354632
653	HL-93 Inventory	50	47.5	7.43	29.6	1.353716
653	HL-93 Inventory	50	47.5	7.5	29.56	1.35318
654	HL-93 Inventory	50	47.5	7.5	29.58	1.352265
654	HL-93 Inventory	50	47.5	7.55	29.49	1.354697
655	HL-93 Inventory	50	47.5	7.55	29.49	1.354697
655	HL-93 Inventory	50	47.5	7.57	29.36	1.360014
656	HL-93 Inventory	50	47.5	7.58	29.36	1.359673
656	HL-93 Inventory	50	47.5	7.58	29.17	1.368529
657	HL-93 Inventory	50	47.5	7.58	29.16	1.368999
657	HL-93 Inventory	50	47.5	7.57	28.91	1.381183
658	HL-93 Inventory	50	47.5	7.57	28.9	1.381661
658	HL-93 Inventory	50	47.5	7.53	28.6	1.397552
659	HL-93 Inventory	50	47.5	7.53	28.58	1.39853
659	HL-93 Inventory	50	47.5	7.47	28.22	1.418498
660	HL-93 Inventory	50	47.5	7.47	28.19	1.420007
660	HL-93 Inventory	50	47.5	7.39	27.78	1.443844
661	HL-93 Inventory	50	47.5	7.39	27.74	1.445926
661	HL-93 Inventory	50	47.5	7.29	27.27	1.474514
662	HL-93 Inventory	50	47.5	7.29	27.22	1.477223
662	HL-93 Inventory	50	47.5	7.17	26.69	1.511053
663	HL-93 Inventory	50	47.5	7.16	26.64	1.514264
663	HL-93 Inventory	50	47.5	7.03	26.1	1.550575
664	HL-93 Inventory	50	47.5	7.02	26.04	1.554531
664	HL-93 Inventory	50	47.5	6.86	25.46	1.596229
665	HL-93 Inventory	50	47.5	6.85	25.4	1.600394
665	HL-93 Inventory	50	47.5	6.67	24.75	1.649697
666	HL-93 Inventory	50	47.5	6.66	24.7	1.653441
666	HL-93 Inventory	50	47.5	6.46	23.95	1.71357
667	HL-93 Inventory	50	47.5	6.45	23.93	1.71542
667	HL-93 Inventory	50	47.5	6.39	23.61	1.741211
668	HL-93 Inventory	50	47.5	6.39	23.61	1.741211
668	HL-93 Inventory	50	47.5	6.23	23.1	1.78658
669	HL-93 Inventory	50	47.5	6.21	23.06	1.790546
669	HL-93 Inventory	50	47.5	5.97	22.17	1.873252
670	HL-93 Inventory	50	47.5	5.95	22.09	1.880942
670	HL-93 Inventory	50	47.5	5.69	21.16	1.975898
671	HL-93 Inventory	50	47.5	5.67	21.06	1.98623
671	HL-93 Inventory	50	47.5	5.39	20.07	2.098156
672	HL-93 Inventory	50	47.5	5.37	19.95	2.111779
672	HL-93 Inventory	50	47.5	5.07	18.9	2.244974
673	HL-93 Inventory	50	47.5	5.04	18.77	2.26212
673	HL-93 Inventory	50	47.5	4.72	17.64	2.42517
674	HL-93 Inventory	50	47.5	4.69	17.51	2.444889
674	HL-93 Inventory	50	47.5	4.36	16.31	2.645003
675	HL-93 Inventory	50	47.5	4.32	16.17	2.670377
675	HL-93 Inventory	50	47.5	3.97	14.9	2.921477
676	HL-93 Inventory	50	47.5	3.93	14.75	2.953898
676	HL-93 Inventory	50	47.5	3.56	13.39	3.281553
677	HL-93 Inventory	50	47.5	3.52	13.24	3.321752
677	HL-93 Inventory	50	47.5	3.12	11.8	3.761017
678	HL-93 Inventory	50	47.5	3.08	11.64	3.816151
678	HL-93 Inventory	50	47.5	2.66	10.11	4.435213
679	HL-93 Inventory	50	47.5	2.62	9.94	4.515091
679	HL-93 Inventory	50	47.5	2.18	8.32	5.447115
680	HL-93 Inventory	50	47.5	2.14	8.15	5.565644
680	HL-93 Inventory	50	47.5	1.67	6.43	7.127527

681	HL-93 Inventory	50	47.5	1.64	6.27	7.314195
681	HL-93 Inventory	50	47.5	1.15	4.42	10.48643
682	HL-93 Inventory	50	47.5	1.11	4.29	10.81352
682	HL-93 Inventory	50	47.5	0.59	2.32	20.21983
683	HL-93 Inventory	50	47.5	0.57	2.21	21.23529
683	HL-93 Inventory	50	47.5	0.04	0.6	79.1

LOAD RATING FIXED SPAN -GIRDER 2

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=Y_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
392	HL-93 Inventory	50	47.5	0.05	-0.1	474.5
392	HL-93 Inventory	50	47.5	0.67	2.34	20.01282
393	HL-93 Inventory	50	47.5	0.63	2.3	20.37826
393	HL-93 Inventory	50	47.5	1.24	4.44	10.41892
394	HL-93 Inventory	50	47.5	1.2	4.39	10.5467
394	HL-93 Inventory	50	47.5	1.74	6.38	7.172414
395	HL-93 Inventory	50	47.5	1.71	6.33	7.233807
395	HL-93 Inventory	50	47.5	2.21	8.18	5.536675
396	HL-93 Inventory	50	47.5	2.19	8.14	5.566339
396	HL-93 Inventory	50	47.5	2.65	9.88	4.539474
397	HL-93 Inventory	50	47.5	2.64	9.86	4.549696
397	HL-93 Inventory	50	47.5	3.08	11.5	3.862609
398	HL-93 Inventory	50	47.5	3.07	11.48	3.870209
398	HL-93 Inventory	50	47.5	3.48	13.03	3.378358
399	HL-93 Inventory	50	47.5	3.47	13.02	3.38172
399	HL-93 Inventory	50	47.5	3.87	14.47	3.015204
400	HL-93 Inventory	50	47.5	3.86	14.46	3.017981
400	HL-93 Inventory	50	47.5	4.24	15.83	2.732786
401	HL-93 Inventory	50	47.5	4.23	15.82	2.735145
401	HL-93 Inventory	50	47.5	4.59	17.11	2.50789
402	HL-93 Inventory	50	47.5	4.58	17.11	2.508475
402	HL-93 Inventory	50	47.5	4.92	18.31	2.325505
403	HL-93 Inventory	50	47.5	4.91	18.31	2.326051
403	HL-93 Inventory	50	47.5	5.23	19.42	2.176622
404	HL-93 Inventory	50	47.5	5.22	19.43	2.176016
404	HL-93 Inventory	50	47.5	5.52	20.47	2.050806
405	HL-93 Inventory	50	47.5	5.51	20.47	2.051295
405	HL-93 Inventory	50	47.5	5.78	21.43	1.946804
406	HL-93 Inventory	50	47.5	5.78	21.43	1.946804
406	HL-93 Inventory	50	47.5	6.03	22.31	1.858808
407	HL-93 Inventory	50	47.5	6.03	22.31	1.858808
407	HL-93 Inventory	50	47.5	6.2	22.74	1.816183
408	HL-93 Inventory	50	47.5	6.2	22.74	1.816183
408	HL-93 Inventory	50	47.5	6.26	23.12	1.783737
409	HL-93 Inventory	50	47.5	6.25	23.12	1.78417
409	HL-93 Inventory	50	47.5	6.46	23.92	1.715719
410	HL-93 Inventory	50	47.5	6.46	23.92	1.715719
410	HL-93 Inventory	50	47.5	6.64	24.63	1.658952
411	HL-93 Inventory	50	47.5	6.64	24.63	1.658952
411	HL-93 Inventory	50	47.5	6.8	25.26	1.611243
412	HL-93 Inventory	50	47.5	6.8	25.26	1.611243
412	HL-93 Inventory	50	47.5	6.94	25.82	1.570875
413	HL-93 Inventory	50	47.5	6.94	25.82	1.570875
413	HL-93 Inventory	50	47.5	7.06	26.31	1.537058
414	HL-93 Inventory	50	47.5	7.06	26.32	1.536474
414	HL-93 Inventory	50	47.5	7.16	26.81	1.504662
415	HL-93 Inventory	50	47.5	7.15	26.81	1.505035
415	HL-93 Inventory	50	47.5	7.23	27.26	1.477256
416	HL-93 Inventory	50	47.5	7.23	27.26	1.477256
416	HL-93 Inventory	50	47.5	7.29	27.63	1.455302

Minimum Rating Factor 1.411372

417	HL-93 Inventory	50	47.5	7.29	27.64	1.454776
417	HL-93 Inventory	50	47.5	7.32	27.94	1.438082
418	HL-93 Inventory	50	47.5	7.32	27.95	1.437567
418	HL-93 Inventory	50	47.5	7.33	28.18	1.425479
419	HL-93 Inventory	50	47.5	7.33	28.18	1.425479
419	HL-93 Inventory	50	47.5	7.32	28.35	1.417284
420	HL-93 Inventory	50	47.5	7.33	28.35	1.416931
420	HL-93 Inventory	50	47.5	7.29	28.45	1.413357
421	HL-93 Inventory	50	47.5	7.3	28.45	1.413005
421	HL-93 Inventory	50	47.5	7.24	28.48	1.413624
422	HL-93 Inventory	50	47.5	7.25	28.48	1.413272
422	HL-93 Inventory	50	47.5	7.17	28.44	1.418073
423	HL-93 Inventory	50	47.5	7.17	28.44	1.418073
423	HL-93 Inventory	50	47.5	7.08	28.33	1.426756
424	HL-93 Inventory	50	47.5	7.08	28.33	1.426756
424	HL-93 Inventory	50	47.5	7.03	28.09	1.440726
425	HL-93 Inventory	50	47.5	7.02	28.09	1.441082
425	HL-93 Inventory	50	47.5	6.96	28.19	1.438099
426	HL-93 Inventory	50	47.5	6.97	28.18	1.438254
426	HL-93 Inventory	50	47.5	6.83	28.1	1.447331
427	HL-93 Inventory	50	47.5	6.83	28.11	1.446816
427	HL-93 Inventory	50	47.5	6.67	28.03	1.456654
428	HL-93 Inventory	50	47.5	6.67	28.04	1.456134
428	HL-93 Inventory	50	47.5	6.49	27.89	1.47042
429	HL-93 Inventory	50	47.5	6.49	27.9	1.469892
429	HL-93 Inventory	50	47.5	6.29	27.68	1.488801
430	HL-93 Inventory	50	47.5	6.29	27.69	1.488263
430	HL-93 Inventory	50	47.5	6.06	27.4	1.512409
431	HL-93 Inventory	50	47.5	6.07	27.41	1.511492
431	HL-93 Inventory	50	47.5	5.82	27.06	1.540281
432	HL-93 Inventory	50	47.5	5.82	27.07	1.539712
432	HL-93 Inventory	50	47.5	5.55	26.66	1.573518
433	HL-93 Inventory	50	47.5	5.56	26.66	1.573143
433	HL-93 Inventory	50	47.5	5.27	26.19	1.612447
434	HL-93 Inventory	50	47.5	5.27	26.19	1.612447
434	HL-93 Inventory	50	47.5	4.96	25.65	1.65848
435	HL-93 Inventory	50	47.5	4.97	25.66	1.657443
435	HL-93 Inventory	50	47.5	4.63	25.06	1.710694
436	HL-93 Inventory	50	47.5	4.64	25.07	1.709613
436	HL-93 Inventory	50	47.5	4.28	24.41	1.770586
437	HL-93 Inventory	50	47.5	4.29	24.42	1.769451
437	HL-93 Inventory	50	47.5	3.91	23.7	1.839241
438	HL-93 Inventory	50	47.5	3.92	23.71	1.838043
438	HL-93 Inventory	50	47.5	3.52	22.92	1.918848
439	HL-93 Inventory	50	47.5	3.52	22.93	1.918011
439	HL-93 Inventory	50	47.5	3.11	22.09	2.009507
440	HL-93 Inventory	50	47.5	3.11	22.1	2.008597
440	HL-93 Inventory	50	47.5	2.67	21.19	2.115621
441	HL-93 Inventory	50	47.5	2.67	21.2	2.114623
441	HL-93 Inventory	50	47.5	2.56	20.8	2.160577
442	HL-93 Inventory	50	47.5	2.56	20.8	2.160577
442	HL-93 Inventory	50	47.5	2.21	20.31	2.229936
443	HL-93 Inventory	50	47.5	2.22	20.31	2.229444
443	HL-93 Inventory	50	47.5	1.73	19.39	2.360495
444	HL-93 Inventory	50	47.5	1.74	19.4	2.358763
444	HL-93 Inventory	50	47.5	1.23	18.43	2.510581
445	HL-93 Inventory	50	47.5	1.23	18.43	2.510581
445	HL-93 Inventory	50	47.5	0.71	17.41	2.687536
446	HL-93 Inventory	50	47.5	0.71	17.42	2.685993

446	HL-93 Inventory	50	47.5	0.17	16.35	2.894801
447	HL-93 Inventory	50	47.5	0.17	16.35	2.894801
447	HL-93 Inventory	50	47.5	-0.4	15.23	3.09258
448	HL-93 Inventory	50	47.5	-0.41	15.24	3.089895
448	HL-93 Inventory	50	47.5	-0.99	14.06	3.307966
449	HL-93 Inventory	50	47.5	-0.99	14.07	3.305615
449	HL-93 Inventory	50	47.5	-1.6	-12.86	3.569207
450	HL-93 Inventory	50	47.5	-1.6	12.85	3.571984
450	HL-93 Inventory	50	47.5	-2.23	-13.11	3.453089
451	HL-93 Inventory	50	47.5	-2.23	-13.11	3.453089
451	HL-93 Inventory	50	47.5	-2.88	-13.41	3.327368
452	HL-93 Inventory	50	47.5	-2.88	-13.4	3.329851
452	HL-93 Inventory	50	47.5	-3.55	-13.75	3.196364
453	HL-93 Inventory	50	47.5	-3.55	-13.75	3.196364
453	HL-93 Inventory	50	47.5	-4.24	-14.15	3.057244
454	HL-93 Inventory	50	47.5	-4.24	-14.15	3.057244
454	HL-93 Inventory	50	47.5	-4.95	-14.62	2.910397
455	HL-93 Inventory	50	47.5	-4.95	-14.61	2.912389
455	HL-93 Inventory	50	47.5	-5.69	-15.13	2.763384
456	HL-93 Inventory	50	47.5	-5.69	-15.13	2.763384
456	HL-93 Inventory	50	47.5	-6.45	-15.7	2.61465
457	HL-93 Inventory	50	47.5	-6.45	-15.7	2.61465
457	HL-93 Inventory	50	47.5	-7.22	-16.32	2.468137
458	HL-93 Inventory	50	47.5	-7.22	-16.32	2.468137
458	HL-93 Inventory	50	47.5	-8.03	-16.99	2.323131
459	HL-93 Inventory	50	47.5	-8.03	-17	2.321765
459	HL-93 Inventory	50	47.5	-8.85	-17.71	2.182383
460	HL-93 Inventory	50	47.5	-8.85	-17.72	2.181151
460	HL-93 Inventory	50	47.5	-9.69	-18.47	2.047103
461	HL-93 Inventory	50	47.5	-9.7	-18.48	2.045455
461	HL-93 Inventory	50	47.5	-10.56	-19.27	1.916969
462	HL-93 Inventory	50	47.5	-10.56	-19.28	1.915975
462	HL-93 Inventory	50	47.5	-11.44	-20.11	1.793138
463	HL-93 Inventory	50	47.5	-11.44	-20.12	1.792247
463	HL-93 Inventory	50	47.5	-12.33	-20.99	1.67556
464	HL-93 Inventory	50	47.5	-12.33	-20.99	1.67556
464	HL-93 Inventory	50	47.5	-13.23	-22.06	1.55349
465	HL-93 Inventory	50	47.5	-13.24	-22.07	1.552333
465	HL-93 Inventory	50	47.5	-12.34	-21.03	1.671897
466	HL-93 Inventory	50	47.5	-12.34	-21.03	1.671897
466	HL-93 Inventory	50	47.5	-11.45	-20.16	1.788194
467	HL-93 Inventory	50	47.5	-11.44	-20.15	1.789578
467	HL-93 Inventory	50	47.5	-10.56	-19.32	1.912008
468	HL-93 Inventory	50	47.5	-10.56	-19.31	1.912998
468	HL-93 Inventory	50	47.5	-9.7	-18.51	2.042139
469	HL-93 Inventory	50	47.5	-9.7	-18.51	2.042139
469	HL-93 Inventory	50	47.5	-8.86	-17.75	2.176901
470	HL-93 Inventory	50	47.5	-8.85	-17.75	2.177465
470	HL-93 Inventory	50	47.5	-8.03	-17.03	2.317675
471	HL-93 Inventory	50	47.5	-8.03	-17.03	2.317675
471	HL-93 Inventory	50	47.5	-7.23	-16.36	2.461491
472	HL-93 Inventory	50	47.5	-7.23	-16.36	2.461491
472	HL-93 Inventory	50	47.5	-6.45	-15.74	2.608005
473	HL-93 Inventory	50	47.5	-6.45	-15.74	2.608005
473	HL-93 Inventory	50	47.5	-5.69	-15.17	2.756098
474	HL-93 Inventory	50	47.5	-5.69	-15.17	2.756098
474	HL-93 Inventory	50	47.5	-4.96	-14.65	2.903754
475	HL-93 Inventory	50	47.5	-4.96	-14.66	2.901774
475	HL-93 Inventory	50	47.5	-4.24	-14.19	3.048626

476	HL-93 Inventory	50	47.5	-4.24	-14.2	3.046479
476	HL-93 Inventory	50	47.5	-3.55	-13.79	3.187092
477	HL-93 Inventory	50	47.5	-3.55	-13.79	3.187092
477	HL-93 Inventory	50	47.5	-2.88	-13.45	3.317472
478	HL-93 Inventory	50	47.5	-2.88	-13.45	3.317472
478	HL-93 Inventory	50	47.5	-2.23	-13.16	3.43997
479	HL-93 Inventory	50	47.5	-2.23	-13.17	3.437358
479	HL-93 Inventory	50	47.5	-1.6	12.91	3.555383
480	HL-93 Inventory	50	47.5	-1.6	-12.92	3.552632
480	HL-93 Inventory	50	47.5	-0.99	14.13	3.291578
481	HL-93 Inventory	50	47.5	-0.99	14.12	3.293909
481	HL-93 Inventory	50	47.5	-0.41	15.3	3.077778
482	HL-93 Inventory	50	47.5	-0.41	15.29	3.079791
482	HL-93 Inventory	50	47.5	0.17	16.41	2.884217
483	HL-93 Inventory	50	47.5	0.17	16.41	2.884217
483	HL-93 Inventory	50	47.5	0.71	17.48	2.676773
484	HL-93 Inventory	50	47.5	0.71	17.47	2.678306
484	HL-93 Inventory	50	47.5	1.23	18.49	2.502434
485	HL-93 Inventory	50	47.5	1.23	18.49	2.502434
485	HL-93 Inventory	50	47.5	1.73	19.45	2.353213
486	HL-93 Inventory	50	47.5	1.73	19.45	2.353213
486	HL-93 Inventory	50	47.5	2.21	20.37	2.223368
487	HL-93 Inventory	50	47.5	2.21	20.36	2.22446
487	HL-93 Inventory	50	47.5	2.56	20.85	2.155396
488	HL-93 Inventory	50	47.5	2.56	20.85	2.155396
488	HL-93 Inventory	50	47.5	2.67	21.25	2.109647
489	HL-93 Inventory	50	47.5	2.67	21.24	2.11064
489	HL-93 Inventory	50	47.5	3.11	22.15	2.004063
490	HL-93 Inventory	50	47.5	3.1	22.15	2.004515
490	HL-93 Inventory	50	47.5	3.52	22.99	1.913006
491	HL-93 Inventory	50	47.5	3.52	22.98	1.913838
491	HL-93 Inventory	50	47.5	3.91	23.76	1.834596
492	HL-93 Inventory	50	47.5	3.91	23.75	1.835368
492	HL-93 Inventory	50	47.5	4.28	24.47	1.766244
493	HL-93 Inventory	50	47.5	4.28	24.46	1.766966
493	HL-93 Inventory	50	47.5	4.63	25.12	1.706608
494	HL-93 Inventory	50	47.5	4.63	25.12	1.706608
494	HL-93 Inventory	50	47.5	4.96	25.72	1.653966
495	HL-93 Inventory	50	47.5	4.96	25.71	1.654609
495	HL-93 Inventory	50	47.5	5.27	26.25	1.608762
496	HL-93 Inventory	50	47.5	5.27	26.24	1.609375
496	HL-93 Inventory	50	47.5	5.56	26.72	1.569611
497	HL-93 Inventory	50	47.5	5.55	26.71	1.570573
497	HL-93 Inventory	50	47.5	5.82	27.12	1.536873
498	HL-93 Inventory	50	47.5	5.82	27.12	1.536873
498	HL-93 Inventory	50	47.5	6.06	27.46	1.509104
499	HL-93 Inventory	50	47.5	6.06	27.46	1.509104
499	HL-93 Inventory	50	47.5	6.29	27.74	1.48558
500	HL-93 Inventory	50	47.5	6.28	27.73	1.486477
500	HL-93 Inventory	50	47.5	6.49	27.95	1.467263
501	HL-93 Inventory	50	47.5	6.48	27.94	1.468146
501	HL-93 Inventory	50	47.5	6.67	28.09	1.453542
502	HL-93 Inventory	50	47.5	6.66	28.08	1.454416
502	HL-93 Inventory	50	47.5	6.82	28.16	1.444602
503	HL-93 Inventory	50	47.5	6.82	28.15	1.445115
503	HL-93 Inventory	50	47.5	6.96	28.23	1.436061
504	HL-93 Inventory	50	47.5	6.96	28.23	1.436061
504	HL-93 Inventory	50	47.5	7.02	28.13	1.439033
505	HL-93 Inventory	50	47.5	7.02	28.13	1.439033

505	HL-93 Inventory	50	47.5	7.08	28.37	1.424744
506	HL-93 Inventory	50	47.5	7.07	28.37	1.425097
506	HL-93 Inventory	50	47.5	7.17	28.49	1.415584
507	HL-93 Inventory	50	47.5	7.17	28.48	1.416081
507	HL-93 Inventory	50	47.5	7.24	28.52	1.411641
508	HL-93 Inventory	50	47.5	7.24	28.52	1.411641
508	HL-93 Inventory	50	47.5	7.29	28.49	1.411372
509	HL-93 Inventory	50	47.5	7.29	28.49	1.411372
509	HL-93 Inventory	50	47.5	7.32	28.39	1.415287
510	HL-93 Inventory	50	47.5	7.32	28.39	1.415287
510	HL-93 Inventory	50	47.5	7.33	28.22	1.423459
511	HL-93 Inventory	50	47.5	7.33	28.22	1.423459
511	HL-93 Inventory	50	47.5	7.31	27.99	1.43587
512	HL-93 Inventory	50	47.5	7.31	27.98	1.436383
512	HL-93 Inventory	50	47.5	7.28	27.68	1.453035
513	HL-93 Inventory	50	47.5	7.28	27.67	1.45356
513	HL-93 Inventory	50	47.5	7.22	27.3	1.475458
514	HL-93 Inventory	50	47.5	7.22	27.29	1.475999
514	HL-93 Inventory	50	47.5	7.14	26.85	1.503166
515	HL-93 Inventory	50	47.5	7.14	26.84	1.503726
515	HL-93 Inventory	50	47.5	7.04	26.35	1.535484
516	HL-93 Inventory	50	47.5	7.04	26.35	1.535484
516	HL-93 Inventory	50	47.5	6.92	25.85	1.569826
517	HL-93 Inventory	50	47.5	6.92	25.85	1.569826
517	HL-93 Inventory	50	47.5	6.78	25.29	1.610123
518	HL-93 Inventory	50	47.5	6.78	25.29	1.610123
518	HL-93 Inventory	50	47.5	6.62	24.66	1.657745
519	HL-93 Inventory	50	47.5	6.62	24.66	1.657745
519	HL-93 Inventory	50	47.5	6.43	23.95	1.714823
520	HL-93 Inventory	50	47.5	6.43	23.95	1.714823
520	HL-93 Inventory	50	47.5	6.23	23.16	1.781952
521	HL-93 Inventory	50	47.5	6.23	23.15	1.782721
521	HL-93 Inventory	50	47.5	6.17	22.78	1.814311
522	HL-93 Inventory	50	47.5	6.17	22.77	1.815108
522	HL-93 Inventory	50	47.5	6	22.34	1.857654
523	HL-93 Inventory	50	47.5	6	22.34	1.857654
523	HL-93 Inventory	50	47.5	5.75	21.46	1.94548
524	HL-93 Inventory	50	47.5	5.75	21.46	1.94548
524	HL-93 Inventory	50	47.5	5.48	20.5	2.049756
525	HL-93 Inventory	50	47.5	5.48	20.5	2.049756
525	HL-93 Inventory	50	47.5	5.18	19.46	2.174717
526	HL-93 Inventory	50	47.5	5.19	19.46	2.174203
526	HL-93 Inventory	50	47.5	4.87	18.34	2.324427
527	HL-93 Inventory	50	47.5	4.87	18.34	2.324427
527	HL-93 Inventory	50	47.5	4.53	17.14	2.507001
528	HL-93 Inventory	50	47.5	4.54	17.14	2.506418
528	HL-93 Inventory	50	47.5	4.18	15.86	2.7314
529	HL-93 Inventory	50	47.5	4.18	15.87	2.729679
529	HL-93 Inventory	50	47.5	3.8	14.5	3.013793
530	HL-93 Inventory	50	47.5	3.8	14.51	3.011716
530	HL-93 Inventory	50	47.5	3.4	13.05	3.37931
531	HL-93 Inventory	50	47.5	3.4	13.07	3.374139
531	HL-93 Inventory	50	47.5	2.98	11.52	3.864583
532	HL-93 Inventory	50	47.5	2.98	11.54	3.857886
532	HL-93 Inventory	50	47.5	2.53	9.9	4.542424
533	HL-93 Inventory	50	47.5	2.54	9.93	4.527694
533	HL-93 Inventory	50	47.5	2.07	8.19	5.547009
534	HL-93 Inventory	50	47.5	2.07	8.23	5.520049
534	HL-93 Inventory	50	47.5	1.58	6.37	7.208791

535	HL-93 Inventory	50	47.5	1.58	6.42	7.152648
535	HL-93 Inventory	50	47.5	1.08	4.43	10.47856
536	HL-93 Inventory	50	47.5	1.07	4.48	10.36384
536	HL-93 Inventory	50	47.5	0.55	2.33	20.15021
537	HL-93 Inventory	50	47.5	0.55	2.37	19.81013
537	HL-93 Inventory	50	47.5	0.01	-0.11	431.7273

LOAD RATING FIXED SPAN -GIRDER 3

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=Y_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
246	HL-93 Inventory	50	47.5	0.05	-0.1	474.5
246	HL-93 Inventory	50	47.5	0.67	2.34	20.01282
247	HL-93 Inventory	50	47.5	0.62	2.3	20.38261
247	HL-93 Inventory	50	47.5	1.22	4.44	10.42342
248	HL-93 Inventory	50	47.5	1.18	4.39	10.55125
248	HL-93 Inventory	50	47.5	1.71	6.38	7.177116
249	HL-93 Inventory	50	47.5	1.68	6.33	7.238547
249	HL-93 Inventory	50	47.5	2.16	8.18	5.542787
250	HL-93 Inventory	50	47.5	2.14	8.14	5.572482
250	HL-93 Inventory	50	47.5	2.59	9.88	4.545547
251	HL-93 Inventory	50	47.5	2.57	9.86	4.556795
251	HL-93 Inventory	50	47.5	3	11.5	3.869565
252	HL-93 Inventory	50	47.5	2.99	11.48	3.877178
252	HL-93 Inventory	50	47.5	3.4	13.03	3.384497
253	HL-93 Inventory	50	47.5	3.39	13.02	3.387865
253	HL-93 Inventory	50	47.5	3.77	14.47	3.022115
254	HL-93 Inventory	50	47.5	3.77	14.46	3.024205
254	HL-93 Inventory	50	47.5	4.14	15.83	2.739103
255	HL-93 Inventory	50	47.5	4.14	15.82	2.740834
255	HL-93 Inventory	50	47.5	4.48	17.11	2.514319
256	HL-93 Inventory	50	47.5	4.48	17.11	2.514319
256	HL-93 Inventory	50	47.5	4.8	18.3	2.333333
257	HL-93 Inventory	50	47.5	4.81	18.31	2.331513
257	HL-93 Inventory	50	47.5	5.11	19.42	2.182801
258	HL-93 Inventory	50	47.5	5.11	19.43	2.181678
258	HL-93 Inventory	50	47.5	5.39	20.46	2.058162
259	HL-93 Inventory	50	47.5	5.39	20.47	2.057157
259	HL-93 Inventory	50	47.5	5.65	21.43	1.95287
260	HL-93 Inventory	50	47.5	5.66	21.43	1.952403
260	HL-93 Inventory	50	47.5	5.9	22.3	1.865471
261	HL-93 Inventory	50	47.5	5.9	22.31	1.864635
261	HL-93 Inventory	50	47.5	6.07	22.74	1.8219
262	HL-93 Inventory	50	47.5	6.07	22.74	1.8219
262	HL-93 Inventory	50	47.5	6.12	23.12	1.789792
263	HL-93 Inventory	50	47.5	6.12	23.12	1.789792
263	HL-93 Inventory	50	47.5	6.32	23.92	1.721572
264	HL-93 Inventory	50	47.5	6.32	23.92	1.721572
264	HL-93 Inventory	50	47.5	6.49	24.63	1.665043
265	HL-93 Inventory	50	47.5	6.5	24.63	1.664637
265	HL-93 Inventory	50	47.5	6.65	25.26	1.617181
266	HL-93 Inventory	50	47.5	6.65	25.26	1.617181
266	HL-93 Inventory	50	47.5	6.79	25.82	1.576685
267	HL-93 Inventory	50	47.5	6.79	25.82	1.576685
267	HL-93 Inventory	50	47.5	6.9	26.31	1.543139
268	HL-93 Inventory	50	47.5	6.91	26.32	1.542173
268	HL-93 Inventory	50	47.5	7	26.8	1.511194
269	HL-93 Inventory	50	47.5	7	26.81	1.51063
269	HL-93 Inventory	50	47.5	7.08	27.25	1.483303
270	HL-93 Inventory	50	47.5	7.08	27.26	1.482759
270	HL-93 Inventory	50	47.5	7.13	27.63	1.461093

Minimum Rating Factor 1.416988

271	HL-93 Inventory	50	47.5	7.13	27.64	1.460564
271	HL-93 Inventory	50	47.5	7.16	27.94	1.443808
272	HL-93 Inventory	50	47.5	7.16	27.94	1.443808
272	HL-93 Inventory	50	47.5	7.18	28.18	1.430802
273	HL-93 Inventory	50	47.5	7.18	28.18	1.430802
273	HL-93 Inventory	50	47.5	7.17	28.35	1.422575
274	HL-93 Inventory	50	47.5	7.17	28.35	1.422575
274	HL-93 Inventory	50	47.5	7.14	28.45	1.418629
275	HL-93 Inventory	50	47.5	7.14	28.45	1.418629
275	HL-93 Inventory	50	47.5	7.09	28.48	1.41889
276	HL-93 Inventory	50	47.5	7.09	28.48	1.41889
276	HL-93 Inventory	50	47.5	7.02	28.44	1.423347
277	HL-93 Inventory	50	47.5	7.01	28.44	1.423699
277	HL-93 Inventory	50	47.5	6.92	28.33	1.432404
278	HL-93 Inventory	50	47.5	6.92	28.33	1.432404
278	HL-93 Inventory	50	47.5	6.87	28.09	1.446422
279	HL-93 Inventory	50	47.5	6.87	28.09	1.446422
279	HL-93 Inventory	50	47.5	6.81	28.19	1.44342
280	HL-93 Inventory	50	47.5	6.81	28.18	1.443932
280	HL-93 Inventory	50	47.5	6.67	28.1	1.453025
281	HL-93 Inventory	50	47.5	6.67	28.1	1.453025
281	HL-93 Inventory	50	47.5	6.52	28.03	1.462005
282	HL-93 Inventory	50	47.5	6.51	28.04	1.46184
282	HL-93 Inventory	50	47.5	6.34	27.89	1.475798
283	HL-93 Inventory	50	47.5	6.33	27.89	1.476156
283	HL-93 Inventory	50	47.5	6.14	27.68	1.49422
284	HL-93 Inventory	50	47.5	6.13	27.68	1.494581
284	HL-93 Inventory	50	47.5	5.92	27.4	1.517518
285	HL-93 Inventory	50	47.5	5.91	27.41	1.517329
285	HL-93 Inventory	50	47.5	5.68	27.06	1.545455
286	HL-93 Inventory	50	47.5	5.67	27.07	1.545253
286	HL-93 Inventory	50	47.5	5.42	26.65	1.578987
287	HL-93 Inventory	50	47.5	5.41	26.66	1.57877
287	HL-93 Inventory	50	47.5	5.14	26.18	1.618029
288	HL-93 Inventory	50	47.5	5.13	26.19	1.617793
288	HL-93 Inventory	50	47.5	4.83	25.65	1.663548
289	HL-93 Inventory	50	47.5	4.82	25.66	1.663289
289	HL-93 Inventory	50	47.5	4.51	25.06	1.715483
290	HL-93 Inventory	50	47.5	4.5	25.07	1.715197
290	HL-93 Inventory	50	47.5	4.16	24.41	1.775502
291	HL-93 Inventory	50	47.5	4.15	24.42	1.775184
291	HL-93 Inventory	50	47.5	3.8	23.69	1.84466
292	HL-93 Inventory	50	47.5	3.79	23.7	1.844304
292	HL-93 Inventory	50	47.5	3.41	22.92	1.923647
293	HL-93 Inventory	50	47.5	3.4	22.93	1.923245
293	HL-93 Inventory	50	47.5	3.01	22.09	2.014033
294	HL-93 Inventory	50	47.5	2.99	22.1	2.014027
294	HL-93 Inventory	50	47.5	2.58	21.19	2.119868
295	HL-93 Inventory	50	47.5	2.57	21.2	2.11934
295	HL-93 Inventory	50	47.5	2.46	20.8	2.165385
296	HL-93 Inventory	50	47.5	2.46	20.8	2.165385
296	HL-93 Inventory	50	47.5	2.13	20.31	2.233875
297	HL-93 Inventory	50	47.5	2.12	20.31	2.234367
297	HL-93 Inventory	50	47.5	1.66	19.39	2.364105
298	HL-93 Inventory	50	47.5	1.65	19.39	2.364621
298	HL-93 Inventory	50	47.5	1.16	18.43	2.514379
299	HL-93 Inventory	50	47.5	1.15	18.43	2.514921
299	HL-93 Inventory	50	47.5	0.65	17.41	2.690982
300	HL-93 Inventory	50	47.5	0.64	17.42	2.690011

300	HL-93 Inventory	50	47.5	0.12	16.34	2.899633
301	HL-93 Inventory	50	47.5	0.11	16.35	2.898471
301	HL-93 Inventory	50	47.5	-0.45	15.23	3.089297
302	HL-93 Inventory	50	47.5	-0.45	15.23	3.089297
302	HL-93 Inventory	50	47.5	-1.02	14.06	3.305832
303	HL-93 Inventory	50	47.5	-1.02	14.07	3.303483
303	HL-93 Inventory	50	47.5	-1.61	-12.85	3.571206
304	HL-93 Inventory	50	47.5	-1.62	12.85	3.570428
304	HL-93 Inventory	50	47.5	-2.22	-13.11	3.453852
305	HL-93 Inventory	50	47.5	-2.23	-13.11	3.453089
305	HL-93 Inventory	50	47.5	-2.85	-13.41	3.329605
306	HL-93 Inventory	50	47.5	-2.86	-13.4	3.331343
306	HL-93 Inventory	50	47.5	-3.51	-13.75	3.199273
307	HL-93 Inventory	50	47.5	-3.52	-13.75	3.198545
307	HL-93 Inventory	50	47.5	-4.18	-14.15	3.061484
308	HL-93 Inventory	50	47.5	-4.19	-14.15	3.060777
308	HL-93 Inventory	50	47.5	-4.87	-14.62	2.915869
309	HL-93 Inventory	50	47.5	-4.89	-14.61	2.916496
309	HL-93 Inventory	50	47.5	-5.58	-15.13	2.770654
310	HL-93 Inventory	50	47.5	-5.6	-15.13	2.769332
310	HL-93 Inventory	50	47.5	-6.32	-15.7	2.62293
311	HL-93 Inventory	50	47.5	-6.33	-15.7	2.622293
311	HL-93 Inventory	50	47.5	-7.07	-16.32	2.477328
312	HL-93 Inventory	50	47.5	-7.08	-16.32	2.476716
312	HL-93 Inventory	50	47.5	-7.84	-16.99	2.334314
313	HL-93 Inventory	50	47.5	-7.85	-17	2.332353
313	HL-93 Inventory	50	47.5	-8.63	-17.71	2.194805
314	HL-93 Inventory	50	47.5	-8.64	-17.72	2.193002
314	HL-93 Inventory	50	47.5	-9.44	-18.47	2.060639
315	HL-93 Inventory	50	47.5	-9.45	-18.48	2.058983
315	HL-93 Inventory	50	47.5	-10.27	-19.27	1.932019
316	HL-93 Inventory	50	47.5	-10.28	-19.28	1.930498
316	HL-93 Inventory	50	47.5	-11.11	-20.11	1.809547
317	HL-93 Inventory	50	47.5	-11.12	-20.12	1.808151
317	HL-93 Inventory	50	47.5	-11.96	-20.99	1.693187
318	HL-93 Inventory	50	47.5	-11.97	-20.99	1.692711
318	HL-93 Inventory	50	47.5	-12.83	-22.06	1.571623
319	HL-93 Inventory	50	47.5	-12.83	-22.07	1.570911
319	HL-93 Inventory	50	47.5	-11.96	-21.03	1.689967
320	HL-93 Inventory	50	47.5	-11.96	-21.03	1.689967
320	HL-93 Inventory	50	47.5	-11.11	-20.16	1.80506
321	HL-93 Inventory	50	47.5	-11.1	-20.15	1.806452
321	HL-93 Inventory	50	47.5	-10.27	-19.32	1.927019
322	HL-93 Inventory	50	47.5	-10.26	-19.31	1.928534
322	HL-93 Inventory	50	47.5	-9.45	-18.51	2.055646
323	HL-93 Inventory	50	47.5	-9.44	-18.51	2.056186
323	HL-93 Inventory	50	47.5	-8.64	-17.75	2.189296
324	HL-93 Inventory	50	47.5	-8.63	-17.75	2.189859
324	HL-93 Inventory	50	47.5	-7.85	-17.03	2.328244
325	HL-93 Inventory	50	47.5	-7.84	-17.03	2.328831
325	HL-93 Inventory	50	47.5	-7.08	-16.36	2.47066
326	HL-93 Inventory	50	47.5	-7.06	-16.36	2.471883
326	HL-93 Inventory	50	47.5	-6.33	-15.74	2.615629
327	HL-93 Inventory	50	47.5	-6.31	-15.74	2.6169
327	HL-93 Inventory	50	47.5	-5.59	-15.17	2.76269
328	HL-93 Inventory	50	47.5	-5.58	-15.17	2.763349
328	HL-93 Inventory	50	47.5	-4.88	-14.65	2.909215
329	HL-93 Inventory	50	47.5	-4.87	-14.66	2.907913
329	HL-93 Inventory	50	47.5	-4.19	-14.19	3.052149

330	HL-93 Inventory	50	47.5	-4.17	-14.2	3.051408
330	HL-93 Inventory	50	47.5	-3.51	-13.79	3.189993
331	HL-93 Inventory	50	47.5	-3.5	-13.79	3.190718
331	HL-93 Inventory	50	47.5	-2.86	-13.45	3.318959
332	HL-93 Inventory	50	47.5	-2.85	-13.45	3.319703
332	HL-93 Inventory	50	47.5	-2.23	-13.16	3.43997
333	HL-93 Inventory	50	47.5	-2.22	-13.17	3.438117
333	HL-93 Inventory	50	47.5	-1.61	12.91	3.554609
334	HL-93 Inventory	50	47.5	-1.61	-12.92	3.551858
334	HL-93 Inventory	50	47.5	-1.02	14.13	3.289455
335	HL-93 Inventory	50	47.5	-1.02	14.12	3.291785
335	HL-93 Inventory	50	47.5	-0.45	15.3	3.075163
336	HL-93 Inventory	50	47.5	-0.44	15.29	3.077829
336	HL-93 Inventory	50	47.5	0.11	16.41	2.887873
337	HL-93 Inventory	50	47.5	0.12	16.41	2.887264
337	HL-93 Inventory	50	47.5	0.65	17.48	2.680206
338	HL-93 Inventory	50	47.5	0.65	17.47	2.68174
338	HL-93 Inventory	50	47.5	1.16	18.49	2.50622
339	HL-93 Inventory	50	47.5	1.17	18.49	2.505679
339	HL-93 Inventory	50	47.5	1.65	19.45	2.357326
340	HL-93 Inventory	50	47.5	1.66	19.45	2.356812
340	HL-93 Inventory	50	47.5	2.12	20.37	2.227786
341	HL-93 Inventory	50	47.5	2.13	20.36	2.228389
341	HL-93 Inventory	50	47.5	2.46	20.85	2.160192
342	HL-93 Inventory	50	47.5	2.46	20.85	2.160192
342	HL-93 Inventory	50	47.5	2.57	21.25	2.114353
343	HL-93 Inventory	50	47.5	2.58	21.24	2.114878
343	HL-93 Inventory	50	47.5	3	22.15	2.009029
344	HL-93 Inventory	50	47.5	3.01	22.15	2.008578
344	HL-93 Inventory	50	47.5	3.4	22.99	1.918225
345	HL-93 Inventory	50	47.5	3.41	22.98	1.918625
345	HL-93 Inventory	50	47.5	3.79	23.76	1.839646
346	HL-93 Inventory	50	47.5	3.8	23.75	1.84
346	HL-93 Inventory	50	47.5	4.16	24.47	1.771148
347	HL-93 Inventory	50	47.5	4.17	24.46	1.771464
347	HL-93 Inventory	50	47.5	4.5	25.12	1.711783
348	HL-93 Inventory	50	47.5	4.51	25.12	1.711385
348	HL-93 Inventory	50	47.5	4.83	25.72	1.65902
349	HL-93 Inventory	50	47.5	4.83	25.71	1.659665
349	HL-93 Inventory	50	47.5	5.13	26.25	1.614095
350	HL-93 Inventory	50	47.5	5.14	26.24	1.614329
350	HL-93 Inventory	50	47.5	5.41	26.72	1.575225
351	HL-93 Inventory	50	47.5	5.42	26.71	1.57544
351	HL-93 Inventory	50	47.5	5.67	27.12	1.542404
352	HL-93 Inventory	50	47.5	5.68	27.12	1.542035
352	HL-93 Inventory	50	47.5	5.91	27.46	1.514567
353	HL-93 Inventory	50	47.5	5.92	27.46	1.514202
353	HL-93 Inventory	50	47.5	6.13	27.74	1.491348
354	HL-93 Inventory	50	47.5	6.14	27.73	1.491525
354	HL-93 Inventory	50	47.5	6.33	27.95	1.472987
355	HL-93 Inventory	50	47.5	6.34	27.94	1.473157
355	HL-93 Inventory	50	47.5	6.51	28.09	1.459238
356	HL-93 Inventory	50	47.5	6.52	28.08	1.459402
356	HL-93 Inventory	50	47.5	6.67	28.16	1.449929
357	HL-93 Inventory	50	47.5	6.67	28.15	1.450444
357	HL-93 Inventory	50	47.5	6.81	28.23	1.441374
358	HL-93 Inventory	50	47.5	6.81	28.23	1.441374
358	HL-93 Inventory	50	47.5	6.87	28.13	1.444365
359	HL-93 Inventory	50	47.5	6.87	28.13	1.444365

359	HL-93 Inventory	50	47.5	6.92	28.37	1.430384
360	HL-93 Inventory	50	47.5	6.92	28.37	1.430384
360	HL-93 Inventory	50	47.5	7.01	28.49	1.4212
361	HL-93 Inventory	50	47.5	7.01	28.48	1.421699
361	HL-93 Inventory	50	47.5	7.08	28.52	1.417251
362	HL-93 Inventory	50	47.5	7.08	28.52	1.417251
362	HL-93 Inventory	50	47.5	7.13	28.49	1.416988
363	HL-93 Inventory	50	47.5	7.13	28.49	1.416988
363	HL-93 Inventory	50	47.5	7.16	28.39	1.420923
364	HL-93 Inventory	50	47.5	7.16	28.39	1.420923
364	HL-93 Inventory	50	47.5	7.17	28.22	1.429128
365	HL-93 Inventory	50	47.5	7.17	28.22	1.429128
365	HL-93 Inventory	50	47.5	7.16	27.99	1.441229
366	HL-93 Inventory	50	47.5	7.16	27.98	1.441744
366	HL-93 Inventory	50	47.5	7.12	27.68	1.458815
367	HL-93 Inventory	50	47.5	7.12	27.67	1.459342
367	HL-93 Inventory	50	47.5	7.07	27.3	1.480952
368	HL-93 Inventory	50	47.5	7.07	27.29	1.481495
368	HL-93 Inventory	50	47.5	6.99	26.85	1.508752
369	HL-93 Inventory	50	47.5	6.99	26.84	1.509314
369	HL-93 Inventory	50	47.5	6.9	26.35	1.540797
370	HL-93 Inventory	50	47.5	6.89	26.35	1.541176
370	HL-93 Inventory	50	47.5	6.78	25.85	1.575242
371	HL-93 Inventory	50	47.5	6.77	25.85	1.575629
371	HL-93 Inventory	50	47.5	6.64	25.29	1.615658
372	HL-93 Inventory	50	47.5	6.63	25.29	1.616054
372	HL-93 Inventory	50	47.5	6.48	24.66	1.663423
373	HL-93 Inventory	50	47.5	6.47	24.66	1.663828
373	HL-93 Inventory	50	47.5	6.3	23.95	1.720251
374	HL-93 Inventory	50	47.5	6.29	23.95	1.720668
374	HL-93 Inventory	50	47.5	6.1	23.16	1.787565
375	HL-93 Inventory	50	47.5	6.09	23.15	1.788769
375	HL-93 Inventory	50	47.5	6.04	22.78	1.820018
376	HL-93 Inventory	50	47.5	6.04	22.77	1.820817
376	HL-93 Inventory	50	47.5	5.87	22.34	1.863474
377	HL-93 Inventory	50	47.5	5.87	22.34	1.863474
377	HL-93 Inventory	50	47.5	5.63	21.46	1.951072
378	HL-93 Inventory	50	47.5	5.62	21.46	1.951538
378	HL-93 Inventory	50	47.5	5.36	20.5	2.05561
379	HL-93 Inventory	50	47.5	5.35	20.5	2.056098
379	HL-93 Inventory	50	47.5	5.07	19.46	2.18037
380	HL-93 Inventory	50	47.5	5.06	19.46	2.180884
380	HL-93 Inventory	50	47.5	4.76	18.34	2.330425
381	HL-93 Inventory	50	47.5	4.76	18.34	2.330425
381	HL-93 Inventory	50	47.5	4.44	17.14	2.512252
382	HL-93 Inventory	50	47.5	4.43	17.14	2.512835
382	HL-93 Inventory	50	47.5	4.09	15.86	2.737074
383	HL-93 Inventory	50	47.5	4.08	15.87	2.73598
383	HL-93 Inventory	50	47.5	3.72	14.5	3.01931
384	HL-93 Inventory	50	47.5	3.71	14.51	3.017919
384	HL-93 Inventory	50	47.5	3.32	13.05	3.385441
385	HL-93 Inventory	50	47.5	3.31	13.07	3.381025
385	HL-93 Inventory	50	47.5	2.91	11.52	3.87066
386	HL-93 Inventory	50	47.5	2.9	11.54	3.864818
386	HL-93 Inventory	50	47.5	2.48	9.9	4.547475
387	HL-93 Inventory	50	47.5	2.47	9.93	4.534743
387	HL-93 Inventory	50	47.5	2.02	8.19	5.553114
388	HL-93 Inventory	50	47.5	2.02	8.23	5.526124
388	HL-93 Inventory	50	47.5	1.55	6.37	7.213501

389	HL-93 Inventory	50	47.5	1.55	6.42	7.157321
389	HL-93 Inventory	50	47.5	1.06	4.43	10.48307
390	HL-93 Inventory	50	47.5	1.05	4.48	10.3683
390	HL-93 Inventory	50	47.5	0.54	2.33	20.15451
391	HL-93 Inventory	50	47.5	0.54	2.37	19.81435
391	HL-93 Inventory	50	47.5	0.01	-0.11	431.7273

LOAD RATING FIXED SPAN -GIRDER 4

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=Y_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
100	HL-93 Inventory	50	47.5	0.11	0.59	80.32203
100	HL-93 Inventory	50	47.5	0.48	2.22	21.18018
101	HL-93 Inventory	50	47.5	0.53	2.36	19.90254
101	HL-93 Inventory	50	47.5	0.96	4.3	10.82326
102	HL-93 Inventory	50	47.5	1.01	4.49	10.35412
102	HL-93 Inventory	50	47.5	1.44	6.3	7.311111
103	HL-93 Inventory	50	47.5	1.49	6.49	7.089368
103	HL-93 Inventory	50	47.5	1.9	8.19	5.567766
104	HL-93 Inventory	50	47.5	1.95	8.38	5.435561
104	HL-93 Inventory	50	47.5	2.35	9.97	4.528586
105	HL-93 Inventory	50	47.5	2.4	10.16	4.438976
105	HL-93 Inventory	50	47.5	2.78	11.65	3.838627
106	HL-93 Inventory	50	47.5	2.83	11.83	3.775993
106	HL-93 Inventory	50	47.5	3.19	13.24	3.346677
107	HL-93 Inventory	50	47.5	3.25	13.41	3.299776
107	HL-93 Inventory	50	47.5	3.58	14.74	2.979647
108	HL-93 Inventory	50	47.5	3.65	14.91	2.940979
108	HL-93 Inventory	50	47.5	3.96	16.17	2.692641
109	HL-93 Inventory	50	47.5	4.02	16.32	2.664216
109	HL-93 Inventory	50	47.5	4.31	17.5	2.468
110	HL-93 Inventory	50	47.5	4.38	17.64	2.444444
110	HL-93 Inventory	50	47.5	4.65	18.76	2.284115
111	HL-93 Inventory	50	47.5	4.71	18.89	2.26522
111	HL-93 Inventory	50	47.5	4.96	19.94	2.1334
112	HL-93 Inventory	50	47.5	5.02	20.06	2.117647
112	HL-93 Inventory	50	47.5	5.25	21.04	2.00808
113	HL-93 Inventory	50	47.5	5.31	21.14	1.995743
113	HL-93 Inventory	50	47.5	5.53	22.07	1.901676
114	HL-93 Inventory	50	47.5	5.58	22.15	1.892551
114	HL-93 Inventory	50	47.5	5.78	23.04	1.810764
115	HL-93 Inventory	50	47.5	5.82	23.08	1.805893
115	HL-93 Inventory	50	47.5	5.96	23.59	1.760916
116	HL-93 Inventory	50	47.5	5.96	23.59	1.760916
116	HL-93 Inventory	50	47.5	6	23.91	1.735675
117	HL-93 Inventory	50	47.5	6.05	23.93	1.732135
117	HL-93 Inventory	50	47.5	6.21	24.67	1.673693
118	HL-93 Inventory	50	47.5	6.25	24.72	1.668689
118	HL-93 Inventory	50	47.5	6.4	25.37	1.620024
119	HL-93 Inventory	50	47.5	6.43	25.43	1.615022
119	HL-93 Inventory	50	47.5	6.56	26.02	1.573405
120	HL-93 Inventory	50	47.5	6.59	26.07	1.569237
120	HL-93 Inventory	50	47.5	6.7	26.6	1.533835
121	HL-93 Inventory	50	47.5	6.73	26.66	1.529257
121	HL-93 Inventory	50	47.5	6.82	27.19	1.496138
122	HL-93 Inventory	50	47.5	6.85	27.23	1.492839
122	HL-93 Inventory	50	47.5	6.92	27.7	1.464982
123	HL-93 Inventory	50	47.5	6.94	27.74	1.462149
123	HL-93 Inventory	50	47.5	7	28.15	1.438721
124	HL-93 Inventory	50	47.5	7.02	28.18	1.43648
124	HL-93 Inventory	50	47.5	7.06	28.54	1.416959
125	HL-93 Inventory	50	47.5	7.07	28.56	1.415616
125	HL-93 Inventory	50	47.5	7.1	28.86	1.399861
126	HL-93 Inventory	50	47.5	7.11	28.88	1.398546
126	HL-93 Inventory	50	47.5	7.11	29.12	1.387019

Minimum Rating Factor 1.367478

127	HL-93 Inventory	50	47.5	7.12	29.13	1.3862
127	HL-93 Inventory	50	47.5	7.11	29.32	1.377558
128	HL-93 Inventory	50	47.5	7.11	29.32	1.377558
128	HL-93 Inventory	50	47.5	7.08	29.46	1.37203
129	HL-93 Inventory	50	47.5	7.08	29.45	1.372496
129	HL-93 Inventory	50	47.5	7.04	29.54	1.369668
130	HL-93 Inventory	50	47.5	7.03	29.52	1.370935
130	HL-93 Inventory	50	47.5	6.97	29.56	1.37111
131	HL-93 Inventory	50	47.5	6.96	29.54	1.372376
131	HL-93 Inventory	50	47.5	6.88	29.53	1.37555
132	HL-93 Inventory	50	47.5	6.86	29.51	1.37716
132	HL-93 Inventory	50	47.5	6.82	29.39	1.384144
133	HL-93 Inventory	50	47.5	6.82	29.39	1.384144
133	HL-93 Inventory	50	47.5	6.77	29.41	1.384903
134	HL-93 Inventory	50	47.5	6.75	29.39	1.386526
134	HL-93 Inventory	50	47.5	6.64	29.27	1.395969
135	HL-93 Inventory	50	47.5	6.61	29.27	1.396994
135	HL-93 Inventory	50	47.5	6.48	29.12	1.408654
136	HL-93 Inventory	50	47.5	6.45	29.11	1.410168
136	HL-93 Inventory	50	47.5	6.31	28.92	1.424274
137	HL-93 Inventory	50	47.5	6.27	28.89	1.427137
137	HL-93 Inventory	50	47.5	6.11	28.65	1.444677
138	HL-93 Inventory	50	47.5	6.07	28.62	1.447589
138	HL-93 Inventory	50	47.5	5.9	28.33	1.468408
139	HL-93 Inventory	50	47.5	5.85	28.3	1.471731
139	HL-93 Inventory	50	47.5	5.66	27.94	1.497495
140	HL-93 Inventory	50	47.5	5.61	27.91	1.500896
140	HL-93 Inventory	50	47.5	5.4	27.5	1.530909
141	HL-93 Inventory	50	47.5	5.35	27.47	1.534401
141	HL-93 Inventory	50	47.5	5.12	27.01	1.569049
142	HL-93 Inventory	50	47.5	5.06	26.97	1.5736
142	HL-93 Inventory	50	47.5	4.82	26.46	1.613001
143	HL-93 Inventory	50	47.5	4.76	26.42	1.617714
143	HL-93 Inventory	50	47.5	4.5	25.85	1.663443
144	HL-93 Inventory	50	47.5	4.44	25.81	1.668346
144	HL-93 Inventory	50	47.5	4.16	25.19	1.720524
145	HL-93 Inventory	50	47.5	4.09	25.14	1.72673
145	HL-93 Inventory	50	47.5	3.79	24.48	1.785539
146	HL-93 Inventory	50	47.5	3.73	24.42	1.792383
146	HL-93 Inventory	50	47.5	3.41	23.7	1.860338
147	HL-93 Inventory	50	47.5	3.34	23.65	1.86723
147	HL-93 Inventory	50	47.5	3.01	22.87	1.945343
148	HL-93 Inventory	50	47.5	2.94	22.83	1.951818
148	HL-93 Inventory	50	47.5	2.58	21.97	2.044606
149	HL-93 Inventory	50	47.5	2.51	21.95	2.049658
149	HL-93 Inventory	50	47.5	2.41	21.62	2.085569
150	HL-93 Inventory	50	47.5	2.41	21.63	2.084605
150	HL-93 Inventory	50	47.5	2.13	21.04	2.156369
151	HL-93 Inventory	50	47.5	2.06	20.99	2.16484
151	HL-93 Inventory	50	47.5	1.67	20.04	2.286926
152	HL-93 Inventory	50	47.5	1.59	19.96	2.3001
152	HL-93 Inventory	50	47.5	1.18	18.98	2.440464
153	HL-93 Inventory	50	47.5	1.1	18.87	2.45893
153	HL-93 Inventory	50	47.5	0.67	17.87	2.620593
154	HL-93 Inventory	50	47.5	0.59	17.75	2.642817
154	HL-93 Inventory	50	47.5	0.14	16.7	2.835928
155	HL-93 Inventory	50	47.5	0.06	16.57	2.863005
155	HL-93 Inventory	50	47.5	-0.45	15.49	3.037444
156	HL-93 Inventory	50	47.5	-0.51	15.35	3.061238
156	HL-93 Inventory	50	47.5	-1.02	14.24	3.264045
157	HL-93 Inventory	50	47.5	-1.09	14.09	3.293825
157	HL-93 Inventory	50	47.5	-1.61	-13.17	3.484434

158	HL-93 Inventory	50	47.5	-1.68	-13.18	3.47648
158	HL-93 Inventory	50	47.5	-2.22	-13.49	3.35656
159	HL-93 Inventory	50	47.5	-2.29	-13.5	3.348889
159	HL-93 Inventory	50	47.5	-2.84	-13.85	3.224549
160	HL-93 Inventory	50	47.5	-2.93	-13.86	3.215729
160	HL-93 Inventory	50	47.5	-3.49	-14.25	3.088421
161	HL-93 Inventory	50	47.5	-3.58	-14.27	3.077786
161	HL-93 Inventory	50	47.5	-4.16	-14.71	2.946295
162	HL-93 Inventory	50	47.5	-4.25	-14.73	2.936185
162	HL-93 Inventory	50	47.5	-4.85	-15.22	2.802234
163	HL-93 Inventory	50	47.5	-4.94	-15.25	2.79082
163	HL-93 Inventory	50	47.5	-5.55	-15.79	2.656745
164	HL-93 Inventory	50	47.5	-5.65	-15.82	2.645386
164	HL-93 Inventory	50	47.5	-6.27	-16.42	2.510962
165	HL-93 Inventory	50	47.5	-6.38	-16.46	2.498177
165	HL-93 Inventory	50	47.5	-7.02	-17.11	2.365868
166	HL-93 Inventory	50	47.5	-7.13	-17.16	2.352564
166	HL-93 Inventory	50	47.5	-7.78	-17.84	2.226457
167	HL-93 Inventory	50	47.5	-7.9	-17.91	2.211055
167	HL-93 Inventory	50	47.5	-8.57	-18.64	2.088519
168	HL-93 Inventory	50	47.5	-8.7	-18.73	2.071543
168	HL-93 Inventory	50	47.5	-9.39	-19.49	1.955362
169	HL-93 Inventory	50	47.5	-9.51	-19.62	1.93629
169	HL-93 Inventory	50	47.5	-10.23	-20.42	1.825171
170	HL-93 Inventory	50	47.5	-10.35	-20.57	1.806028
170	HL-93 Inventory	50	47.5	-11.08	-21.45	1.697902
171	HL-93 Inventory	50	47.5	-11.2	-21.56	1.683673
171	HL-93 Inventory	50	47.5	-11.96	-23.2	1.531897
172	HL-93 Inventory	50	47.5	-12.04	-23.22	1.527132
172	HL-93 Inventory	50	47.5	-12.85	-25.11	1.379928
173	HL-93 Inventory	50	47.5	-12.83	-25.1	1.381275
173	HL-93 Inventory	50	47.5	-12.02	-23.24	1.526678
174	HL-93 Inventory	50	47.5	-11.94	-23.23	1.530779
174	HL-93 Inventory	50	47.5	-11.18	-21.55	1.685383
175	HL-93 Inventory	50	47.5	-11.07	-21.47	1.696786
175	HL-93 Inventory	50	47.5	-10.33	-20.56	1.807879
176	HL-93 Inventory	50	47.5	-10.21	-20.41	1.827046
176	HL-93 Inventory	50	47.5	-9.5	-19.61	1.937787
177	HL-93 Inventory	50	47.5	-9.37	-19.49	1.956388
177	HL-93 Inventory	50	47.5	-8.68	-18.72	2.073718
178	HL-93 Inventory	50	47.5	-8.56	-18.64	2.089056
178	HL-93 Inventory	50	47.5	-7.89	-17.91	2.211614
179	HL-93 Inventory	50	47.5	-7.76	-17.84	2.227578
179	HL-93 Inventory	50	47.5	-7.12	-17.16	2.353147
180	HL-93 Inventory	50	47.5	-7	-17.11	2.367037
180	HL-93 Inventory	50	47.5	-6.37	-16.46	2.498785
181	HL-93 Inventory	50	47.5	-6.26	-16.42	2.511571
181	HL-93 Inventory	50	47.5	-5.64	-15.83	2.644346
182	HL-93 Inventory	50	47.5	-5.54	-15.79	2.657378
182	HL-93 Inventory	50	47.5	-4.93	-15.25	2.791475
183	HL-93 Inventory	50	47.5	-4.83	-15.22	2.803548
183	HL-93 Inventory	50	47.5	-4.24	-14.73	2.936864
184	HL-93 Inventory	50	47.5	-4.15	-14.71	2.946975
184	HL-93 Inventory	50	47.5	-3.57	-14.27	3.078486
185	HL-93 Inventory	50	47.5	-3.48	-14.25	3.089123
185	HL-93 Inventory	50	47.5	-2.91	-13.87	3.214852
186	HL-93 Inventory	50	47.5	-2.83	-13.85	3.225271
186	HL-93 Inventory	50	47.5	-2.28	-13.51	3.34715
187	HL-93 Inventory	50	47.5	-2.21	-13.5	3.354815
187	HL-93 Inventory	50	47.5	-1.67	-13.2	3.47197
188	HL-93 Inventory	50	47.5	-1.6	-13.19	3.479909
188	HL-93 Inventory	50	47.5	-1.08	14.14	3.282885

189	HL-93 Inventory	50	47.5	-1.01	14.29	3.253324
189	HL-93 Inventory	50	47.5	-0.5	15.41	3.049968
190	HL-93 Inventory	50	47.5	-0.44	15.54	3.028314
190	HL-93 Inventory	50	47.5	0.07	16.62	2.853791
191	HL-93 Inventory	50	47.5	0.15	16.75	2.826866
191	HL-93 Inventory	50	47.5	0.6	17.8	2.634831
192	HL-93 Inventory	50	47.5	0.68	17.91	2.614182
192	HL-93 Inventory	50	47.5	1.11	18.93	2.450608
193	HL-93 Inventory	50	47.5	1.19	19.03	2.433526
193	HL-93 Inventory	50	47.5	1.6	20.01	2.293853
194	HL-93 Inventory	50	47.5	1.68	20.09	2.280737
194	HL-93 Inventory	50	47.5	2.07	21.04	2.159221
195	HL-93 Inventory	50	47.5	2.14	21.09	2.150782
195	HL-93 Inventory	50	47.5	2.42	21.68	2.079336
196	HL-93 Inventory	50	47.5	2.42	21.68	2.079336
196	HL-93 Inventory	50	47.5	2.52	22.01	2.043617
197	HL-93 Inventory	50	47.5	2.59	22.02	2.03951
197	HL-93 Inventory	50	47.5	2.95	22.88	1.947115
198	HL-93 Inventory	50	47.5	3.01	22.92	1.941099
198	HL-93 Inventory	50	47.5	3.35	23.71	1.862084
199	HL-93 Inventory	50	47.5	3.42	23.76	1.855219
199	HL-93 Inventory	50	47.5	3.73	24.48	1.78799
200	HL-93 Inventory	50	47.5	3.8	24.53	1.781492
200	HL-93 Inventory	50	47.5	4.1	25.2	1.722222
201	HL-93 Inventory	50	47.5	4.16	25.25	1.716436
201	HL-93 Inventory	50	47.5	4.44	25.86	1.66512
202	HL-93 Inventory	50	47.5	4.51	25.91	1.659205
202	HL-93 Inventory	50	47.5	4.77	26.47	1.61428
203	HL-93 Inventory	50	47.5	4.83	26.51	1.609581
203	HL-93 Inventory	50	47.5	5.07	27.03	1.569737
204	HL-93 Inventory	50	47.5	5.13	27.06	1.56578
204	HL-93 Inventory	50	47.5	5.35	27.53	1.531057
205	HL-93 Inventory	50	47.5	5.41	27.56	1.527213
205	HL-93 Inventory	50	47.5	5.62	27.97	1.497319
206	HL-93 Inventory	50	47.5	5.66	28	1.494286
206	HL-93 Inventory	50	47.5	5.86	28.36	1.468265
207	HL-93 Inventory	50	47.5	5.9	28.38	1.465821
207	HL-93 Inventory	50	47.5	6.08	28.68	1.444212
208	HL-93 Inventory	50	47.5	6.12	28.71	1.44131
208	HL-93 Inventory	50	47.5	6.28	28.95	1.423834
209	HL-93 Inventory	50	47.5	6.32	28.98	1.42098
209	HL-93 Inventory	50	47.5	6.46	29.16	1.407407
210	HL-93 Inventory	50	47.5	6.49	29.18	1.405415
210	HL-93 Inventory	50	47.5	6.62	29.33	1.393795
211	HL-93 Inventory	50	47.5	6.65	29.33	1.392772
211	HL-93 Inventory	50	47.5	6.76	29.43	1.384302
212	HL-93 Inventory	50	47.5	6.78	29.45	1.382683
212	HL-93 Inventory	50	47.5	6.83	29.43	1.381923
213	HL-93 Inventory	50	47.5	6.83	29.43	1.381923
213	HL-93 Inventory	50	47.5	6.87	29.55	1.374958
214	HL-93 Inventory	50	47.5	6.89	29.57	1.373351
214	HL-93 Inventory	50	47.5	6.97	29.58	1.370183
215	HL-93 Inventory	50	47.5	6.98	29.6	1.368919
215	HL-93 Inventory	50	47.5	7.04	29.56	1.368742
216	HL-93 Inventory	50	47.5	7.05	29.58	1.367478
216	HL-93 Inventory	50	47.5	7.09	29.49	1.370295
217	HL-93 Inventory	50	47.5	7.09	29.49	1.370295
217	HL-93 Inventory	50	47.5	7.12	29.36	1.375341
218	HL-93 Inventory	50	47.5	7.12	29.36	1.375341
218	HL-93 Inventory	50	47.5	7.13	29.17	1.383956
219	HL-93 Inventory	50	47.5	7.13	29.16	1.384431
219	HL-93 Inventory	50	47.5	7.12	28.91	1.396749

220	HL-93 Inventory	50	47.5	7.11	28.9	1.397578
220	HL-93 Inventory	50	47.5	7.09	28.6	1.412937
221	HL-93 Inventory	50	47.5	7.07	28.58	1.414626
221	HL-93 Inventory	50	47.5	7.03	28.22	1.434089
222	HL-93 Inventory	50	47.5	7.02	28.19	1.43597
222	HL-93 Inventory	50	47.5	6.96	27.78	1.459323
223	HL-93 Inventory	50	47.5	6.94	27.74	1.462149
223	HL-93 Inventory	50	47.5	6.86	27.27	1.490282
224	HL-93 Inventory	50	47.5	6.84	27.22	1.493755
224	HL-93 Inventory	50	47.5	6.75	26.69	1.526789
225	HL-93 Inventory	50	47.5	6.72	26.64	1.530781
225	HL-93 Inventory	50	47.5	6.61	26.1	1.566667
226	HL-93 Inventory	50	47.5	6.58	26.04	1.571429
226	HL-93 Inventory	50	47.5	6.46	25.46	1.61194
227	HL-93 Inventory	50	47.5	6.42	25.4	1.617323
227	HL-93 Inventory	50	47.5	6.28	24.75	1.665455
228	HL-93 Inventory	50	47.5	6.24	24.7	1.670445
228	HL-93 Inventory	50	47.5	6.08	23.95	1.729436
229	HL-93 Inventory	50	47.5	6.03	23.93	1.732971
229	HL-93 Inventory	50	47.5	5.99	23.61	1.758153
230	HL-93 Inventory	50	47.5	5.99	23.61	1.758153
230	HL-93 Inventory	50	47.5	5.86	23.1	1.802597
231	HL-93 Inventory	50	47.5	5.81	23.06	1.807892
231	HL-93 Inventory	50	47.5	5.61	22.17	1.88949
232	HL-93 Inventory	50	47.5	5.56	22.09	1.898597
232	HL-93 Inventory	50	47.5	5.35	21.16	1.991966
233	HL-93 Inventory	50	47.5	5.29	21.06	2.004274
233	HL-93 Inventory	50	47.5	5.07	20.07	2.114101
234	HL-93 Inventory	50	47.5	5	19.95	2.130326
234	HL-93 Inventory	50	47.5	4.76	18.9	2.261376
235	HL-93 Inventory	50	47.5	4.69	18.77	2.280767
235	HL-93 Inventory	50	47.5	4.44	17.64	2.441043
236	HL-93 Inventory	50	47.5	4.37	17.51	2.463164
236	HL-93 Inventory	50	47.5	4.09	16.31	2.661557
237	HL-93 Inventory	50	47.5	4.02	16.17	2.68893
237	HL-93 Inventory	50	47.5	3.72	14.9	2.938255
238	HL-93 Inventory	50	47.5	3.65	14.75	2.972881
238	HL-93 Inventory	50	47.5	3.34	13.39	3.297984
239	HL-93 Inventory	50	47.5	3.26	13.24	3.34139
239	HL-93 Inventory	50	47.5	2.93	11.8	3.777119
240	HL-93 Inventory	50	47.5	2.85	11.64	3.835911
240	HL-93 Inventory	50	47.5	2.5	10.11	4.451039
241	HL-93 Inventory	50	47.5	2.43	9.94	4.534205
241	HL-93 Inventory	50	47.5	2.05	8.32	5.46274
242	HL-93 Inventory	50	47.5	1.98	8.15	5.585276
242	HL-93 Inventory	50	47.5	1.59	6.43	7.139969
243	HL-93 Inventory	50	47.5	1.51	6.27	7.334928
243	HL-93 Inventory	50	47.5	1.1	4.42	10.49774
244	HL-93 Inventory	50	47.5	1.03	4.29	10.83217
244	HL-93 Inventory	50	47.5	0.59	2.32	20.21983
245	HL-93 Inventory	50	47.5	0.52	2.21	21.25792
245	HL-93 Inventory	50	47.5	0.07	0.6	79.05

LOAD RATING FIXED SPAN -GIRDER 1

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\Upsilon_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	.95F_Y (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
538	HL-93 Operating	50	47.5	0.06	0.45	105.4222
538	HL-93 Operating	50	47.5	0.53	1.71	27.46784
539	HL-93 Operating	50	47.5	0.53	1.82	25.80769
539	HL-93 Operating	50	47.5	1.05	3.32	13.99096
540	HL-93 Operating	50	47.5	1.07	3.46	13.41908
540	HL-93 Operating	50	47.5	1.56	4.86	9.452675
541	HL-93 Operating	50	47.5	1.59	5.01	9.163673
541	HL-93 Operating	50	47.5	2.06	6.32	7.189873
542	HL-93 Operating	50	47.5	2.09	6.46	7.029412
542	HL-93 Operating	50	47.5	2.54	7.69	5.846554
543	HL-93 Operating	50	47.5	2.57	7.84	5.730867
543	HL-93 Operating	50	47.5	3.01	8.99	4.948832
544	HL-93 Operating	50	47.5	3.03	9.13	4.870756
544	HL-93 Operating	50	47.5	3.45	10.22	4.310176
545	HL-93 Operating	50	47.5	3.47	10.35	4.254106
545	HL-93 Operating	50	47.5	3.87	11.38	3.833919
546	HL-93 Operating	50	47.5	3.89	11.5	3.792174
546	HL-93 Operating	50	47.5	4.26	12.47	3.467522
547	HL-93 Operating	50	47.5	4.29	12.59	3.432089
547	HL-93 Operating	50	47.5	4.64	13.5	3.174815
548	HL-93 Operating	50	47.5	4.67	13.61	3.146951
548	HL-93 Operating	50	47.5	4.99	14.47	2.937802
549	HL-93 Operating	50	47.5	5.02	14.57	2.91558
549	HL-93 Operating	50	47.5	5.32	15.38	2.742523
550	HL-93 Operating	50	47.5	5.35	15.47	2.724628
550	HL-93 Operating	50	47.5	5.63	16.23	2.579791
551	HL-93 Operating	50	47.5	5.66	16.31	2.565297
551	HL-93 Operating	50	47.5	5.92	17.03	2.441574
552	HL-93 Operating	50	47.5	5.94	17.09	2.431831
552	HL-93 Operating	50	47.5	6.18	17.77	2.325267
553	HL-93 Operating	50	47.5	6.2	17.81	2.318922
553	HL-93 Operating	50	47.5	6.37	18.2	2.25989
554	HL-93 Operating	50	47.5	6.37	18.2	2.25989
554	HL-93 Operating	50	47.5	6.42	18.45	2.226558
555	HL-93 Operating	50	47.5	6.44	18.46	2.224269
555	HL-93 Operating	50	47.5	6.64	19.04	2.146008
556	HL-93 Operating	50	47.5	6.65	19.07	2.142108
556	HL-93 Operating	50	47.5	6.83	19.58	2.07712
557	HL-93 Operating	50	47.5	6.84	19.62	2.072375
557	HL-93 Operating	50	47.5	7	20.07	2.017937
558	HL-93 Operating	50	47.5	7.01	20.12	2.012425
558	HL-93 Operating	50	47.5	7.15	20.53	1.965416
559	HL-93 Operating	50	47.5	7.16	20.57	1.961108
559	HL-93 Operating	50	47.5	7.27	20.98	1.917541
560	HL-93 Operating	50	47.5	7.28	21.01	1.914327
560	HL-93 Operating	50	47.5	7.38	21.37	1.877398
561	HL-93 Operating	50	47.5	7.38	21.41	1.873891
561	HL-93 Operating	50	47.5	7.46	21.72	1.843462
562	HL-93 Operating	50	47.5	7.46	21.74	1.841766
562	HL-93 Operating	50	47.5	7.52	22.02	1.815622

Minimum Rating Factor 1.721218

563	HL-93 Operating	50	47.5	7.52	22.04	1.813975
563	HL-93 Operating	50	47.5	7.56	22.27	1.793444
564	HL-93 Operating	50	47.5	7.56	22.28	1.792639
564	HL-93 Operating	50	47.5	7.58	22.47	1.776591
565	HL-93 Operating	50	47.5	7.58	22.48	1.775801
565	HL-93 Operating	50	47.5	7.58	22.62	1.76481
566	HL-93 Operating	50	47.5	7.57	22.62	1.765252
566	HL-93 Operating	50	47.5	7.55	22.73	1.757589
567	HL-93 Operating	50	47.5	7.54	22.72	1.758803
567	HL-93 Operating	50	47.5	7.5	22.79	1.755156
568	HL-93 Operating	50	47.5	7.5	22.78	1.755926
568	HL-93 Operating	50	47.5	7.43	22.8	1.757456
569	HL-93 Operating	50	47.5	7.43	22.79	1.758227
569	HL-93 Operating	50	47.5	7.34	22.78	1.76295
570	HL-93 Operating	50	47.5	7.33	22.77	1.764163
570	HL-93 Operating	50	47.5	7.28	22.68	1.773369
571	HL-93 Operating	50	47.5	7.28	22.68	1.773369
571	HL-93 Operating	50	47.5	7.23	22.69	1.774791
572	HL-93 Operating	50	47.5	7.22	22.67	1.776798
572	HL-93 Operating	50	47.5	7.09	22.59	1.788845
573	HL-93 Operating	50	47.5	7.08	22.58	1.79008
573	HL-93 Operating	50	47.5	6.93	22.47	1.805518
574	HL-93 Operating	50	47.5	6.92	22.46	1.806768
574	HL-93 Operating	50	47.5	6.75	22.31	1.826535
575	HL-93 Operating	50	47.5	6.73	22.29	1.829071
575	HL-93 Operating	50	47.5	6.55	22.11	1.852103
576	HL-93 Operating	50	47.5	6.53	22.08	1.855525
576	HL-93 Operating	50	47.5	6.33	21.86	1.883349
577	HL-93 Operating	50	47.5	6.3	21.83	1.887311
577	HL-93 Operating	50	47.5	6.08	21.56	1.92115
578	HL-93 Operating	50	47.5	6.05	21.54	1.924327
578	HL-93 Operating	50	47.5	5.81	21.22	1.964656
579	HL-93 Operating	50	47.5	5.78	21.2	1.967925
579	HL-93 Operating	50	47.5	5.52	20.84	2.014395
580	HL-93 Operating	50	47.5	5.49	20.81	2.018741
580	HL-93 Operating	50	47.5	5.21	20.41	2.072024
581	HL-93 Operating	50	47.5	5.18	20.38	2.076546
581	HL-93 Operating	50	47.5	4.88	19.95	2.136341
582	HL-93 Operating	50	47.5	4.84	19.91	2.142642
582	HL-93 Operating	50	47.5	4.52	19.44	2.210905
583	HL-93 Operating	50	47.5	4.48	19.4	2.217526
583	HL-93 Operating	50	47.5	4.14	18.89	2.295394
584	HL-93 Operating	50	47.5	4.1	18.84	2.303609
584	HL-93 Operating	50	47.5	3.74	18.29	2.392564
585	HL-93 Operating	50	47.5	3.7	18.25	2.4
585	HL-93 Operating	50	47.5	3.32	17.65	2.503116
586	HL-93 Operating	50	47.5	3.28	17.61	2.511073
586	HL-93 Operating	50	47.5	2.87	16.95	2.633038
587	HL-93 Operating	50	47.5	2.83	16.94	2.636954
587	HL-93 Operating	50	47.5	2.72	16.68	2.684652
588	HL-93 Operating	50	47.5	2.72	16.69	2.683044
588	HL-93 Operating	50	47.5	2.41	16.23	2.778189
589	HL-93 Operating	50	47.5	2.36	16.19	2.788141
589	HL-93 Operating	50	47.5	1.91	15.46	2.9489
590	HL-93 Operating	50	47.5	1.86	15.4	2.963636
590	HL-93 Operating	50	47.5	1.4	14.65	3.146758
591	HL-93 Operating	50	47.5	1.34	14.56	3.17033
591	HL-93 Operating	50	47.5	0.86	13.79	3.382161

592	HL-93 Operating	50	47.5	0.8	13.69	3.411249
592	HL-93 Operating	50	47.5	0.3	12.89	3.661753
593	HL-93 Operating	50	47.5	0.24	12.79	3.695074
593	HL-93 Operating	50	47.5	-0.33	11.95	3.94728
594	HL-93 Operating	50	47.5	-0.37	11.85	3.977215
594	HL-93 Operating	50	47.5	-0.94	10.99	4.236579
595	HL-93 Operating	50	47.5	-0.98	10.88	4.275735
595	HL-93 Operating	50	47.5	-1.57	-10.16	4.520669
596	HL-93 Operating	50	47.5	-1.62	-10.17	4.511308
596	HL-93 Operating	50	47.5	-2.22	-10.4	4.353846
597	HL-93 Operating	50	47.5	-2.28	-10.42	4.339731
597	HL-93 Operating	50	47.5	-2.9	-10.68	4.17603
598	HL-93 Operating	50	47.5	-2.96	-10.69	4.166511
598	HL-93 Operating	50	47.5	-3.61	-10.99	3.993631
599	HL-93 Operating	50	47.5	-3.66	-11.01	3.981835
599	HL-93 Operating	50	47.5	-4.33	-11.35	3.803524
600	HL-93 Operating	50	47.5	-4.39	-11.36	3.794894
600	HL-93 Operating	50	47.5	-5.09	-11.74	3.612436
601	HL-93 Operating	50	47.5	-5.15	-11.76	3.60119
601	HL-93 Operating	50	47.5	-5.86	-12.18	3.418719
602	HL-93 Operating	50	47.5	-5.93	-12.21	3.404586
602	HL-93 Operating	50	47.5	-6.66	-12.67	3.223362
603	HL-93 Operating	50	47.5	-6.74	-12.7	3.209449
603	HL-93 Operating	50	47.5	-7.49	-13.2	3.031061
604	HL-93 Operating	50	47.5	-7.57	-13.24	3.015861
604	HL-93 Operating	50	47.5	-8.34	-13.76	2.84593
605	HL-93 Operating	50	47.5	-8.43	-13.81	2.829109
605	HL-93 Operating	50	47.5	-9.22	-14.38	2.662031
606	HL-93 Operating	50	47.5	-9.33	-14.45	2.641522
606	HL-93 Operating	50	47.5	-10.13	-15.03	2.486361
607	HL-93 Operating	50	47.5	-10.25	-15.13	2.461996
607	HL-93 Operating	50	47.5	-11.07	-15.75	2.313016
608	HL-93 Operating	50	47.5	-11.2	-15.86	2.288777
608	HL-93 Operating	50	47.5	-12.06	-16.55	2.14139
609	HL-93 Operating	50	47.5	-12.18	-16.63	2.123873
609	HL-93 Operating	50	47.5	-13.08	-17.9	1.922905
610	HL-93 Operating	50	47.5	-13.17	-17.91	1.916806
610	HL-93 Operating	50	47.5	-14.14	-19.36	1.72314
611	HL-93 Operating	50	47.5	-14.16	-19.37	1.721218
611	HL-93 Operating	50	47.5	-13.19	-17.93	1.913553
612	HL-93 Operating	50	47.5	-13.1	-17.92	1.919643
612	HL-93 Operating	50	47.5	-12.2	-16.63	2.12267
613	HL-93 Operating	50	47.5	-12.08	-16.57	2.137598
613	HL-93 Operating	50	47.5	-11.22	-15.86	2.287516
614	HL-93 Operating	50	47.5	-11.09	-15.75	2.311746
614	HL-93 Operating	50	47.5	-10.27	-15.13	2.460674
615	HL-93 Operating	50	47.5	-10.14	-15.03	2.485695
615	HL-93 Operating	50	47.5	-9.34	-14.44	2.642659
616	HL-93 Operating	50	47.5	-9.24	-14.38	2.66064
616	HL-93 Operating	50	47.5	-8.45	-13.81	2.827661
617	HL-93 Operating	50	47.5	-8.36	-13.77	2.842411
617	HL-93 Operating	50	47.5	-7.58	-13.24	3.015106
618	HL-93 Operating	50	47.5	-7.5	-13.2	3.030303
618	HL-93 Operating	50	47.5	-6.75	-12.7	3.208661
619	HL-93 Operating	50	47.5	-6.68	-12.67	3.221784
619	HL-93 Operating	50	47.5	-5.94	-12.21	3.403767
620	HL-93 Operating	50	47.5	-5.87	-12.18	3.417898
620	HL-93 Operating	50	47.5	-5.16	-11.76	3.60034

621	HL-93 Operating	50	47.5	-5.1	-11.74	3.611584
621	HL-93 Operating	50	47.5	-4.41	-11.36	3.793134
622	HL-93 Operating	50	47.5	-4.34	-11.35	3.802643
622	HL-93 Operating	50	47.5	-3.68	-11.01	3.980018
623	HL-93 Operating	50	47.5	-3.62	-11	3.989091
623	HL-93 Operating	50	47.5	-2.97	-10.7	4.161682
624	HL-93 Operating	50	47.5	-2.91	-10.69	4.171188
624	HL-93 Operating	50	47.5	-2.29	-10.42	4.338772
625	HL-93 Operating	50	47.5	-2.23	-10.41	4.348703
625	HL-93 Operating	50	47.5	-1.63	-10.19	4.501472
626	HL-93 Operating	50	47.5	-1.58	-10.17	4.515241
626	HL-93 Operating	50	47.5	-0.99	10.91	4.263061
627	HL-93 Operating	50	47.5	-0.94	11.02	4.225045
627	HL-93 Operating	50	47.5	-0.38	11.89	3.962994
628	HL-93 Operating	50	47.5	-0.33	11.99	3.934112
628	HL-93 Operating	50	47.5	0.23	12.82	3.687207
629	HL-93 Operating	50	47.5	0.29	12.92	3.654025
629	HL-93 Operating	50	47.5	0.79	13.73	3.402039
630	HL-93 Operating	50	47.5	0.85	13.82	3.375543
630	HL-93 Operating	50	47.5	1.34	14.6	3.161644
631	HL-93 Operating	50	47.5	1.39	14.68	3.141008
631	HL-93 Operating	50	47.5	1.85	15.44	2.956606
632	HL-93 Operating	50	47.5	1.91	15.5	2.94129
632	HL-93 Operating	50	47.5	2.35	16.23	2.781885
633	HL-93 Operating	50	47.5	2.4	16.27	2.771973
633	HL-93 Operating	50	47.5	2.71	16.73	2.677227
634	HL-93 Operating	50	47.5	2.71	16.72	2.678828
634	HL-93 Operating	50	47.5	2.82	16.98	2.631331
635	HL-93 Operating	50	47.5	2.87	16.99	2.626839
635	HL-93 Operating	50	47.5	3.27	17.65	2.505949
636	HL-93 Operating	50	47.5	3.31	17.68	2.499434
636	HL-93 Operating	50	47.5	3.7	18.29	2.394751
637	HL-93 Operating	50	47.5	3.74	18.33	2.387343
637	HL-93 Operating	50	47.5	4.1	18.88	2.298729
638	HL-93 Operating	50	47.5	4.14	18.92	2.291755
638	HL-93 Operating	50	47.5	4.48	19.44	2.212963
639	HL-93 Operating	50	47.5	4.52	19.48	2.206366
639	HL-93 Operating	50	47.5	4.84	19.95	2.138346
640	HL-93 Operating	50	47.5	4.87	19.98	2.133634
640	HL-93 Operating	50	47.5	5.17	20.42	2.072968
641	HL-93 Operating	50	47.5	5.21	20.45	2.067971
641	HL-93 Operating	50	47.5	5.49	20.85	2.014868
642	HL-93 Operating	50	47.5	5.52	20.88	2.010536
642	HL-93 Operating	50	47.5	5.78	21.24	1.964218
643	HL-93 Operating	50	47.5	5.81	21.26	1.96096
643	HL-93 Operating	50	47.5	6.05	21.58	1.92076
644	HL-93 Operating	50	47.5	6.08	21.6	1.917593
644	HL-93 Operating	50	47.5	6.3	21.87	1.883859
645	HL-93 Operating	50	47.5	6.32	21.9	1.880365
645	HL-93 Operating	50	47.5	6.53	22.12	1.85217
646	HL-93 Operating	50	47.5	6.55	22.15	1.848758
646	HL-93 Operating	50	47.5	6.73	22.33	1.825795
647	HL-93 Operating	50	47.5	6.75	22.35	1.823266
647	HL-93 Operating	50	47.5	6.91	22.5	1.804
648	HL-93 Operating	50	47.5	6.93	22.51	1.80231
648	HL-93 Operating	50	47.5	7.08	22.62	1.786914
649	HL-93 Operating	50	47.5	7.09	22.63	1.785683
649	HL-93 Operating	50	47.5	7.22	22.7	1.774449

650	HL-93 Operating	50	47.5	7.23	22.72	1.772447
650	HL-93 Operating	50	47.5	7.28	22.7	1.771806
651	HL-93 Operating	50	47.5	7.28	22.7	1.771806
651	HL-93 Operating	50	47.5	7.33	22.79	1.762615
652	HL-93 Operating	50	47.5	7.34	22.81	1.760631
652	HL-93 Operating	50	47.5	7.43	22.82	1.755916
653	HL-93 Operating	50	47.5	7.43	22.83	1.755147
653	HL-93 Operating	50	47.5	7.5	22.8	1.754386
654	HL-93 Operating	50	47.5	7.5	22.82	1.752848
654	HL-93 Operating	50	47.5	7.55	22.75	1.756044
655	HL-93 Operating	50	47.5	7.55	22.75	1.756044
655	HL-93 Operating	50	47.5	7.57	22.65	1.762914
656	HL-93 Operating	50	47.5	7.58	22.65	1.762472
656	HL-93 Operating	50	47.5	7.58	22.5	1.774222
657	HL-93 Operating	50	47.5	7.58	22.49	1.775011
657	HL-93 Operating	50	47.5	7.57	22.3	1.790583
658	HL-93 Operating	50	47.5	7.57	22.29	1.791386
658	HL-93 Operating	50	47.5	7.53	22.06	1.811877
659	HL-93 Operating	50	47.5	7.53	22.04	1.813521
659	HL-93 Operating	50	47.5	7.47	21.77	1.838769
660	HL-93 Operating	50	47.5	7.47	21.75	1.84046
660	HL-93 Operating	50	47.5	7.39	21.43	1.871675
661	HL-93 Operating	50	47.5	7.39	21.4	1.874299
661	HL-93 Operating	50	47.5	7.29	21.03	1.91203
662	HL-93 Operating	50	47.5	7.29	21	1.914762
662	HL-93 Operating	50	47.5	7.17	20.59	1.958718
663	HL-93 Operating	50	47.5	7.16	20.55	1.963017
663	HL-93 Operating	50	47.5	7.03	20.13	2.010432
664	HL-93 Operating	50	47.5	7.02	20.09	2.014933
664	HL-93 Operating	50	47.5	6.86	19.64	2.069246
665	HL-93 Operating	50	47.5	6.85	19.59	2.075038
665	HL-93 Operating	50	47.5	6.67	19.09	2.138816
666	HL-93 Operating	50	47.5	6.66	19.05	2.143832
666	HL-93 Operating	50	47.5	6.46	18.48	2.220779
667	HL-93 Operating	50	47.5	6.45	18.46	2.223727
667	HL-93 Operating	50	47.5	6.39	18.21	2.257551
668	HL-93 Operating	50	47.5	6.39	18.22	2.256312
668	HL-93 Operating	50	47.5	6.23	17.82	2.315937
669	HL-93 Operating	50	47.5	6.21	17.79	2.320967
669	HL-93 Operating	50	47.5	5.97	17.1	2.428655
670	HL-93 Operating	50	47.5	5.95	17.04	2.43838
670	HL-93 Operating	50	47.5	5.69	16.32	2.561887
671	HL-93 Operating	50	47.5	5.67	16.24	2.575739
671	HL-93 Operating	50	47.5	5.39	15.48	2.720284
672	HL-93 Operating	50	47.5	5.37	15.39	2.737492
672	HL-93 Operating	50	47.5	5.07	14.58	2.910151
673	HL-93 Operating	50	47.5	5.04	14.48	2.93232
673	HL-93 Operating	50	47.5	4.72	13.61	3.143277
674	HL-93 Operating	50	47.5	4.69	13.51	3.168764
674	HL-93 Operating	50	47.5	4.36	12.58	3.429253
675	HL-93 Operating	50	47.5	4.32	12.47	3.462711
675	HL-93 Operating	50	47.5	3.97	11.49	3.788512
676	HL-93 Operating	50	47.5	3.93	11.38	3.828647
676	HL-93 Operating	50	47.5	3.56	10.33	4.25363
677	HL-93 Operating	50	47.5	3.52	10.21	4.307542
677	HL-93 Operating	50	47.5	3.12	9.1	4.876923
678	HL-93 Operating	50	47.5	3.08	8.98	4.946548
678	HL-93 Operating	50	47.5	2.66	7.8	5.748718

679	HL-93 Operating	50	47.5	2.62	7.67	5.851369
679	HL-93 Operating	50	47.5	2.18	6.42	7.05919
680	HL-93 Operating	50	47.5	2.14	6.29	7.211447
680	HL-93 Operating	50	47.5	1.67	4.96	9.239919
681	HL-93 Operating	50	47.5	1.64	4.84	9.475207
681	HL-93 Operating	50	47.5	1.15	3.41	13.59238
682	HL-93 Operating	50	47.5	1.11	3.31	14.01511
682	HL-93 Operating	50	47.5	0.59	1.79	26.2067
683	HL-93 Operating	50	47.5	0.57	1.7	27.60588
683	HL-93 Operating	50	47.5	0.04	0.46	103.1739

LOAD RATING FIXED SPAN -GIRDER 2

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\Upsilon_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	.95F_Y (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
392	HL-93 Operating	50	47.5	0.05	-0.08	593.125
392	HL-93 Operating	50	47.5	0.67	1.8	26.01667
393	HL-93 Operating	50	47.5	0.63	1.77	26.48023
393	HL-93 Operating	50	47.5	1.24	3.43	13.48688
394	HL-93 Operating	50	47.5	1.2	3.38	13.69822
394	HL-93 Operating	50	47.5	1.74	4.92	9.300813
395	HL-93 Operating	50	47.5	1.71	4.88	9.383197
395	HL-93 Operating	50	47.5	2.21	6.31	7.177496
396	HL-93 Operating	50	47.5	2.19	6.28	7.214968
396	HL-93 Operating	50	47.5	2.65	7.62	5.885827
397	HL-93 Operating	50	47.5	2.64	7.6	5.902632
397	HL-93 Operating	50	47.5	3.08	8.87	5.007892
398	HL-93 Operating	50	47.5	3.07	8.86	5.014673
398	HL-93 Operating	50	47.5	3.48	10.05	4.3801
399	HL-93 Operating	50	47.5	3.47	10.04	4.385458
399	HL-93 Operating	50	47.5	3.87	11.16	3.909498
400	HL-93 Operating	50	47.5	3.86	11.16	3.910394
400	HL-93 Operating	50	47.5	4.24	12.21	3.542998
401	HL-93 Operating	50	47.5	4.23	12.21	3.543817
401	HL-93 Operating	50	47.5	4.59	13.2	3.250758
402	HL-93 Operating	50	47.5	4.58	13.2	3.251515
402	HL-93 Operating	50	47.5	4.92	14.12	3.015581
403	HL-93 Operating	50	47.5	4.91	14.12	3.016289
403	HL-93 Operating	50	47.5	5.23	14.98	2.821762
404	HL-93 Operating	50	47.5	5.22	14.99	2.820547
404	HL-93 Operating	50	47.5	5.52	15.79	2.658645
405	HL-93 Operating	50	47.5	5.51	15.79	2.659278
405	HL-93 Operating	50	47.5	5.78	16.53	2.523896
406	HL-93 Operating	50	47.5	5.78	16.53	2.523896
406	HL-93 Operating	50	47.5	6.03	17.21	2.409646
407	HL-93 Operating	50	47.5	6.03	17.21	2.409646
407	HL-93 Operating	50	47.5	6.2	17.54	2.354618
408	HL-93 Operating	50	47.5	6.2	17.55	2.353276
408	HL-93 Operating	50	47.5	6.26	17.84	2.311659
409	HL-93 Operating	50	47.5	6.25	17.84	2.31222
409	HL-93 Operating	50	47.5	6.46	18.45	2.22439
410	HL-93 Operating	50	47.5	6.46	18.45	2.22439
410	HL-93 Operating	50	47.5	6.64	19	2.150526
411	HL-93 Operating	50	47.5	6.64	19	2.150526
411	HL-93 Operating	50	47.5	6.8	19.49	2.08825
412	HL-93 Operating	50	47.5	6.8	19.49	2.08825
412	HL-93 Operating	50	47.5	6.94	19.92	2.036145
413	HL-93 Operating	50	47.5	6.94	19.92	2.036145
413	HL-93 Operating	50	47.5	7.06	20.3	1.992118
414	HL-93 Operating	50	47.5	7.06	20.3	1.992118
414	HL-93 Operating	50	47.5	7.16	20.68	1.950677
415	HL-93 Operating	50	47.5	7.15	20.68	1.951161
415	HL-93 Operating	50	47.5	7.23	21.03	1.914883
416	HL-93 Operating	50	47.5	7.23	21.03	1.914883
416	HL-93 Operating	50	47.5	7.29	21.32	1.886023

Minimum Rating Factor 1.82939

417	HL-93 Operating	50	47.5	7.29	21.32	1.886023
417	HL-93 Operating	50	47.5	7.32	21.56	1.863636
418	HL-93 Operating	50	47.5	7.32	21.56	1.863636
418	HL-93 Operating	50	47.5	7.33	21.74	1.847746
419	HL-93 Operating	50	47.5	7.33	21.74	1.847746
419	HL-93 Operating	50	47.5	7.32	21.87	1.83722
420	HL-93 Operating	50	47.5	7.33	21.87	1.836763
420	HL-93 Operating	50	47.5	7.29	21.95	1.831891
421	HL-93 Operating	50	47.5	7.3	21.95	1.831435
421	HL-93 Operating	50	47.5	7.24	21.97	1.832499
422	HL-93 Operating	50	47.5	7.25	21.97	1.832044
422	HL-93 Operating	50	47.5	7.17	21.94	1.838195
423	HL-93 Operating	50	47.5	7.17	21.94	1.838195
423	HL-93 Operating	50	47.5	7.08	21.85	1.849886
424	HL-93 Operating	50	47.5	7.08	21.85	1.849886
424	HL-93 Operating	50	47.5	7.03	21.67	1.867559
425	HL-93 Operating	50	47.5	7.02	21.67	1.86802
425	HL-93 Operating	50	47.5	6.96	21.75	1.863908
426	HL-93 Operating	50	47.5	6.97	21.74	1.864305
426	HL-93 Operating	50	47.5	6.83	21.68	1.875923
427	HL-93 Operating	50	47.5	6.83	21.68	1.875923
427	HL-93 Operating	50	47.5	6.67	21.62	1.888529
428	HL-93 Operating	50	47.5	6.67	21.63	1.887656
428	HL-93 Operating	50	47.5	6.49	21.51	1.906555
429	HL-93 Operating	50	47.5	6.49	21.52	1.905669
429	HL-93 Operating	50	47.5	6.29	21.35	1.930211
430	HL-93 Operating	50	47.5	6.29	21.36	1.929307
430	HL-93 Operating	50	47.5	6.06	21.14	1.960265
431	HL-93 Operating	50	47.5	6.07	21.15	1.958865
431	HL-93 Operating	50	47.5	5.82	20.88	1.996169
432	HL-93 Operating	50	47.5	5.82	20.88	1.996169
432	HL-93 Operating	50	47.5	5.55	20.56	2.04037
433	HL-93 Operating	50	47.5	5.56	20.57	2.038892
433	HL-93 Operating	50	47.5	5.27	20.2	2.090594
434	HL-93 Operating	50	47.5	5.27	20.21	2.08956
434	HL-93 Operating	50	47.5	4.96	19.79	2.14957
435	HL-93 Operating	50	47.5	4.97	19.8	2.14798
435	HL-93 Operating	50	47.5	4.63	19.33	2.217796
436	HL-93 Operating	50	47.5	4.64	19.34	2.216132
436	HL-93 Operating	50	47.5	4.28	18.83	2.295273
437	HL-93 Operating	50	47.5	4.29	18.84	2.293524
437	HL-93 Operating	50	47.5	3.91	18.28	2.384573
438	HL-93 Operating	50	47.5	3.92	18.29	2.382723
438	HL-93 Operating	50	47.5	3.52	17.68	2.487557
439	HL-93 Operating	50	47.5	3.52	17.69	2.48615
439	HL-93 Operating	50	47.5	3.11	17.04	2.605047
440	HL-93 Operating	50	47.5	3.11	17.05	2.603519
440	HL-93 Operating	50	47.5	2.67	16.35	2.741896
441	HL-93 Operating	50	47.5	2.67	16.35	2.741896
441	HL-93 Operating	50	47.5	2.56	16.05	2.8
442	HL-93 Operating	50	47.5	2.56	16.04	2.801746
442	HL-93 Operating	50	47.5	2.21	15.67	2.890236
443	HL-93 Operating	50	47.5	2.22	15.67	2.889598
443	HL-93 Operating	50	47.5	1.73	14.96	3.059492
444	HL-93 Operating	50	47.5	1.74	14.96	3.058824
444	HL-93 Operating	50	47.5	1.23	14.22	3.253868
445	HL-93 Operating	50	47.5	1.23	14.22	3.253868
445	HL-93 Operating	50	47.5	0.71	13.43	3.483991

446	HL-93 Operating	50	47.5	0.71	13.44	3.481399
446	HL-93 Operating	50	47.5	0.17	12.61	3.75337
447	HL-93 Operating	50	47.5	0.17	12.62	3.750396
447	HL-93 Operating	50	47.5	-0.4	11.75	4.008511
448	HL-93 Operating	50	47.5	-0.41	11.75	4.00766
448	HL-93 Operating	50	47.5	-0.99	10.85	4.286636
449	HL-93 Operating	50	47.5	-0.99	10.85	4.286636
449	HL-93 Operating	50	47.5	-1.6	-9.92	4.627016
450	HL-93 Operating	50	47.5	-1.6	9.92	4.627016
450	HL-93 Operating	50	47.5	-2.23	-10.12	4.47332
451	HL-93 Operating	50	47.5	-2.23	-10.11	4.477745
451	HL-93 Operating	50	47.5	-2.88	-10.34	4.31528
452	HL-93 Operating	50	47.5	-2.88	-10.34	4.31528
452	HL-93 Operating	50	47.5	-3.55	-10.61	4.142319
453	HL-93 Operating	50	47.5	-3.55	-10.6	4.146226
453	HL-93 Operating	50	47.5	-4.24	-10.92	3.961538
454	HL-93 Operating	50	47.5	-4.24	-10.92	3.961538
454	HL-93 Operating	50	47.5	-4.95	-11.27	3.77551
455	HL-93 Operating	50	47.5	-4.95	-11.27	3.77551
455	HL-93 Operating	50	47.5	-5.69	-11.67	3.582691
456	HL-93 Operating	50	47.5	-5.69	-11.67	3.582691
456	HL-93 Operating	50	47.5	-6.45	-12.11	3.389761
457	HL-93 Operating	50	47.5	-6.45	-12.11	3.389761
457	HL-93 Operating	50	47.5	-7.22	-12.59	3.199365
458	HL-93 Operating	50	47.5	-7.22	-12.59	3.199365
458	HL-93 Operating	50	47.5	-8.03	-13.11	3.010679
459	HL-93 Operating	50	47.5	-8.03	-13.11	3.010679
459	HL-93 Operating	50	47.5	-8.85	-13.66	2.829429
460	HL-93 Operating	50	47.5	-8.85	-13.67	2.827359
460	HL-93 Operating	50	47.5	-9.69	-14.25	2.653333
461	HL-93 Operating	50	47.5	-9.7	-14.25	2.652632
461	HL-93 Operating	50	47.5	-10.56	-14.87	2.484196
462	HL-93 Operating	50	47.5	-10.56	-14.87	2.484196
462	HL-93 Operating	50	47.5	-11.44	-15.52	2.323454
463	HL-93 Operating	50	47.5	-11.44	-15.52	2.323454
463	HL-93 Operating	50	47.5	-12.33	-16.19	2.172329
464	HL-93 Operating	50	47.5	-12.33	-16.2	2.170988
464	HL-93 Operating	50	47.5	-13.23	-17.02	2.013514
465	HL-93 Operating	50	47.5	-13.24	-17.02	2.012926
465	HL-93 Operating	50	47.5	-12.34	-16.23	2.166359
466	HL-93 Operating	50	47.5	-12.34	-16.22	2.167694
466	HL-93 Operating	50	47.5	-11.45	-15.55	2.318328
467	HL-93 Operating	50	47.5	-11.44	-15.55	2.318971
467	HL-93 Operating	50	47.5	-10.56	-14.9	2.479195
468	HL-93 Operating	50	47.5	-10.56	-14.9	2.479195
468	HL-93 Operating	50	47.5	-9.7	-14.28	2.647059
469	HL-93 Operating	50	47.5	-9.7	-14.28	2.647059
469	HL-93 Operating	50	47.5	-8.86	-13.7	2.820438
470	HL-93 Operating	50	47.5	-8.85	-13.69	2.823229
470	HL-93 Operating	50	47.5	-8.03	-13.14	3.003805
471	HL-93 Operating	50	47.5	-8.03	-13.14	3.003805
471	HL-93 Operating	50	47.5	-7.23	-12.62	3.190967
472	HL-93 Operating	50	47.5	-7.23	-12.62	3.190967
472	HL-93 Operating	50	47.5	-6.45	-12.14	3.381384
473	HL-93 Operating	50	47.5	-6.45	-12.14	3.381384
473	HL-93 Operating	50	47.5	-5.69	-11.7	3.573504
474	HL-93 Operating	50	47.5	-5.69	-11.7	3.573504
474	HL-93 Operating	50	47.5	-4.96	-11.3	3.764602

475	HL-93 Operating	50	47.5	-4.96	-11.31	3.761273
475	HL-93 Operating	50	47.5	-4.24	-10.95	3.950685
476	HL-93 Operating	50	47.5	-4.24	-10.95	3.950685
476	HL-93 Operating	50	47.5	-3.55	-10.64	4.130639
477	HL-93 Operating	50	47.5	-3.55	-10.64	4.130639
477	HL-93 Operating	50	47.5	-2.88	-10.37	4.302797
478	HL-93 Operating	50	47.5	-2.88	-10.38	4.298651
478	HL-93 Operating	50	47.5	-2.23	-10.15	4.460099
479	HL-93 Operating	50	47.5	-2.23	-10.16	4.455709
479	HL-93 Operating	50	47.5	-1.6	9.96	4.608434
480	HL-93 Operating	50	47.5	-1.6	-9.96	4.608434
480	HL-93 Operating	50	47.5	-0.99	10.9	4.266972
481	HL-93 Operating	50	47.5	-0.99	10.89	4.270891
481	HL-93 Operating	50	47.5	-0.41	11.8	3.990678
482	HL-93 Operating	50	47.5	-0.41	11.79	3.994063
482	HL-93 Operating	50	47.5	0.17	12.66	3.738547
483	HL-93 Operating	50	47.5	0.17	12.66	3.738547
483	HL-93 Operating	50	47.5	0.71	13.49	3.468495
484	HL-93 Operating	50	47.5	0.71	13.48	3.471068
484	HL-93 Operating	50	47.5	1.23	14.27	3.242467
485	HL-93 Operating	50	47.5	1.23	14.26	3.244741
485	HL-93 Operating	50	47.5	1.73	15.01	3.0493
486	HL-93 Operating	50	47.5	1.73	15	3.051333
486	HL-93 Operating	50	47.5	2.21	15.71	2.882877
487	HL-93 Operating	50	47.5	2.21	15.71	2.882877
487	HL-93 Operating	50	47.5	2.56	16.09	2.793039
488	HL-93 Operating	50	47.5	2.56	16.09	2.793039
488	HL-93 Operating	50	47.5	2.67	16.39	2.735204
489	HL-93 Operating	50	47.5	2.67	16.39	2.735204
489	HL-93 Operating	50	47.5	3.11	17.09	2.597425
490	HL-93 Operating	50	47.5	3.1	17.08	2.599532
490	HL-93 Operating	50	47.5	3.52	17.73	2.480541
491	HL-93 Operating	50	47.5	3.52	17.73	2.480541
491	HL-93 Operating	50	47.5	3.91	18.33	2.378069
492	HL-93 Operating	50	47.5	3.91	18.32	2.379367
492	HL-93 Operating	50	47.5	4.28	18.88	2.289195
493	HL-93 Operating	50	47.5	4.28	18.87	2.290408
493	HL-93 Operating	50	47.5	4.63	19.38	2.212074
494	HL-93 Operating	50	47.5	4.63	19.38	2.212074
494	HL-93 Operating	50	47.5	4.96	19.84	2.144153
495	HL-93 Operating	50	47.5	4.96	19.83	2.145234
495	HL-93 Operating	50	47.5	5.27	20.25	2.085432
496	HL-93 Operating	50	47.5	5.27	20.24	2.086462
496	HL-93 Operating	50	47.5	5.56	20.61	2.034934
497	HL-93 Operating	50	47.5	5.55	20.6	2.036408
497	HL-93 Operating	50	47.5	5.82	20.92	1.992352
498	HL-93 Operating	50	47.5	5.82	20.92	1.992352
498	HL-93 Operating	50	47.5	6.06	21.19	1.955639
499	HL-93 Operating	50	47.5	6.06	21.18	1.956563
499	HL-93 Operating	50	47.5	6.29	21.4	1.925701
500	HL-93 Operating	50	47.5	6.28	21.39	1.927069
500	HL-93 Operating	50	47.5	6.49	21.56	1.902134
501	HL-93 Operating	50	47.5	6.48	21.55	1.90348
501	HL-93 Operating	50	47.5	6.67	21.67	1.884172
502	HL-93 Operating	50	47.5	6.66	21.66	1.885503
502	HL-93 Operating	50	47.5	6.82	21.72	1.872928
503	HL-93 Operating	50	47.5	6.82	21.72	1.872928
503	HL-93 Operating	50	47.5	6.96	21.78	1.861341

504	HL-93 Operating	50	47.5	6.96	21.78	1.861341
504	HL-93 Operating	50	47.5	7.02	21.7	1.865438
505	HL-93 Operating	50	47.5	7.02	21.7	1.865438
505	HL-93 Operating	50	47.5	7.08	21.89	1.846505
506	HL-93 Operating	50	47.5	7.07	21.89	1.846962
506	HL-93 Operating	50	47.5	7.17	21.97	1.835685
507	HL-93 Operating	50	47.5	7.17	21.97	1.835685
507	HL-93 Operating	50	47.5	7.24	22	1.83
508	HL-93 Operating	50	47.5	7.24	22	1.83
508	HL-93 Operating	50	47.5	7.29	21.98	1.82939
509	HL-93 Operating	50	47.5	7.29	21.98	1.82939
509	HL-93 Operating	50	47.5	7.32	21.9	1.834703
510	HL-93 Operating	50	47.5	7.32	21.9	1.834703
510	HL-93 Operating	50	47.5	7.33	21.77	1.8452
511	HL-93 Operating	50	47.5	7.33	21.77	1.8452
511	HL-93 Operating	50	47.5	7.31	21.59	1.86151
512	HL-93 Operating	50	47.5	7.31	21.59	1.86151
512	HL-93 Operating	50	47.5	7.28	21.35	1.883841
513	HL-93 Operating	50	47.5	7.28	21.35	1.883841
513	HL-93 Operating	50	47.5	7.22	21.06	1.912631
514	HL-93 Operating	50	47.5	7.22	21.06	1.912631
514	HL-93 Operating	50	47.5	7.14	20.71	1.948817
515	HL-93 Operating	50	47.5	7.14	20.71	1.948817
515	HL-93 Operating	50	47.5	7.04	20.33	1.990162
516	HL-93 Operating	50	47.5	7.04	20.33	1.990162
516	HL-93 Operating	50	47.5	6.92	19.94	2.035105
517	HL-93 Operating	50	47.5	6.92	19.94	2.035105
517	HL-93 Operating	50	47.5	6.78	19.51	2.087135
518	HL-93 Operating	50	47.5	6.78	19.51	2.087135
518	HL-93 Operating	50	47.5	6.62	19.03	2.148187
519	HL-93 Operating	50	47.5	6.62	19.03	2.148187
519	HL-93 Operating	50	47.5	6.43	18.48	2.222403
520	HL-93 Operating	50	47.5	6.43	18.48	2.222403
520	HL-93 Operating	50	47.5	6.23	17.86	2.31075
521	HL-93 Operating	50	47.5	6.23	17.86	2.31075
521	HL-93 Operating	50	47.5	6.17	17.57	2.352305
522	HL-93 Operating	50	47.5	6.17	17.57	2.352305
522	HL-93 Operating	50	47.5	6	17.23	2.40859
523	HL-93 Operating	50	47.5	6	17.23	2.40859
523	HL-93 Operating	50	47.5	5.75	16.56	2.521135
524	HL-93 Operating	50	47.5	5.75	16.55	2.522659
524	HL-93 Operating	50	47.5	5.48	15.81	2.657812
525	HL-93 Operating	50	47.5	5.48	15.81	2.657812
525	HL-93 Operating	50	47.5	5.18	15.01	2.819454
526	HL-93 Operating	50	47.5	5.19	15.01	2.818787
526	HL-93 Operating	50	47.5	4.87	14.15	3.012721
527	HL-93 Operating	50	47.5	4.87	14.15	3.012721
527	HL-93 Operating	50	47.5	4.53	13.22	3.250378
528	HL-93 Operating	50	47.5	4.54	13.22	3.249622
528	HL-93 Operating	50	47.5	4.18	12.23	3.54211
529	HL-93 Operating	50	47.5	4.18	12.24	3.539216
529	HL-93 Operating	50	47.5	3.8	11.18	3.908766
530	HL-93 Operating	50	47.5	3.8	11.19	3.905273
530	HL-93 Operating	50	47.5	3.4	10.07	4.379345
531	HL-93 Operating	50	47.5	3.4	10.08	4.375
531	HL-93 Operating	50	47.5	2.98	8.89	5.007874
532	HL-93 Operating	50	47.5	2.98	8.91	4.996633
532	HL-93 Operating	50	47.5	2.53	7.64	5.886126

533	HL-93 Operating	50	47.5	2.54	7.66	5.869452
533	HL-93 Operating	50	47.5	2.07	6.32	7.188291
534	HL-93 Operating	50	47.5	2.07	6.35	7.154331
534	HL-93 Operating	50	47.5	1.58	4.91	9.352342
535	HL-93 Operating	50	47.5	1.58	4.95	9.276768
535	HL-93 Operating	50	47.5	1.08	3.41	13.6129
536	HL-93 Operating	50	47.5	1.07	3.46	13.41908
536	HL-93 Operating	50	47.5	0.55	1.79	26.22905
537	HL-93 Operating	50	47.5	0.55	1.83	25.65574
537	HL-93 Operating	50	47.5	0.01	-0.08	593.625

LOAD RATING FIXED SPAN -GIRDER 3

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\Upsilon_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	.95F_Y (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
246	HL-93 Operating	50	47.5	0.05	-0.08	593.125
246	HL-93 Operating	50	47.5	0.67	1.8	26.01667
247	HL-93 Operating	50	47.5	0.62	1.77	26.48588
247	HL-93 Operating	50	47.5	1.22	3.43	13.49271
248	HL-93 Operating	50	47.5	1.18	3.39	13.66372
248	HL-93 Operating	50	47.5	1.71	4.92	9.306911
249	HL-93 Operating	50	47.5	1.68	4.88	9.389344
249	HL-93 Operating	50	47.5	2.16	6.31	7.18542
250	HL-93 Operating	50	47.5	2.14	6.28	7.22293
250	HL-93 Operating	50	47.5	2.59	7.62	5.893701
251	HL-93 Operating	50	47.5	2.57	7.6	5.911842
251	HL-93 Operating	50	47.5	3	8.87	5.016911
252	HL-93 Operating	50	47.5	2.99	8.86	5.023702
252	HL-93 Operating	50	47.5	3.4	10.05	4.38806
253	HL-93 Operating	50	47.5	3.39	10.04	4.393426
253	HL-93 Operating	50	47.5	3.77	11.16	3.918459
254	HL-93 Operating	50	47.5	3.77	11.16	3.918459
254	HL-93 Operating	50	47.5	4.14	12.21	3.551188
255	HL-93 Operating	50	47.5	4.14	12.21	3.551188
255	HL-93 Operating	50	47.5	4.48	13.2	3.259091
256	HL-93 Operating	50	47.5	4.48	13.2	3.259091
256	HL-93 Operating	50	47.5	4.8	14.12	3.024079
257	HL-93 Operating	50	47.5	4.81	14.12	3.023371
257	HL-93 Operating	50	47.5	5.11	14.98	2.829773
258	HL-93 Operating	50	47.5	5.11	14.99	2.827885
258	HL-93 Operating	50	47.5	5.39	15.79	2.666878
259	HL-93 Operating	50	47.5	5.39	15.79	2.666878
259	HL-93 Operating	50	47.5	5.65	16.53	2.53176
260	HL-93 Operating	50	47.5	5.66	16.53	2.531155
260	HL-93 Operating	50	47.5	5.9	17.21	2.417199
261	HL-93 Operating	50	47.5	5.9	17.21	2.417199
261	HL-93 Operating	50	47.5	6.07	17.54	2.36203
262	HL-93 Operating	50	47.5	6.07	17.54	2.36203
262	HL-93 Operating	50	47.5	6.12	17.84	2.319507
263	HL-93 Operating	50	47.5	6.12	17.84	2.319507
263	HL-93 Operating	50	47.5	6.32	18.45	2.231978
264	HL-93 Operating	50	47.5	6.32	18.45	2.231978
264	HL-93 Operating	50	47.5	6.49	19	2.158421
265	HL-93 Operating	50	47.5	6.5	19	2.157895
265	HL-93 Operating	50	47.5	6.65	19.49	2.095947
266	HL-93 Operating	50	47.5	6.65	19.49	2.095947
266	HL-93 Operating	50	47.5	6.79	19.92	2.043675
267	HL-93 Operating	50	47.5	6.79	19.92	2.043675
267	HL-93 Operating	50	47.5	6.9	20.3	2
268	HL-93 Operating	50	47.5	6.91	20.3	1.999507
268	HL-93 Operating	50	47.5	7	20.68	1.958414
269	HL-93 Operating	50	47.5	7	20.68	1.958414
269	HL-93 Operating	50	47.5	7.08	21.03	1.922016
270	HL-93 Operating	50	47.5	7.08	21.03	1.922016
270	HL-93 Operating	50	47.5	7.13	21.32	1.893527

Minimum Rating Factor 1.83667

271	HL-93 Operating	50	47.5	7.13	21.32	1.893527
271	HL-93 Operating	50	47.5	7.16	21.55	1.871926
272	HL-93 Operating	50	47.5	7.16	21.56	1.871058
272	HL-93 Operating	50	47.5	7.18	21.74	1.854646
273	HL-93 Operating	50	47.5	7.18	21.74	1.854646
273	HL-93 Operating	50	47.5	7.17	21.87	1.844079
274	HL-93 Operating	50	47.5	7.17	21.87	1.844079
274	HL-93 Operating	50	47.5	7.14	21.94	1.839562
275	HL-93 Operating	50	47.5	7.14	21.95	1.838724
275	HL-93 Operating	50	47.5	7.09	21.97	1.839326
276	HL-93 Operating	50	47.5	7.09	21.97	1.839326
276	HL-93 Operating	50	47.5	7.02	21.94	1.845032
277	HL-93 Operating	50	47.5	7.01	21.94	1.845488
277	HL-93 Operating	50	47.5	6.92	21.85	1.857208
278	HL-93 Operating	50	47.5	6.92	21.85	1.857208
278	HL-93 Operating	50	47.5	6.87	21.67	1.874942
279	HL-93 Operating	50	47.5	6.87	21.67	1.874942
279	HL-93 Operating	50	47.5	6.81	21.74	1.871665
280	HL-93 Operating	50	47.5	6.81	21.74	1.871665
280	HL-93 Operating	50	47.5	6.67	21.67	1.884172
281	HL-93 Operating	50	47.5	6.67	21.68	1.883303
281	HL-93 Operating	50	47.5	6.52	21.62	1.895467
282	HL-93 Operating	50	47.5	6.51	21.63	1.895053
282	HL-93 Operating	50	47.5	6.34	21.51	1.913529
283	HL-93 Operating	50	47.5	6.33	21.52	1.913104
283	HL-93 Operating	50	47.5	6.14	21.35	1.937237
284	HL-93 Operating	50	47.5	6.13	21.36	1.936798
284	HL-93 Operating	50	47.5	5.92	21.14	1.966887
285	HL-93 Operating	50	47.5	5.91	21.14	1.96736
285	HL-93 Operating	50	47.5	5.68	20.87	2.003833
286	HL-93 Operating	50	47.5	5.67	20.88	2.003352
286	HL-93 Operating	50	47.5	5.42	20.56	2.046693
287	HL-93 Operating	50	47.5	5.41	20.57	2.046184
287	HL-93 Operating	50	47.5	5.14	20.2	2.09703
288	HL-93 Operating	50	47.5	5.13	20.21	2.096487
288	HL-93 Operating	50	47.5	4.83	19.79	2.156139
289	HL-93 Operating	50	47.5	4.82	19.8	2.155556
289	HL-93 Operating	50	47.5	4.51	19.33	2.224004
290	HL-93 Operating	50	47.5	4.5	19.34	2.223371
290	HL-93 Operating	50	47.5	4.16	18.83	2.301646
291	HL-93 Operating	50	47.5	4.15	18.83	2.302177
291	HL-93 Operating	50	47.5	3.8	18.28	2.390591
292	HL-93 Operating	50	47.5	3.79	18.29	2.389831
292	HL-93 Operating	50	47.5	3.41	17.68	2.493778
293	HL-93 Operating	50	47.5	3.4	17.69	2.492934
293	HL-93 Operating	50	47.5	3.01	17.04	2.610915
294	HL-93 Operating	50	47.5	2.99	17.05	2.610557
294	HL-93 Operating	50	47.5	2.58	16.35	2.747401
295	HL-93 Operating	50	47.5	2.57	16.35	2.748012
295	HL-93 Operating	50	47.5	2.46	16.04	2.80798
296	HL-93 Operating	50	47.5	2.46	16.04	2.80798
296	HL-93 Operating	50	47.5	2.13	15.67	2.895341
297	HL-93 Operating	50	47.5	2.12	15.67	2.89598
297	HL-93 Operating	50	47.5	1.66	14.96	3.064171
298	HL-93 Operating	50	47.5	1.65	14.96	3.06484
298	HL-93 Operating	50	47.5	1.16	14.21	3.261084
299	HL-93 Operating	50	47.5	1.15	14.22	3.259494
299	HL-93 Operating	50	47.5	0.65	13.43	3.488459

300	HL-93 Operating	50	47.5	0.64	13.44	3.486607
300	HL-93 Operating	50	47.5	0.12	12.61	3.757335
301	HL-93 Operating	50	47.5	0.11	12.61	3.758128
301	HL-93 Operating	50	47.5	-0.45	11.75	4.004255
302	HL-93 Operating	50	47.5	-0.45	11.75	4.004255
302	HL-93 Operating	50	47.5	-1.02	10.84	4.287823
303	HL-93 Operating	50	47.5	-1.02	10.85	4.283871
303	HL-93 Operating	50	47.5	-1.61	-9.92	4.626008
304	HL-93 Operating	50	47.5	-1.62	9.91	4.629667
304	HL-93 Operating	50	47.5	-2.22	-10.12	4.474308
305	HL-93 Operating	50	47.5	-2.23	-10.11	4.477745
305	HL-93 Operating	50	47.5	-2.85	-10.34	4.318182
306	HL-93 Operating	50	47.5	-2.86	-10.34	4.317215
306	HL-93 Operating	50	47.5	-3.51	-10.61	4.146089
307	HL-93 Operating	50	47.5	-3.52	-10.6	4.149057
307	HL-93 Operating	50	47.5	-4.18	-10.92	3.967033
308	HL-93 Operating	50	47.5	-4.19	-10.92	3.966117
308	HL-93 Operating	50	47.5	-4.87	-11.27	3.782609
309	HL-93 Operating	50	47.5	-4.89	-11.27	3.780834
309	HL-93 Operating	50	47.5	-5.58	-11.67	3.592117
310	HL-93 Operating	50	47.5	-5.6	-11.67	3.590403
310	HL-93 Operating	50	47.5	-6.32	-12.11	3.400495
311	HL-93 Operating	50	47.5	-6.33	-12.11	3.39967
311	HL-93 Operating	50	47.5	-7.07	-12.59	3.211279
312	HL-93 Operating	50	47.5	-7.08	-12.59	3.210485
312	HL-93 Operating	50	47.5	-7.84	-13.11	3.025172
313	HL-93 Operating	50	47.5	-7.85	-13.11	3.024409
313	HL-93 Operating	50	47.5	-8.63	-13.66	2.845534
314	HL-93 Operating	50	47.5	-8.64	-13.67	2.842721
314	HL-93 Operating	50	47.5	-9.44	-14.25	2.670877
315	HL-93 Operating	50	47.5	-9.45	-14.25	2.670175
315	HL-93 Operating	50	47.5	-10.27	-14.87	2.503699
316	HL-93 Operating	50	47.5	-10.28	-14.87	2.503026
316	HL-93 Operating	50	47.5	-11.11	-15.52	2.344716
317	HL-93 Operating	50	47.5	-11.12	-15.52	2.344072
317	HL-93 Operating	50	47.5	-11.96	-16.19	2.195182
318	HL-93 Operating	50	47.5	-11.97	-16.2	2.19321
318	HL-93 Operating	50	47.5	-12.83	-17.02	2.037015
319	HL-93 Operating	50	47.5	-12.83	-17.02	2.037015
319	HL-93 Operating	50	47.5	-11.96	-16.22	2.191122
320	HL-93 Operating	50	47.5	-11.96	-16.22	2.191122
320	HL-93 Operating	50	47.5	-11.11	-15.55	2.340193
321	HL-93 Operating	50	47.5	-11.1	-15.55	2.340836
321	HL-93 Operating	50	47.5	-10.27	-14.9	2.498658
322	HL-93 Operating	50	47.5	-10.26	-14.9	2.499329
322	HL-93 Operating	50	47.5	-9.45	-14.28	2.664566
323	HL-93 Operating	50	47.5	-9.44	-14.28	2.665266
323	HL-93 Operating	50	47.5	-8.64	-13.69	2.838568
324	HL-93 Operating	50	47.5	-8.63	-13.69	2.839299
324	HL-93 Operating	50	47.5	-7.85	-13.14	3.017504
325	HL-93 Operating	50	47.5	-7.84	-13.14	3.018265
325	HL-93 Operating	50	47.5	-7.08	-12.62	3.202853
326	HL-93 Operating	50	47.5	-7.06	-12.62	3.204437
326	HL-93 Operating	50	47.5	-6.33	-12.14	3.391269
327	HL-93 Operating	50	47.5	-6.31	-12.14	3.392916
327	HL-93 Operating	50	47.5	-5.59	-11.7	3.582051
328	HL-93 Operating	50	47.5	-5.58	-11.7	3.582906
328	HL-93 Operating	50	47.5	-4.88	-11.3	3.771681

329	HL-93 Operating	50	47.5	-4.87	-11.31	3.769231
329	HL-93 Operating	50	47.5	-4.19	-10.95	3.955251
330	HL-93 Operating	50	47.5	-4.17	-10.95	3.957078
330	HL-93 Operating	50	47.5	-3.51	-10.64	4.134398
331	HL-93 Operating	50	47.5	-3.5	-10.64	4.135338
331	HL-93 Operating	50	47.5	-2.86	-10.37	4.304725
332	HL-93 Operating	50	47.5	-2.85	-10.38	4.301541
332	HL-93 Operating	50	47.5	-2.23	-10.15	4.460099
333	HL-93 Operating	50	47.5	-2.22	-10.16	4.456693
333	HL-93 Operating	50	47.5	-1.61	9.96	4.60743
334	HL-93 Operating	50	47.5	-1.61	-9.96	4.60743
334	HL-93 Operating	50	47.5	-1.02	10.9	4.26422
335	HL-93 Operating	50	47.5	-1.02	10.89	4.268136
335	HL-93 Operating	50	47.5	-0.45	11.8	3.987288
336	HL-93 Operating	50	47.5	-0.44	11.79	3.991518
336	HL-93 Operating	50	47.5	0.11	12.66	3.743286
337	HL-93 Operating	50	47.5	0.12	12.66	3.742496
337	HL-93 Operating	50	47.5	0.65	13.49	3.472943
338	HL-93 Operating	50	47.5	0.65	13.48	3.475519
338	HL-93 Operating	50	47.5	1.16	14.27	3.247372
339	HL-93 Operating	50	47.5	1.17	14.26	3.248948
339	HL-93 Operating	50	47.5	1.65	15.01	3.05463
340	HL-93 Operating	50	47.5	1.66	15	3.056
340	HL-93 Operating	50	47.5	2.12	15.71	2.888606
341	HL-93 Operating	50	47.5	2.13	15.71	2.887969
341	HL-93 Operating	50	47.5	2.46	16.09	2.799254
342	HL-93 Operating	50	47.5	2.46	16.09	2.799254
342	HL-93 Operating	50	47.5	2.57	16.39	2.741306
343	HL-93 Operating	50	47.5	2.58	16.39	2.740696
343	HL-93 Operating	50	47.5	3	17.09	2.603862
344	HL-93 Operating	50	47.5	3.01	17.08	2.604801
344	HL-93 Operating	50	47.5	3.4	17.73	2.48731
345	HL-93 Operating	50	47.5	3.41	17.73	2.486746
345	HL-93 Operating	50	47.5	3.79	18.33	2.384615
346	HL-93 Operating	50	47.5	3.8	18.32	2.385371
346	HL-93 Operating	50	47.5	4.16	18.88	2.295551
347	HL-93 Operating	50	47.5	4.17	18.87	2.296237
347	HL-93 Operating	50	47.5	4.5	19.38	2.218782
348	HL-93 Operating	50	47.5	4.51	19.38	2.218266
348	HL-93 Operating	50	47.5	4.83	19.84	2.150706
349	HL-93 Operating	50	47.5	4.83	19.83	2.15179
349	HL-93 Operating	50	47.5	5.13	20.25	2.092346
350	HL-93 Operating	50	47.5	5.14	20.24	2.092885
350	HL-93 Operating	50	47.5	5.41	20.61	2.042213
351	HL-93 Operating	50	47.5	5.42	20.6	2.042718
351	HL-93 Operating	50	47.5	5.67	20.92	1.999522
352	HL-93 Operating	50	47.5	5.68	20.92	1.999044
352	HL-93 Operating	50	47.5	5.91	21.19	1.962718
353	HL-93 Operating	50	47.5	5.92	21.18	1.963173
353	HL-93 Operating	50	47.5	6.13	21.4	1.933178
354	HL-93 Operating	50	47.5	6.14	21.39	1.933614
354	HL-93 Operating	50	47.5	6.33	21.56	1.909555
355	HL-93 Operating	50	47.5	6.34	21.55	1.909977
355	HL-93 Operating	50	47.5	6.51	21.67	1.891555
356	HL-93 Operating	50	47.5	6.52	21.66	1.891967
356	HL-93 Operating	50	47.5	6.67	21.72	1.879834
357	HL-93 Operating	50	47.5	6.67	21.72	1.879834
357	HL-93 Operating	50	47.5	6.81	21.78	1.868228

358	HL-93 Operating	50	47.5	6.81	21.78	1.868228
358	HL-93 Operating	50	47.5	6.87	21.7	1.87235
359	HL-93 Operating	50	47.5	6.87	21.7	1.87235
359	HL-93 Operating	50	47.5	6.92	21.89	1.853815
360	HL-93 Operating	50	47.5	6.92	21.89	1.853815
360	HL-93 Operating	50	47.5	7.01	21.97	1.842968
361	HL-93 Operating	50	47.5	7.01	21.97	1.842968
361	HL-93 Operating	50	47.5	7.08	22	1.837273
362	HL-93 Operating	50	47.5	7.08	22	1.837273
362	HL-93 Operating	50	47.5	7.13	21.98	1.83667
363	HL-93 Operating	50	47.5	7.13	21.98	1.83667
363	HL-93 Operating	50	47.5	7.16	21.9	1.842009
364	HL-93 Operating	50	47.5	7.16	21.9	1.842009
364	HL-93 Operating	50	47.5	7.17	21.77	1.852549
365	HL-93 Operating	50	47.5	7.17	21.77	1.852549
365	HL-93 Operating	50	47.5	7.16	21.59	1.868458
366	HL-93 Operating	50	47.5	7.16	21.59	1.868458
366	HL-93 Operating	50	47.5	7.12	21.35	1.891335
367	HL-93 Operating	50	47.5	7.12	21.35	1.891335
367	HL-93 Operating	50	47.5	7.07	21.06	1.919753
368	HL-93 Operating	50	47.5	7.07	21.06	1.919753
368	HL-93 Operating	50	47.5	6.99	20.71	1.95606
369	HL-93 Operating	50	47.5	6.99	20.71	1.95606
369	HL-93 Operating	50	47.5	6.9	20.33	1.997049
370	HL-93 Operating	50	47.5	6.89	20.33	1.997541
370	HL-93 Operating	50	47.5	6.78	19.94	2.042126
371	HL-93 Operating	50	47.5	6.77	19.94	2.042628
371	HL-93 Operating	50	47.5	6.64	19.51	2.094311
372	HL-93 Operating	50	47.5	6.63	19.51	2.094823
372	HL-93 Operating	50	47.5	6.48	19.03	2.155544
373	HL-93 Operating	50	47.5	6.47	19.03	2.156069
373	HL-93 Operating	50	47.5	6.3	18.48	2.229437
374	HL-93 Operating	50	47.5	6.29	18.48	2.229978
374	HL-93 Operating	50	47.5	6.1	17.86	2.318029
375	HL-93 Operating	50	47.5	6.09	17.86	2.318589
375	HL-93 Operating	50	47.5	6.04	17.57	2.359704
376	HL-93 Operating	50	47.5	6.04	17.57	2.359704
376	HL-93 Operating	50	47.5	5.87	17.23	2.416135
377	HL-93 Operating	50	47.5	5.87	17.23	2.416135
377	HL-93 Operating	50	47.5	5.63	16.56	2.528382
378	HL-93 Operating	50	47.5	5.62	16.55	2.530514
378	HL-93 Operating	50	47.5	5.36	15.81	2.665402
379	HL-93 Operating	50	47.5	5.35	15.81	2.666034
379	HL-93 Operating	50	47.5	5.07	15.01	2.826782
380	HL-93 Operating	50	47.5	5.06	15.01	2.827448
380	HL-93 Operating	50	47.5	4.76	14.15	3.020495
381	HL-93 Operating	50	47.5	4.76	14.15	3.020495
381	HL-93 Operating	50	47.5	4.44	13.22	3.257186
382	HL-93 Operating	50	47.5	4.43	13.22	3.257943
382	HL-93 Operating	50	47.5	4.09	12.23	3.549469
383	HL-93 Operating	50	47.5	4.08	12.24	3.547386
383	HL-93 Operating	50	47.5	3.72	11.18	3.915921
384	HL-93 Operating	50	47.5	3.71	11.19	3.913315
384	HL-93 Operating	50	47.5	3.32	10.07	4.387289
385	HL-93 Operating	50	47.5	3.31	10.08	4.383929
385	HL-93 Operating	50	47.5	2.91	8.89	5.015748
386	HL-93 Operating	50	47.5	2.9	8.91	5.005612
386	HL-93 Operating	50	47.5	2.48	7.64	5.89267

387	HL-93 Operating	50	47.5	2.47	7.66	5.87859
387	HL-93 Operating	50	47.5	2.02	6.32	7.196203
388	HL-93 Operating	50	47.5	2.02	6.35	7.162205
388	HL-93 Operating	50	47.5	1.55	4.91	9.358452
389	HL-93 Operating	50	47.5	1.55	4.95	9.282828
389	HL-93 Operating	50	47.5	1.06	3.41	13.61877
390	HL-93 Operating	50	47.5	1.05	3.46	13.42486
390	HL-93 Operating	50	47.5	0.54	1.79	26.23464
391	HL-93 Operating	50	47.5	0.54	1.83	25.6612
391	HL-93 Operating	50	47.5	0.01	-0.08	593.625

LOAD RATING FIXED SPAN -GIRDER 4

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\Upsilon_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	.95F_Y (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
100	HL-93 Operating	50	47.5	0.11	0.45	105.3111
100	HL-93 Operating	50	47.5	0.48	1.71	27.49708
101	HL-93 Operating	50	47.5	0.53	1.82	25.80769
101	HL-93 Operating	50	47.5	0.96	3.32	14.01807
102	HL-93 Operating	50	47.5	1.01	3.46	13.43642
102	HL-93 Operating	50	47.5	1.44	4.86	9.477366
103	HL-93 Operating	50	47.5	1.49	5.01	9.183633
103	HL-93 Operating	50	47.5	1.9	6.31	7.226624
104	HL-93 Operating	50	47.5	1.95	6.46	7.051084
104	HL-93 Operating	50	47.5	2.35	7.69	5.871261
105	HL-93 Operating	50	47.5	2.4	7.83	5.759898
105	HL-93 Operating	50	47.5	2.78	8.99	4.974416
106	HL-93 Operating	50	47.5	2.83	9.13	4.892662
106	HL-93 Operating	50	47.5	3.19	10.22	4.335616
107	HL-93 Operating	50	47.5	3.25	10.35	4.275362
107	HL-93 Operating	50	47.5	3.58	11.37	3.862797
108	HL-93 Operating	50	47.5	3.65	11.5	3.813043
108	HL-93 Operating	50	47.5	3.96	12.47	3.49158
109	HL-93 Operating	50	47.5	4.02	12.59	3.453535
109	HL-93 Operating	50	47.5	4.31	13.5	3.199259
110	HL-93 Operating	50	47.5	4.38	13.61	3.168259
110	HL-93 Operating	50	47.5	4.65	14.47	2.961299
111	HL-93 Operating	50	47.5	4.71	14.57	2.936857
111	HL-93 Operating	50	47.5	4.96	15.38	2.76593
112	HL-93 Operating	50	47.5	5.02	15.47	2.74596
112	HL-93 Operating	50	47.5	5.25	16.23	2.603204
113	HL-93 Operating	50	47.5	5.31	16.31	2.586757
113	HL-93 Operating	50	47.5	5.53	17.03	2.464474
114	HL-93 Operating	50	47.5	5.58	17.09	2.452896
114	HL-93 Operating	50	47.5	5.78	17.77	2.347777
115	HL-93 Operating	50	47.5	5.82	17.81	2.340258
115	HL-93 Operating	50	47.5	5.96	18.2	2.282418
116	HL-93 Operating	50	47.5	5.96	18.2	2.282418
116	HL-93 Operating	50	47.5	6	18.44	2.250542
117	HL-93 Operating	50	47.5	6.05	18.46	2.245395
117	HL-93 Operating	50	47.5	6.21	19.03	2.169732
118	HL-93 Operating	50	47.5	6.25	19.07	2.163083
118	HL-93 Operating	50	47.5	6.4	19.57	2.100153
119	HL-93 Operating	50	47.5	6.43	19.62	2.093272
119	HL-93 Operating	50	47.5	6.56	20.07	2.03986
120	HL-93 Operating	50	47.5	6.59	20.11	2.034311
120	HL-93 Operating	50	47.5	6.7	20.52	1.988304
121	HL-93 Operating	50	47.5	6.73	20.57	1.982013
121	HL-93 Operating	50	47.5	6.82	20.97	1.939914
122	HL-93 Operating	50	47.5	6.85	21.01	1.934793
122	HL-93 Operating	50	47.5	6.92	21.37	1.898924
123	HL-93 Operating	50	47.5	6.94	21.4	1.895327
123	HL-93 Operating	50	47.5	7	21.72	1.864641
124	HL-93 Operating	50	47.5	7.02	21.74	1.862006
124	HL-93 Operating	50	47.5	7.06	22.02	1.836512

Minimum Rating Factor 1.772568

125	HL-93 Operating	50	47.5	7.07	22.04	1.834392
125	HL-93 Operating	50	47.5	7.1	22.27	1.8141
126	HL-93 Operating	50	47.5	7.11	22.28	1.812837
126	HL-93 Operating	50	47.5	7.11	22.46	1.798308
127	HL-93 Operating	50	47.5	7.12	22.47	1.797063
127	HL-93 Operating	50	47.5	7.11	22.62	1.785588
128	HL-93 Operating	50	47.5	7.11	22.62	1.785588
128	HL-93 Operating	50	47.5	7.08	22.72	1.779049
129	HL-93 Operating	50	47.5	7.08	22.72	1.779049
129	HL-93 Operating	50	47.5	7.04	22.79	1.77534
130	HL-93 Operating	50	47.5	7.03	22.77	1.777339
130	HL-93 Operating	50	47.5	6.97	22.8	1.777632
131	HL-93 Operating	50	47.5	6.96	22.79	1.77885
131	HL-93 Operating	50	47.5	6.88	22.78	1.783143
132	HL-93 Operating	50	47.5	6.86	22.76	1.785589
132	HL-93 Operating	50	47.5	6.82	22.67	1.794442
133	HL-93 Operating	50	47.5	6.82	22.67	1.794442
133	HL-93 Operating	50	47.5	6.77	22.68	1.795855
134	HL-93 Operating	50	47.5	6.75	22.67	1.79753
134	HL-93 Operating	50	47.5	6.64	22.58	1.809566
135	HL-93 Operating	50	47.5	6.61	22.58	1.810895
135	HL-93 Operating	50	47.5	6.48	22.47	1.825545
136	HL-93 Operating	50	47.5	6.45	22.46	1.827694
136	HL-93 Operating	50	47.5	6.31	22.31	1.846257
137	HL-93 Operating	50	47.5	6.27	22.29	1.849708
137	HL-93 Operating	50	47.5	6.11	22.1	1.872851
138	HL-93 Operating	50	47.5	6.07	22.08	1.876359
138	HL-93 Operating	50	47.5	5.9	21.85	1.90389
139	HL-93 Operating	50	47.5	5.85	21.83	1.907925
139	HL-93 Operating	50	47.5	5.66	21.55	1.941531
140	HL-93 Operating	50	47.5	5.61	21.53	1.945657
140	HL-93 Operating	50	47.5	5.4	21.22	1.983977
141	HL-93 Operating	50	47.5	5.35	21.19	1.989146
141	HL-93 Operating	50	47.5	5.12	20.83	2.034566
142	HL-93 Operating	50	47.5	5.06	20.81	2.039404
142	HL-93 Operating	50	47.5	4.82	20.41	2.091132
143	HL-93 Operating	50	47.5	4.76	20.38	2.097154
143	HL-93 Operating	50	47.5	4.5	19.94	2.156469
144	HL-93 Operating	50	47.5	4.44	19.91	2.162732
144	HL-93 Operating	50	47.5	4.16	19.43	2.230571
145	HL-93 Operating	50	47.5	4.09	19.39	2.238783
145	HL-93 Operating	50	47.5	3.79	18.88	2.315148
146	HL-93 Operating	50	47.5	3.73	18.84	2.323248
146	HL-93 Operating	50	47.5	3.41	18.29	2.410607
147	HL-93 Operating	50	47.5	3.34	18.25	2.419726
147	HL-93 Operating	50	47.5	3.01	17.64	2.522109
148	HL-93 Operating	50	47.5	2.94	17.61	2.53038
148	HL-93 Operating	50	47.5	2.58	16.95	2.650147
149	HL-93 Operating	50	47.5	2.51	16.94	2.655844
149	HL-93 Operating	50	47.5	2.41	16.68	2.703237
150	HL-93 Operating	50	47.5	2.41	16.68	2.703237
150	HL-93 Operating	50	47.5	2.13	16.23	2.795441
151	HL-93 Operating	50	47.5	2.06	16.19	2.806671
151	HL-93 Operating	50	47.5	1.67	15.46	2.964424
152	HL-93 Operating	50	47.5	1.59	15.39	2.983106
152	HL-93 Operating	50	47.5	1.18	14.64	3.163934
153	HL-93 Operating	50	47.5	1.1	14.56	3.186813
153	HL-93 Operating	50	47.5	0.67	13.78	3.398403

154	HL-93 Operating	50	47.5	0.59	13.69	3.426589
154	HL-93 Operating	50	47.5	0.14	12.88	3.677019
155	HL-93 Operating	50	47.5	0.06	12.78	3.71205
155	HL-93 Operating	50	47.5	-0.45	11.95	3.937238
156	HL-93 Operating	50	47.5	-0.51	11.84	3.96875
156	HL-93 Operating	50	47.5	-1.02	10.98	4.233151
157	HL-93 Operating	50	47.5	-1.09	10.87	4.269549
157	HL-93 Operating	50	47.5	-1.61	-10.16	4.516732
158	HL-93 Operating	50	47.5	-1.68	-10.17	4.505408
158	HL-93 Operating	50	47.5	-2.22	-10.4	4.353846
159	HL-93 Operating	50	47.5	-2.29	-10.42	4.338772
159	HL-93 Operating	50	47.5	-2.84	-10.68	4.181648
160	HL-93 Operating	50	47.5	-2.93	-10.69	4.169317
160	HL-93 Operating	50	47.5	-3.49	-10.99	4.00455
161	HL-93 Operating	50	47.5	-3.58	-11.01	3.989101
161	HL-93 Operating	50	47.5	-4.16	-11.35	3.818502
162	HL-93 Operating	50	47.5	-4.25	-11.36	3.807218
162	HL-93 Operating	50	47.5	-4.85	-11.74	3.632879
163	HL-93 Operating	50	47.5	-4.94	-11.76	3.619048
163	HL-93 Operating	50	47.5	-5.55	-12.18	3.444171
164	HL-93 Operating	50	47.5	-5.65	-12.21	3.427518
164	HL-93 Operating	50	47.5	-6.27	-12.67	3.254144
165	HL-93 Operating	50	47.5	-6.38	-12.7	3.237795
165	HL-93 Operating	50	47.5	-7.02	-13.2	3.066667
166	HL-93 Operating	50	47.5	-7.13	-13.24	3.049094
166	HL-93 Operating	50	47.5	-7.78	-13.77	2.884532
167	HL-93 Operating	50	47.5	-7.9	-13.81	2.867487
167	HL-93 Operating	50	47.5	-8.57	-14.38	2.707232
168	HL-93 Operating	50	47.5	-8.7	-14.45	2.685121
168	HL-93 Operating	50	47.5	-9.39	-15.03	2.535595
169	HL-93 Operating	50	47.5	-9.51	-15.13	2.510905
169	HL-93 Operating	50	47.5	-10.23	-15.76	2.364848
170	HL-93 Operating	50	47.5	-10.35	-15.87	2.340895
170	HL-93 Operating	50	47.5	-11.08	-16.55	2.200604
171	HL-93 Operating	50	47.5	-11.2	-16.64	2.18149
171	HL-93 Operating	50	47.5	-11.96	-17.9	1.985475
172	HL-93 Operating	50	47.5	-12.04	-17.91	1.979899
172	HL-93 Operating	50	47.5	-12.85	-19.37	1.788849
173	HL-93 Operating	50	47.5	-12.83	-19.37	1.789881
173	HL-93 Operating	50	47.5	-12.02	-17.93	1.978806
174	HL-93 Operating	50	47.5	-11.94	-17.92	1.984375
174	HL-93 Operating	50	47.5	-11.18	-16.63	2.184005
175	HL-93 Operating	50	47.5	-11.07	-16.56	2.199879
175	HL-93 Operating	50	47.5	-10.33	-15.86	2.343632
176	HL-93 Operating	50	47.5	-10.21	-15.75	2.367619
176	HL-93 Operating	50	47.5	-9.5	-15.13	2.511566
177	HL-93 Operating	50	47.5	-9.37	-15.03	2.536926
177	HL-93 Operating	50	47.5	-8.68	-14.44	2.688366
178	HL-93 Operating	50	47.5	-8.56	-14.38	2.707928
178	HL-93 Operating	50	47.5	-7.89	-13.81	2.868211
179	HL-93 Operating	50	47.5	-7.76	-13.76	2.888081
179	HL-93 Operating	50	47.5	-7.12	-13.24	3.049849
180	HL-93 Operating	50	47.5	-7	-13.2	3.068182
180	HL-93 Operating	50	47.5	-6.37	-12.7	3.238583
181	HL-93 Operating	50	47.5	-6.26	-12.67	3.254933
181	HL-93 Operating	50	47.5	-5.64	-12.21	3.428337
182	HL-93 Operating	50	47.5	-5.54	-12.18	3.444992
182	HL-93 Operating	50	47.5	-4.93	-11.76	3.619898

183	HL-93 Operating	50	47.5	-4.83	-11.74	3.634583
183	HL-93 Operating	50	47.5	-4.24	-11.36	3.808099
184	HL-93 Operating	50	47.5	-4.15	-11.35	3.819383
184	HL-93 Operating	50	47.5	-3.57	-11.01	3.990009
185	HL-93 Operating	50	47.5	-3.48	-11	4.001818
185	HL-93 Operating	50	47.5	-2.91	-10.7	4.16729
186	HL-93 Operating	50	47.5	-2.83	-10.69	4.178672
186	HL-93 Operating	50	47.5	-2.28	-10.42	4.339731
187	HL-93 Operating	50	47.5	-2.21	-10.41	4.350624
187	HL-93 Operating	50	47.5	-1.67	-10.19	4.497547
188	HL-93 Operating	50	47.5	-1.6	-10.17	4.513274
188	HL-93 Operating	50	47.5	-1.08	10.91	4.254812
189	HL-93 Operating	50	47.5	-1.01	11.02	4.218693
189	HL-93 Operating	50	47.5	-0.5	11.89	3.952902
190	HL-93 Operating	50	47.5	-0.44	11.99	3.924937
190	HL-93 Operating	50	47.5	0.07	12.82	3.699688
191	HL-93 Operating	50	47.5	0.15	12.92	3.664861
191	HL-93 Operating	50	47.5	0.6	13.73	3.415878
192	HL-93 Operating	50	47.5	0.68	13.82	3.387844
192	HL-93 Operating	50	47.5	1.11	14.6	3.177397
193	HL-93 Operating	50	47.5	1.19	14.68	3.154632
193	HL-93 Operating	50	47.5	1.6	15.44	2.972798
194	HL-93 Operating	50	47.5	1.68	15.5	2.956129
194	HL-93 Operating	50	47.5	2.07	16.23	2.799137
195	HL-93 Operating	50	47.5	2.14	16.27	2.787953
195	HL-93 Operating	50	47.5	2.42	16.73	2.694561
196	HL-93 Operating	50	47.5	2.42	16.72	2.696172
196	HL-93 Operating	50	47.5	2.52	16.98	2.648999
197	HL-93 Operating	50	47.5	2.59	16.99	2.64332
197	HL-93 Operating	50	47.5	2.95	17.65	2.524079
198	HL-93 Operating	50	47.5	3.01	17.68	2.516403
198	HL-93 Operating	50	47.5	3.35	18.29	2.413887
199	HL-93 Operating	50	47.5	3.42	18.33	2.404801
199	HL-93 Operating	50	47.5	3.73	18.88	2.318326
200	HL-93 Operating	50	47.5	3.8	18.92	2.309725
200	HL-93 Operating	50	47.5	4.1	19.44	2.23251
201	HL-93 Operating	50	47.5	4.16	19.48	2.224846
201	HL-93 Operating	50	47.5	4.44	19.95	2.158396
202	HL-93 Operating	50	47.5	4.51	19.98	2.151652
202	HL-93 Operating	50	47.5	4.77	20.42	2.092556
203	HL-93 Operating	50	47.5	4.83	20.45	2.086553
203	HL-93 Operating	50	47.5	5.07	20.85	2.035012
204	HL-93 Operating	50	47.5	5.13	20.88	2.029215
204	HL-93 Operating	50	47.5	5.35	21.24	1.984463
205	HL-93 Operating	50	47.5	5.41	21.26	1.979774
205	HL-93 Operating	50	47.5	5.62	21.58	1.940686
206	HL-93 Operating	50	47.5	5.66	21.6	1.937037
206	HL-93 Operating	50	47.5	5.86	21.87	1.903978
207	HL-93 Operating	50	47.5	5.9	21.9	1.899543
207	HL-93 Operating	50	47.5	6.08	22.12	1.872514
208	HL-93 Operating	50	47.5	6.12	22.15	1.868172
208	HL-93 Operating	50	47.5	6.28	22.33	1.845947
209	HL-93 Operating	50	47.5	6.32	22.35	1.842506
209	HL-93 Operating	50	47.5	6.46	22.5	1.824
210	HL-93 Operating	50	47.5	6.49	22.51	1.821857
210	HL-93 Operating	50	47.5	6.62	22.62	1.80725
211	HL-93 Operating	50	47.5	6.65	22.63	1.805126
211	HL-93 Operating	50	47.5	6.76	22.7	1.794714

212	HL-93 Operating	50	47.5	6.78	22.72	1.792254
212	HL-93 Operating	50	47.5	6.83	22.7	1.79163
213	HL-93 Operating	50	47.5	6.83	22.7	1.79163
213	HL-93 Operating	50	47.5	6.87	22.79	1.782799
214	HL-93 Operating	50	47.5	6.89	22.81	1.780359
214	HL-93 Operating	50	47.5	6.97	22.82	1.776074
215	HL-93 Operating	50	47.5	6.98	22.83	1.774858
215	HL-93 Operating	50	47.5	7.04	22.8	1.774561
216	HL-93 Operating	50	47.5	7.05	22.82	1.772568
216	HL-93 Operating	50	47.5	7.09	22.75	1.776264
217	HL-93 Operating	50	47.5	7.09	22.75	1.776264
217	HL-93 Operating	50	47.5	7.12	22.65	1.782781
218	HL-93 Operating	50	47.5	7.12	22.65	1.782781
218	HL-93 Operating	50	47.5	7.13	22.5	1.794222
219	HL-93 Operating	50	47.5	7.13	22.49	1.79502
219	HL-93 Operating	50	47.5	7.12	22.3	1.810762
220	HL-93 Operating	50	47.5	7.11	22.29	1.812023
220	HL-93 Operating	50	47.5	7.09	22.06	1.831822
221	HL-93 Operating	50	47.5	7.07	22.04	1.834392
221	HL-93 Operating	50	47.5	7.03	21.77	1.85898
222	HL-93 Operating	50	47.5	7.02	21.75	1.861149
222	HL-93 Operating	50	47.5	6.96	21.43	1.891741
223	HL-93 Operating	50	47.5	6.94	21.4	1.895327
223	HL-93 Operating	50	47.5	6.86	21.03	1.932477
224	HL-93 Operating	50	47.5	6.84	21	1.93619
224	HL-93 Operating	50	47.5	6.75	20.59	1.979116
225	HL-93 Operating	50	47.5	6.72	20.55	1.984428
225	HL-93 Operating	50	47.5	6.61	20.13	2.031297
226	HL-93 Operating	50	47.5	6.58	20.09	2.036834
226	HL-93 Operating	50	47.5	6.46	19.64	2.089613
227	HL-93 Operating	50	47.5	6.42	19.59	2.096988
227	HL-93 Operating	50	47.5	6.28	19.09	2.159246
228	HL-93 Operating	50	47.5	6.24	19.05	2.165879
228	HL-93 Operating	50	47.5	6.08	18.48	2.241342
229	HL-93 Operating	50	47.5	6.03	18.46	2.246479
229	HL-93 Operating	50	47.5	5.99	18.21	2.279517
230	HL-93 Operating	50	47.5	5.99	18.22	2.278266
230	HL-93 Operating	50	47.5	5.86	17.82	2.3367
231	HL-93 Operating	50	47.5	5.81	17.79	2.343451
231	HL-93 Operating	50	47.5	5.61	17.1	2.449708
232	HL-93 Operating	50	47.5	5.56	17.04	2.461268
232	HL-93 Operating	50	47.5	5.35	16.32	2.582721
233	HL-93 Operating	50	47.5	5.29	16.24	2.599138
233	HL-93 Operating	50	47.5	5.07	15.48	2.740956
234	HL-93 Operating	50	47.5	5	15.39	2.761533
234	HL-93 Operating	50	47.5	4.76	14.58	2.931413
235	HL-93 Operating	50	47.5	4.69	14.48	2.956492
235	HL-93 Operating	50	47.5	4.44	13.61	3.16385
236	HL-93 Operating	50	47.5	4.37	13.51	3.19245
236	HL-93 Operating	50	47.5	4.09	12.58	3.450715
237	HL-93 Operating	50	47.5	4.02	12.47	3.486768
237	HL-93 Operating	50	47.5	3.72	11.49	3.81027
238	HL-93 Operating	50	47.5	3.65	11.38	3.853251
238	HL-93 Operating	50	47.5	3.34	10.33	4.274927
239	HL-93 Operating	50	47.5	3.26	10.21	4.333007
239	HL-93 Operating	50	47.5	2.93	9.1	4.897802
240	HL-93 Operating	50	47.5	2.85	8.98	4.97216
240	HL-93 Operating	50	47.5	2.5	7.8	5.769231

241	HL-93 Operating	50	47.5	2.43	7.67	5.876141
241	HL-93 Operating	50	47.5	2.05	6.42	7.079439
242	HL-93 Operating	50	47.5	1.98	6.29	7.236884
242	HL-93 Operating	50	47.5	1.59	4.96	9.256048
243	HL-93 Operating	50	47.5	1.51	4.84	9.502066
243	HL-93 Operating	50	47.5	1.1	3.41	13.60704
244	HL-93 Operating	50	47.5	1.03	3.31	14.03927
244	HL-93 Operating	50	47.5	0.59	1.79	26.2067
245	HL-93 Operating	50	47.5	0.52	1.7	27.63529
245	HL-93 Operating	50	47.5	0.07	0.46	103.1087

LOAD RATING FIXED SPAN -GIRDER 1

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
538	HS-20	50	47.5	0.06	0.42	112.9524
538	HS-20	50	47.5	0.53	1.7	27.62941
539	HS-20	50	47.5	0.53	1.82	25.80769
539	HS-20	50	47.5	1.05	3.3	14.07576
540	HS-20	50	47.5	1.07	3.45	13.45797
540	HS-20	50	47.5	1.56	4.81	9.550936
541	HS-20	50	47.5	1.59	4.96	9.256048
541	HS-20	50	47.5	2.06	6.23	7.29374
542	HS-20	50	47.5	2.09	6.38	7.117555
542	HS-20	50	47.5	2.54	7.56	5.94709
543	HS-20	50	47.5	2.57	7.7	5.835065
543	HS-20	50	47.5	3.01	8.81	5.049943
544	HS-20	50	47.5	3.03	8.95	4.968715
544	HS-20	50	47.5	3.45	9.98	4.413828
545	HS-20	50	47.5	3.47	10.11	4.355094
545	HS-20	50	47.5	3.87	11.08	3.937726
546	HS-20	50	47.5	3.89	11.21	3.890277
546	HS-20	50	47.5	4.26	12.12	3.567657
547	HS-20	50	47.5	4.29	12.23	3.533115
547	HS-20	50	47.5	4.64	13.09	3.274255
548	HS-20	50	47.5	4.67	13.2	3.244697
548	HS-20	50	47.5	4.99	13.99	3.038599
549	HS-20	50	47.5	5.02	14.09	3.014904
549	HS-20	50	47.5	5.32	14.83	2.844235
550	HS-20	50	47.5	5.35	14.93	2.823175
550	HS-20	50	47.5	5.63	15.62	2.680538
551	HS-20	50	47.5	5.66	15.7	2.664968
551	HS-20	50	47.5	5.92	16.35	2.543119
552	HS-20	50	47.5	5.94	16.42	2.53106
552	HS-20	50	47.5	6.18	17.03	2.426307
553	HS-20	50	47.5	6.2	17.08	2.418033
553	HS-20	50	47.5	6.37	17.38	2.366513
554	HS-20	50	47.5	6.37	17.38	2.366513
554	HS-20	50	47.5	6.42	17.64	2.328798
555	HS-20	50	47.5	6.44	17.67	2.323713
555	HS-20	50	47.5	6.64	18.17	2.248762
556	HS-20	50	47.5	6.65	18.22	2.242042
556	HS-20	50	47.5	6.83	18.65	2.180697
557	HS-20	50	47.5	6.84	18.71	2.173169
557	HS-20	50	47.5	7	19.1	2.120419
558	HS-20	50	47.5	7.01	19.15	2.11436
558	HS-20	50	47.5	7.15	19.5	2.069231
559	HS-20	50	47.5	7.16	19.55	2.063427
559	HS-20	50	47.5	7.27	19.91	2.020593
560	HS-20	50	47.5	7.28	19.95	2.01604
560	HS-20	50	47.5	7.38	20.27	1.97928

Minimum Rating Factor 1.860465

561	HS-20	50	47.5	7.38	20.31	1.975382
561	HS-20	50	47.5	7.46	20.58	1.945578
562	HS-20	50	47.5	7.46	20.61	1.942746
562	HS-20	50	47.5	7.52	20.84	1.918426
563	HS-20	50	47.5	7.52	20.87	1.915668
563	HS-20	50	47.5	7.56	21.06	1.896486
564	HS-20	50	47.5	7.56	21.08	1.894687
564	HS-20	50	47.5	7.58	21.23	1.880358
565	HS-20	50	47.5	7.58	21.25	1.878588
565	HS-20	50	47.5	7.58	21.36	1.868914
566	HS-20	50	47.5	7.57	21.37	1.868507
566	HS-20	50	47.5	7.55	21.44	1.86334
567	HS-20	50	47.5	7.54	21.45	1.862937
567	HS-20	50	47.5	7.5	21.48	1.862197
568	HS-20	50	47.5	7.5	21.48	1.862197
568	HS-20	50	47.5	7.43	21.48	1.865456
569	HS-20	50	47.5	7.43	21.46	1.867195
569	HS-20	50	47.5	7.34	21.44	1.873134
570	HS-20	50	47.5	7.33	21.42	1.87535
570	HS-20	50	47.5	7.28	21.31	1.887377
571	HS-20	50	47.5	7.28	21.31	1.887377
571	HS-20	50	47.5	7.23	21.33	1.887951
572	HS-20	50	47.5	7.22	21.32	1.889306
572	HS-20	50	47.5	7.09	21.25	1.901647
573	HS-20	50	47.5	7.08	21.24	1.903013
573	HS-20	50	47.5	6.93	21.16	1.917297
574	HS-20	50	47.5	6.92	21.13	1.920492
574	HS-20	50	47.5	6.75	21.02	1.93863
575	HS-20	50	47.5	6.73	20.99	1.942354
575	HS-20	50	47.5	6.55	20.84	1.964971
576	HS-20	50	47.5	6.53	20.81	1.968765
576	HS-20	50	47.5	6.33	20.62	1.996605
577	HS-20	50	47.5	6.3	20.58	2.001944
577	HS-20	50	47.5	6.08	20.35	2.035381
578	HS-20	50	47.5	6.05	20.32	2.039862
578	HS-20	50	47.5	5.81	20.04	2.080339
579	HS-20	50	47.5	5.78	20.01	2.084958
579	HS-20	50	47.5	5.52	19.7	2.130964
580	HS-20	50	47.5	5.49	19.66	2.136826
580	HS-20	50	47.5	5.21	19.32	2.188923
581	HS-20	50	47.5	5.18	19.28	2.195021
581	HS-20	50	47.5	4.88	18.9	2.255026
582	HS-20	50	47.5	4.84	18.85	2.26313
582	HS-20	50	47.5	4.52	18.44	2.330803
583	HS-20	50	47.5	4.48	18.39	2.339315
583	HS-20	50	47.5	4.14	17.94	2.416945
584	HS-20	50	47.5	4.1	17.89	2.425936
584	HS-20	50	47.5	3.74	17.4	2.514943
585	HS-20	50	47.5	3.7	17.35	2.524496
585	HS-20	50	47.5	3.32	16.83	2.625074
586	HS-20	50	47.5	3.28	16.77	2.636852
586	HS-20	50	47.5	2.87	16.2	2.754938
587	HS-20	50	47.5	2.83	16.17	2.762523
587	HS-20	50	47.5	2.72	15.91	2.814582
588	HS-20	50	47.5	2.72	15.91	2.814582

588	HS-20	50	47.5	2.41	15.55	2.899678
589	HS-20	50	47.5	2.36	15.5	2.912258
589	HS-20	50	47.5	1.91	14.86	3.067968
590	HS-20	50	47.5	1.86	14.78	3.087957
590	HS-20	50	47.5	1.4	14.13	3.262562
591	HS-20	50	47.5	1.34	14.04	3.287749
591	HS-20	50	47.5	0.86	13.36	3.491018
592	HS-20	50	47.5	0.8	13.26	3.52187
592	HS-20	50	47.5	0.3	12.56	3.757962
593	HS-20	50	47.5	0.24	12.46	3.792937
593	HS-20	50	47.5	-0.33	11.73	4.021313
594	HS-20	50	47.5	-0.37	11.63	4.052451
594	HS-20	50	47.5	-0.94	10.87	4.283349
595	HS-20	50	47.5	-0.98	10.77	4.319406
595	HS-20	50	47.5	-1.57	9.98	4.602204
596	HS-20	50	47.5	-1.62	9.88	4.643725
596	HS-20	50	47.5	-2.22	-9.33	4.853162
597	HS-20	50	47.5	-2.28	-9.35	4.836364
597	HS-20	50	47.5	-2.9	-9.52	4.684874
598	HS-20	50	47.5	-2.96	-9.54	4.668763
598	HS-20	50	47.5	-3.61	-9.72	4.515432
599	HS-20	50	47.5	-3.66	-9.74	4.501027
599	HS-20	50	47.5	-4.33	-9.92	4.351815
600	HS-20	50	47.5	-4.39	-9.94	4.337022
600	HS-20	50	47.5	-5.09	-10.12	4.190711
601	HS-20	50	47.5	-5.15	-10.14	4.176529
601	HS-20	50	47.5	-5.86	-10.32	4.034884
602	HS-20	50	47.5	-5.93	-10.35	4.016425
602	HS-20	50	47.5	-6.66	-10.53	3.878443
603	HS-20	50	47.5	-6.74	-10.56	3.859848
603	HS-20	50	47.5	-7.49	-10.74	3.725326
604	HS-20	50	47.5	-7.57	-10.78	3.704082
604	HS-20	50	47.5	-8.34	-10.96	3.572993
605	HS-20	50	47.5	-8.43	-10.99	3.55505
605	HS-20	50	47.5	-9.22	-11.17	3.427037
606	HS-20	50	47.5	-9.33	-11.21	3.404996
606	HS-20	50	47.5	-10.13	-11.39	3.280948
607	HS-20	50	47.5	-10.25	-11.44	3.256119
607	HS-20	50	47.5	-11.07	-11.63	3.132416
608	HS-20	50	47.5	-11.2	-11.69	3.105218
608	HS-20	50	47.5	-12.06	-11.91	2.975651
609	HS-20	50	47.5	-12.18	-11.94	2.958124
609	HS-20	50	47.5	-13.08	-12.87	2.674437
610	HS-20	50	47.5	-13.17	-12.81	2.679938
610	HS-20	50	47.5	-14.14	-13.94	2.393113
611	HS-20	50	47.5	-14.16	-13.97	2.386543
611	HS-20	50	47.5	-13.19	-12.87	2.66589
612	HS-20	50	47.5	-13.1	-12.92	2.662539
612	HS-20	50	47.5	-12.2	-11.95	2.953975
613	HS-20	50	47.5	-12.08	-11.96	2.961538
613	HS-20	50	47.5	-11.22	-11.7	3.100855
614	HS-20	50	47.5	-11.09	-11.65	3.125322
614	HS-20	50	47.5	-10.27	-11.46	3.248691
615	HS-20	50	47.5	-10.14	-11.42	3.271454
615	HS-20	50	47.5	-9.34	-11.24	3.395018

616	HS-20	50	47.5	-9.24	-11.19	3.419124
616	HS-20	50	47.5	-8.45	-11.01	3.546776
617	HS-20	50	47.5	-8.36	-10.98	3.564663
617	HS-20	50	47.5	-7.58	-10.8	3.696296
618	HS-20	50	47.5	-7.5	-10.76	3.717472
618	HS-20	50	47.5	-6.75	-10.58	3.851607
619	HS-20	50	47.5	-6.68	-10.55	3.869194
619	HS-20	50	47.5	-5.94	-10.37	4.007715
620	HS-20	50	47.5	-5.87	-10.34	4.026112
620	HS-20	50	47.5	-5.16	-10.16	4.167323
621	HS-20	50	47.5	-5.1	-10.14	4.18146
621	HS-20	50	47.5	-4.41	-9.96	4.326305
622	HS-20	50	47.5	-4.34	-9.93	4.346425
622	HS-20	50	47.5	-3.68	-9.76	4.489754
623	HS-20	50	47.5	-3.62	-9.74	4.505133
623	HS-20	50	47.5	-2.97	-9.56	4.65795
624	HS-20	50	47.5	-2.91	-9.54	4.674004
624	HS-20	50	47.5	-2.29	-9.36	4.830128
625	HS-20	50	47.5	-2.23	-9.35	4.841711
625	HS-20	50	47.5	-1.63	9.9	4.633333
626	HS-20	50	47.5	-1.58	10	4.592
626	HS-20	50	47.5	-0.99	10.79	4.310473
627	HS-20	50	47.5	-0.94	10.89	4.275482
627	HS-20	50	47.5	-0.38	11.65	4.044635
628	HS-20	50	47.5	-0.33	11.75	4.014468
628	HS-20	50	47.5	0.23	12.48	3.78766
629	HS-20	50	47.5	0.29	12.58	3.752782
629	HS-20	50	47.5	0.79	13.28	3.517319
630	HS-20	50	47.5	0.85	13.38	3.486547
630	HS-20	50	47.5	1.34	14.06	3.283073
631	HS-20	50	47.5	1.39	14.15	3.258657
631	HS-20	50	47.5	1.85	14.81	3.082377
632	HS-20	50	47.5	1.91	14.88	3.063844
632	HS-20	50	47.5	2.35	15.52	2.909149
633	HS-20	50	47.5	2.4	15.57	2.896596
633	HS-20	50	47.5	2.71	15.94	2.809912
634	HS-20	50	47.5	2.71	15.93	2.811676
634	HS-20	50	47.5	2.82	16.19	2.759728
635	HS-20	50	47.5	2.87	16.22	2.751541
635	HS-20	50	47.5	3.27	16.8	2.632738
636	HS-20	50	47.5	3.31	16.85	2.622552
636	HS-20	50	47.5	3.7	17.37	2.521589
637	HS-20	50	47.5	3.74	17.43	2.510614
637	HS-20	50	47.5	4.1	17.91	2.423227
638	HS-20	50	47.5	4.14	17.96	2.414254
638	HS-20	50	47.5	4.48	18.41	2.336773
639	HS-20	50	47.5	4.52	18.47	2.327017
639	HS-20	50	47.5	4.84	18.88	2.259534
640	HS-20	50	47.5	4.87	18.92	2.253171
640	HS-20	50	47.5	5.17	19.31	2.192128
641	HS-20	50	47.5	5.21	19.35	2.18553
641	HS-20	50	47.5	5.49	19.69	2.13357
642	HS-20	50	47.5	5.52	19.73	2.127724
642	HS-20	50	47.5	5.78	20.04	2.081836
643	HS-20	50	47.5	5.81	20.08	2.076195

643	HS-20	50	47.5	6.05	20.35	2.036855
644	HS-20	50	47.5	6.08	20.38	2.032385
644	HS-20	50	47.5	6.3	20.62	1.99806
645	HS-20	50	47.5	6.32	20.65	1.994189
645	HS-20	50	47.5	6.53	20.84	1.965931
646	HS-20	50	47.5	6.55	20.88	1.961207
646	HS-20	50	47.5	6.73	21.03	1.938659
647	HS-20	50	47.5	6.75	21.06	1.934948
647	HS-20	50	47.5	6.91	21.17	1.917336
648	HS-20	50	47.5	6.93	21.2	1.913679
648	HS-20	50	47.5	7.08	21.28	1.899436
649	HS-20	50	47.5	7.09	21.29	1.898074
649	HS-20	50	47.5	7.22	21.34	1.887535
650	HS-20	50	47.5	7.23	21.35	1.886183
650	HS-20	50	47.5	7.28	21.33	1.885607
651	HS-20	50	47.5	7.28	21.33	1.885607
651	HS-20	50	47.5	7.33	21.44	1.873601
652	HS-20	50	47.5	7.34	21.46	1.871389
652	HS-20	50	47.5	7.43	21.48	1.865456
653	HS-20	50	47.5	7.43	21.5	1.863721
653	HS-20	50	47.5	7.5	21.5	1.860465
654	HS-20	50	47.5	7.5	21.5	1.860465
654	HS-20	50	47.5	7.55	21.47	1.860736
655	HS-20	50	47.5	7.55	21.46	1.861603
655	HS-20	50	47.5	7.57	21.39	1.86676
656	HS-20	50	47.5	7.58	21.38	1.867166
656	HS-20	50	47.5	7.58	21.27	1.876822
657	HS-20	50	47.5	7.58	21.25	1.878588
657	HS-20	50	47.5	7.57	21.1	1.892417
658	HS-20	50	47.5	7.57	21.08	1.894213
658	HS-20	50	47.5	7.53	20.9	1.91244
659	HS-20	50	47.5	7.53	20.87	1.915189
659	HS-20	50	47.5	7.47	20.64	1.939438
660	HS-20	50	47.5	7.47	20.6	1.943204
660	HS-20	50	47.5	7.39	20.33	1.972946
661	HS-20	50	47.5	7.39	20.29	1.976836
661	HS-20	50	47.5	7.29	19.97	2.01352
662	HS-20	50	47.5	7.29	19.93	2.017561
662	HS-20	50	47.5	7.17	19.57	2.060807
663	HS-20	50	47.5	7.16	19.52	2.066598
663	HS-20	50	47.5	7.03	19.16	2.112213
664	HS-20	50	47.5	7.02	19.11	2.118263
664	HS-20	50	47.5	6.86	18.72	2.17094
665	HS-20	50	47.5	6.85	18.67	2.17729
665	HS-20	50	47.5	6.67	18.24	2.238487
666	HS-20	50	47.5	6.66	18.18	2.246425
666	HS-20	50	47.5	6.46	17.68	2.321267
667	HS-20	50	47.5	6.45	17.65	2.325779
667	HS-20	50	47.5	6.39	17.4	2.362644
668	HS-20	50	47.5	6.39	17.4	2.362644
668	HS-20	50	47.5	6.23	17.09	2.414862
669	HS-20	50	47.5	6.21	17.04	2.423122
669	HS-20	50	47.5	5.97	16.43	2.527693
670	HS-20	50	47.5	5.95	16.36	2.539731
670	HS-20	50	47.5	5.69	15.71	2.661362

671	HS-20	50	47.5	5.67	15.63	2.676264
671	HS-20	50	47.5	5.39	14.94	2.818608
672	HS-20	50	47.5	5.37	14.84	2.838949
672	HS-20	50	47.5	5.07	14.1	3.00922
673	HS-20	50	47.5	5.04	14	3.032857
673	HS-20	50	47.5	4.72	13.2	3.240909
674	HS-20	50	47.5	4.69	13.09	3.270435
674	HS-20	50	47.5	4.36	12.23	3.527392
675	HS-20	50	47.5	4.32	12.12	3.562706
675	HS-20	50	47.5	3.97	11.2	3.886607
676	HS-20	50	47.5	3.93	11.08	3.93231
676	HS-20	50	47.5	3.56	10.1	4.350495
677	HS-20	50	47.5	3.52	9.97	4.411234
677	HS-20	50	47.5	3.12	8.92	4.975336
678	HS-20	50	47.5	3.08	8.79	5.05347
678	HS-20	50	47.5	2.66	7.67	5.846154
679	HS-20	50	47.5	2.62	7.53	5.960159
679	HS-20	50	47.5	2.18	6.34	7.148265
680	HS-20	50	47.5	2.14	6.2	7.316129
680	HS-20	50	47.5	1.67	4.92	9.315041
681	HS-20	50	47.5	1.64	4.78	9.594142
681	HS-20	50	47.5	1.15	3.4	13.63235
682	HS-20	50	47.5	1.11	3.28	14.14329
682	HS-20	50	47.5	0.59	1.8	26.06111
683	HS-20	50	47.5	0.57	1.69	27.76923
683	HS-20	50	47.5	0.04	0.43	110.3721

LOAD RATING FIXED SPAN -GIRDER 2

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
392	HS-20	50	47.5	0.05	-0.08	593.125
392	HS-20	50	47.5	0.67	1.83	25.59016
393	HS-20	50	47.5	0.63	1.8	26.03889
393	HS-20	50	47.5	1.24	3.44	13.44767
394	HS-20	50	47.5	1.2	3.4	13.61765
394	HS-20	50	47.5	1.74	4.91	9.319756
395	HS-20	50	47.5	1.71	4.87	9.402464
395	HS-20	50	47.5	2.21	6.26	7.234824
396	HS-20	50	47.5	2.19	6.23	7.272873
396	HS-20	50	47.5	2.65	7.53	5.956175
397	HS-20	50	47.5	2.64	7.5	5.981333
397	HS-20	50	47.5	3.08	8.73	5.088202
398	HS-20	50	47.5	3.07	8.71	5.101033
398	HS-20	50	47.5	3.48	9.86	4.464503
399	HS-20	50	47.5	3.47	9.85	4.470051
399	HS-20	50	47.5	3.87	10.92	3.995421
400	HS-20	50	47.5	3.86	10.91	4
400	HS-20	50	47.5	4.24	11.92	3.629195
401	HS-20	50	47.5	4.23	11.91	3.633081
401	HS-20	50	47.5	4.59	12.85	3.3393
402	HS-20	50	47.5	4.58	12.85	3.340078
402	HS-20	50	47.5	4.92	13.72	3.103499
403	HS-20	50	47.5	4.91	13.72	3.104227
403	HS-20	50	47.5	5.23	14.53	2.909153
404	HS-20	50	47.5	5.22	14.53	2.909842
404	HS-20	50	47.5	5.52	15.28	2.747382
405	HS-20	50	47.5	5.51	15.28	2.748037
405	HS-20	50	47.5	5.78	15.97	2.612398
406	HS-20	50	47.5	5.78	15.97	2.612398
406	HS-20	50	47.5	6.03	16.59	2.499699
407	HS-20	50	47.5	6.03	16.59	2.499699
407	HS-20	50	47.5	6.2	16.85	2.451039
408	HS-20	50	47.5	6.2	16.85	2.451039
408	HS-20	50	47.5	6.26	17.17	2.401864
409	HS-20	50	47.5	6.25	17.16	2.403846
409	HS-20	50	47.5	6.46	17.73	2.314721
410	HS-20	50	47.5	6.46	17.73	2.314721
410	HS-20	50	47.5	6.64	18.22	2.242591
411	HS-20	50	47.5	6.64	18.22	2.242591
411	HS-20	50	47.5	6.8	18.65	2.182306
412	HS-20	50	47.5	6.8	18.65	2.182306
412	HS-20	50	47.5	6.94	19.03	2.131372
413	HS-20	50	47.5	6.94	19.02	2.132492
413	HS-20	50	47.5	7.06	19.36	2.088843
414	HS-20	50	47.5	7.06	19.36	2.088843
414	HS-20	50	47.5	7.16	19.7	2.047716

Minimum Rating Factor 1.930389

415	HS-20	50	47.5	7.15	19.7	2.048223
415	HS-20	50	47.5	7.23	20.02	2.011489
416	HS-20	50	47.5	7.23	20.02	2.011489
416	HS-20	50	47.5	7.29	20.28	1.982742
417	HS-20	50	47.5	7.29	20.28	1.982742
417	HS-20	50	47.5	7.32	20.49	1.960957
418	HS-20	50	47.5	7.32	20.49	1.960957
418	HS-20	50	47.5	7.33	20.65	1.945278
419	HS-20	50	47.5	7.33	20.65	1.945278
419	HS-20	50	47.5	7.32	20.75	1.936386
420	HS-20	50	47.5	7.33	20.75	1.935904
420	HS-20	50	47.5	7.29	20.8	1.933173
421	HS-20	50	47.5	7.3	20.8	1.932692
421	HS-20	50	47.5	7.24	20.8	1.935577
422	HS-20	50	47.5	7.25	20.8	1.935096
422	HS-20	50	47.5	7.17	20.75	1.943614
423	HS-20	50	47.5	7.17	20.75	1.943614
423	HS-20	50	47.5	7.08	20.64	1.958333
424	HS-20	50	47.5	7.08	20.64	1.958333
424	HS-20	50	47.5	7.03	20.39	1.984796
425	HS-20	50	47.5	7.02	20.39	1.985287
425	HS-20	50	47.5	6.96	20.52	1.975634
426	HS-20	50	47.5	6.97	20.51	1.976109
426	HS-20	50	47.5	6.83	20.45	1.988753
427	HS-20	50	47.5	6.83	20.46	1.987781
427	HS-20	50	47.5	6.67	20.43	1.998532
428	HS-20	50	47.5	6.67	20.43	1.998532
428	HS-20	50	47.5	6.49	20.35	2.015233
429	HS-20	50	47.5	6.49	20.35	2.015233
429	HS-20	50	47.5	6.29	20.21	2.03909
430	HS-20	50	47.5	6.29	20.22	2.038081
430	HS-20	50	47.5	6.06	20.03	2.068897
431	HS-20	50	47.5	6.07	20.04	2.067365
431	HS-20	50	47.5	5.82	19.8	2.105051
432	HS-20	50	47.5	5.82	19.81	2.103988
432	HS-20	50	47.5	5.55	19.52	2.149078
433	HS-20	50	47.5	5.56	19.53	2.147465
433	HS-20	50	47.5	5.27	19.2	2.199479
434	HS-20	50	47.5	5.27	19.21	2.198334
434	HS-20	50	47.5	4.96	18.83	2.259161
435	HS-20	50	47.5	4.97	18.84	2.257431
435	HS-20	50	47.5	4.63	18.42	2.327362
436	HS-20	50	47.5	4.64	18.42	2.326819
436	HS-20	50	47.5	4.28	17.96	2.406459
437	HS-20	50	47.5	4.29	17.97	2.404563
437	HS-20	50	47.5	3.91	17.46	2.496564
438	HS-20	50	47.5	3.92	17.47	2.494562
438	HS-20	50	47.5	3.52	16.92	2.599291
439	HS-20	50	47.5	3.52	16.93	2.597755
439	HS-20	50	47.5	3.11	16.33	2.71831
440	HS-20	50	47.5	3.11	16.34	2.716646
440	HS-20	50	47.5	2.67	15.69	2.857234
441	HS-20	50	47.5	2.67	15.7	2.855414
441	HS-20	50	47.5	2.56	15.37	2.923878
442	HS-20	50	47.5	2.56	15.37	2.923878

442	HS-20	50	47.5	2.21	15.09	3.001325
443	HS-20	50	47.5	2.22	15.09	3.000663
443	HS-20	50	47.5	1.73	14.46	3.165284
444	HS-20	50	47.5	1.74	14.46	3.164592
444	HS-20	50	47.5	1.23	13.8	3.352899
445	HS-20	50	47.5	1.23	13.8	3.352899
445	HS-20	50	47.5	0.71	13.1	3.571756
446	HS-20	50	47.5	0.71	13.11	3.569031
446	HS-20	50	47.5	0.17	12.38	3.823102
447	HS-20	50	47.5	0.17	12.38	3.823102
447	HS-20	50	47.5	-0.4	11.61	4.056848
448	HS-20	50	47.5	-0.41	11.62	4.052496
448	HS-20	50	47.5	-0.99	10.81	4.302498
449	HS-20	50	47.5	-0.99	10.82	4.298521
449	HS-20	50	47.5	-1.6	9.99	4.594595
450	HS-20	50	47.5	-1.6	10	4.59
450	HS-20	50	47.5	-2.23	9.13	4.958379
451	HS-20	50	47.5	-2.23	9.14	4.952954
451	HS-20	50	47.5	-2.88	-9.29	4.803014
452	HS-20	50	47.5	-2.88	-9.28	4.80819
452	HS-20	50	47.5	-3.55	-9.46	4.645877
453	HS-20	50	47.5	-3.55	-9.46	4.645877
453	HS-20	50	47.5	-4.24	-9.63	4.492212
454	HS-20	50	47.5	-4.24	-9.63	4.492212
454	HS-20	50	47.5	-4.95	-9.81	4.337411
455	HS-20	50	47.5	-4.95	-9.81	4.337411
455	HS-20	50	47.5	-5.69	-9.99	4.185185
456	HS-20	50	47.5	-5.69	-9.99	4.185185
456	HS-20	50	47.5	-6.45	-10.17	4.036382
457	HS-20	50	47.5	-6.45	-10.17	4.036382
457	HS-20	50	47.5	-7.22	-10.35	3.891787
458	HS-20	50	47.5	-7.22	-10.35	3.891787
458	HS-20	50	47.5	-8.03	-10.53	3.748338
459	HS-20	50	47.5	-8.03	-10.54	3.744782
459	HS-20	50	47.5	-8.85	-10.72	3.60541
460	HS-20	50	47.5	-8.85	-10.73	3.60205
460	HS-20	50	47.5	-9.69	-10.91	3.465628
461	HS-20	50	47.5	-9.7	-10.92	3.461538
461	HS-20	50	47.5	-10.56	-11.1	3.327928
462	HS-20	50	47.5	-10.56	-11.11	3.324932
462	HS-20	50	47.5	-11.44	-11.29	3.193977
463	HS-20	50	47.5	-11.44	-11.3	3.19115
463	HS-20	50	47.5	-12.33	-11.48	3.063589
464	HS-20	50	47.5	-12.33	-11.48	3.063589
464	HS-20	50	47.5	-13.23	-11.83	2.896872
465	HS-20	50	47.5	-13.24	-11.85	2.891139
465	HS-20	50	47.5	-12.34	-11.53	3.049436
466	HS-20	50	47.5	-12.34	-11.53	3.049436
466	HS-20	50	47.5	-11.45	-11.34	3.179012
467	HS-20	50	47.5	-11.44	-11.34	3.179894
467	HS-20	50	47.5	-10.56	-11.15	3.313004
468	HS-20	50	47.5	-10.56	-11.15	3.313004
468	HS-20	50	47.5	-9.7	-10.96	3.448905
469	HS-20	50	47.5	-9.7	-10.96	3.448905
469	HS-20	50	47.5	-8.86	-10.77	3.587744

470	HS-20	50	47.5	-8.85	-10.77	3.588672
470	HS-20	50	47.5	-8.03	-10.58	3.730624
471	HS-20	50	47.5	-8.03	-10.58	3.730624
471	HS-20	50	47.5	-7.23	-10.39	3.875842
472	HS-20	50	47.5	-7.23	-10.39	3.875842
472	HS-20	50	47.5	-6.45	-10.21	4.020568
473	HS-20	50	47.5	-6.45	-10.21	4.020568
473	HS-20	50	47.5	-5.69	-10.03	4.168495
474	HS-20	50	47.5	-5.69	-10.03	4.168495
474	HS-20	50	47.5	-4.96	-9.85	4.318782
475	HS-20	50	47.5	-4.96	-9.85	4.318782
475	HS-20	50	47.5	-4.24	-9.67	4.47363
476	HS-20	50	47.5	-4.24	-9.67	4.47363
476	HS-20	50	47.5	-3.55	-9.49	4.631191
477	HS-20	50	47.5	-3.55	-9.5	4.626316
477	HS-20	50	47.5	-2.88	-9.32	4.787554
478	HS-20	50	47.5	-2.88	-9.32	4.787554
478	HS-20	50	47.5	-2.23	9.17	4.93675
479	HS-20	50	47.5	-2.23	9.16	4.94214
479	HS-20	50	47.5	-1.6	10.02	4.580838
480	HS-20	50	47.5	-1.6	10.01	4.585415
480	HS-20	50	47.5	-0.99	10.85	4.286636
481	HS-20	50	47.5	-0.99	10.84	4.29059
481	HS-20	50	47.5	-0.41	11.65	4.04206
482	HS-20	50	47.5	-0.41	11.64	4.045533
482	HS-20	50	47.5	0.17	12.41	3.81386
483	HS-20	50	47.5	0.17	12.41	3.81386
483	HS-20	50	47.5	0.71	13.14	3.560883
484	HS-20	50	47.5	0.71	13.14	3.560883
484	HS-20	50	47.5	1.23	13.84	3.343208
485	HS-20	50	47.5	1.23	13.83	3.345625
485	HS-20	50	47.5	1.73	14.49	3.15873
486	HS-20	50	47.5	1.73	14.49	3.15873
486	HS-20	50	47.5	2.21	15.12	2.99537
487	HS-20	50	47.5	2.21	15.12	2.99537
487	HS-20	50	47.5	2.56	15.4	2.918182
488	HS-20	50	47.5	2.56	15.4	2.918182
488	HS-20	50	47.5	2.67	15.73	2.849968
489	HS-20	50	47.5	2.67	15.72	2.851781
489	HS-20	50	47.5	3.11	16.37	2.711668
490	HS-20	50	47.5	3.1	16.36	2.713936
490	HS-20	50	47.5	3.52	16.96	2.59316
491	HS-20	50	47.5	3.52	16.95	2.59469
491	HS-20	50	47.5	3.91	17.5	2.490857
492	HS-20	50	47.5	3.91	17.49	2.492281
492	HS-20	50	47.5	4.28	18	2.401111
493	HS-20	50	47.5	4.28	17.99	2.402446
493	HS-20	50	47.5	4.63	18.46	2.322319
494	HS-20	50	47.5	4.63	18.45	2.323577
494	HS-20	50	47.5	4.96	18.87	2.254372
495	HS-20	50	47.5	4.96	18.86	2.255567
495	HS-20	50	47.5	5.27	19.24	2.194906
496	HS-20	50	47.5	5.27	19.23	2.196048
496	HS-20	50	47.5	5.56	19.56	2.144172
497	HS-20	50	47.5	5.55	19.56	2.144683

497	HS-20	50	47.5	5.82	19.84	2.100806
498	HS-20	50	47.5	5.82	19.83	2.101866
498	HS-20	50	47.5	6.06	20.07	2.064773
499	HS-20	50	47.5	6.06	20.07	2.064773
499	HS-20	50	47.5	6.29	20.25	2.035062
500	HS-20	50	47.5	6.28	20.25	2.035556
500	HS-20	50	47.5	6.49	20.39	2.01128
501	HS-20	50	47.5	6.48	20.38	2.012758
501	HS-20	50	47.5	6.67	20.47	1.994626
502	HS-20	50	47.5	6.66	20.46	1.99609
502	HS-20	50	47.5	6.82	20.49	1.985359
503	HS-20	50	47.5	6.82	20.49	1.985359
503	HS-20	50	47.5	6.96	20.54	1.97371
504	HS-20	50	47.5	6.96	20.54	1.97371
504	HS-20	50	47.5	7.02	20.41	1.983341
505	HS-20	50	47.5	7.02	20.41	1.983341
505	HS-20	50	47.5	7.08	20.67	1.955491
506	HS-20	50	47.5	7.07	20.67	1.955975
506	HS-20	50	47.5	7.17	20.78	1.940808
507	HS-20	50	47.5	7.17	20.78	1.940808
507	HS-20	50	47.5	7.24	20.83	1.932789
508	HS-20	50	47.5	7.24	20.83	1.932789
508	HS-20	50	47.5	7.29	20.83	1.930389
509	HS-20	50	47.5	7.29	20.83	1.930389
509	HS-20	50	47.5	7.32	20.78	1.93359
510	HS-20	50	47.5	7.32	20.78	1.93359
510	HS-20	50	47.5	7.33	20.67	1.943396
511	HS-20	50	47.5	7.33	20.67	1.943396
511	HS-20	50	47.5	7.31	20.52	1.958577
512	HS-20	50	47.5	7.31	20.52	1.958577
512	HS-20	50	47.5	7.28	20.31	1.980305
513	HS-20	50	47.5	7.28	20.31	1.980305
513	HS-20	50	47.5	7.22	20.04	2.00998
514	HS-20	50	47.5	7.22	20.04	2.00998
514	HS-20	50	47.5	7.14	19.72	2.046653
515	HS-20	50	47.5	7.14	19.73	2.045616
515	HS-20	50	47.5	7.04	19.38	2.087719
516	HS-20	50	47.5	7.04	19.38	2.087719
516	HS-20	50	47.5	6.92	19.05	2.130184
517	HS-20	50	47.5	6.92	19.05	2.130184
517	HS-20	50	47.5	6.78	18.67	2.181039
518	HS-20	50	47.5	6.78	18.68	2.179872
518	HS-20	50	47.5	6.62	18.24	2.241228
519	HS-20	50	47.5	6.62	18.24	2.241228
519	HS-20	50	47.5	6.43	17.75	2.313803
520	HS-20	50	47.5	6.43	17.75	2.313803
520	HS-20	50	47.5	6.23	17.19	2.400814
521	HS-20	50	47.5	6.23	17.19	2.400814
521	HS-20	50	47.5	6.17	16.87	2.449911
522	HS-20	50	47.5	6.17	16.87	2.449911
522	HS-20	50	47.5	6	16.61	2.498495
523	HS-20	50	47.5	6	16.61	2.498495
523	HS-20	50	47.5	5.75	15.99	2.611007
524	HS-20	50	47.5	5.75	15.99	2.611007
524	HS-20	50	47.5	5.48	15.3	2.746405

525	HS-20	50	47.5	5.48	15.3	2.746405
525	HS-20	50	47.5	5.18	14.55	2.908591
526	HS-20	50	47.5	5.19	14.56	2.905907
526	HS-20	50	47.5	4.87	13.74	3.10262
527	HS-20	50	47.5	4.87	13.75	3.100364
527	HS-20	50	47.5	4.53	12.87	3.338772
528	HS-20	50	47.5	4.54	12.88	3.335404
528	HS-20	50	47.5	4.18	11.94	3.628141
529	HS-20	50	47.5	4.18	11.94	3.628141
529	HS-20	50	47.5	3.8	10.94	3.994516
530	HS-20	50	47.5	3.8	10.95	3.990868
530	HS-20	50	47.5	3.4	9.87	4.468085
531	HS-20	50	47.5	3.4	9.89	4.45905
531	HS-20	50	47.5	2.98	8.74	5.093822
532	HS-20	50	47.5	2.98	8.76	5.082192
532	HS-20	50	47.5	2.53	7.54	5.964191
533	HS-20	50	47.5	2.54	7.56	5.94709
533	HS-20	50	47.5	2.07	6.26	7.257188
534	HS-20	50	47.5	2.07	6.29	7.222576
534	HS-20	50	47.5	1.58	4.9	9.371429
535	HS-20	50	47.5	1.58	4.94	9.295547
535	HS-20	50	47.5	1.08	3.43	13.53353
536	HS-20	50	47.5	1.07	3.47	13.3804
536	HS-20	50	47.5	0.55	1.82	25.7967
537	HS-20	50	47.5	0.55	1.85	25.37838
537	HS-20	50	47.5	0.01	-0.08	593.625

LOAD RATING FIXED SPAN -GIRDER 3

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
246	HS-20	50	47.5	0.05	-0.08	593.125
246	HS-20	50	47.5	0.67	1.83	25.59016
247	HS-20	50	47.5	0.62	1.8	26.04444
247	HS-20	50	47.5	1.22	3.44	13.45349
248	HS-20	50	47.5	1.18	3.4	13.62353
248	HS-20	50	47.5	1.71	4.91	9.325866
249	HS-20	50	47.5	1.68	4.87	9.408624
249	HS-20	50	47.5	2.16	6.26	7.242812
250	HS-20	50	47.5	2.14	6.23	7.280899
250	HS-20	50	47.5	2.59	7.53	5.964143
251	HS-20	50	47.5	2.57	7.5	5.990667
251	HS-20	50	47.5	3	8.72	5.103211
252	HS-20	50	47.5	2.99	8.71	5.110218
252	HS-20	50	47.5	3.4	9.86	4.472617
253	HS-20	50	47.5	3.39	9.85	4.478173
253	HS-20	50	47.5	3.77	10.92	4.004579
254	HS-20	50	47.5	3.77	10.91	4.008249
254	HS-20	50	47.5	4.14	11.92	3.637584
255	HS-20	50	47.5	4.14	11.91	3.640638
255	HS-20	50	47.5	4.48	12.85	3.34786
256	HS-20	50	47.5	4.48	12.85	3.34786
256	HS-20	50	47.5	4.8	13.72	3.112245
257	HS-20	50	47.5	4.81	13.72	3.111516
257	HS-20	50	47.5	5.11	14.53	2.917412
258	HS-20	50	47.5	5.11	14.53	2.917412
258	HS-20	50	47.5	5.39	15.28	2.75589
259	HS-20	50	47.5	5.39	15.28	2.75589
259	HS-20	50	47.5	5.65	15.97	2.620539
260	HS-20	50	47.5	5.66	15.97	2.619912
260	HS-20	50	47.5	5.9	16.59	2.507535
261	HS-20	50	47.5	5.9	16.59	2.507535
261	HS-20	50	47.5	6.07	16.85	2.458754
262	HS-20	50	47.5	6.07	16.85	2.458754
262	HS-20	50	47.5	6.12	17.17	2.410017
263	HS-20	50	47.5	6.12	17.16	2.411422
263	HS-20	50	47.5	6.32	17.73	2.322617
264	HS-20	50	47.5	6.32	17.73	2.322617
264	HS-20	50	47.5	6.49	18.22	2.250823
265	HS-20	50	47.5	6.5	18.22	2.250274
265	HS-20	50	47.5	6.65	18.65	2.190349
266	HS-20	50	47.5	6.65	18.65	2.190349
266	HS-20	50	47.5	6.79	19.03	2.139254
267	HS-20	50	47.5	6.79	19.02	2.140379
267	HS-20	50	47.5	6.9	19.36	2.097107
268	HS-20	50	47.5	6.91	19.36	2.096591
268	HS-20	50	47.5	7	19.7	2.055838

Minimum Rating Factor 1.93807

269	HS-20	50	47.5	7	19.7	2.055838
269	HS-20	50	47.5	7.08	20.02	2.018981
270	HS-20	50	47.5	7.08	20.02	2.018981
270	HS-20	50	47.5	7.13	20.28	1.990631
271	HS-20	50	47.5	7.13	20.28	1.990631
271	HS-20	50	47.5	7.16	20.49	1.968765
272	HS-20	50	47.5	7.16	20.49	1.968765
272	HS-20	50	47.5	7.18	20.65	1.952542
273	HS-20	50	47.5	7.18	20.65	1.952542
273	HS-20	50	47.5	7.17	20.75	1.943614
274	HS-20	50	47.5	7.17	20.75	1.943614
274	HS-20	50	47.5	7.14	20.8	1.940385
275	HS-20	50	47.5	7.14	20.8	1.940385
275	HS-20	50	47.5	7.09	20.8	1.942788
276	HS-20	50	47.5	7.09	20.8	1.942788
276	HS-20	50	47.5	7.02	20.75	1.950843
277	HS-20	50	47.5	7.01	20.75	1.951325
277	HS-20	50	47.5	6.92	20.64	1.966085
278	HS-20	50	47.5	6.92	20.64	1.966085
278	HS-20	50	47.5	6.87	20.39	1.992643
279	HS-20	50	47.5	6.87	20.39	1.992643
279	HS-20	50	47.5	6.81	20.52	1.982943
280	HS-20	50	47.5	6.81	20.51	1.98391
280	HS-20	50	47.5	6.67	20.45	1.996577
281	HS-20	50	47.5	6.67	20.46	1.995601
281	HS-20	50	47.5	6.52	20.42	2.006856
282	HS-20	50	47.5	6.51	20.43	2.006363
282	HS-20	50	47.5	6.34	20.34	2.023599
283	HS-20	50	47.5	6.33	20.35	2.023096
283	HS-20	50	47.5	6.14	20.21	2.046512
284	HS-20	50	47.5	6.13	20.22	2.045994
284	HS-20	50	47.5	5.92	20.03	2.075886
285	HS-20	50	47.5	5.91	20.04	2.075349
285	HS-20	50	47.5	5.68	19.8	2.112121
286	HS-20	50	47.5	5.67	19.81	2.11156
286	HS-20	50	47.5	5.42	19.52	2.155738
287	HS-20	50	47.5	5.41	19.53	2.155146
287	HS-20	50	47.5	5.14	19.2	2.20625
288	HS-20	50	47.5	5.13	19.2	2.206771
288	HS-20	50	47.5	4.83	18.83	2.266065
289	HS-20	50	47.5	4.82	18.84	2.265393
289	HS-20	50	47.5	4.51	18.41	2.335144
290	HS-20	50	47.5	4.5	18.42	2.334419
290	HS-20	50	47.5	4.16	17.96	2.41314
291	HS-20	50	47.5	4.15	17.97	2.412354
291	HS-20	50	47.5	3.8	17.46	2.502864
292	HS-20	50	47.5	3.79	17.47	2.502003
292	HS-20	50	47.5	3.41	16.92	2.605792
293	HS-20	50	47.5	3.4	16.93	2.604843
293	HS-20	50	47.5	3.01	16.33	2.724434
294	HS-20	50	47.5	2.99	16.34	2.72399
294	HS-20	50	47.5	2.58	15.69	2.86297
295	HS-20	50	47.5	2.57	15.7	2.861783
295	HS-20	50	47.5	2.46	15.37	2.930384
296	HS-20	50	47.5	2.46	15.37	2.930384

296	HS-20	50	47.5	2.13	15.09	3.006627
297	HS-20	50	47.5	2.12	15.09	3.00729
297	HS-20	50	47.5	1.66	14.46	3.170124
298	HS-20	50	47.5	1.65	14.46	3.170816
298	HS-20	50	47.5	1.16	13.8	3.357971
299	HS-20	50	47.5	1.15	13.8	3.358696
299	HS-20	50	47.5	0.65	13.1	3.576336
300	HS-20	50	47.5	0.64	13.11	3.574371
300	HS-20	50	47.5	0.12	12.37	3.830234
301	HS-20	50	47.5	0.11	12.38	3.827948
301	HS-20	50	47.5	-0.45	11.61	4.052541
302	HS-20	50	47.5	-0.45	11.62	4.049053
302	HS-20	50	47.5	-1.02	10.81	4.299722
303	HS-20	50	47.5	-1.02	10.82	4.295749
303	HS-20	50	47.5	-1.61	9.99	4.593594
304	HS-20	50	47.5	-1.62	9.99	4.592593
304	HS-20	50	47.5	-2.22	9.13	4.959474
305	HS-20	50	47.5	-2.23	9.14	4.952954
305	HS-20	50	47.5	-2.85	-9.29	4.806243
306	HS-20	50	47.5	-2.86	-9.28	4.810345
306	HS-20	50	47.5	-3.51	-9.46	4.650106
307	HS-20	50	47.5	-3.52	-9.46	4.649049
307	HS-20	50	47.5	-4.18	-9.63	4.498442
308	HS-20	50	47.5	-4.19	-9.63	4.497404
308	HS-20	50	47.5	-4.87	-9.81	4.345566
309	HS-20	50	47.5	-4.89	-9.81	4.343527
309	HS-20	50	47.5	-5.58	-9.99	4.196196
310	HS-20	50	47.5	-5.6	-9.99	4.194194
310	HS-20	50	47.5	-6.32	-10.17	4.049164
311	HS-20	50	47.5	-6.33	-10.17	4.048181
311	HS-20	50	47.5	-7.07	-10.35	3.90628
312	HS-20	50	47.5	-7.08	-10.35	3.905314
312	HS-20	50	47.5	-7.84	-10.53	3.766382
313	HS-20	50	47.5	-7.85	-10.54	3.76186
313	HS-20	50	47.5	-8.63	-10.72	3.625933
314	HS-20	50	47.5	-8.64	-10.73	3.621622
314	HS-20	50	47.5	-9.44	-10.91	3.488543
315	HS-20	50	47.5	-9.45	-10.92	3.484432
315	HS-20	50	47.5	-10.27	-11.1	3.354054
316	HS-20	50	47.5	-10.28	-11.11	3.350135
316	HS-20	50	47.5	-11.11	-11.29	3.223206
317	HS-20	50	47.5	-11.12	-11.3	3.219469
317	HS-20	50	47.5	-11.96	-11.48	3.095819
318	HS-20	50	47.5	-11.97	-11.48	3.094948
318	HS-20	50	47.5	-12.83	-11.83	2.930685
319	HS-20	50	47.5	-12.83	-11.85	2.925738
319	HS-20	50	47.5	-11.96	-11.53	3.082394
320	HS-20	50	47.5	-11.96	-11.53	3.082394
320	HS-20	50	47.5	-11.11	-11.34	3.208995
321	HS-20	50	47.5	-11.1	-11.34	3.209877
321	HS-20	50	47.5	-10.27	-11.15	3.339013
322	HS-20	50	47.5	-10.26	-11.15	3.33991
322	HS-20	50	47.5	-9.45	-10.96	3.471715
323	HS-20	50	47.5	-9.44	-10.96	3.472628
323	HS-20	50	47.5	-8.64	-10.77	3.608171

324	HS-20	50	47.5	-8.63	-10.77	3.609099
324	HS-20	50	47.5	-7.85	-10.58	3.747637
325	HS-20	50	47.5	-7.84	-10.58	3.748582
325	HS-20	50	47.5	-7.08	-10.39	3.890279
326	HS-20	50	47.5	-7.06	-10.39	3.892204
326	HS-20	50	47.5	-6.33	-10.21	4.032321
327	HS-20	50	47.5	-6.31	-10.21	4.03428
327	HS-20	50	47.5	-5.59	-10.03	4.178465
328	HS-20	50	47.5	-5.58	-10.03	4.179462
328	HS-20	50	47.5	-4.88	-9.85	4.326904
329	HS-20	50	47.5	-4.87	-9.85	4.327919
329	HS-20	50	47.5	-4.19	-9.67	4.4788
330	HS-20	50	47.5	-4.17	-9.67	4.480869
330	HS-20	50	47.5	-3.51	-9.49	4.635406
331	HS-20	50	47.5	-3.5	-9.5	4.631579
331	HS-20	50	47.5	-2.86	-9.32	4.7897
332	HS-20	50	47.5	-2.85	-9.32	4.790773
332	HS-20	50	47.5	-2.23	9.17	4.93675
333	HS-20	50	47.5	-2.22	9.16	4.943231
333	HS-20	50	47.5	-1.61	10.02	4.57984
334	HS-20	50	47.5	-1.61	10.01	4.584416
334	HS-20	50	47.5	-1.02	10.85	4.283871
335	HS-20	50	47.5	-1.02	10.84	4.287823
335	HS-20	50	47.5	-0.45	11.65	4.038627
336	HS-20	50	47.5	-0.44	11.64	4.042955
336	HS-20	50	47.5	0.11	12.41	3.818695
337	HS-20	50	47.5	0.12	12.41	3.817889
337	HS-20	50	47.5	0.65	13.14	3.565449
338	HS-20	50	47.5	0.65	13.14	3.565449
338	HS-20	50	47.5	1.16	13.84	3.348266
339	HS-20	50	47.5	1.17	13.83	3.349964
339	HS-20	50	47.5	1.65	14.49	3.164251
340	HS-20	50	47.5	1.66	14.49	3.163561
340	HS-20	50	47.5	2.12	15.12	3.001323
341	HS-20	50	47.5	2.13	15.12	3.000661
341	HS-20	50	47.5	2.46	15.4	2.924675
342	HS-20	50	47.5	2.46	15.4	2.924675
342	HS-20	50	47.5	2.57	15.73	2.856325
343	HS-20	50	47.5	2.58	15.72	2.857506
343	HS-20	50	47.5	3	16.37	2.718387
344	HS-20	50	47.5	3.01	16.36	2.719438
344	HS-20	50	47.5	3.4	16.96	2.600236
345	HS-20	50	47.5	3.41	16.95	2.60118
345	HS-20	50	47.5	3.79	17.5	2.497714
346	HS-20	50	47.5	3.8	17.49	2.498571
346	HS-20	50	47.5	4.16	18	2.407778
347	HS-20	50	47.5	4.17	17.99	2.40856
347	HS-20	50	47.5	4.5	18.46	2.329361
348	HS-20	50	47.5	4.51	18.45	2.330081
348	HS-20	50	47.5	4.83	18.87	2.261261
349	HS-20	50	47.5	4.83	18.86	2.26246
349	HS-20	50	47.5	5.13	19.24	2.202183
350	HS-20	50	47.5	5.14	19.23	2.202808
350	HS-20	50	47.5	5.41	19.56	2.15184
351	HS-20	50	47.5	5.42	19.56	2.151329

351	HS-20	50	47.5	5.67	19.84	2.108367
352	HS-20	50	47.5	5.68	19.83	2.108926
352	HS-20	50	47.5	5.91	20.07	2.072247
353	HS-20	50	47.5	5.92	20.07	2.071749
353	HS-20	50	47.5	6.13	20.25	2.042963
354	HS-20	50	47.5	6.14	20.25	2.042469
354	HS-20	50	47.5	6.33	20.39	2.019127
355	HS-20	50	47.5	6.34	20.38	2.019627
355	HS-20	50	47.5	6.51	20.47	2.002443
356	HS-20	50	47.5	6.52	20.46	2.002933
356	HS-20	50	47.5	6.67	20.49	1.992679
357	HS-20	50	47.5	6.67	20.49	1.992679
357	HS-20	50	47.5	6.81	20.54	1.981013
358	HS-20	50	47.5	6.81	20.54	1.981013
358	HS-20	50	47.5	6.87	20.41	1.990691
359	HS-20	50	47.5	6.87	20.41	1.990691
359	HS-20	50	47.5	6.92	20.67	1.963232
360	HS-20	50	47.5	6.92	20.67	1.963232
360	HS-20	50	47.5	7.01	20.78	1.948508
361	HS-20	50	47.5	7.01	20.78	1.948508
361	HS-20	50	47.5	7.08	20.83	1.94047
362	HS-20	50	47.5	7.08	20.83	1.94047
362	HS-20	50	47.5	7.13	20.83	1.93807
363	HS-20	50	47.5	7.13	20.83	1.93807
363	HS-20	50	47.5	7.16	20.78	1.94129
364	HS-20	50	47.5	7.16	20.78	1.94129
364	HS-20	50	47.5	7.17	20.67	1.951137
365	HS-20	50	47.5	7.17	20.67	1.951137
365	HS-20	50	47.5	7.16	20.52	1.965887
366	HS-20	50	47.5	7.16	20.52	1.965887
366	HS-20	50	47.5	7.12	20.31	1.988183
367	HS-20	50	47.5	7.12	20.31	1.988183
367	HS-20	50	47.5	7.07	20.04	2.017465
368	HS-20	50	47.5	7.07	20.04	2.017465
368	HS-20	50	47.5	6.99	19.72	2.05426
369	HS-20	50	47.5	6.99	19.73	2.053218
369	HS-20	50	47.5	6.9	19.38	2.094943
370	HS-20	50	47.5	6.89	19.38	2.095459
370	HS-20	50	47.5	6.78	19.05	2.137533
371	HS-20	50	47.5	6.77	19.05	2.138058
371	HS-20	50	47.5	6.64	18.67	2.188538
372	HS-20	50	47.5	6.63	18.68	2.187901
372	HS-20	50	47.5	6.48	18.24	2.248904
373	HS-20	50	47.5	6.47	18.24	2.249452
373	HS-20	50	47.5	6.3	17.75	2.321127
374	HS-20	50	47.5	6.29	17.75	2.32169
374	HS-20	50	47.5	6.1	17.19	2.408377
375	HS-20	50	47.5	6.09	17.19	2.408959
375	HS-20	50	47.5	6.04	16.87	2.457617
376	HS-20	50	47.5	6.04	16.87	2.457617
376	HS-20	50	47.5	5.87	16.61	2.506321
377	HS-20	50	47.5	5.87	16.61	2.506321
377	HS-20	50	47.5	5.63	15.99	2.618512
378	HS-20	50	47.5	5.62	15.99	2.619137
378	HS-20	50	47.5	5.36	15.3	2.754248

379	HS-20	50	47.5	5.35	15.3	2.754902
379	HS-20	50	47.5	5.07	14.55	2.916151
380	HS-20	50	47.5	5.06	14.56	2.914835
380	HS-20	50	47.5	4.76	13.74	3.110626
381	HS-20	50	47.5	4.76	13.75	3.108364
381	HS-20	50	47.5	4.44	12.87	3.345765
382	HS-20	50	47.5	4.43	12.88	3.343944
382	HS-20	50	47.5	4.09	11.94	3.635678
383	HS-20	50	47.5	4.08	11.94	3.636516
383	HS-20	50	47.5	3.72	10.94	4.001828
384	HS-20	50	47.5	3.71	10.95	3.999087
384	HS-20	50	47.5	3.32	9.87	4.47619
385	HS-20	50	47.5	3.31	9.89	4.46815
385	HS-20	50	47.5	2.91	8.74	5.101831
386	HS-20	50	47.5	2.9	8.76	5.091324
386	HS-20	50	47.5	2.48	7.54	5.970822
387	HS-20	50	47.5	2.47	7.56	5.956349
387	HS-20	50	47.5	2.02	6.26	7.265176
388	HS-20	50	47.5	2.02	6.29	7.230525
388	HS-20	50	47.5	1.55	4.9	9.377551
389	HS-20	50	47.5	1.55	4.94	9.301619
389	HS-20	50	47.5	1.06	3.43	13.53936
390	HS-20	50	47.5	1.05	3.47	13.38617
390	HS-20	50	47.5	0.54	1.82	25.8022
391	HS-20	50	47.5	0.54	1.85	25.38378
391	HS-20	50	47.5	0.01	-0.08	593.625

LOAD RATING FIXED SPAN -GIRDER 4

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
100	HS-20	50	47.5	0.11	0.42	112.8333
100	HS-20	50	47.5	0.48	1.7	27.65882
101	HS-20	50	47.5	0.53	1.82	25.80769
101	HS-20	50	47.5	0.96	3.3	14.10303
102	HS-20	50	47.5	1.01	3.45	13.47536
102	HS-20	50	47.5	1.44	4.81	9.575884
103	HS-20	50	47.5	1.49	4.96	9.27621
103	HS-20	50	47.5	1.9	6.23	7.319422
104	HS-20	50	47.5	1.95	6.38	7.139498
104	HS-20	50	47.5	2.35	7.56	5.972222
105	HS-20	50	47.5	2.4	7.7	5.857143
105	HS-20	50	47.5	2.78	8.81	5.07605
106	HS-20	50	47.5	2.83	8.94	4.996644
106	HS-20	50	47.5	3.19	9.98	4.43988
107	HS-20	50	47.5	3.25	10.11	4.376855
107	HS-20	50	47.5	3.58	11.08	3.963899
108	HS-20	50	47.5	3.65	11.21	3.911686
108	HS-20	50	47.5	3.96	12.12	3.592409
109	HS-20	50	47.5	4.02	12.23	3.555192
109	HS-20	50	47.5	4.31	13.08	3.301988
110	HS-20	50	47.5	4.38	13.19	3.269143
110	HS-20	50	47.5	4.65	13.99	3.062902
111	HS-20	50	47.5	4.71	14.09	3.036906
111	HS-20	50	47.5	4.96	14.83	2.86851
112	HS-20	50	47.5	5.02	14.93	2.845278
112	HS-20	50	47.5	5.25	15.62	2.704866
113	HS-20	50	47.5	5.31	15.7	2.687261
113	HS-20	50	47.5	5.53	16.35	2.566972
114	HS-20	50	47.5	5.58	16.42	2.552984
114	HS-20	50	47.5	5.78	17.03	2.449794
115	HS-20	50	47.5	5.82	17.08	2.440281
115	HS-20	50	47.5	5.96	17.38	2.390104
116	HS-20	50	47.5	5.96	17.38	2.390104
116	HS-20	50	47.5	6	17.64	2.352608
117	HS-20	50	47.5	6.05	17.67	2.345784
117	HS-20	50	47.5	6.21	18.17	2.272427
118	HS-20	50	47.5	6.25	18.22	2.263996
118	HS-20	50	47.5	6.4	18.65	2.203753
119	HS-20	50	47.5	6.43	18.71	2.195083
119	HS-20	50	47.5	6.56	19.1	2.143455
120	HS-20	50	47.5	6.59	19.14	2.137409
120	HS-20	50	47.5	6.7	19.5	2.092308
121	HS-20	50	47.5	6.73	19.55	2.085422
121	HS-20	50	47.5	6.82	19.91	2.043194
122	HS-20	50	47.5	6.85	19.95	2.037594
122	HS-20	50	47.5	6.92	20.27	2.001973

Minimum Rating Factor 1.881395

123	HS-20	50	47.5	6.94	20.31	1.997046
123	HS-20	50	47.5	7	20.58	1.96793
124	HS-20	50	47.5	7.02	20.61	1.964095
124	HS-20	50	47.5	7.06	20.84	1.940499
125	HS-20	50	47.5	7.07	20.87	1.93723
125	HS-20	50	47.5	7.1	21.06	1.918329
126	HS-20	50	47.5	7.11	21.08	1.916034
126	HS-20	50	47.5	7.11	21.23	1.902496
127	HS-20	50	47.5	7.12	21.25	1.900235
127	HS-20	50	47.5	7.11	21.36	1.890918
128	HS-20	50	47.5	7.11	21.37	1.890033
128	HS-20	50	47.5	7.08	21.44	1.885261
129	HS-20	50	47.5	7.08	21.45	1.884382
129	HS-20	50	47.5	7.04	21.48	1.883613
130	HS-20	50	47.5	7.03	21.48	1.884078
130	HS-20	50	47.5	6.97	21.47	1.88775
131	HS-20	50	47.5	6.96	21.46	1.889096
131	HS-20	50	47.5	6.88	21.44	1.89459
132	HS-20	50	47.5	6.86	21.42	1.897292
132	HS-20	50	47.5	6.82	21.31	1.908963
133	HS-20	50	47.5	6.82	21.31	1.908963
133	HS-20	50	47.5	6.77	21.33	1.909517
134	HS-20	50	47.5	6.75	21.32	1.911351
134	HS-20	50	47.5	6.64	21.25	1.922824
135	HS-20	50	47.5	6.61	21.24	1.925141
135	HS-20	50	47.5	6.48	21.16	1.938563
136	HS-20	50	47.5	6.45	21.13	1.942735
136	HS-20	50	47.5	6.31	21.02	1.959562
137	HS-20	50	47.5	6.27	20.99	1.964269
137	HS-20	50	47.5	6.11	20.84	1.986084
138	HS-20	50	47.5	6.07	20.8	1.991827
138	HS-20	50	47.5	5.9	20.61	2.018438
139	HS-20	50	47.5	5.85	20.58	2.02381
139	HS-20	50	47.5	5.66	20.35	2.05602
140	HS-20	50	47.5	5.61	20.31	2.062531
140	HS-20	50	47.5	5.4	20.04	2.100798
141	HS-20	50	47.5	5.35	20.01	2.106447
141	HS-20	50	47.5	5.12	19.7	2.151269
142	HS-20	50	47.5	5.06	19.66	2.158698
142	HS-20	50	47.5	4.82	19.32	2.20911
143	HS-20	50	47.5	4.76	19.27	2.217955
143	HS-20	50	47.5	4.5	18.89	2.276337
144	HS-20	50	47.5	4.44	18.85	2.28435
144	HS-20	50	47.5	4.16	18.44	2.350325
145	HS-20	50	47.5	4.09	18.38	2.361806
145	HS-20	50	47.5	3.79	17.94	2.436455
146	HS-20	50	47.5	3.73	17.88	2.447987
146	HS-20	50	47.5	3.41	17.4	2.533908
147	HS-20	50	47.5	3.34	17.35	2.545245
147	HS-20	50	47.5	3.01	16.82	2.645065
148	HS-20	50	47.5	2.94	16.77	2.657126
148	HS-20	50	47.5	2.58	16.2	2.77284
149	HS-20	50	47.5	2.51	16.17	2.782313
149	HS-20	50	47.5	2.41	15.91	2.834067
150	HS-20	50	47.5	2.41	15.91	2.834067

150	HS-20	50	47.5	2.13	15.55	2.917685
151	HS-20	50	47.5	2.06	15.5	2.931613
151	HS-20	50	47.5	1.67	14.86	3.084118
152	HS-20	50	47.5	1.59	14.78	3.106225
152	HS-20	50	47.5	1.18	14.13	3.278132
153	HS-20	50	47.5	1.1	14.03	3.307199
153	HS-20	50	47.5	0.67	13.36	3.50524
154	HS-20	50	47.5	0.59	13.26	3.537707
154	HS-20	50	47.5	0.14	12.56	3.770701
155	HS-20	50	47.5	0.06	12.45	3.810442
155	HS-20	50	47.5	-0.45	11.73	4.011083
156	HS-20	50	47.5	-0.51	11.62	4.04389
156	HS-20	50	47.5	-1.02	10.87	4.275989
157	HS-20	50	47.5	-1.09	10.77	4.309192
157	HS-20	50	47.5	-1.61	9.98	4.598196
158	HS-20	50	47.5	-1.68	9.87	4.642351
158	HS-20	50	47.5	-2.22	-9.33	4.853162
159	HS-20	50	47.5	-2.29	-9.35	4.835294
159	HS-20	50	47.5	-2.84	-9.52	4.691176
160	HS-20	50	47.5	-2.93	-9.54	4.671908
160	HS-20	50	47.5	-3.49	-9.72	4.527778
161	HS-20	50	47.5	-3.58	-9.74	4.50924
161	HS-20	50	47.5	-4.16	-9.91	4.37336
162	HS-20	50	47.5	-4.25	-9.94	4.351107
162	HS-20	50	47.5	-4.85	-10.12	4.214427
163	HS-20	50	47.5	-4.94	-10.14	4.197239
163	HS-20	50	47.5	-5.55	-10.32	4.064922
164	HS-20	50	47.5	-5.65	-10.35	4.043478
164	HS-20	50	47.5	-6.27	-10.53	3.91548
165	HS-20	50	47.5	-6.38	-10.56	3.893939
165	HS-20	50	47.5	-7.02	-10.74	3.769088
166	HS-20	50	47.5	-7.13	-10.78	3.744898
166	HS-20	50	47.5	-7.78	-10.95	3.627397
167	HS-20	50	47.5	-7.9	-10.99	3.603276
167	HS-20	50	47.5	-8.57	-11.17	3.485228
168	HS-20	50	47.5	-8.7	-11.21	3.461195
168	HS-20	50	47.5	-9.39	-11.39	3.345917
169	HS-20	50	47.5	-9.51	-11.44	3.320804
169	HS-20	50	47.5	-10.23	-11.63	3.204643
170	HS-20	50	47.5	-10.35	-11.69	3.17793
170	HS-20	50	47.5	-11.08	-11.91	3.057935
171	HS-20	50	47.5	-11.2	-11.94	3.040201
171	HS-20	50	47.5	-11.96	-12.87	2.761461
172	HS-20	50	47.5	-12.04	-12.82	2.765991
172	HS-20	50	47.5	-12.85	-13.94	2.485653
173	HS-20	50	47.5	-12.83	-13.96	2.483524
173	HS-20	50	47.5	-12.02	-12.87	2.756799
174	HS-20	50	47.5	-11.94	-12.92	2.752322
174	HS-20	50	47.5	-11.18	-11.95	3.039331
175	HS-20	50	47.5	-11.07	-11.96	3.045987
175	HS-20	50	47.5	-10.33	-11.7	3.176923
176	HS-20	50	47.5	-10.21	-11.64	3.203608
176	HS-20	50	47.5	-9.5	-11.46	3.315881
177	HS-20	50	47.5	-9.37	-11.41	3.341805
177	HS-20	50	47.5	-8.68	-11.23	3.456812

178	HS-20	50	47.5	-8.56	-11.19	3.479893
178	HS-20	50	47.5	-7.89	-11.01	3.597639
179	HS-20	50	47.5	-7.76	-10.97	3.622607
179	HS-20	50	47.5	-7.12	-10.8	3.738889
180	HS-20	50	47.5	-7	-10.76	3.763941
180	HS-20	50	47.5	-6.37	-10.58	3.887524
181	HS-20	50	47.5	-6.26	-10.55	3.909005
181	HS-20	50	47.5	-5.64	-10.37	4.036644
182	HS-20	50	47.5	-5.54	-10.34	4.058027
182	HS-20	50	47.5	-4.93	-10.16	4.189961
183	HS-20	50	47.5	-4.83	-10.13	4.212241
183	HS-20	50	47.5	-4.24	-9.96	4.343373
184	HS-20	50	47.5	-4.15	-9.93	4.365559
184	HS-20	50	47.5	-3.57	-9.76	4.501025
185	HS-20	50	47.5	-3.48	-9.73	4.524152
185	HS-20	50	47.5	-2.91	-9.56	4.664226
186	HS-20	50	47.5	-2.83	-9.54	4.68239
186	HS-20	50	47.5	-2.28	-9.36	4.831197
187	HS-20	50	47.5	-2.21	-9.35	4.84385
187	HS-20	50	47.5	-1.67	9.9	4.629293
188	HS-20	50	47.5	-1.6	10	4.59
188	HS-20	50	47.5	-1.08	10.79	4.302132
189	HS-20	50	47.5	-1.01	10.89	4.269054
189	HS-20	50	47.5	-0.5	11.65	4.034335
190	HS-20	50	47.5	-0.44	11.75	4.005106
190	HS-20	50	47.5	0.07	12.48	3.800481
191	HS-20	50	47.5	0.15	12.58	3.763911
191	HS-20	50	47.5	0.6	13.28	3.531627
192	HS-20	50	47.5	0.68	13.38	3.499253
192	HS-20	50	47.5	1.11	14.06	3.299431
193	HS-20	50	47.5	1.19	14.15	3.272792
193	HS-20	50	47.5	1.6	14.81	3.099257
194	HS-20	50	47.5	1.68	14.88	3.079301
194	HS-20	50	47.5	2.07	15.52	2.927191
195	HS-20	50	47.5	2.14	15.57	2.913295
195	HS-20	50	47.5	2.42	15.94	2.828105
196	HS-20	50	47.5	2.42	15.93	2.829881
196	HS-20	50	47.5	2.52	16.19	2.778258
197	HS-20	50	47.5	2.59	16.22	2.768804
197	HS-20	50	47.5	2.95	16.8	2.651786
198	HS-20	50	47.5	3.01	16.85	2.640356
198	HS-20	50	47.5	3.35	17.37	2.541739
199	HS-20	50	47.5	3.42	17.43	2.528973
199	HS-20	50	47.5	3.73	17.91	2.443886
200	HS-20	50	47.5	3.8	17.96	2.433185
200	HS-20	50	47.5	4.1	18.41	2.357414
201	HS-20	50	47.5	4.16	18.46	2.347779
201	HS-20	50	47.5	4.44	18.88	2.28072
202	HS-20	50	47.5	4.51	18.92	2.272199
202	HS-20	50	47.5	4.77	19.31	2.212843
203	HS-20	50	47.5	4.83	19.35	2.205168
203	HS-20	50	47.5	5.07	19.69	2.154901
204	HS-20	50	47.5	5.13	19.73	2.147491
204	HS-20	50	47.5	5.35	20.04	2.103293
205	HS-20	50	47.5	5.41	20.08	2.096116

205	HS-20	50	47.5	5.62	20.35	2.057985
206	HS-20	50	47.5	5.66	20.38	2.052993
206	HS-20	50	47.5	5.86	20.62	2.019399
207	HS-20	50	47.5	5.9	20.65	2.014528
207	HS-20	50	47.5	6.08	20.84	1.987524
208	HS-20	50	47.5	6.12	20.88	1.981801
208	HS-20	50	47.5	6.28	21.03	1.960057
209	HS-20	50	47.5	6.32	21.06	1.955366
209	HS-20	50	47.5	6.46	21.17	1.938592
210	HS-20	50	47.5	6.49	21.2	1.934434
210	HS-20	50	47.5	6.62	21.28	1.921053
211	HS-20	50	47.5	6.65	21.29	1.918741
211	HS-20	50	47.5	6.76	21.34	1.909091
212	HS-20	50	47.5	6.78	21.35	1.90726
212	HS-20	50	47.5	6.83	21.33	1.906704
213	HS-20	50	47.5	6.83	21.33	1.906704
213	HS-20	50	47.5	6.87	21.44	1.895056
214	HS-20	50	47.5	6.89	21.46	1.892358
214	HS-20	50	47.5	6.97	21.48	1.886872
215	HS-20	50	47.5	6.98	21.5	1.884651
215	HS-20	50	47.5	7.04	21.5	1.88186
216	HS-20	50	47.5	7.05	21.5	1.881395
216	HS-20	50	47.5	7.09	21.47	1.882161
217	HS-20	50	47.5	7.09	21.46	1.883038
217	HS-20	50	47.5	7.12	21.39	1.887798
218	HS-20	50	47.5	7.12	21.38	1.888681
218	HS-20	50	47.5	7.13	21.27	1.897978
219	HS-20	50	47.5	7.13	21.25	1.899765
219	HS-20	50	47.5	7.12	21.1	1.913744
220	HS-20	50	47.5	7.11	21.08	1.916034
220	HS-20	50	47.5	7.09	20.9	1.933493
221	HS-20	50	47.5	7.07	20.87	1.93723
221	HS-20	50	47.5	7.03	20.64	1.960756
222	HS-20	50	47.5	7.02	20.6	1.965049
222	HS-20	50	47.5	6.96	20.33	1.994097
223	HS-20	50	47.5	6.94	20.29	1.999014
223	HS-20	50	47.5	6.86	19.97	2.035053
224	HS-20	50	47.5	6.84	19.93	2.04014
224	HS-20	50	47.5	6.75	19.57	2.082269
225	HS-20	50	47.5	6.72	19.52	2.089139
225	HS-20	50	47.5	6.61	19.16	2.134134
226	HS-20	50	47.5	6.58	19.11	2.141287
226	HS-20	50	47.5	6.46	18.72	2.192308
227	HS-20	50	47.5	6.42	18.67	2.200321
227	HS-20	50	47.5	6.28	18.24	2.259868
228	HS-20	50	47.5	6.24	18.18	2.269527
228	HS-20	50	47.5	6.08	17.68	2.34276
229	HS-20	50	47.5	6.03	17.65	2.349575
229	HS-20	50	47.5	5.99	17.4	2.385632
230	HS-20	50	47.5	5.99	17.4	2.385632
230	HS-20	50	47.5	5.86	17.09	2.436513
231	HS-20	50	47.5	5.81	17.04	2.446596
231	HS-20	50	47.5	5.61	16.43	2.549604
232	HS-20	50	47.5	5.56	16.36	2.56357
232	HS-20	50	47.5	5.35	15.71	2.683004

233	HS-20	50	47.5	5.29	15.63	2.700576
233	HS-20	50	47.5	5.07	14.94	2.840027
234	HS-20	50	47.5	5	14.84	2.863881
234	HS-20	50	47.5	4.76	14.1	3.031206
235	HS-20	50	47.5	4.69	14	3.057857
235	HS-20	50	47.5	4.44	13.2	3.262121
236	HS-20	50	47.5	4.37	13.09	3.294882
236	HS-20	50	47.5	4.09	12.23	3.549469
237	HS-20	50	47.5	4.02	12.12	3.587459
237	HS-20	50	47.5	3.72	11.2	3.908929
238	HS-20	50	47.5	3.65	11.08	3.957581
238	HS-20	50	47.5	3.34	10.1	4.372277
239	HS-20	50	47.5	3.26	9.97	4.437312
239	HS-20	50	47.5	2.93	8.92	4.996637
240	HS-20	50	47.5	2.85	8.79	5.079636
240	HS-20	50	47.5	2.5	7.67	5.867014
241	HS-20	50	47.5	2.43	7.53	5.985392
241	HS-20	50	47.5	2.05	6.34	7.16877
242	HS-20	50	47.5	1.98	6.2	7.341935
242	HS-20	50	47.5	1.59	4.92	9.331301
243	HS-20	50	47.5	1.51	4.78	9.621339
243	HS-20	50	47.5	1.1	3.4	13.64706
244	HS-20	50	47.5	1.03	3.28	14.16768
244	HS-20	50	47.5	0.59	1.8	26.06111
245	HS-20	50	47.5	0.52	1.69	27.79882
245	HS-20	50	47.5	0.07	0.43	110.3023

LOAD RATING FIXED SPAN -GIRDER 1

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
538	H-20	50	47.5	0.06	0.250	189.760
538	H-20	50	47.5	0.53	1.150	40.843
539	H-20	50	47.5	0.53	1.260	37.278
539	H-20	50	47.5	1.05	2.240	20.737
540	H-20	50	47.5	1.07	2.350	19.757
540	H-20	50	47.5	1.56	3.250	14.135
541	H-20	50	47.5	1.59	3.360	13.664
541	H-20	50	47.5	2.06	4.200	10.819
542	H-20	50	47.5	2.09	4.300	10.560
542	H-20	50	47.5	2.54	5.080	8.850
543	H-20	50	47.5	2.57	5.180	8.674
543	H-20	50	47.5	3.01	5.910	7.528
544	H-20	50	47.5	3.03	6.000	7.412
544	H-20	50	47.5	3.45	6.690	6.584
545	H-20	50	47.5	3.47	6.780	6.494
545	H-20	50	47.5	3.87	7.420	5.880
546	H-20	50	47.5	3.89	7.500	5.815
546	H-20	50	47.5	4.26	8.110	5.332
547	H-20	50	47.5	4.29	8.180	5.282
547	H-20	50	47.5	4.64	8.750	4.898
548	H-20	50	47.5	4.67	8.830	4.851
548	H-20	50	47.5	4.99	9.360	4.542
549	H-20	50	47.5	5.02	9.430	4.505
549	H-20	50	47.5	5.32	9.920	4.252
550	H-20	50	47.5	5.35	9.990	4.219
550	H-20	50	47.5	5.63	10.460	4.003
551	H-20	50	47.5	5.66	10.510	3.981
551	H-20	50	47.5	5.92	10.940	3.801
552	H-20	50	47.5	5.94	11.000	3.778
552	H-20	50	47.5	6.18	11.400	3.625
553	H-20	50	47.5	6.2	11.450	3.607
553	H-20	50	47.5	6.37	11.650	3.530
554	H-20	50	47.5	6.37	11.650	3.530
554	H-20	50	47.5	6.42	11.810	3.478
555	H-20	50	47.5	6.44	11.850	3.465
555	H-20	50	47.5	6.64	12.200	3.349
556	H-20	50	47.5	6.65	12.230	3.340
556	H-20	50	47.5	6.83	12.540	3.243
557	H-20	50	47.5	6.84	12.580	3.232
557	H-20	50	47.5	7	12.860	3.149
558	H-20	50	47.5	7.01	12.890	3.141
558	H-20	50	47.5	7.15	13.140	3.071
559	H-20	50	47.5	7.16	13.170	3.063
559	H-20	50	47.5	7.27	13.390	3.004
560	H-20	50	47.5	7.28	13.410	2.999
560	H-20	50	47.5	7.38	13.610	2.948

Minimum Rating Factor 2.778

561	H-20	50	47.5	7.38	13.630	2.944
561	H-20	50	47.5	7.46	13.800	2.901
562	H-20	50	47.5	7.46	13.820	2.897
562	H-20	50	47.5	7.52	13.960	2.864
563	H-20	50	47.5	7.52	13.980	2.860
563	H-20	50	47.5	7.56	14.100	2.833
564	H-20	50	47.5	7.56	14.110	2.831
564	H-20	50	47.5	7.58	14.200	2.811
565	H-20	50	47.5	7.58	14.220	2.807
565	H-20	50	47.5	7.58	14.290	2.794
566	H-20	50	47.5	7.57	14.300	2.792
566	H-20	50	47.5	7.55	14.350	2.784
567	H-20	50	47.5	7.54	14.360	2.783
567	H-20	50	47.5	7.5	14.380	2.782
568	H-20	50	47.5	7.5	14.390	2.780
568	H-20	50	47.5	7.43	14.380	2.787
569	H-20	50	47.5	7.43	14.390	2.785
569	H-20	50	47.5	7.34	14.350	2.799
570	H-20	50	47.5	7.33	14.360	2.797
570	H-20	50	47.5	7.28	14.180	2.836
571	H-20	50	47.5	7.28	14.180	2.836
571	H-20	50	47.5	7.23	14.310	2.814
572	H-20	50	47.5	7.22	14.300	2.817
572	H-20	50	47.5	7.09	14.250	2.836
573	H-20	50	47.5	7.08	14.240	2.838
573	H-20	50	47.5	6.93	14.180	2.861
574	H-20	50	47.5	6.92	14.160	2.866
574	H-20	50	47.5	6.75	14.090	2.892
575	H-20	50	47.5	6.73	14.070	2.898
575	H-20	50	47.5	6.55	13.970	2.931
576	H-20	50	47.5	6.53	13.950	2.937
576	H-20	50	47.5	6.33	13.820	2.979
577	H-20	50	47.5	6.3	13.800	2.986
577	H-20	50	47.5	6.08	13.650	3.034
578	H-20	50	47.5	6.05	13.630	3.041
578	H-20	50	47.5	5.81	13.460	3.097
579	H-20	50	47.5	5.78	13.430	3.106
579	H-20	50	47.5	5.52	13.240	3.171
580	H-20	50	47.5	5.49	13.210	3.180
580	H-20	50	47.5	5.21	13.010	3.251
581	H-20	50	47.5	5.18	12.980	3.260
581	H-20	50	47.5	4.88	12.760	3.340
582	H-20	50	47.5	4.84	12.720	3.354
582	H-20	50	47.5	4.52	12.480	3.444
583	H-20	50	47.5	4.48	12.440	3.458
583	H-20	50	47.5	4.14	12.180	3.560
584	H-20	50	47.5	4.1	12.140	3.575
584	H-20	50	47.5	3.74	11.860	3.690
585	H-20	50	47.5	3.7	11.820	3.706
585	H-20	50	47.5	3.32	11.510	3.838
586	H-20	50	47.5	3.28	11.480	3.852
586	H-20	50	47.5	2.87	11.150	4.003
587	H-20	50	47.5	2.83	11.110	4.021
587	H-20	50	47.5	2.72	10.940	4.093
588	H-20	50	47.5	2.72	10.940	4.093

588	H-20	50	47.5	2.41	10.770	4.187
589	H-20	50	47.5	2.36	10.720	4.211
589	H-20	50	47.5	1.91	10.360	4.401
590	H-20	50	47.5	1.86	10.310	4.427
590	H-20	50	47.5	1.4	9.930	4.642
591	H-20	50	47.5	1.34	9.870	4.677
591	H-20	50	47.5	0.86	9.480	4.920
592	H-20	50	47.5	0.8	9.420	4.958
592	H-20	50	47.5	0.3	9.010	5.239
593	H-20	50	47.5	0.24	8.950	5.280
593	H-20	50	47.5	-0.33	8.520	5.536
594	H-20	50	47.5	-0.37	8.460	5.571
594	H-20	50	47.5	-0.94	8.030	5.798
595	H-20	50	47.5	-0.98	7.960	5.844
595	H-20	50	47.5	-1.57	7.510	6.116
596	H-20	50	47.5	-1.62	7.450	6.158
596	H-20	50	47.5	-2.22	6.980	6.487
597	H-20	50	47.5	-2.28	6.920	6.535
597	H-20	50	47.5	-2.9	6.440	6.925
598	H-20	50	47.5	-2.96	6.370	6.992
598	H-20	50	47.5	-3.61	5.890	7.452
599	H-20	50	47.5	-3.66	5.820	7.533
599	H-20	50	47.5	-4.33	-5.800	7.443
600	H-20	50	47.5	-4.39	-5.820	7.407
600	H-20	50	47.5	-5.09	-5.920	7.164
601	H-20	50	47.5	-5.15	-5.930	7.142
601	H-20	50	47.5	-5.86	-6.040	6.894
602	H-20	50	47.5	-5.93	-6.060	6.860
602	H-20	50	47.5	-6.66	-6.160	6.630
603	H-20	50	47.5	-6.74	-6.180	6.595
603	H-20	50	47.5	-7.49	-6.290	6.361
604	H-20	50	47.5	-7.57	-6.310	6.328
604	H-20	50	47.5	-8.34	-6.410	6.109
605	H-20	50	47.5	-8.43	-6.440	6.067
605	H-20	50	47.5	-9.22	-6.540	5.853
606	H-20	50	47.5	-9.33	-6.570	5.810
606	H-20	50	47.5	-10.13	-6.670	5.603
607	H-20	50	47.5	-10.25	-6.700	5.560
607	H-20	50	47.5	-11.07	-6.810	5.349
608	H-20	50	47.5	-11.2	-6.840	5.307
608	H-20	50	47.5	-12.06	-7.000	5.063
609	H-20	50	47.5	-12.18	-6.990	5.053
609	H-20	50	47.5	-13.08	-7.550	4.559
610	H-20	50	47.5	-13.17	-7.510	4.571
610	H-20	50	47.5	-14.14	-8.160	4.088
611	H-20	50	47.5	-14.16	-8.180	4.076
611	H-20	50	47.5	-13.19	-7.550	4.544
612	H-20	50	47.5	-13.1	-7.580	4.538
612	H-20	50	47.5	-12.2	-7.010	5.036
613	H-20	50	47.5	-12.08	-7.030	5.038
613	H-20	50	47.5	-11.22	-6.850	5.296
614	H-20	50	47.5	-11.09	-6.820	5.339
614	H-20	50	47.5	-10.27	-6.710	5.548
615	H-20	50	47.5	-10.14	-6.680	5.593
615	H-20	50	47.5	-9.34	-6.580	5.799

616	H-20	50	47.5	-9.24	-6.550	5.841
616	H-20	50	47.5	-8.45	-6.440	6.064
617	H-20	50	47.5	-8.36	-6.420	6.097
617	H-20	50	47.5	-7.58	-6.320	6.316
618	H-20	50	47.5	-7.5	-6.300	6.349
618	H-20	50	47.5	-6.75	-6.190	6.583
619	H-20	50	47.5	-6.68	-6.170	6.616
619	H-20	50	47.5	-5.94	-6.070	6.847
620	H-20	50	47.5	-5.87	-6.050	6.881
620	H-20	50	47.5	-5.16	-5.940	7.128
621	H-20	50	47.5	-5.1	-5.930	7.150
621	H-20	50	47.5	-4.41	-5.820	7.404
622	H-20	50	47.5	-4.34	-5.810	7.429
622	H-20	50	47.5	-3.68	5.820	7.529
623	H-20	50	47.5	-3.62	5.890	7.450
623	H-20	50	47.5	-2.97	6.380	6.980
624	H-20	50	47.5	-2.91	6.440	6.924
624	H-20	50	47.5	-2.29	6.920	6.533
625	H-20	50	47.5	-2.23	6.980	6.486
625	H-20	50	47.5	-1.63	7.450	6.157
626	H-20	50	47.5	-1.58	7.510	6.115
626	H-20	50	47.5	-0.99	7.970	5.836
627	H-20	50	47.5	-0.94	8.030	5.798
627	H-20	50	47.5	-0.38	8.470	5.563
628	H-20	50	47.5	-0.33	8.530	5.530
628	H-20	50	47.5	0.23	8.950	5.282
629	H-20	50	47.5	0.29	9.010	5.240
629	H-20	50	47.5	0.79	9.420	4.959
630	H-20	50	47.5	0.85	9.480	4.921
630	H-20	50	47.5	1.34	9.880	4.672
631	H-20	50	47.5	1.39	9.930	4.644
631	H-20	50	47.5	1.85	10.310	4.428
632	H-20	50	47.5	1.91	10.370	4.396
632	H-20	50	47.5	2.35	10.730	4.208
633	H-20	50	47.5	2.4	10.780	4.184
633	H-20	50	47.5	2.71	10.940	4.094
634	H-20	50	47.5	2.71	10.940	4.094
634	H-20	50	47.5	2.82	11.120	4.018
635	H-20	50	47.5	2.87	11.160	3.999
635	H-20	50	47.5	3.27	11.490	3.849
636	H-20	50	47.5	3.31	11.520	3.836
636	H-20	50	47.5	3.7	11.830	3.702
637	H-20	50	47.5	3.74	11.870	3.687
637	H-20	50	47.5	4.1	12.150	3.572
638	H-20	50	47.5	4.14	12.190	3.557
638	H-20	50	47.5	4.48	12.460	3.453
639	H-20	50	47.5	4.52	12.490	3.441
639	H-20	50	47.5	4.84	12.730	3.351
640	H-20	50	47.5	4.87	12.770	3.338
640	H-20	50	47.5	5.17	12.990	3.259
641	H-20	50	47.5	5.21	13.020	3.248
641	H-20	50	47.5	5.49	13.230	3.175
642	H-20	50	47.5	5.52	13.260	3.166
642	H-20	50	47.5	5.78	13.450	3.102
643	H-20	50	47.5	5.81	13.470	3.095

643	H-20	50	47.5	6.05	13.640	3.039
644	H-20	50	47.5	6.08	13.670	3.030
644	H-20	50	47.5	6.3	13.820	2.981
645	H-20	50	47.5	6.32	13.840	2.975
645	H-20	50	47.5	6.53	13.960	2.935
646	H-20	50	47.5	6.55	13.980	2.929
646	H-20	50	47.5	6.73	14.080	2.896
647	H-20	50	47.5	6.75	14.100	2.890
647	H-20	50	47.5	6.91	14.180	2.862
648	H-20	50	47.5	6.93	14.200	2.857
648	H-20	50	47.5	7.08	14.260	2.835
649	H-20	50	47.5	7.09	14.270	2.832
649	H-20	50	47.5	7.22	14.310	2.815
650	H-20	50	47.5	7.23	14.320	2.812
650	H-20	50	47.5	7.28	14.190	2.834
651	H-20	50	47.5	7.28	14.190	2.834
651	H-20	50	47.5	7.33	14.370	2.795
652	H-20	50	47.5	7.34	14.370	2.795
652	H-20	50	47.5	7.43	14.400	2.783
653	H-20	50	47.5	7.43	14.390	2.785
653	H-20	50	47.5	7.5	14.400	2.778
654	H-20	50	47.5	7.5	14.390	2.780
654	H-20	50	47.5	7.55	14.370	2.780
655	H-20	50	47.5	7.55	14.360	2.782
655	H-20	50	47.5	7.57	14.310	2.790
656	H-20	50	47.5	7.58	14.300	2.792
656	H-20	50	47.5	7.58	14.230	2.805
657	H-20	50	47.5	7.58	14.220	2.807
657	H-20	50	47.5	7.57	14.130	2.826
658	H-20	50	47.5	7.57	14.110	2.830
658	H-20	50	47.5	7.53	14.000	2.855
659	H-20	50	47.5	7.53	13.980	2.859
659	H-20	50	47.5	7.47	13.830	2.894
660	H-20	50	47.5	7.47	13.820	2.897
660	H-20	50	47.5	7.39	13.640	2.941
661	H-20	50	47.5	7.39	13.620	2.945
661	H-20	50	47.5	7.29	13.430	2.994
662	H-20	50	47.5	7.29	13.400	3.001
662	H-20	50	47.5	7.17	13.180	3.060
663	H-20	50	47.5	7.16	13.150	3.068
663	H-20	50	47.5	7.03	12.900	3.137
664	H-20	50	47.5	7.02	12.870	3.145
664	H-20	50	47.5	6.86	12.590	3.228
665	H-20	50	47.5	6.85	12.560	3.236
665	H-20	50	47.5	6.67	12.240	3.336
666	H-20	50	47.5	6.66	12.210	3.345
666	H-20	50	47.5	6.46	11.860	3.460
667	H-20	50	47.5	6.45	11.820	3.473
667	H-20	50	47.5	6.39	11.660	3.526
668	H-20	50	47.5	6.39	11.660	3.526
668	H-20	50	47.5	6.23	11.460	3.601
669	H-20	50	47.5	6.21	11.410	3.619
669	H-20	50	47.5	5.97	11.010	3.772
670	H-20	50	47.5	5.95	10.950	3.795
670	H-20	50	47.5	5.69	10.520	3.974

671	H-20	50	47.5	5.67	10.460	3.999
671	H-20	50	47.5	5.39	9.990	4.215
672	H-20	50	47.5	5.37	9.930	4.243
672	H-20	50	47.5	5.07	9.430	4.499
673	H-20	50	47.5	5.04	9.360	4.536
673	H-20	50	47.5	4.72	8.830	4.845
674	H-20	50	47.5	4.69	8.760	4.887
674	H-20	50	47.5	4.36	8.180	5.274
675	H-20	50	47.5	4.32	8.110	5.324
675	H-20	50	47.5	3.97	7.500	5.804
676	H-20	50	47.5	3.93	7.420	5.872
676	H-20	50	47.5	3.56	6.770	6.490
677	H-20	50	47.5	3.52	6.680	6.584
677	H-20	50	47.5	3.12	5.990	7.409
678	H-20	50	47.5	3.08	5.900	7.529
678	H-20	50	47.5	2.66	5.160	8.690
679	H-20	50	47.5	2.62	5.060	8.870
679	H-20	50	47.5	2.18	4.280	10.589
680	H-20	50	47.5	2.14	4.170	10.878
680	H-20	50	47.5	1.67	3.330	13.763
681	H-20	50	47.5	1.64	3.220	14.242
681	H-20	50	47.5	1.15	2.320	19.978
682	H-20	50	47.5	1.11	2.200	21.086
682	H-20	50	47.5	0.59	1.240	37.831
683	H-20	50	47.5	0.57	1.130	41.531
683	H-20	50	47.5	0.04	0.250	189.840

LOAD RATING FIXED SPAN -GIRDER 2

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
392	H-20	50	47.5	0.05	-0.070	677.857
392	H-20	50	47.5	0.67	1.300	36.023
393	H-20	50	47.5	0.63	1.270	36.906
393	H-20	50	47.5	1.24	2.410	19.195
394	H-20	50	47.5	1.2	2.380	19.454
394	H-20	50	47.5	1.74	3.400	13.459
395	H-20	50	47.5	1.71	3.370	13.588
395	H-20	50	47.5	2.21	4.300	10.533
396	H-20	50	47.5	2.19	4.270	10.611
396	H-20	50	47.5	2.65	5.120	8.760
397	H-20	50	47.5	2.64	5.100	8.796
397	H-20	50	47.5	3.08	5.890	7.542
398	H-20	50	47.5	3.07	5.870	7.569
398	H-20	50	47.5	3.48	6.610	6.660
399	H-20	50	47.5	3.47	6.600	6.671
399	H-20	50	47.5	3.87	7.300	5.977
400	H-20	50	47.5	3.86	7.290	5.986
400	H-20	50	47.5	4.24	7.960	5.435
401	H-20	50	47.5	4.23	7.960	5.436
401	H-20	50	47.5	4.59	8.580	5.001
402	H-20	50	47.5	4.58	8.580	5.002
402	H-20	50	47.5	4.92	9.170	4.643
403	H-20	50	47.5	4.91	9.170	4.644
403	H-20	50	47.5	5.23	9.720	4.349
404	H-20	50	47.5	5.22	9.720	4.350
404	H-20	50	47.5	5.52	10.230	4.104
405	H-20	50	47.5	5.51	10.240	4.101
405	H-20	50	47.5	5.78	10.710	3.895
406	H-20	50	47.5	5.78	10.710	3.895
406	H-20	50	47.5	6.03	11.140	3.723
407	H-20	50	47.5	6.03	11.150	3.719
407	H-20	50	47.5	6.2	11.320	3.648
408	H-20	50	47.5	6.2	11.320	3.648
408	H-20	50	47.5	6.26	11.550	3.571
409	H-20	50	47.5	6.25	11.550	3.571
409	H-20	50	47.5	6.46	11.970	3.429
410	H-20	50	47.5	6.46	11.970	3.429
410	H-20	50	47.5	6.64	12.340	3.311
411	H-20	50	47.5	6.64	12.340	3.311
411	H-20	50	47.5	6.8	12.680	3.210
412	H-20	50	47.5	6.8	12.680	3.210
412	H-20	50	47.5	6.94	12.980	3.125
413	H-20	50	47.5	6.94	12.980	3.125
413	H-20	50	47.5	7.06	13.240	3.054
414	H-20	50	47.5	7.06	13.240	3.054
414	H-20	50	47.5	7.16	13.470	2.995

Minimum Rating Factor 2.830

415	H-20	50	47.5	7.15	13.470	2.996
415	H-20	50	47.5	7.23	13.670	2.946
416	H-20	50	47.5	7.23	13.670	2.946
416	H-20	50	47.5	7.29	13.840	2.905
417	H-20	50	47.5	7.29	13.840	2.905
417	H-20	50	47.5	7.32	13.970	2.876
418	H-20	50	47.5	7.32	13.970	2.876
418	H-20	50	47.5	7.33	14.070	2.855
419	H-20	50	47.5	7.33	14.080	2.853
419	H-20	50	47.5	7.32	14.150	2.840
420	H-20	50	47.5	7.33	14.150	2.839
420	H-20	50	47.5	7.29	14.190	2.834
421	H-20	50	47.5	7.3	14.190	2.833
421	H-20	50	47.5	7.24	14.200	2.835
422	H-20	50	47.5	7.25	14.200	2.835
422	H-20	50	47.5	7.17	14.180	2.844
423	H-20	50	47.5	7.17	14.180	2.844
423	H-20	50	47.5	7.08	14.120	2.863
424	H-20	50	47.5	7.08	14.120	2.863
424	H-20	50	47.5	7.03	13.820	2.928
425	H-20	50	47.5	7.02	13.820	2.929
425	H-20	50	47.5	6.96	14.060	2.883
426	H-20	50	47.5	6.97	14.060	2.883
426	H-20	50	47.5	6.83	14.030	2.899
427	H-20	50	47.5	6.83	14.030	2.899
427	H-20	50	47.5	6.67	13.990	2.919
428	H-20	50	47.5	6.67	13.990	2.919
428	H-20	50	47.5	6.49	13.920	2.946
429	H-20	50	47.5	6.49	13.920	2.946
429	H-20	50	47.5	6.29	13.820	2.982
430	H-20	50	47.5	6.29	13.820	2.982
430	H-20	50	47.5	6.06	13.690	3.027
431	H-20	50	47.5	6.07	13.690	3.026
431	H-20	50	47.5	5.82	13.540	3.078
432	H-20	50	47.5	5.82	13.540	3.078
432	H-20	50	47.5	5.55	13.350	3.142
433	H-20	50	47.5	5.56	13.360	3.139
433	H-20	50	47.5	5.27	13.150	3.211
434	H-20	50	47.5	5.27	13.150	3.211
434	H-20	50	47.5	4.96	12.920	3.293
435	H-20	50	47.5	4.97	12.920	3.292
435	H-20	50	47.5	4.63	12.660	3.386
436	H-20	50	47.5	4.64	12.660	3.385
436	H-20	50	47.5	4.28	12.380	3.491
437	H-20	50	47.5	4.29	12.380	3.490
437	H-20	50	47.5	3.91	12.070	3.611
438	H-20	50	47.5	3.92	12.080	3.608
438	H-20	50	47.5	3.52	11.750	3.743
439	H-20	50	47.5	3.52	11.750	3.743
439	H-20	50	47.5	3.11	11.390	3.897
440	H-20	50	47.5	3.11	11.400	3.894
440	H-20	50	47.5	2.67	11.010	4.072
441	H-20	50	47.5	2.67	11.010	4.072
441	H-20	50	47.5	2.56	10.770	4.173
442	H-20	50	47.5	2.56	10.760	4.177

442	H-20	50	47.5	2.21	10.650	4.253
443	H-20	50	47.5	2.22	10.650	4.252
443	H-20	50	47.5	1.73	10.280	4.452
444	H-20	50	47.5	1.74	10.280	4.451
444	H-20	50	47.5	1.23	9.880	4.683
445	H-20	50	47.5	1.23	9.880	4.683
445	H-20	50	47.5	0.71	9.460	4.946
446	H-20	50	47.5	0.71	9.460	4.946
446	H-20	50	47.5	0.17	9.030	5.241
447	H-20	50	47.5	0.17	9.030	5.241
447	H-20	50	47.5	-0.4	8.570	5.496
448	H-20	50	47.5	-0.41	8.580	5.488
448	H-20	50	47.5	-0.99	8.110	5.735
449	H-20	50	47.5	-0.99	8.110	5.735
449	H-20	50	47.5	-1.6	7.630	6.016
450	H-20	50	47.5	-1.6	7.630	6.016
450	H-20	50	47.5	-2.23	7.140	6.340
451	H-20	50	47.5	-2.23	7.140	6.340
451	H-20	50	47.5	-2.88	6.640	6.720
452	H-20	50	47.5	-2.88	6.640	6.720
452	H-20	50	47.5	-3.55	6.130	7.170
453	H-20	50	47.5	-3.55	6.140	7.158
453	H-20	50	47.5	-4.24	-5.640	7.670
454	H-20	50	47.5	-4.24	-5.630	7.684
454	H-20	50	47.5	-4.95	-5.740	7.413
455	H-20	50	47.5	-4.95	-5.740	7.413
455	H-20	50	47.5	-5.69	-5.840	7.159
456	H-20	50	47.5	-5.69	-5.840	7.159
456	H-20	50	47.5	-6.45	-5.950	6.899
457	H-20	50	47.5	-6.45	-5.950	6.899
457	H-20	50	47.5	-7.22	-6.050	6.658
458	H-20	50	47.5	-7.22	-6.050	6.658
458	H-20	50	47.5	-8.03	-6.160	6.407
459	H-20	50	47.5	-8.03	-6.160	6.407
459	H-20	50	47.5	-8.85	-6.270	6.164
460	H-20	50	47.5	-8.85	-6.270	6.164
460	H-20	50	47.5	-9.69	-6.380	5.926
461	H-20	50	47.5	-9.7	-6.380	5.925
461	H-20	50	47.5	-10.56	-6.490	5.692
462	H-20	50	47.5	-10.56	-6.490	5.692
462	H-20	50	47.5	-11.44	-6.600	5.464
463	H-20	50	47.5	-11.44	-6.600	5.464
463	H-20	50	47.5	-12.33	-6.710	5.241
464	H-20	50	47.5	-12.33	-6.710	5.241
464	H-20	50	47.5	-13.23	-6.910	4.959
465	H-20	50	47.5	-13.24	-6.920	4.951
465	H-20	50	47.5	-12.34	-6.730	5.224
466	H-20	50	47.5	-12.34	-6.740	5.217
466	H-20	50	47.5	-11.45	-6.630	5.437
467	H-20	50	47.5	-11.44	-6.630	5.439
467	H-20	50	47.5	-10.56	-6.520	5.666
468	H-20	50	47.5	-10.56	-6.520	5.666
468	H-20	50	47.5	-9.7	-6.410	5.897
469	H-20	50	47.5	-9.7	-6.410	5.897
469	H-20	50	47.5	-8.86	-6.290	6.143

470	H-20	50	47.5	-8.85	-6.290	6.145
470	H-20	50	47.5	-8.03	-6.180	6.387
471	H-20	50	47.5	-8.03	-6.180	6.387
471	H-20	50	47.5	-7.23	-6.070	6.634
472	H-20	50	47.5	-7.23	-6.070	6.634
472	H-20	50	47.5	-6.45	-5.970	6.876
473	H-20	50	47.5	-6.45	-5.970	6.876
473	H-20	50	47.5	-5.69	-5.860	7.135
474	H-20	50	47.5	-5.69	-5.860	7.135
474	H-20	50	47.5	-4.96	-5.760	7.385
475	H-20	50	47.5	-4.96	-5.760	7.385
475	H-20	50	47.5	-4.24	-5.660	7.643
476	H-20	50	47.5	-4.24	-5.660	7.643
476	H-20	50	47.5	-3.55	6.150	7.146
477	H-20	50	47.5	-3.55	6.140	7.158
477	H-20	50	47.5	-2.88	6.650	6.710
478	H-20	50	47.5	-2.88	6.650	6.710
478	H-20	50	47.5	-2.23	7.150	6.331
479	H-20	50	47.5	-2.23	7.150	6.331
479	H-20	50	47.5	-1.6	7.640	6.008
480	H-20	50	47.5	-1.6	7.640	6.008
480	H-20	50	47.5	-0.99	8.120	5.728
481	H-20	50	47.5	-0.99	8.120	5.728
481	H-20	50	47.5	-0.41	8.590	5.482
482	H-20	50	47.5	-0.41	8.580	5.488
482	H-20	50	47.5	0.17	9.040	5.236
483	H-20	50	47.5	0.17	9.040	5.236
483	H-20	50	47.5	0.71	9.470	4.941
484	H-20	50	47.5	0.71	9.470	4.941
484	H-20	50	47.5	1.23	9.890	4.678
485	H-20	50	47.5	1.23	9.890	4.678
485	H-20	50	47.5	1.73	10.290	4.448
486	H-20	50	47.5	1.73	10.290	4.448
486	H-20	50	47.5	2.21	10.660	4.249
487	H-20	50	47.5	2.21	10.660	4.249
487	H-20	50	47.5	2.56	10.780	4.169
488	H-20	50	47.5	2.56	10.780	4.169
488	H-20	50	47.5	2.67	11.020	4.068
489	H-20	50	47.5	2.67	11.020	4.068
489	H-20	50	47.5	3.11	11.410	3.890
490	H-20	50	47.5	3.1	11.410	3.891
490	H-20	50	47.5	3.52	11.770	3.737
491	H-20	50	47.5	3.52	11.760	3.740
491	H-20	50	47.5	3.91	12.090	3.605
492	H-20	50	47.5	3.91	12.090	3.605
492	H-20	50	47.5	4.28	12.400	3.485
493	H-20	50	47.5	4.28	12.390	3.488
493	H-20	50	47.5	4.63	12.680	3.381
494	H-20	50	47.5	4.63	12.680	3.381
494	H-20	50	47.5	4.96	12.940	3.287
495	H-20	50	47.5	4.96	12.930	3.290
495	H-20	50	47.5	5.27	13.170	3.207
496	H-20	50	47.5	5.27	13.160	3.209
496	H-20	50	47.5	5.56	13.370	3.137
497	H-20	50	47.5	5.55	13.370	3.138

497	H-20	50	47.5	5.82	13.560	3.074
498	H-20	50	47.5	5.82	13.550	3.076
498	H-20	50	47.5	6.06	13.710	3.023
499	H-20	50	47.5	6.06	13.710	3.023
499	H-20	50	47.5	6.29	13.840	2.978
500	H-20	50	47.5	6.28	13.840	2.978
500	H-20	50	47.5	6.49	13.940	2.942
501	H-20	50	47.5	6.48	13.940	2.943
501	H-20	50	47.5	6.67	14.010	2.914
502	H-20	50	47.5	6.66	14.010	2.915
502	H-20	50	47.5	6.82	14.050	2.895
503	H-20	50	47.5	6.82	14.050	2.895
503	H-20	50	47.5	6.96	14.080	2.879
504	H-20	50	47.5	6.96	14.080	2.879
504	H-20	50	47.5	7.02	13.830	2.927
505	H-20	50	47.5	7.02	13.830	2.927
505	H-20	50	47.5	7.08	14.140	2.859
506	H-20	50	47.5	7.07	14.140	2.859
506	H-20	50	47.5	7.17	14.200	2.840
507	H-20	50	47.5	7.17	14.190	2.842
507	H-20	50	47.5	7.24	14.220	2.831
508	H-20	50	47.5	7.24	14.210	2.833
508	H-20	50	47.5	7.29	14.210	2.830
509	H-20	50	47.5	7.29	14.200	2.832
509	H-20	50	47.5	7.32	14.160	2.838
510	H-20	50	47.5	7.32	14.160	2.838
510	H-20	50	47.5	7.33	14.090	2.851
511	H-20	50	47.5	7.33	14.090	2.851
511	H-20	50	47.5	7.31	13.990	2.873
512	H-20	50	47.5	7.31	13.990	2.873
512	H-20	50	47.5	7.28	13.850	2.904
513	H-20	50	47.5	7.28	13.850	2.904
513	H-20	50	47.5	7.22	13.690	2.942
514	H-20	50	47.5	7.22	13.680	2.944
514	H-20	50	47.5	7.14	13.490	2.992
515	H-20	50	47.5	7.14	13.490	2.992
515	H-20	50	47.5	7.04	13.260	3.051
516	H-20	50	47.5	7.04	13.250	3.054
516	H-20	50	47.5	6.92	12.990	3.124
517	H-20	50	47.5	6.92	12.990	3.124
517	H-20	50	47.5	6.78	12.690	3.209
518	H-20	50	47.5	6.78	12.690	3.209
518	H-20	50	47.5	6.62	12.360	3.307
519	H-20	50	47.5	6.62	12.360	3.307
519	H-20	50	47.5	6.43	11.990	3.425
520	H-20	50	47.5	6.43	11.990	3.425
520	H-20	50	47.5	6.23	11.570	3.567
521	H-20	50	47.5	6.23	11.570	3.567
521	H-20	50	47.5	6.17	11.340	3.645
522	H-20	50	47.5	6.17	11.340	3.645
522	H-20	50	47.5	6	11.160	3.719
523	H-20	50	47.5	6	11.160	3.719
523	H-20	50	47.5	5.75	10.730	3.891
524	H-20	50	47.5	5.75	10.720	3.895
524	H-20	50	47.5	5.48	10.250	4.100

525	H-20	50	47.5	5.48	10.250	4.100
525	H-20	50	47.5	5.18	9.740	4.345
526	H-20	50	47.5	5.19	9.740	4.344
526	H-20	50	47.5	4.87	9.190	4.639
527	H-20	50	47.5	4.87	9.190	4.639
527	H-20	50	47.5	4.53	8.600	4.997
528	H-20	50	47.5	4.54	8.600	4.995
528	H-20	50	47.5	4.18	7.970	5.435
529	H-20	50	47.5	4.18	7.980	5.429
529	H-20	50	47.5	3.8	7.310	5.978
530	H-20	50	47.5	3.8	7.320	5.970
530	H-20	50	47.5	3.4	6.620	6.662
531	H-20	50	47.5	3.4	6.630	6.652
531	H-20	50	47.5	2.98	5.890	7.559
532	H-20	50	47.5	2.98	5.910	7.533
532	H-20	50	47.5	2.53	5.120	8.783
533	H-20	50	47.5	2.54	5.140	8.747
533	H-20	50	47.5	2.07	4.290	10.590
534	H-20	50	47.5	2.07	4.320	10.516
534	H-20	50	47.5	1.58	3.390	13.546
535	H-20	50	47.5	1.58	3.420	13.427
535	H-20	50	47.5	1.08	2.390	19.423
536	H-20	50	47.5	1.07	2.430	19.107
536	H-20	50	47.5	0.55	1.280	36.680
537	H-20	50	47.5	0.55	1.310	35.840
537	H-20	50	47.5	0.01	-0.070	678.429

LOAD RATING FIXED SPAN -GIRDER 3

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
246	H-20	50	47.5	0.05	-0.070	677.857
246	H-20	50	47.5	0.67	1.300	36.023
247	H-20	50	47.5	0.62	1.270	36.913
247	H-20	50	47.5	1.22	2.410	19.203
248	H-20	50	47.5	1.18	2.380	19.462
248	H-20	50	47.5	1.71	3.400	13.468
249	H-20	50	47.5	1.68	3.370	13.596
249	H-20	50	47.5	2.16	4.300	10.544
250	H-20	50	47.5	2.14	4.270	10.623
250	H-20	50	47.5	2.59	5.120	8.771
251	H-20	50	47.5	2.57	5.100	8.810
251	H-20	50	47.5	3	5.890	7.555
252	H-20	50	47.5	2.99	5.870	7.583
252	H-20	50	47.5	3.4	6.610	6.672
253	H-20	50	47.5	3.39	6.600	6.683
253	H-20	50	47.5	3.77	7.300	5.990
254	H-20	50	47.5	3.77	7.290	5.999
254	H-20	50	47.5	4.14	7.960	5.447
255	H-20	50	47.5	4.14	7.960	5.447
255	H-20	50	47.5	4.48	8.580	5.014
256	H-20	50	47.5	4.48	8.580	5.014
256	H-20	50	47.5	4.8	9.170	4.656
257	H-20	50	47.5	4.81	9.170	4.655
257	H-20	50	47.5	5.11	9.720	4.361
258	H-20	50	47.5	5.11	9.720	4.361
258	H-20	50	47.5	5.39	10.230	4.116
259	H-20	50	47.5	5.39	10.240	4.112
259	H-20	50	47.5	5.65	10.710	3.908
260	H-20	50	47.5	5.66	10.710	3.907
260	H-20	50	47.5	5.9	11.140	3.734
261	H-20	50	47.5	5.9	11.150	3.731
261	H-20	50	47.5	6.07	11.320	3.660
262	H-20	50	47.5	6.07	11.320	3.660
262	H-20	50	47.5	6.12	11.550	3.583
263	H-20	50	47.5	6.12	11.550	3.583
263	H-20	50	47.5	6.32	11.970	3.440
264	H-20	50	47.5	6.32	11.970	3.440
264	H-20	50	47.5	6.49	12.340	3.323
265	H-20	50	47.5	6.5	12.340	3.323
265	H-20	50	47.5	6.65	12.680	3.222
266	H-20	50	47.5	6.65	12.680	3.222
266	H-20	50	47.5	6.79	12.980	3.136
267	H-20	50	47.5	6.79	12.980	3.136
267	H-20	50	47.5	6.9	13.240	3.066
268	H-20	50	47.5	6.91	13.240	3.066
268	H-20	50	47.5	7	13.470	3.007

Minimum Rating Factor 2.841

269	H-20	50	47.5	7	13.470	3.007
269	H-20	50	47.5	7.08	13.670	2.957
270	H-20	50	47.5	7.08	13.670	2.957
270	H-20	50	47.5	7.13	13.830	2.919
271	H-20	50	47.5	7.13	13.840	2.917
271	H-20	50	47.5	7.16	13.970	2.888
272	H-20	50	47.5	7.16	13.970	2.888
272	H-20	50	47.5	7.18	14.070	2.866
273	H-20	50	47.5	7.18	14.070	2.866
273	H-20	50	47.5	7.17	14.150	2.850
274	H-20	50	47.5	7.17	14.150	2.850
274	H-20	50	47.5	7.14	14.190	2.844
275	H-20	50	47.5	7.14	14.190	2.844
275	H-20	50	47.5	7.09	14.200	2.846
276	H-20	50	47.5	7.09	14.200	2.846
276	H-20	50	47.5	7.02	14.180	2.855
277	H-20	50	47.5	7.01	14.180	2.855
277	H-20	50	47.5	6.92	14.120	2.874
278	H-20	50	47.5	6.92	14.120	2.874
278	H-20	50	47.5	6.87	13.820	2.940
279	H-20	50	47.5	6.87	13.820	2.940
279	H-20	50	47.5	6.81	14.060	2.894
280	H-20	50	47.5	6.81	14.060	2.894
280	H-20	50	47.5	6.67	14.030	2.910
281	H-20	50	47.5	6.67	14.030	2.910
281	H-20	50	47.5	6.52	13.990	2.929
282	H-20	50	47.5	6.51	13.990	2.930
282	H-20	50	47.5	6.34	13.920	2.957
283	H-20	50	47.5	6.33	13.920	2.958
283	H-20	50	47.5	6.14	13.820	2.993
284	H-20	50	47.5	6.13	13.820	2.993
284	H-20	50	47.5	5.92	13.690	3.037
285	H-20	50	47.5	5.91	13.690	3.038
285	H-20	50	47.5	5.68	13.540	3.089
286	H-20	50	47.5	5.67	13.540	3.089
286	H-20	50	47.5	5.42	13.350	3.152
287	H-20	50	47.5	5.41	13.360	3.150
287	H-20	50	47.5	5.14	13.150	3.221
288	H-20	50	47.5	5.13	13.150	3.222
288	H-20	50	47.5	4.83	12.910	3.305
289	H-20	50	47.5	4.82	12.920	3.303
289	H-20	50	47.5	4.51	12.660	3.396
290	H-20	50	47.5	4.5	12.660	3.397
290	H-20	50	47.5	4.16	12.380	3.501
291	H-20	50	47.5	4.15	12.380	3.502
291	H-20	50	47.5	3.8	12.070	3.621
292	H-20	50	47.5	3.79	12.080	3.618
292	H-20	50	47.5	3.41	11.750	3.752
293	H-20	50	47.5	3.4	11.750	3.753
293	H-20	50	47.5	3.01	11.390	3.906
294	H-20	50	47.5	2.99	11.400	3.904
294	H-20	50	47.5	2.58	11.010	4.080
295	H-20	50	47.5	2.57	11.010	4.081
295	H-20	50	47.5	2.46	10.760	4.186
296	H-20	50	47.5	2.46	10.760	4.186

296	H-20	50	47.5	2.13	10.650	4.260
297	H-20	50	47.5	2.12	10.650	4.261
297	H-20	50	47.5	1.66	10.280	4.459
298	H-20	50	47.5	1.65	10.280	4.460
298	H-20	50	47.5	1.16	9.880	4.690
299	H-20	50	47.5	1.15	9.880	4.691
299	H-20	50	47.5	0.65	9.460	4.952
300	H-20	50	47.5	0.64	9.460	4.953
300	H-20	50	47.5	0.12	9.030	5.247
301	H-20	50	47.5	0.11	9.030	5.248
301	H-20	50	47.5	-0.45	8.570	5.490
302	H-20	50	47.5	-0.45	8.580	5.484
302	H-20	50	47.5	-1.02	8.110	5.731
303	H-20	50	47.5	-1.02	8.110	5.731
303	H-20	50	47.5	-1.61	7.630	6.014
304	H-20	50	47.5	-1.62	7.630	6.013
304	H-20	50	47.5	-2.22	7.140	6.342
305	H-20	50	47.5	-2.23	7.140	6.340
305	H-20	50	47.5	-2.85	6.640	6.724
306	H-20	50	47.5	-2.86	6.640	6.723
306	H-20	50	47.5	-3.51	6.130	7.176
307	H-20	50	47.5	-3.52	6.140	7.163
307	H-20	50	47.5	-4.18	-5.640	7.681
308	H-20	50	47.5	-4.19	-5.630	7.693
308	H-20	50	47.5	-4.87	-5.740	7.427
309	H-20	50	47.5	-4.89	-5.740	7.423
309	H-20	50	47.5	-5.58	-5.840	7.178
310	H-20	50	47.5	-5.6	-5.840	7.175
310	H-20	50	47.5	-6.32	-5.950	6.921
311	H-20	50	47.5	-6.33	-5.950	6.919
311	H-20	50	47.5	-7.07	-6.050	6.683
312	H-20	50	47.5	-7.08	-6.050	6.681
312	H-20	50	47.5	-7.84	-6.160	6.438
313	H-20	50	47.5	-7.85	-6.160	6.437
313	H-20	50	47.5	-8.63	-6.270	6.199
314	H-20	50	47.5	-8.64	-6.270	6.198
314	H-20	50	47.5	-9.44	-6.380	5.966
315	H-20	50	47.5	-9.45	-6.380	5.964
315	H-20	50	47.5	-10.27	-6.490	5.737
316	H-20	50	47.5	-10.28	-6.490	5.735
316	H-20	50	47.5	-11.11	-6.600	5.514
317	H-20	50	47.5	-11.12	-6.600	5.512
317	H-20	50	47.5	-11.96	-6.710	5.297
318	H-20	50	47.5	-11.97	-6.710	5.295
318	H-20	50	47.5	-12.83	-6.910	5.017
319	H-20	50	47.5	-12.83	-6.920	5.010
319	H-20	50	47.5	-11.96	-6.730	5.281
320	H-20	50	47.5	-11.96	-6.730	5.281
320	H-20	50	47.5	-11.11	-6.630	5.489
321	H-20	50	47.5	-11.1	-6.630	5.490
321	H-20	50	47.5	-10.27	-6.520	5.710
322	H-20	50	47.5	-10.26	-6.520	5.712
322	H-20	50	47.5	-9.45	-6.410	5.936
323	H-20	50	47.5	-9.44	-6.400	5.947
323	H-20	50	47.5	-8.64	-6.290	6.178

324	H-20	50	47.5	-8.63	-6.290	6.180
324	H-20	50	47.5	-7.85	-6.180	6.416
325	H-20	50	47.5	-7.84	-6.180	6.417
325	H-20	50	47.5	-7.08	-6.070	6.659
326	H-20	50	47.5	-7.06	-6.070	6.662
326	H-20	50	47.5	-6.33	-5.970	6.896
327	H-20	50	47.5	-6.31	-5.970	6.899
327	H-20	50	47.5	-5.59	-5.860	7.152
328	H-20	50	47.5	-5.58	-5.860	7.154
328	H-20	50	47.5	-4.88	-5.760	7.399
329	H-20	50	47.5	-4.87	-5.760	7.401
329	H-20	50	47.5	-4.19	-5.650	7.665
330	H-20	50	47.5	-4.17	-5.660	7.655
330	H-20	50	47.5	-3.51	6.150	7.153
331	H-20	50	47.5	-3.5	6.140	7.166
331	H-20	50	47.5	-2.86	6.650	6.713
332	H-20	50	47.5	-2.85	6.650	6.714
332	H-20	50	47.5	-2.23	7.150	6.331
333	H-20	50	47.5	-2.22	7.150	6.333
333	H-20	50	47.5	-1.61	7.640	6.007
334	H-20	50	47.5	-1.61	7.640	6.007
334	H-20	50	47.5	-1.02	8.120	5.724
335	H-20	50	47.5	-1.02	8.120	5.724
335	H-20	50	47.5	-0.45	8.590	5.477
336	H-20	50	47.5	-0.44	8.580	5.485
336	H-20	50	47.5	0.11	9.040	5.242
337	H-20	50	47.5	0.12	9.040	5.241
337	H-20	50	47.5	0.65	9.470	4.947
338	H-20	50	47.5	0.65	9.470	4.947
338	H-20	50	47.5	1.16	9.890	4.686
339	H-20	50	47.5	1.17	9.890	4.685
339	H-20	50	47.5	1.65	10.290	4.456
340	H-20	50	47.5	1.66	10.290	4.455
340	H-20	50	47.5	2.12	10.660	4.257
341	H-20	50	47.5	2.13	10.660	4.256
341	H-20	50	47.5	2.46	10.780	4.178
342	H-20	50	47.5	2.46	10.780	4.178
342	H-20	50	47.5	2.57	11.020	4.077
343	H-20	50	47.5	2.58	11.020	4.076
343	H-20	50	47.5	3	11.410	3.900
344	H-20	50	47.5	3.01	11.410	3.899
344	H-20	50	47.5	3.4	11.770	3.747
345	H-20	50	47.5	3.41	11.760	3.749
345	H-20	50	47.5	3.79	12.090	3.615
346	H-20	50	47.5	3.8	12.090	3.615
346	H-20	50	47.5	4.16	12.400	3.495
347	H-20	50	47.5	4.17	12.390	3.497
347	H-20	50	47.5	4.5	12.680	3.391
348	H-20	50	47.5	4.51	12.680	3.390
348	H-20	50	47.5	4.83	12.940	3.298
349	H-20	50	47.5	4.83	12.930	3.300
349	H-20	50	47.5	5.13	13.170	3.217
350	H-20	50	47.5	5.14	13.160	3.219
350	H-20	50	47.5	5.41	13.370	3.148
351	H-20	50	47.5	5.42	13.370	3.147

351	H-20	50	47.5	5.67	13.560	3.085
352	H-20	50	47.5	5.68	13.550	3.086
352	H-20	50	47.5	5.91	13.710	3.034
353	H-20	50	47.5	5.92	13.710	3.033
353	H-20	50	47.5	6.13	13.840	2.989
354	H-20	50	47.5	6.14	13.840	2.988
354	H-20	50	47.5	6.33	13.940	2.953
355	H-20	50	47.5	6.34	13.940	2.953
355	H-20	50	47.5	6.51	14.010	2.926
356	H-20	50	47.5	6.52	14.010	2.925
356	H-20	50	47.5	6.67	14.050	2.906
357	H-20	50	47.5	6.67	14.050	2.906
357	H-20	50	47.5	6.81	14.080	2.890
358	H-20	50	47.5	6.81	14.080	2.890
358	H-20	50	47.5	6.87	13.830	2.938
359	H-20	50	47.5	6.87	13.830	2.938
359	H-20	50	47.5	6.92	14.140	2.870
360	H-20	50	47.5	6.92	14.140	2.870
360	H-20	50	47.5	7.01	14.200	2.851
361	H-20	50	47.5	7.01	14.190	2.853
361	H-20	50	47.5	7.08	14.220	2.842
362	H-20	50	47.5	7.08	14.210	2.844
362	H-20	50	47.5	7.13	14.210	2.841
363	H-20	50	47.5	7.13	14.200	2.843
363	H-20	50	47.5	7.16	14.160	2.849
364	H-20	50	47.5	7.16	14.160	2.849
364	H-20	50	47.5	7.17	14.090	2.862
365	H-20	50	47.5	7.17	14.090	2.862
365	H-20	50	47.5	7.16	13.990	2.883
366	H-20	50	47.5	7.16	13.990	2.883
366	H-20	50	47.5	7.12	13.850	2.916
367	H-20	50	47.5	7.12	13.850	2.916
367	H-20	50	47.5	7.07	13.690	2.953
368	H-20	50	47.5	7.07	13.680	2.955
368	H-20	50	47.5	6.99	13.490	3.003
369	H-20	50	47.5	6.99	13.490	3.003
369	H-20	50	47.5	6.9	13.260	3.062
370	H-20	50	47.5	6.89	13.250	3.065
370	H-20	50	47.5	6.78	12.990	3.135
371	H-20	50	47.5	6.77	12.990	3.135
371	H-20	50	47.5	6.64	12.690	3.220
372	H-20	50	47.5	6.63	12.690	3.221
372	H-20	50	47.5	6.48	12.360	3.319
373	H-20	50	47.5	6.47	12.360	3.320
373	H-20	50	47.5	6.3	11.990	3.436
374	H-20	50	47.5	6.29	11.990	3.437
374	H-20	50	47.5	6.1	11.570	3.578
375	H-20	50	47.5	6.09	11.570	3.579
375	H-20	50	47.5	6.04	11.340	3.656
376	H-20	50	47.5	6.04	11.340	3.656
376	H-20	50	47.5	5.87	11.160	3.730
377	H-20	50	47.5	5.87	11.160	3.730
377	H-20	50	47.5	5.63	10.730	3.902
378	H-20	50	47.5	5.62	10.720	3.907
378	H-20	50	47.5	5.36	10.250	4.111

379	H-20	50	47.5	5.35	10.250	4.112
379	H-20	50	47.5	5.07	9.740	4.356
380	H-20	50	47.5	5.06	9.740	4.357
380	H-20	50	47.5	4.76	9.190	4.651
381	H-20	50	47.5	4.76	9.190	4.651
381	H-20	50	47.5	4.44	8.600	5.007
382	H-20	50	47.5	4.43	8.600	5.008
382	H-20	50	47.5	4.09	7.970	5.447
383	H-20	50	47.5	4.08	7.980	5.441
383	H-20	50	47.5	3.72	7.310	5.989
384	H-20	50	47.5	3.71	7.320	5.982
384	H-20	50	47.5	3.32	6.620	6.674
385	H-20	50	47.5	3.31	6.630	6.665
385	H-20	50	47.5	2.91	5.890	7.570
386	H-20	50	47.5	2.9	5.910	7.547
386	H-20	50	47.5	2.48	5.120	8.793
387	H-20	50	47.5	2.47	5.140	8.761
387	H-20	50	47.5	2.02	4.290	10.601
388	H-20	50	47.5	2.02	4.320	10.528
388	H-20	50	47.5	1.55	3.390	13.555
389	H-20	50	47.5	1.55	3.420	13.436
389	H-20	50	47.5	1.06	2.390	19.431
390	H-20	50	47.5	1.05	2.430	19.115
390	H-20	50	47.5	0.54	1.280	36.688
391	H-20	50	47.5	0.54	1.310	35.847
391	H-20	50	47.5	0.01	-0.070	678.429

LOAD RATING FIXED SPAN -GIRDER 4

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
100	H-20	50	47.5	0.11	0.250	189.560
100	H-20	50	47.5	0.48	1.150	40.887
101	H-20	50	47.5	0.53	1.260	37.278
101	H-20	50	47.5	0.96	2.240	20.777
102	H-20	50	47.5	1.01	2.350	19.783
102	H-20	50	47.5	1.44	3.250	14.172
103	H-20	50	47.5	1.49	3.360	13.693
103	H-20	50	47.5	1.9	4.190	10.883
104	H-20	50	47.5	1.95	4.300	10.593
104	H-20	50	47.5	2.35	5.080	8.888
105	H-20	50	47.5	2.4	5.180	8.707
105	H-20	50	47.5	2.78	5.910	7.567
106	H-20	50	47.5	2.83	6.000	7.445
106	H-20	50	47.5	3.19	6.690	6.623
107	H-20	50	47.5	3.25	6.780	6.527
107	H-20	50	47.5	3.58	7.420	5.919
108	H-20	50	47.5	3.65	7.500	5.847
108	H-20	50	47.5	3.96	8.110	5.369
109	H-20	50	47.5	4.02	8.180	5.315
109	H-20	50	47.5	4.31	8.750	4.936
110	H-20	50	47.5	4.38	8.820	4.889
110	H-20	50	47.5	4.65	9.360	4.578
111	H-20	50	47.5	4.71	9.430	4.538
111	H-20	50	47.5	4.96	9.920	4.288
112	H-20	50	47.5	5.02	9.990	4.252
112	H-20	50	47.5	5.25	10.450	4.043
113	H-20	50	47.5	5.31	10.510	4.014
113	H-20	50	47.5	5.53	10.940	3.836
114	H-20	50	47.5	5.58	11.000	3.811
114	H-20	50	47.5	5.78	11.400	3.660
115	H-20	50	47.5	5.82	11.450	3.640
115	H-20	50	47.5	5.96	11.650	3.566
116	H-20	50	47.5	5.96	11.650	3.566
116	H-20	50	47.5	6	11.810	3.514
117	H-20	50	47.5	6.05	11.850	3.498
117	H-20	50	47.5	6.21	12.190	3.387
118	H-20	50	47.5	6.25	12.230	3.373
118	H-20	50	47.5	6.4	12.540	3.278
119	H-20	50	47.5	6.43	12.570	3.267
119	H-20	50	47.5	6.56	12.860	3.184
120	H-20	50	47.5	6.59	12.890	3.174
120	H-20	50	47.5	6.7	13.140	3.105
121	H-20	50	47.5	6.73	13.170	3.096
121	H-20	50	47.5	6.82	13.390	3.038
122	H-20	50	47.5	6.85	13.410	3.031
122	H-20	50	47.5	6.92	13.610	2.982

Minimum Rating Factor 2.810

123	H-20	50	47.5	6.94	13.630	2.976
123	H-20	50	47.5	7	13.800	2.935
124	H-20	50	47.5	7.02	13.820	2.929
124	H-20	50	47.5	7.06	13.960	2.897
125	H-20	50	47.5	7.07	13.980	2.892
125	H-20	50	47.5	7.1	14.100	2.865
126	H-20	50	47.5	7.11	14.110	2.863
126	H-20	50	47.5	7.11	14.200	2.844
127	H-20	50	47.5	7.12	14.220	2.840
127	H-20	50	47.5	7.11	14.290	2.826
128	H-20	50	47.5	7.11	14.300	2.824
128	H-20	50	47.5	7.08	14.350	2.817
129	H-20	50	47.5	7.08	14.350	2.817
129	H-20	50	47.5	7.04	14.380	2.814
130	H-20	50	47.5	7.03	14.380	2.814
130	H-20	50	47.5	6.97	14.380	2.818
131	H-20	50	47.5	6.96	14.380	2.819
131	H-20	50	47.5	6.88	14.350	2.831
132	H-20	50	47.5	6.86	14.350	2.832
132	H-20	50	47.5	6.82	14.180	2.869
133	H-20	50	47.5	6.82	14.180	2.869
133	H-20	50	47.5	6.77	14.300	2.848
134	H-20	50	47.5	6.75	14.300	2.850
134	H-20	50	47.5	6.64	14.250	2.867
135	H-20	50	47.5	6.61	14.240	2.871
135	H-20	50	47.5	6.48	14.180	2.893
136	H-20	50	47.5	6.45	14.160	2.899
136	H-20	50	47.5	6.31	14.090	2.923
137	H-20	50	47.5	6.27	14.070	2.930
137	H-20	50	47.5	6.11	13.970	2.963
138	H-20	50	47.5	6.07	13.940	2.972
138	H-20	50	47.5	5.9	13.820	3.010
139	H-20	50	47.5	5.85	13.800	3.018
139	H-20	50	47.5	5.66	13.650	3.065
140	H-20	50	47.5	5.61	13.630	3.073
140	H-20	50	47.5	5.4	13.450	3.130
141	H-20	50	47.5	5.35	13.430	3.138
141	H-20	50	47.5	5.12	13.240	3.201
142	H-20	50	47.5	5.06	13.210	3.213
142	H-20	50	47.5	4.82	13.010	3.281
143	H-20	50	47.5	4.76	12.980	3.293
143	H-20	50	47.5	4.5	12.750	3.373
144	H-20	50	47.5	4.44	12.720	3.385
144	H-20	50	47.5	4.16	12.480	3.473
145	H-20	50	47.5	4.09	12.440	3.490
145	H-20	50	47.5	3.79	12.180	3.589
146	H-20	50	47.5	3.73	12.140	3.605
146	H-20	50	47.5	3.41	11.860	3.718
147	H-20	50	47.5	3.34	11.820	3.736
147	H-20	50	47.5	3.01	11.510	3.865
148	H-20	50	47.5	2.94	11.480	3.882
148	H-20	50	47.5	2.58	11.150	4.029
149	H-20	50	47.5	2.51	11.110	4.050
149	H-20	50	47.5	2.41	10.930	4.125
150	H-20	50	47.5	2.41	10.930	4.125

150	H-20	50	47.5	2.13	10.770	4.213
151	H-20	50	47.5	2.06	10.720	4.239
151	H-20	50	47.5	1.67	10.360	4.424
152	H-20	50	47.5	1.59	10.310	4.453
152	H-20	50	47.5	1.18	9.930	4.665
153	H-20	50	47.5	1.1	9.870	4.701
153	H-20	50	47.5	0.67	9.480	4.940
154	H-20	50	47.5	0.59	9.420	4.980
154	H-20	50	47.5	0.14	9.010	5.256
155	H-20	50	47.5	0.06	8.950	5.301
155	H-20	50	47.5	-0.45	8.520	5.522
156	H-20	50	47.5	-0.51	8.460	5.554
156	H-20	50	47.5	-1.02	8.020	5.796
157	H-20	50	47.5	-1.09	7.960	5.830
157	H-20	50	47.5	-1.61	7.510	6.111
158	H-20	50	47.5	-1.68	7.450	6.150
158	H-20	50	47.5	-2.22	6.980	6.487
159	H-20	50	47.5	-2.29	6.920	6.533
159	H-20	50	47.5	-2.84	6.440	6.935
160	H-20	50	47.5	-2.93	6.370	6.997
160	H-20	50	47.5	-3.49	5.880	7.485
161	H-20	50	47.5	-3.58	5.820	7.546
161	H-20	50	47.5	-4.16	-5.800	7.472
162	H-20	50	47.5	-4.25	-5.810	7.444
162	H-20	50	47.5	-4.85	-5.920	7.204
163	H-20	50	47.5	-4.94	-5.930	7.177
163	H-20	50	47.5	-5.55	-6.040	6.945
164	H-20	50	47.5	-5.65	-6.060	6.906
164	H-20	50	47.5	-6.27	-6.160	6.693
165	H-20	50	47.5	-6.38	-6.180	6.654
165	H-20	50	47.5	-7.02	-6.290	6.436
166	H-20	50	47.5	-7.13	-6.310	6.398
166	H-20	50	47.5	-7.78	-6.410	6.197
167	H-20	50	47.5	-7.9	-6.430	6.159
167	H-20	50	47.5	-8.57	-6.540	5.953
168	H-20	50	47.5	-8.7	-6.570	5.906
168	H-20	50	47.5	-9.39	-6.670	5.714
169	H-20	50	47.5	-9.51	-6.700	5.670
169	H-20	50	47.5	-10.23	-6.810	5.473
170	H-20	50	47.5	-10.35	-6.840	5.431
170	H-20	50	47.5	-11.08	-7.000	5.203
171	H-20	50	47.5	-11.2	-6.990	5.193
171	H-20	50	47.5	-11.96	-7.550	4.707
172	H-20	50	47.5	-12.04	-7.510	4.722
172	H-20	50	47.5	-12.85	-8.160	4.246
173	H-20	50	47.5	-12.83	-8.180	4.238
173	H-20	50	47.5	-12.02	-7.550	4.699
174	H-20	50	47.5	-11.94	-7.580	4.691
174	H-20	50	47.5	-11.18	-7.010	5.181
175	H-20	50	47.5	-11.07	-7.030	5.182
175	H-20	50	47.5	-10.33	-6.850	5.426
176	H-20	50	47.5	-10.21	-6.820	5.468
176	H-20	50	47.5	-9.5	-6.710	5.663
177	H-20	50	47.5	-9.37	-6.680	5.708
177	H-20	50	47.5	-8.68	-6.570	5.909

178	H-20	50	47.5	-8.56	-6.550	5.945
178	H-20	50	47.5	-7.89	-6.440	6.151
179	H-20	50	47.5	-7.76	-6.420	6.190
179	H-20	50	47.5	-7.12	-6.320	6.389
180	H-20	50	47.5	-7	-6.300	6.429
180	H-20	50	47.5	-6.37	-6.190	6.645
181	H-20	50	47.5	-6.26	-6.170	6.684
181	H-20	50	47.5	-5.64	-6.060	6.908
182	H-20	50	47.5	-5.54	-6.050	6.936
182	H-20	50	47.5	-4.93	-5.940	7.167
183	H-20	50	47.5	-4.83	-5.930	7.196
183	H-20	50	47.5	-4.24	-5.820	7.433
184	H-20	50	47.5	-4.15	-5.810	7.461
184	H-20	50	47.5	-3.57	5.820	7.548
185	H-20	50	47.5	-3.48	5.890	7.474
185	H-20	50	47.5	-2.91	6.380	6.989
186	H-20	50	47.5	-2.83	6.440	6.936
186	H-20	50	47.5	-2.28	6.920	6.535
187	H-20	50	47.5	-2.21	6.980	6.489
187	H-20	50	47.5	-1.67	7.450	6.152
188	H-20	50	47.5	-1.6	7.510	6.112
188	H-20	50	47.5	-1.08	7.970	5.824
189	H-20	50	47.5	-1.01	8.030	5.790
189	H-20	50	47.5	-0.5	8.470	5.549
190	H-20	50	47.5	-0.44	8.530	5.517
190	H-20	50	47.5	0.07	8.950	5.299
191	H-20	50	47.5	0.15	9.010	5.255
191	H-20	50	47.5	0.6	9.420	4.979
192	H-20	50	47.5	0.68	9.480	4.939
192	H-20	50	47.5	1.11	9.880	4.695
193	H-20	50	47.5	1.19	9.930	4.664
193	H-20	50	47.5	1.6	10.310	4.452
194	H-20	50	47.5	1.68	10.370	4.419
194	H-20	50	47.5	2.07	10.730	4.234
195	H-20	50	47.5	2.14	10.780	4.208
195	H-20	50	47.5	2.42	10.940	4.121
196	H-20	50	47.5	2.42	10.940	4.121
196	H-20	50	47.5	2.52	11.120	4.045
197	H-20	50	47.5	2.59	11.160	4.024
197	H-20	50	47.5	2.95	11.490	3.877
198	H-20	50	47.5	3.01	11.520	3.862
198	H-20	50	47.5	3.35	11.830	3.732
199	H-20	50	47.5	3.42	11.870	3.714
199	H-20	50	47.5	3.73	12.150	3.602
200	H-20	50	47.5	3.8	12.190	3.585
200	H-20	50	47.5	4.1	12.460	3.483
201	H-20	50	47.5	4.16	12.490	3.470
201	H-20	50	47.5	4.44	12.730	3.383
202	H-20	50	47.5	4.51	12.770	3.366
202	H-20	50	47.5	4.77	12.990	3.289
203	H-20	50	47.5	4.83	13.020	3.277
203	H-20	50	47.5	5.07	13.230	3.207
204	H-20	50	47.5	5.13	13.260	3.195
204	H-20	50	47.5	5.35	13.450	3.134
205	H-20	50	47.5	5.41	13.470	3.125

205	H-20	50	47.5	5.62	13.640	3.070
206	H-20	50	47.5	5.66	13.670	3.061
206	H-20	50	47.5	5.86	13.820	3.013
207	H-20	50	47.5	5.9	13.840	3.006
207	H-20	50	47.5	6.08	13.960	2.967
208	H-20	50	47.5	6.12	13.980	2.960
208	H-20	50	47.5	6.28	14.080	2.928
209	H-20	50	47.5	6.32	14.100	2.921
209	H-20	50	47.5	6.46	14.180	2.894
210	H-20	50	47.5	6.49	14.200	2.888
210	H-20	50	47.5	6.62	14.260	2.867
211	H-20	50	47.5	6.65	14.270	2.863
211	H-20	50	47.5	6.76	14.310	2.847
212	H-20	50	47.5	6.78	14.320	2.844
212	H-20	50	47.5	6.83	14.190	2.866
213	H-20	50	47.5	6.83	14.190	2.866
213	H-20	50	47.5	6.87	14.370	2.827
214	H-20	50	47.5	6.89	14.370	2.826
214	H-20	50	47.5	6.97	14.400	2.815
215	H-20	50	47.5	6.98	14.390	2.816
215	H-20	50	47.5	7.04	14.400	2.810
216	H-20	50	47.5	7.05	14.390	2.811
216	H-20	50	47.5	7.09	14.370	2.812
217	H-20	50	47.5	7.09	14.360	2.814
217	H-20	50	47.5	7.12	14.310	2.822
218	H-20	50	47.5	7.12	14.300	2.824
218	H-20	50	47.5	7.13	14.230	2.837
219	H-20	50	47.5	7.13	14.220	2.839
219	H-20	50	47.5	7.12	14.130	2.858
220	H-20	50	47.5	7.11	14.110	2.863
220	H-20	50	47.5	7.09	14.000	2.886
221	H-20	50	47.5	7.07	13.980	2.892
221	H-20	50	47.5	7.03	13.830	2.926
222	H-20	50	47.5	7.02	13.820	2.929
222	H-20	50	47.5	6.96	13.640	2.972
223	H-20	50	47.5	6.94	13.620	2.978
223	H-20	50	47.5	6.86	13.430	3.026
224	H-20	50	47.5	6.84	13.400	3.034
224	H-20	50	47.5	6.75	13.180	3.092
225	H-20	50	47.5	6.72	13.150	3.101
225	H-20	50	47.5	6.61	12.900	3.170
226	H-20	50	47.5	6.58	12.870	3.179
226	H-20	50	47.5	6.46	12.590	3.260
227	H-20	50	47.5	6.42	12.560	3.271
227	H-20	50	47.5	6.28	12.240	3.368
228	H-20	50	47.5	6.24	12.210	3.379
228	H-20	50	47.5	6.08	11.860	3.492
229	H-20	50	47.5	6.03	11.820	3.508
229	H-20	50	47.5	5.99	11.660	3.560
230	H-20	50	47.5	5.99	11.660	3.560
230	H-20	50	47.5	5.86	11.460	3.634
231	H-20	50	47.5	5.81	11.410	3.654
231	H-20	50	47.5	5.61	11.010	3.805
232	H-20	50	47.5	5.56	10.950	3.830
232	H-20	50	47.5	5.35	10.520	4.007

233	H-20	50	47.5	5.29	10.460	4.035
233	H-20	50	47.5	5.07	9.990	4.247
234	H-20	50	47.5	5	9.930	4.280
234	H-20	50	47.5	4.76	9.430	4.532
235	H-20	50	47.5	4.69	9.360	4.574
235	H-20	50	47.5	4.44	8.830	4.877
236	H-20	50	47.5	4.37	8.760	4.924
236	H-20	50	47.5	4.09	8.180	5.307
237	H-20	50	47.5	4.02	8.110	5.361
237	H-20	50	47.5	3.72	7.500	5.837
238	H-20	50	47.5	3.65	7.420	5.910
238	H-20	50	47.5	3.34	6.770	6.523
239	H-20	50	47.5	3.26	6.680	6.623
239	H-20	50	47.5	2.93	5.990	7.441
240	H-20	50	47.5	2.85	5.900	7.568
240	H-20	50	47.5	2.5	5.160	8.721
241	H-20	50	47.5	2.43	5.060	8.907
241	H-20	50	47.5	2.05	4.280	10.619
242	H-20	50	47.5	1.98	4.170	10.916
242	H-20	50	47.5	1.59	3.330	13.787
243	H-20	50	47.5	1.51	3.220	14.283
243	H-20	50	47.5	1.1	2.320	20.000
244	H-20	50	47.5	1.03	2.200	21.123
244	H-20	50	47.5	0.59	1.240	37.831
245	H-20	50	47.5	0.52	1.130	41.575
245	H-20	50	47.5	0.07	0.250	189.720

LOAD RATING FIXED SPAN -GIRDER 1

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
538	CT-L3S2	50	47.5	0.06	0.250	189.760
538	CT-L3S2	50	47.5	0.53	0.980	47.929
539	CT-L3S2	50	47.5	0.53	1.090	43.092
539	CT-L3S2	50	47.5	1.05	1.900	24.447
540	CT-L3S2	50	47.5	1.07	2.020	22.985
540	CT-L3S2	50	47.5	1.56	2.770	16.585
541	CT-L3S2	50	47.5	1.59	2.880	15.941
541	CT-L3S2	50	47.5	2.06	3.580	12.693
542	CT-L3S2	50	47.5	2.09	3.690	12.306
542	CT-L3S2	50	47.5	2.54	4.340	10.359
543	CT-L3S2	50	47.5	2.57	4.440	10.119
543	CT-L3S2	50	47.5	3.01	5.050	8.810
544	CT-L3S2	50	47.5	3.03	5.150	8.635
544	CT-L3S2	50	47.5	3.45	5.730	7.688
545	CT-L3S2	50	47.5	3.47	5.820	7.565
545	CT-L3S2	50	47.5	3.87	6.360	6.860
546	CT-L3S2	50	47.5	3.89	6.450	6.761
546	CT-L3S2	50	47.5	4.26	6.960	6.213
547	CT-L3S2	50	47.5	4.29	7.040	6.138
547	CT-L3S2	50	47.5	4.64	7.510	5.707
548	CT-L3S2	50	47.5	4.67	7.590	5.643
548	CT-L3S2	50	47.5	4.99	8.040	5.287
549	CT-L3S2	50	47.5	5.02	8.110	5.238
549	CT-L3S2	50	47.5	5.32	8.530	4.945
550	CT-L3S2	50	47.5	5.35	8.590	4.907
550	CT-L3S2	50	47.5	5.63	9.080	4.611
551	CT-L3S2	50	47.5	5.66	9.130	4.583
551	CT-L3S2	50	47.5	5.92	9.590	4.336
552	CT-L3S2	50	47.5	5.94	9.630	4.316
552	CT-L3S2	50	47.5	6.18	10.050	4.111
553	CT-L3S2	50	47.5	6.2	10.080	4.097
553	CT-L3S2	50	47.5	6.37	10.340	3.978
554	CT-L3S2	50	47.5	6.37	10.340	3.978
554	CT-L3S2	50	47.5	6.42	10.470	3.924
555	CT-L3S2	50	47.5	6.44	10.480	3.918
555	CT-L3S2	50	47.5	6.64	10.830	3.773
556	CT-L3S2	50	47.5	6.65	10.860	3.762
556	CT-L3S2	50	47.5	6.83	11.150	3.648
557	CT-L3S2	50	47.5	6.84	11.190	3.634
557	CT-L3S2	50	47.5	7	11.440	3.540
558	CT-L3S2	50	47.5	7.01	11.480	3.527
558	CT-L3S2	50	47.5	7.15	11.700	3.449
559	CT-L3S2	50	47.5	7.16	11.730	3.439
559	CT-L3S2	50	47.5	7.27	11.910	3.378
560	CT-L3S2	50	47.5	7.28	11.940	3.369
560	CT-L3S2	50	47.5	7.38	12.100	3.316

Minimum Rating Factor 3.184

561	CT-L3S2	50	47.5	7.38	12.120	3.310
561	CT-L3S2	50	47.5	7.46	12.250	3.269
562	CT-L3S2	50	47.5	7.46	12.270	3.263
562	CT-L3S2	50	47.5	7.52	12.360	3.235
563	CT-L3S2	50	47.5	7.52	12.380	3.229
563	CT-L3S2	50	47.5	7.56	12.450	3.208
564	CT-L3S2	50	47.5	7.56	12.460	3.205
564	CT-L3S2	50	47.5	7.58	12.500	3.194
565	CT-L3S2	50	47.5	7.58	12.510	3.191
565	CT-L3S2	50	47.5	7.58	12.520	3.188
566	CT-L3S2	50	47.5	7.57	12.530	3.187
566	CT-L3S2	50	47.5	7.55	12.510	3.193
567	CT-L3S2	50	47.5	7.54	12.520	3.192
567	CT-L3S2	50	47.5	7.5	12.470	3.208
568	CT-L3S2	50	47.5	7.5	12.470	3.208
568	CT-L3S2	50	47.5	7.43	12.400	3.231
569	CT-L3S2	50	47.5	7.43	12.400	3.231
569	CT-L3S2	50	47.5	7.34	12.330	3.257
570	CT-L3S2	50	47.5	7.33	12.330	3.258
570	CT-L3S2	50	47.5	7.28	12.270	3.278
571	CT-L3S2	50	47.5	7.28	12.270	3.278
571	CT-L3S2	50	47.5	7.23	12.230	3.293
572	CT-L3S2	50	47.5	7.22	12.230	3.294
572	CT-L3S2	50	47.5	7.09	12.110	3.337
573	CT-L3S2	50	47.5	7.08	12.100	3.340
573	CT-L3S2	50	47.5	6.93	11.970	3.389
574	CT-L3S2	50	47.5	6.92	11.960	3.393
574	CT-L3S2	50	47.5	6.75	11.850	3.439
575	CT-L3S2	50	47.5	6.73	11.840	3.443
575	CT-L3S2	50	47.5	6.55	11.710	3.497
576	CT-L3S2	50	47.5	6.53	11.700	3.502
576	CT-L3S2	50	47.5	6.33	11.590	3.552
577	CT-L3S2	50	47.5	6.3	11.590	3.555
577	CT-L3S2	50	47.5	6.08	11.510	3.599
578	CT-L3S2	50	47.5	6.05	11.500	3.604
578	CT-L3S2	50	47.5	5.81	11.420	3.651
579	CT-L3S2	50	47.5	5.78	11.400	3.660
579	CT-L3S2	50	47.5	5.52	11.290	3.718
580	CT-L3S2	50	47.5	5.49	11.270	3.728
580	CT-L3S2	50	47.5	5.21	11.160	3.789
581	CT-L3S2	50	47.5	5.18	11.140	3.799
581	CT-L3S2	50	47.5	4.88	11.010	3.871
582	CT-L3S2	50	47.5	4.84	10.980	3.885
582	CT-L3S2	50	47.5	4.52	10.820	3.972
583	CT-L3S2	50	47.5	4.48	10.790	3.987
583	CT-L3S2	50	47.5	4.14	10.600	4.091
584	CT-L3S2	50	47.5	4.1	10.570	4.106
584	CT-L3S2	50	47.5	3.74	10.340	4.232
585	CT-L3S2	50	47.5	3.7	10.300	4.252
585	CT-L3S2	50	47.5	3.32	10.040	4.400
586	CT-L3S2	50	47.5	3.28	10.010	4.418
586	CT-L3S2	50	47.5	2.87	9.710	4.596
587	CT-L3S2	50	47.5	2.83	9.690	4.610
587	CT-L3S2	50	47.5	2.72	9.550	4.689
588	CT-L3S2	50	47.5	2.72	9.550	4.689

588	CT-L3S2	50	47.5	2.41	9.350	4.822
589	CT-L3S2	50	47.5	2.36	9.310	4.849
589	CT-L3S2	50	47.5	1.91	8.950	5.094
590	CT-L3S2	50	47.5	1.86	8.900	5.128
590	CT-L3S2	50	47.5	1.4	8.510	5.417
591	CT-L3S2	50	47.5	1.34	8.450	5.463
591	CT-L3S2	50	47.5	0.86	8.040	5.801
592	CT-L3S2	50	47.5	0.8	7.980	5.852
592	CT-L3S2	50	47.5	0.3	7.540	6.260
593	CT-L3S2	50	47.5	0.24	7.470	6.327
593	CT-L3S2	50	47.5	-0.33	7.000	6.739
594	CT-L3S2	50	47.5	-0.37	6.930	6.801
594	CT-L3S2	50	47.5	-0.94	6.500	7.163
595	CT-L3S2	50	47.5	-0.98	6.420	7.246
595	CT-L3S2	50	47.5	-1.57	6.000	7.655
596	CT-L3S2	50	47.5	-1.62	5.920	7.750
596	CT-L3S2	50	47.5	-2.22	-5.650	8.014
597	CT-L3S2	50	47.5	-2.28	-5.660	7.989
597	CT-L3S2	50	47.5	-2.9	-5.770	7.730
598	CT-L3S2	50	47.5	-2.96	-5.780	7.706
598	CT-L3S2	50	47.5	-3.61	-5.890	7.452
599	CT-L3S2	50	47.5	-3.66	-5.900	7.431
599	CT-L3S2	50	47.5	-4.33	-6.000	7.195
600	CT-L3S2	50	47.5	-4.39	-6.020	7.161
600	CT-L3S2	50	47.5	-5.09	-6.130	6.918
601	CT-L3S2	50	47.5	-5.15	-6.140	6.897
601	CT-L3S2	50	47.5	-5.86	-6.250	6.662
602	CT-L3S2	50	47.5	-5.93	-6.270	6.630
602	CT-L3S2	50	47.5	-6.66	-6.370	6.411
603	CT-L3S2	50	47.5	-6.74	-6.390	6.379
603	CT-L3S2	50	47.5	-7.49	-6.500	6.155
604	CT-L3S2	50	47.5	-7.57	-6.520	6.124
604	CT-L3S2	50	47.5	-8.34	-6.630	5.906
605	CT-L3S2	50	47.5	-8.43	-6.650	5.875
605	CT-L3S2	50	47.5	-9.22	-7.100	5.392
606	CT-L3S2	50	47.5	-9.33	-7.120	5.361
606	CT-L3S2	50	47.5	-10.13	-7.590	4.924
607	CT-L3S2	50	47.5	-10.25	-7.620	4.888
607	CT-L3S2	50	47.5	-11.07	-8.100	4.498
608	CT-L3S2	50	47.5	-11.2	-8.130	4.465
608	CT-L3S2	50	47.5	-12.06	-8.700	4.074
609	CT-L3S2	50	47.5	-12.18	-8.780	4.023
609	CT-L3S2	50	47.5	-13.08	-9.520	3.616
610	CT-L3S2	50	47.5	-13.17	-9.570	3.587
610	CT-L3S2	50	47.5	-14.14	-10.380	3.214
611	CT-L3S2	50	47.5	-14.16	-10.370	3.215
611	CT-L3S2	50	47.5	-13.19	-9.570	3.585
612	CT-L3S2	50	47.5	-13.1	-9.530	3.610
612	CT-L3S2	50	47.5	-12.2	-8.770	4.025
613	CT-L3S2	50	47.5	-12.08	-8.700	4.071
613	CT-L3S2	50	47.5	-11.22	-8.160	4.446
614	CT-L3S2	50	47.5	-11.09	-8.120	4.484
614	CT-L3S2	50	47.5	-10.27	-7.650	4.867
615	CT-L3S2	50	47.5	-10.14	-7.610	4.909
615	CT-L3S2	50	47.5	-9.34	-7.150	5.337

616	CT-L3S2	50	47.5	-9.24	-7.130	5.366
616	CT-L3S2	50	47.5	-8.45	-6.680	5.846
617	CT-L3S2	50	47.5	-8.36	-6.650	5.886
617	CT-L3S2	50	47.5	-7.58	-6.550	6.095
618	CT-L3S2	50	47.5	-7.5	-6.530	6.126
618	CT-L3S2	50	47.5	-6.75	-6.420	6.347
619	CT-L3S2	50	47.5	-6.68	-6.400	6.378
619	CT-L3S2	50	47.5	-5.94	-6.290	6.607
620	CT-L3S2	50	47.5	-5.87	-6.280	6.629
620	CT-L3S2	50	47.5	-5.16	-6.170	6.862
621	CT-L3S2	50	47.5	-5.1	-6.150	6.894
621	CT-L3S2	50	47.5	-4.41	-6.050	7.122
622	CT-L3S2	50	47.5	-4.34	-6.030	7.158
622	CT-L3S2	50	47.5	-3.68	-5.920	7.402
623	CT-L3S2	50	47.5	-3.62	-5.910	7.425
623	CT-L3S2	50	47.5	-2.97	-5.810	7.664
624	CT-L3S2	50	47.5	-2.91	-5.790	7.701
624	CT-L3S2	50	47.5	-2.29	-5.690	7.946
625	CT-L3S2	50	47.5	-2.23	-5.680	7.970
625	CT-L3S2	50	47.5	-1.63	5.920	7.748
626	CT-L3S2	50	47.5	-1.58	6.000	7.653
626	CT-L3S2	50	47.5	-0.99	6.420	7.245
627	CT-L3S2	50	47.5	-0.94	6.500	7.163
627	CT-L3S2	50	47.5	-0.38	6.970	6.760
628	CT-L3S2	50	47.5	-0.33	7.040	6.700
628	CT-L3S2	50	47.5	0.23	7.500	6.303
629	CT-L3S2	50	47.5	0.29	7.570	6.236
629	CT-L3S2	50	47.5	0.79	8.010	5.831
630	CT-L3S2	50	47.5	0.85	8.070	5.781
630	CT-L3S2	50	47.5	1.34	8.490	5.437
631	CT-L3S2	50	47.5	1.39	8.540	5.399
631	CT-L3S2	50	47.5	1.85	8.930	5.112
632	CT-L3S2	50	47.5	1.91	8.980	5.077
632	CT-L3S2	50	47.5	2.35	9.350	4.829
633	CT-L3S2	50	47.5	2.4	9.380	4.808
633	CT-L3S2	50	47.5	2.71	9.590	4.670
634	CT-L3S2	50	47.5	2.71	9.580	4.675
634	CT-L3S2	50	47.5	2.82	9.720	4.597
635	CT-L3S2	50	47.5	2.87	9.750	4.577
635	CT-L3S2	50	47.5	3.27	10.040	4.405
636	CT-L3S2	50	47.5	3.31	10.080	4.384
636	CT-L3S2	50	47.5	3.7	10.340	4.236
637	CT-L3S2	50	47.5	3.74	10.380	4.216
637	CT-L3S2	50	47.5	4.1	10.600	4.094
638	CT-L3S2	50	47.5	4.14	10.640	4.075
638	CT-L3S2	50	47.5	4.48	10.830	3.972
639	CT-L3S2	50	47.5	4.52	10.860	3.958
639	CT-L3S2	50	47.5	4.84	11.020	3.871
640	CT-L3S2	50	47.5	4.87	11.050	3.858
640	CT-L3S2	50	47.5	5.17	11.180	3.786
641	CT-L3S2	50	47.5	5.21	11.200	3.776
641	CT-L3S2	50	47.5	5.49	11.290	3.721
642	CT-L3S2	50	47.5	5.52	11.320	3.708
642	CT-L3S2	50	47.5	5.78	11.420	3.653
643	CT-L3S2	50	47.5	5.81	11.440	3.644

643	CT-L3S2	50	47.5	6.05	11.520	3.598
644	CT-L3S2	50	47.5	6.08	11.540	3.589
644	CT-L3S2	50	47.5	6.3	11.610	3.549
645	CT-L3S2	50	47.5	6.32	11.610	3.547
645	CT-L3S2	50	47.5	6.53	11.710	3.499
646	CT-L3S2	50	47.5	6.55	11.720	3.494
646	CT-L3S2	50	47.5	6.73	11.850	3.441
647	CT-L3S2	50	47.5	6.75	11.860	3.436
647	CT-L3S2	50	47.5	6.91	11.970	3.391
648	CT-L3S2	50	47.5	6.93	11.980	3.386
648	CT-L3S2	50	47.5	7.08	12.110	3.338
649	CT-L3S2	50	47.5	7.09	12.130	3.331
649	CT-L3S2	50	47.5	7.22	12.240	3.291
650	CT-L3S2	50	47.5	7.23	12.250	3.287
650	CT-L3S2	50	47.5	7.28	12.280	3.275
651	CT-L3S2	50	47.5	7.28	12.280	3.275
651	CT-L3S2	50	47.5	7.33	12.340	3.255
652	CT-L3S2	50	47.5	7.34	12.350	3.252
652	CT-L3S2	50	47.5	7.43	12.410	3.229
653	CT-L3S2	50	47.5	7.43	12.410	3.229
653	CT-L3S2	50	47.5	7.5	12.490	3.203
654	CT-L3S2	50	47.5	7.5	12.480	3.205
654	CT-L3S2	50	47.5	7.55	12.530	3.188
655	CT-L3S2	50	47.5	7.55	12.520	3.191
655	CT-L3S2	50	47.5	7.57	12.540	3.184
656	CT-L3S2	50	47.5	7.58	12.530	3.186
656	CT-L3S2	50	47.5	7.58	12.530	3.186
657	CT-L3S2	50	47.5	7.58	12.510	3.191
657	CT-L3S2	50	47.5	7.57	12.480	3.200
658	CT-L3S2	50	47.5	7.57	12.460	3.205
658	CT-L3S2	50	47.5	7.53	12.400	3.223
659	CT-L3S2	50	47.5	7.53	12.380	3.229
659	CT-L3S2	50	47.5	7.47	12.280	3.260
660	CT-L3S2	50	47.5	7.47	12.260	3.265
660	CT-L3S2	50	47.5	7.39	12.130	3.307
661	CT-L3S2	50	47.5	7.39	12.110	3.312
661	CT-L3S2	50	47.5	7.29	11.950	3.365
662	CT-L3S2	50	47.5	7.29	11.930	3.370
662	CT-L3S2	50	47.5	7.17	11.740	3.435
663	CT-L3S2	50	47.5	7.16	11.710	3.445
663	CT-L3S2	50	47.5	7.03	11.490	3.522
664	CT-L3S2	50	47.5	7.02	11.450	3.535
664	CT-L3S2	50	47.5	6.86	11.200	3.629
665	CT-L3S2	50	47.5	6.85	11.160	3.642
665	CT-L3S2	50	47.5	6.67	10.870	3.756
666	CT-L3S2	50	47.5	6.66	10.840	3.768
666	CT-L3S2	50	47.5	6.46	10.490	3.912
667	CT-L3S2	50	47.5	6.45	10.480	3.917
667	CT-L3S2	50	47.5	6.39	10.350	3.972
668	CT-L3S2	50	47.5	6.39	10.350	3.972
668	CT-L3S2	50	47.5	6.23	10.090	4.090
669	CT-L3S2	50	47.5	6.21	10.060	4.104
669	CT-L3S2	50	47.5	5.97	9.630	4.313
670	CT-L3S2	50	47.5	5.95	9.600	4.328
670	CT-L3S2	50	47.5	5.69	9.140	4.574

671	CT-L3S2	50	47.5	5.67	9.090	4.602
671	CT-L3S2	50	47.5	5.39	8.600	4.897
672	CT-L3S2	50	47.5	5.37	8.530	4.939
672	CT-L3S2	50	47.5	5.07	8.110	5.232
673	CT-L3S2	50	47.5	5.04	8.040	5.281
673	CT-L3S2	50	47.5	4.72	7.590	5.636
674	CT-L3S2	50	47.5	4.69	7.520	5.693
674	CT-L3S2	50	47.5	4.36	7.040	6.128
675	CT-L3S2	50	47.5	4.32	6.960	6.204
675	CT-L3S2	50	47.5	3.97	6.440	6.759
676	CT-L3S2	50	47.5	3.93	6.360	6.851
676	CT-L3S2	50	47.5	3.56	5.810	7.563
677	CT-L3S2	50	47.5	3.52	5.730	7.675
677	CT-L3S2	50	47.5	3.12	5.140	8.634
678	CT-L3S2	50	47.5	3.08	5.050	8.796
678	CT-L3S2	50	47.5	2.66	4.430	10.122
679	CT-L3S2	50	47.5	2.62	4.330	10.365
679	CT-L3S2	50	47.5	2.18	3.670	12.349
680	CT-L3S2	50	47.5	2.14	3.560	12.742
680	CT-L3S2	50	47.5	1.67	2.860	16.024
681	CT-L3S2	50	47.5	1.64	2.750	16.676
681	CT-L3S2	50	47.5	1.15	1.990	23.291
682	CT-L3S2	50	47.5	1.11	1.880	24.676
682	CT-L3S2	50	47.5	0.59	1.070	43.841
683	CT-L3S2	50	47.5	0.57	0.970	48.381
683	CT-L3S2	50	47.5	0.04	0.260	182.538

LOAD RATING FIXED SPAN -GIRDER 2

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
392	CT-L3S2	50	47.5	0.05	-0.050	949.000
392	CT-L3S2	50	47.5	0.67	1.040	45.029
393	CT-L3S2	50	47.5	0.63	1.010	46.406
393	CT-L3S2	50	47.5	1.24	1.970	23.482
394	CT-L3S2	50	47.5	1.2	1.930	23.990
394	CT-L3S2	50	47.5	1.74	2.790	16.401
395	CT-L3S2	50	47.5	1.71	2.760	16.591
395	CT-L3S2	50	47.5	2.21	3.550	12.758
396	CT-L3S2	50	47.5	2.19	3.520	12.872
396	CT-L3S2	50	47.5	2.65	4.250	10.553
397	CT-L3S2	50	47.5	2.64	4.220	10.630
397	CT-L3S2	50	47.5	3.08	4.890	9.084
398	CT-L3S2	50	47.5	3.07	4.870	9.123
398	CT-L3S2	50	47.5	3.48	5.490	8.018
399	CT-L3S2	50	47.5	3.47	5.490	8.020
399	CT-L3S2	50	47.5	3.87	6.070	7.188
400	CT-L3S2	50	47.5	3.86	6.060	7.201
400	CT-L3S2	50	47.5	4.24	6.600	6.555
401	CT-L3S2	50	47.5	4.23	6.590	6.566
401	CT-L3S2	50	47.5	4.59	7.090	6.052
402	CT-L3S2	50	47.5	4.58	7.080	6.062
402	CT-L3S2	50	47.5	4.92	7.550	5.640
403	CT-L3S2	50	47.5	4.91	7.550	5.641
403	CT-L3S2	50	47.5	5.23	8.130	5.199
404	CT-L3S2	50	47.5	5.22	8.130	5.200
404	CT-L3S2	50	47.5	5.52	8.670	4.842
405	CT-L3S2	50	47.5	5.51	8.670	4.843
405	CT-L3S2	50	47.5	5.78	9.170	4.550
406	CT-L3S2	50	47.5	5.78	9.170	4.550
406	CT-L3S2	50	47.5	6.03	9.620	4.311
407	CT-L3S2	50	47.5	6.03	9.620	4.311
407	CT-L3S2	50	47.5	6.2	9.880	4.180
408	CT-L3S2	50	47.5	6.2	9.880	4.180
408	CT-L3S2	50	47.5	6.26	10.030	4.112
409	CT-L3S2	50	47.5	6.25	10.030	4.113
409	CT-L3S2	50	47.5	6.46	10.430	3.935
410	CT-L3S2	50	47.5	6.46	10.430	3.935
410	CT-L3S2	50	47.5	6.64	10.780	3.790
411	CT-L3S2	50	47.5	6.64	10.780	3.790
411	CT-L3S2	50	47.5	6.8	11.080	3.673
412	CT-L3S2	50	47.5	6.8	11.080	3.673
412	CT-L3S2	50	47.5	6.94	11.350	3.574
413	CT-L3S2	50	47.5	6.94	11.350	3.574
413	CT-L3S2	50	47.5	7.06	11.570	3.495
414	CT-L3S2	50	47.5	7.06	11.570	3.495
414	CT-L3S2	50	47.5	7.16	11.750	3.433

Minimum Rating Factor 3.312

415	CT-L3S2	50	47.5	7.15	11.750	3.434
415	CT-L3S2	50	47.5	7.23	11.900	3.384
416	CT-L3S2	50	47.5	7.23	11.900	3.384
416	CT-L3S2	50	47.5	7.29	12.010	3.348
417	CT-L3S2	50	47.5	7.29	12.000	3.351
417	CT-L3S2	50	47.5	7.32	12.080	3.326
418	CT-L3S2	50	47.5	7.32	12.080	3.326
418	CT-L3S2	50	47.5	7.33	12.110	3.317
419	CT-L3S2	50	47.5	7.33	12.110	3.317
419	CT-L3S2	50	47.5	7.32	12.110	3.318
420	CT-L3S2	50	47.5	7.33	12.110	3.317
420	CT-L3S2	50	47.5	7.29	12.090	3.326
421	CT-L3S2	50	47.5	7.3	12.090	3.325
421	CT-L3S2	50	47.5	7.24	12.050	3.341
422	CT-L3S2	50	47.5	7.25	12.070	3.335
422	CT-L3S2	50	47.5	7.17	11.990	3.364
423	CT-L3S2	50	47.5	7.17	12.010	3.358
423	CT-L3S2	50	47.5	7.08	11.900	3.397
424	CT-L3S2	50	47.5	7.08	11.920	3.391
424	CT-L3S2	50	47.5	7.03	11.810	3.427
425	CT-L3S2	50	47.5	7.02	11.810	3.428
425	CT-L3S2	50	47.5	6.96	11.790	3.439
426	CT-L3S2	50	47.5	6.97	11.800	3.435
426	CT-L3S2	50	47.5	6.83	11.680	3.482
427	CT-L3S2	50	47.5	6.83	11.680	3.482
427	CT-L3S2	50	47.5	6.67	11.540	3.538
428	CT-L3S2	50	47.5	6.67	11.540	3.538
428	CT-L3S2	50	47.5	6.49	11.460	3.579
429	CT-L3S2	50	47.5	6.49	11.450	3.582
429	CT-L3S2	50	47.5	6.29	11.350	3.631
430	CT-L3S2	50	47.5	6.29	11.350	3.631
430	CT-L3S2	50	47.5	6.06	11.230	3.690
431	CT-L3S2	50	47.5	6.07	11.220	3.693
431	CT-L3S2	50	47.5	5.82	11.150	3.738
432	CT-L3S2	50	47.5	5.82	11.150	3.738
432	CT-L3S2	50	47.5	5.55	11.060	3.793
433	CT-L3S2	50	47.5	5.56	11.060	3.792
433	CT-L3S2	50	47.5	5.27	10.950	3.857
434	CT-L3S2	50	47.5	5.27	10.940	3.860
434	CT-L3S2	50	47.5	4.96	10.800	3.939
435	CT-L3S2	50	47.5	4.97	10.800	3.938
435	CT-L3S2	50	47.5	4.63	10.640	4.029
436	CT-L3S2	50	47.5	4.64	10.650	4.024
436	CT-L3S2	50	47.5	4.28	10.470	4.128
437	CT-L3S2	50	47.5	4.29	10.480	4.123
437	CT-L3S2	50	47.5	3.91	10.260	4.249
438	CT-L3S2	50	47.5	3.92	10.270	4.243
438	CT-L3S2	50	47.5	3.52	10.010	4.394
439	CT-L3S2	50	47.5	3.52	10.010	4.394
439	CT-L3S2	50	47.5	3.11	9.720	4.567
440	CT-L3S2	50	47.5	3.11	9.720	4.567
440	CT-L3S2	50	47.5	2.67	9.380	4.779
441	CT-L3S2	50	47.5	2.67	9.390	4.774
441	CT-L3S2	50	47.5	2.56	9.220	4.874
442	CT-L3S2	50	47.5	2.56	9.220	4.874

442	CT-L3S2	50	47.5	2.21	9.040	5.010
443	CT-L3S2	50	47.5	2.22	9.050	5.003
443	CT-L3S2	50	47.5	1.73	8.670	5.279
444	CT-L3S2	50	47.5	1.74	8.680	5.272
444	CT-L3S2	50	47.5	1.23	8.270	5.595
445	CT-L3S2	50	47.5	1.23	8.270	5.595
445	CT-L3S2	50	47.5	0.71	7.830	5.976
446	CT-L3S2	50	47.5	0.71	7.830	5.976
446	CT-L3S2	50	47.5	0.17	7.350	6.439
447	CT-L3S2	50	47.5	0.17	7.360	6.431
447	CT-L3S2	50	47.5	-0.4	6.850	6.876
448	CT-L3S2	50	47.5	-0.41	6.850	6.874
448	CT-L3S2	50	47.5	-0.99	6.320	7.359
449	CT-L3S2	50	47.5	-0.99	6.320	7.359
449	CT-L3S2	50	47.5	-1.6	5.820	7.887
450	CT-L3S2	50	47.5	-1.6	5.830	7.873
450	CT-L3S2	50	47.5	-2.23	-5.510	8.216
451	CT-L3S2	50	47.5	-2.23	-5.510	8.216
451	CT-L3S2	50	47.5	-2.88	-5.620	7.940
452	CT-L3S2	50	47.5	-2.88	-5.620	7.940
452	CT-L3S2	50	47.5	-3.55	-5.720	7.684
453	CT-L3S2	50	47.5	-3.55	-5.720	7.684
453	CT-L3S2	50	47.5	-4.24	-5.830	7.420
454	CT-L3S2	50	47.5	-4.24	-5.830	7.420
454	CT-L3S2	50	47.5	-4.95	-5.940	7.163
455	CT-L3S2	50	47.5	-4.95	-5.940	7.163
455	CT-L3S2	50	47.5	-5.69	-6.050	6.911
456	CT-L3S2	50	47.5	-5.69	-6.050	6.911
456	CT-L3S2	50	47.5	-6.45	-6.160	6.664
457	CT-L3S2	50	47.5	-6.45	-6.160	6.664
457	CT-L3S2	50	47.5	-7.22	-6.270	6.424
458	CT-L3S2	50	47.5	-7.22	-6.280	6.414
458	CT-L3S2	50	47.5	-8.03	-6.390	6.177
459	CT-L3S2	50	47.5	-8.03	-6.390	6.177
459	CT-L3S2	50	47.5	-8.85	-6.510	5.937
460	CT-L3S2	50	47.5	-8.85	-6.510	5.937
460	CT-L3S2	50	47.5	-9.69	-6.870	5.504
461	CT-L3S2	50	47.5	-9.7	-6.890	5.486
461	CT-L3S2	50	47.5	-10.56	-7.440	4.965
462	CT-L3S2	50	47.5	-10.56	-7.440	4.965
462	CT-L3S2	50	47.5	-11.44	-8.040	4.485
463	CT-L3S2	50	47.5	-11.44	-8.040	4.485
463	CT-L3S2	50	47.5	-12.33	-8.630	4.075
464	CT-L3S2	50	47.5	-12.33	-8.630	4.075
464	CT-L3S2	50	47.5	-13.23	-9.240	3.709
465	CT-L3S2	50	47.5	-13.24	-9.240	3.708
465	CT-L3S2	50	47.5	-12.34	-8.630	4.074
466	CT-L3S2	50	47.5	-12.34	-8.630	4.074
466	CT-L3S2	50	47.5	-11.45	-8.040	4.484
467	CT-L3S2	50	47.5	-11.44	-8.040	4.485
467	CT-L3S2	50	47.5	-10.56	-7.450	4.958
468	CT-L3S2	50	47.5	-10.56	-7.450	4.958
468	CT-L3S2	50	47.5	-9.7	-6.910	5.470
469	CT-L3S2	50	47.5	-9.7	-6.900	5.478
469	CT-L3S2	50	47.5	-8.86	-6.550	5.899

470	CT-L3S2	50	47.5	-8.85	-6.550	5.901
470	CT-L3S2	50	47.5	-8.03	-6.430	6.138
471	CT-L3S2	50	47.5	-8.03	-6.430	6.138
471	CT-L3S2	50	47.5	-7.23	-6.320	6.372
472	CT-L3S2	50	47.5	-7.23	-6.310	6.382
472	CT-L3S2	50	47.5	-6.45	-6.200	6.621
473	CT-L3S2	50	47.5	-6.45	-6.200	6.621
473	CT-L3S2	50	47.5	-5.69	-6.090	6.865
474	CT-L3S2	50	47.5	-5.69	-6.090	6.865
474	CT-L3S2	50	47.5	-4.96	-5.980	7.114
475	CT-L3S2	50	47.5	-4.96	-5.980	7.114
475	CT-L3S2	50	47.5	-4.24	-5.870	7.370
476	CT-L3S2	50	47.5	-4.24	-5.870	7.370
476	CT-L3S2	50	47.5	-3.55	-5.760	7.630
477	CT-L3S2	50	47.5	-3.55	-5.760	7.630
477	CT-L3S2	50	47.5	-2.88	-5.650	7.897
478	CT-L3S2	50	47.5	-2.88	-5.660	7.883
478	CT-L3S2	50	47.5	-2.23	-5.550	8.157
479	CT-L3S2	50	47.5	-2.23	-5.550	8.157
479	CT-L3S2	50	47.5	-1.6	5.840	7.860
480	CT-L3S2	50	47.5	-1.6	5.840	7.860
480	CT-L3S2	50	47.5	-0.99	6.360	7.313
481	CT-L3S2	50	47.5	-0.99	6.350	7.324
481	CT-L3S2	50	47.5	-0.41	6.890	6.835
482	CT-L3S2	50	47.5	-0.41	6.880	6.844
482	CT-L3S2	50	47.5	0.17	7.390	6.405
483	CT-L3S2	50	47.5	0.17	7.390	6.405
483	CT-L3S2	50	47.5	0.71	7.860	5.953
484	CT-L3S2	50	47.5	0.71	7.860	5.953
484	CT-L3S2	50	47.5	1.23	8.310	5.568
485	CT-L3S2	50	47.5	1.23	8.300	5.575
485	CT-L3S2	50	47.5	1.73	8.710	5.255
486	CT-L3S2	50	47.5	1.73	8.710	5.255
486	CT-L3S2	50	47.5	2.21	9.080	4.988
487	CT-L3S2	50	47.5	2.21	9.080	4.988
487	CT-L3S2	50	47.5	2.56	9.260	4.853
488	CT-L3S2	50	47.5	2.56	9.260	4.853
488	CT-L3S2	50	47.5	2.67	9.430	4.754
489	CT-L3S2	50	47.5	2.67	9.420	4.759
489	CT-L3S2	50	47.5	3.11	9.760	4.548
490	CT-L3S2	50	47.5	3.1	9.750	4.554
490	CT-L3S2	50	47.5	3.52	10.050	4.376
491	CT-L3S2	50	47.5	3.52	10.040	4.380
491	CT-L3S2	50	47.5	3.91	10.300	4.232
492	CT-L3S2	50	47.5	3.91	10.300	4.232
492	CT-L3S2	50	47.5	4.28	10.520	4.108
493	CT-L3S2	50	47.5	4.28	10.510	4.112
493	CT-L3S2	50	47.5	4.63	10.690	4.010
494	CT-L3S2	50	47.5	4.63	10.680	4.014
494	CT-L3S2	50	47.5	4.96	10.830	3.928
495	CT-L3S2	50	47.5	4.96	10.840	3.924
495	CT-L3S2	50	47.5	5.27	10.970	3.850
496	CT-L3S2	50	47.5	5.27	10.980	3.846
496	CT-L3S2	50	47.5	5.56	11.090	3.782
497	CT-L3S2	50	47.5	5.55	11.100	3.779

497	CT-L3S2	50	47.5	5.82	11.180	3.728
498	CT-L3S2	50	47.5	5.82	11.180	3.728
498	CT-L3S2	50	47.5	6.06	11.250	3.684
499	CT-L3S2	50	47.5	6.06	11.240	3.687
499	CT-L3S2	50	47.5	6.29	11.360	3.628
500	CT-L3S2	50	47.5	6.28	11.370	3.625
500	CT-L3S2	50	47.5	6.49	11.470	3.575
501	CT-L3S2	50	47.5	6.48	11.470	3.576
501	CT-L3S2	50	47.5	6.67	11.550	3.535
502	CT-L3S2	50	47.5	6.66	11.550	3.536
502	CT-L3S2	50	47.5	6.82	11.700	3.477
503	CT-L3S2	50	47.5	6.82	11.690	3.480
503	CT-L3S2	50	47.5	6.96	11.820	3.430
504	CT-L3S2	50	47.5	6.96	11.810	3.433
504	CT-L3S2	50	47.5	7.02	11.830	3.422
505	CT-L3S2	50	47.5	7.02	11.830	3.422
505	CT-L3S2	50	47.5	7.08	11.940	3.385
506	CT-L3S2	50	47.5	7.07	11.920	3.392
506	CT-L3S2	50	47.5	7.17	12.030	3.352
507	CT-L3S2	50	47.5	7.17	12.010	3.358
507	CT-L3S2	50	47.5	7.24	12.080	3.333
508	CT-L3S2	50	47.5	7.24	12.070	3.336
508	CT-L3S2	50	47.5	7.29	12.110	3.320
509	CT-L3S2	50	47.5	7.29	12.100	3.323
509	CT-L3S2	50	47.5	7.32	12.130	3.312
510	CT-L3S2	50	47.5	7.32	12.130	3.312
510	CT-L3S2	50	47.5	7.33	12.130	3.312
511	CT-L3S2	50	47.5	7.33	12.130	3.312
511	CT-L3S2	50	47.5	7.31	12.090	3.324
512	CT-L3S2	50	47.5	7.31	12.090	3.324
512	CT-L3S2	50	47.5	7.28	12.020	3.346
513	CT-L3S2	50	47.5	7.28	12.020	3.346
513	CT-L3S2	50	47.5	7.22	11.910	3.382
514	CT-L3S2	50	47.5	7.22	11.910	3.382
514	CT-L3S2	50	47.5	7.14	11.770	3.429
515	CT-L3S2	50	47.5	7.14	11.770	3.429
515	CT-L3S2	50	47.5	7.04	11.580	3.494
516	CT-L3S2	50	47.5	7.04	11.590	3.491
516	CT-L3S2	50	47.5	6.92	11.360	3.572
517	CT-L3S2	50	47.5	6.92	11.360	3.572
517	CT-L3S2	50	47.5	6.78	11.100	3.668
518	CT-L3S2	50	47.5	6.78	11.100	3.668
518	CT-L3S2	50	47.5	6.62	10.790	3.789
519	CT-L3S2	50	47.5	6.62	10.790	3.789
519	CT-L3S2	50	47.5	6.43	10.440	3.934
520	CT-L3S2	50	47.5	6.43	10.450	3.930
520	CT-L3S2	50	47.5	6.23	10.050	4.106
521	CT-L3S2	50	47.5	6.23	10.050	4.106
521	CT-L3S2	50	47.5	6.17	9.890	4.179
522	CT-L3S2	50	47.5	6.17	9.890	4.179
522	CT-L3S2	50	47.5	6	9.640	4.305
523	CT-L3S2	50	47.5	6	9.640	4.305
523	CT-L3S2	50	47.5	5.75	9.190	4.543
524	CT-L3S2	50	47.5	5.75	9.190	4.543
524	CT-L3S2	50	47.5	5.48	8.690	4.835

525	CT-L3S2	50	47.5	5.48	8.690	4.835
525	CT-L3S2	50	47.5	5.18	8.140	5.199
526	CT-L3S2	50	47.5	5.19	8.140	5.198
526	CT-L3S2	50	47.5	4.87	7.560	5.639
527	CT-L3S2	50	47.5	4.87	7.570	5.631
527	CT-L3S2	50	47.5	4.53	7.100	6.052
528	CT-L3S2	50	47.5	4.54	7.100	6.051
528	CT-L3S2	50	47.5	4.18	6.600	6.564
529	CT-L3S2	50	47.5	4.18	6.610	6.554
529	CT-L3S2	50	47.5	3.8	6.070	7.199
530	CT-L3S2	50	47.5	3.8	6.080	7.188
530	CT-L3S2	50	47.5	3.4	5.500	8.018
531	CT-L3S2	50	47.5	3.4	5.510	8.004
531	CT-L3S2	50	47.5	2.98	4.890	9.104
532	CT-L3S2	50	47.5	2.98	4.910	9.067
532	CT-L3S2	50	47.5	2.53	4.240	10.606
533	CT-L3S2	50	47.5	2.54	4.260	10.554
533	CT-L3S2	50	47.5	2.07	3.540	12.833
534	CT-L3S2	50	47.5	2.07	3.570	12.725
534	CT-L3S2	50	47.5	1.58	2.780	16.518
535	CT-L3S2	50	47.5	1.58	2.810	16.342
535	CT-L3S2	50	47.5	1.08	1.950	23.805
536	CT-L3S2	50	47.5	1.07	1.980	23.449
536	CT-L3S2	50	47.5	0.55	1.020	46.029
537	CT-L3S2	50	47.5	0.55	1.050	44.714
537	CT-L3S2	50	47.5	0.01	-0.060	791.500

LOAD RATING FIXED SPAN -GIRDER 3

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
246	CT-L3S2	50	47.5	0.05	-0.050	949.000
246	CT-L3S2	50	47.5	0.67	1.040	45.029
247	CT-L3S2	50	47.5	0.62	1.010	46.416
247	CT-L3S2	50	47.5	1.22	1.970	23.492
248	CT-L3S2	50	47.5	1.18	1.930	24.000
248	CT-L3S2	50	47.5	1.71	2.790	16.412
249	CT-L3S2	50	47.5	1.68	2.760	16.601
249	CT-L3S2	50	47.5	2.16	3.550	12.772
250	CT-L3S2	50	47.5	2.14	3.520	12.886
250	CT-L3S2	50	47.5	2.59	4.240	10.592
251	CT-L3S2	50	47.5	2.57	4.220	10.647
251	CT-L3S2	50	47.5	3	4.890	9.100
252	CT-L3S2	50	47.5	2.99	4.870	9.140
252	CT-L3S2	50	47.5	3.4	5.490	8.033
253	CT-L3S2	50	47.5	3.39	5.490	8.035
253	CT-L3S2	50	47.5	3.77	6.070	7.204
254	CT-L3S2	50	47.5	3.77	6.060	7.216
254	CT-L3S2	50	47.5	4.14	6.600	6.570
255	CT-L3S2	50	47.5	4.14	6.590	6.580
255	CT-L3S2	50	47.5	4.48	7.090	6.068
256	CT-L3S2	50	47.5	4.48	7.080	6.076
256	CT-L3S2	50	47.5	4.8	7.550	5.656
257	CT-L3S2	50	47.5	4.81	7.550	5.654
257	CT-L3S2	50	47.5	5.11	8.130	5.214
258	CT-L3S2	50	47.5	5.11	8.130	5.214
258	CT-L3S2	50	47.5	5.39	8.670	4.857
259	CT-L3S2	50	47.5	5.39	8.670	4.857
259	CT-L3S2	50	47.5	5.65	9.170	4.564
260	CT-L3S2	50	47.5	5.66	9.170	4.563
260	CT-L3S2	50	47.5	5.9	9.620	4.324
261	CT-L3S2	50	47.5	5.9	9.620	4.324
261	CT-L3S2	50	47.5	6.07	9.880	4.193
262	CT-L3S2	50	47.5	6.07	9.880	4.193
262	CT-L3S2	50	47.5	6.12	10.030	4.126
263	CT-L3S2	50	47.5	6.12	10.030	4.126
263	CT-L3S2	50	47.5	6.32	10.430	3.948
264	CT-L3S2	50	47.5	6.32	10.430	3.948
264	CT-L3S2	50	47.5	6.49	10.780	3.804
265	CT-L3S2	50	47.5	6.5	10.780	3.803
265	CT-L3S2	50	47.5	6.65	11.080	3.687
266	CT-L3S2	50	47.5	6.65	11.080	3.687
266	CT-L3S2	50	47.5	6.79	11.350	3.587
267	CT-L3S2	50	47.5	6.79	11.350	3.587
267	CT-L3S2	50	47.5	6.9	11.570	3.509
268	CT-L3S2	50	47.5	6.91	11.570	3.508
268	CT-L3S2	50	47.5	7	11.750	3.447

Minimum Rating Factor 3.325

269	CT-L3S2	50	47.5	7	11.750	3.447
269	CT-L3S2	50	47.5	7.08	11.900	3.397
270	CT-L3S2	50	47.5	7.08	11.900	3.397
270	CT-L3S2	50	47.5	7.13	12.000	3.364
271	CT-L3S2	50	47.5	7.13	12.000	3.364
271	CT-L3S2	50	47.5	7.16	12.080	3.339
272	CT-L3S2	50	47.5	7.16	12.070	3.342
272	CT-L3S2	50	47.5	7.18	12.110	3.329
273	CT-L3S2	50	47.5	7.18	12.110	3.329
273	CT-L3S2	50	47.5	7.17	12.110	3.330
274	CT-L3S2	50	47.5	7.17	12.110	3.330
274	CT-L3S2	50	47.5	7.14	12.080	3.341
275	CT-L3S2	50	47.5	7.14	12.090	3.338
275	CT-L3S2	50	47.5	7.09	12.050	3.354
276	CT-L3S2	50	47.5	7.09	12.070	3.348
276	CT-L3S2	50	47.5	7.02	11.990	3.376
277	CT-L3S2	50	47.5	7.01	12.010	3.371
277	CT-L3S2	50	47.5	6.92	11.900	3.410
278	CT-L3S2	50	47.5	6.92	11.920	3.404
278	CT-L3S2	50	47.5	6.87	11.810	3.440
279	CT-L3S2	50	47.5	6.87	11.810	3.440
279	CT-L3S2	50	47.5	6.81	11.790	3.451
280	CT-L3S2	50	47.5	6.81	11.800	3.448
280	CT-L3S2	50	47.5	6.67	11.680	3.496
281	CT-L3S2	50	47.5	6.67	11.680	3.496
281	CT-L3S2	50	47.5	6.52	11.540	3.551
282	CT-L3S2	50	47.5	6.51	11.540	3.552
282	CT-L3S2	50	47.5	6.34	11.460	3.592
283	CT-L3S2	50	47.5	6.33	11.450	3.596
283	CT-L3S2	50	47.5	6.14	11.350	3.644
284	CT-L3S2	50	47.5	6.13	11.350	3.645
284	CT-L3S2	50	47.5	5.92	11.230	3.703
285	CT-L3S2	50	47.5	5.91	11.220	3.707
285	CT-L3S2	50	47.5	5.68	11.150	3.751
286	CT-L3S2	50	47.5	5.67	11.150	3.752
286	CT-L3S2	50	47.5	5.42	11.060	3.805
287	CT-L3S2	50	47.5	5.41	11.060	3.806
287	CT-L3S2	50	47.5	5.14	10.950	3.868
288	CT-L3S2	50	47.5	5.13	10.930	3.876
288	CT-L3S2	50	47.5	4.83	10.800	3.951
289	CT-L3S2	50	47.5	4.82	10.800	3.952
289	CT-L3S2	50	47.5	4.51	10.640	4.040
290	CT-L3S2	50	47.5	4.5	10.650	4.038
290	CT-L3S2	50	47.5	4.16	10.470	4.139
291	CT-L3S2	50	47.5	4.15	10.480	4.136
291	CT-L3S2	50	47.5	3.8	10.260	4.259
292	CT-L3S2	50	47.5	3.79	10.270	4.256
292	CT-L3S2	50	47.5	3.41	10.010	4.405
293	CT-L3S2	50	47.5	3.4	10.010	4.406
293	CT-L3S2	50	47.5	3.01	9.720	4.577
294	CT-L3S2	50	47.5	2.99	9.720	4.579
294	CT-L3S2	50	47.5	2.58	9.380	4.789
295	CT-L3S2	50	47.5	2.57	9.390	4.785
295	CT-L3S2	50	47.5	2.46	9.220	4.885
296	CT-L3S2	50	47.5	2.46	9.220	4.885

296	CT-L3S2	50	47.5	2.13	9.040	5.019
297	CT-L3S2	50	47.5	2.12	9.040	5.020
297	CT-L3S2	50	47.5	1.66	8.670	5.287
298	CT-L3S2	50	47.5	1.65	8.670	5.288
298	CT-L3S2	50	47.5	1.16	8.270	5.603
299	CT-L3S2	50	47.5	1.15	8.270	5.605
299	CT-L3S2	50	47.5	0.65	7.830	5.983
300	CT-L3S2	50	47.5	0.64	7.830	5.985
300	CT-L3S2	50	47.5	0.12	7.350	6.446
301	CT-L3S2	50	47.5	0.11	7.360	6.439
301	CT-L3S2	50	47.5	-0.45	6.850	6.869
302	CT-L3S2	50	47.5	-0.45	6.850	6.869
302	CT-L3S2	50	47.5	-1.02	6.320	7.354
303	CT-L3S2	50	47.5	-1.02	6.320	7.354
303	CT-L3S2	50	47.5	-1.61	5.820	7.885
304	CT-L3S2	50	47.5	-1.62	5.830	7.870
304	CT-L3S2	50	47.5	-2.22	-5.510	8.218
305	CT-L3S2	50	47.5	-2.23	-5.510	8.216
305	CT-L3S2	50	47.5	-2.85	-5.620	7.945
306	CT-L3S2	50	47.5	-2.86	-5.620	7.943
306	CT-L3S2	50	47.5	-3.51	-5.720	7.691
307	CT-L3S2	50	47.5	-3.52	-5.720	7.689
307	CT-L3S2	50	47.5	-4.18	-5.830	7.431
308	CT-L3S2	50	47.5	-4.19	-5.830	7.429
308	CT-L3S2	50	47.5	-4.87	-5.940	7.177
309	CT-L3S2	50	47.5	-4.89	-5.940	7.173
309	CT-L3S2	50	47.5	-5.58	-6.050	6.929
310	CT-L3S2	50	47.5	-5.6	-6.050	6.926
310	CT-L3S2	50	47.5	-6.32	-6.160	6.685
311	CT-L3S2	50	47.5	-6.33	-6.160	6.683
311	CT-L3S2	50	47.5	-7.07	-6.270	6.448
312	CT-L3S2	50	47.5	-7.08	-6.280	6.436
312	CT-L3S2	50	47.5	-7.84	-6.390	6.207
313	CT-L3S2	50	47.5	-7.85	-6.390	6.205
313	CT-L3S2	50	47.5	-8.63	-6.510	5.971
314	CT-L3S2	50	47.5	-8.64	-6.510	5.969
314	CT-L3S2	50	47.5	-9.44	-6.870	5.540
315	CT-L3S2	50	47.5	-9.45	-6.890	5.522
315	CT-L3S2	50	47.5	-10.27	-7.440	5.004
316	CT-L3S2	50	47.5	-10.28	-7.440	5.003
316	CT-L3S2	50	47.5	-11.11	-8.040	4.526
317	CT-L3S2	50	47.5	-11.12	-8.040	4.525
317	CT-L3S2	50	47.5	-11.96	-8.630	4.118
318	CT-L3S2	50	47.5	-11.97	-8.630	4.117
318	CT-L3S2	50	47.5	-12.83	-9.240	3.752
319	CT-L3S2	50	47.5	-12.83	-9.240	3.752
319	CT-L3S2	50	47.5	-11.96	-8.630	4.118
320	CT-L3S2	50	47.5	-11.96	-8.630	4.118
320	CT-L3S2	50	47.5	-11.11	-8.040	4.526
321	CT-L3S2	50	47.5	-11.1	-8.040	4.527
321	CT-L3S2	50	47.5	-10.27	-7.450	4.997
322	CT-L3S2	50	47.5	-10.26	-7.450	4.999
322	CT-L3S2	50	47.5	-9.45	-6.910	5.507
323	CT-L3S2	50	47.5	-9.44	-6.900	5.516
323	CT-L3S2	50	47.5	-8.64	-6.550	5.933

324	CT-L3S2	50	47.5	-8.63	-6.550	5.934
324	CT-L3S2	50	47.5	-7.85	-6.430	6.166
325	CT-L3S2	50	47.5	-7.84	-6.430	6.168
325	CT-L3S2	50	47.5	-7.08	-6.320	6.396
326	CT-L3S2	50	47.5	-7.06	-6.310	6.409
326	CT-L3S2	50	47.5	-6.33	-6.200	6.640
327	CT-L3S2	50	47.5	-6.31	-6.200	6.644
327	CT-L3S2	50	47.5	-5.59	-6.090	6.882
328	CT-L3S2	50	47.5	-5.58	-6.090	6.883
328	CT-L3S2	50	47.5	-4.88	-5.980	7.127
329	CT-L3S2	50	47.5	-4.87	-5.980	7.129
329	CT-L3S2	50	47.5	-4.19	-5.870	7.378
330	CT-L3S2	50	47.5	-4.17	-5.870	7.382
330	CT-L3S2	50	47.5	-3.51	-5.760	7.637
331	CT-L3S2	50	47.5	-3.5	-5.760	7.639
331	CT-L3S2	50	47.5	-2.86	-5.650	7.901
332	CT-L3S2	50	47.5	-2.85	-5.660	7.889
332	CT-L3S2	50	47.5	-2.23	-5.550	8.157
333	CT-L3S2	50	47.5	-2.22	-5.550	8.159
333	CT-L3S2	50	47.5	-1.61	5.840	7.858
334	CT-L3S2	50	47.5	-1.61	5.840	7.858
334	CT-L3S2	50	47.5	-1.02	6.360	7.308
335	CT-L3S2	50	47.5	-1.02	6.350	7.320
335	CT-L3S2	50	47.5	-0.45	6.890	6.829
336	CT-L3S2	50	47.5	-0.44	6.880	6.840
336	CT-L3S2	50	47.5	0.11	7.390	6.413
337	CT-L3S2	50	47.5	0.12	7.390	6.411
337	CT-L3S2	50	47.5	0.65	7.860	5.961
338	CT-L3S2	50	47.5	0.65	7.860	5.961
338	CT-L3S2	50	47.5	1.16	8.300	5.583
339	CT-L3S2	50	47.5	1.17	8.300	5.582
339	CT-L3S2	50	47.5	1.65	8.710	5.264
340	CT-L3S2	50	47.5	1.66	8.710	5.263
340	CT-L3S2	50	47.5	2.12	9.080	4.998
341	CT-L3S2	50	47.5	2.13	9.080	4.997
341	CT-L3S2	50	47.5	2.46	9.260	4.864
342	CT-L3S2	50	47.5	2.46	9.260	4.864
342	CT-L3S2	50	47.5	2.57	9.430	4.765
343	CT-L3S2	50	47.5	2.58	9.420	4.769
343	CT-L3S2	50	47.5	3	9.760	4.559
344	CT-L3S2	50	47.5	3.01	9.750	4.563
344	CT-L3S2	50	47.5	3.4	10.050	4.388
345	CT-L3S2	50	47.5	3.41	10.040	4.391
345	CT-L3S2	50	47.5	3.79	10.300	4.244
346	CT-L3S2	50	47.5	3.8	10.300	4.243
346	CT-L3S2	50	47.5	4.16	10.520	4.120
347	CT-L3S2	50	47.5	4.17	10.510	4.123
347	CT-L3S2	50	47.5	4.5	10.690	4.022
348	CT-L3S2	50	47.5	4.51	10.680	4.025
348	CT-L3S2	50	47.5	4.83	10.830	3.940
349	CT-L3S2	50	47.5	4.83	10.840	3.936
349	CT-L3S2	50	47.5	5.13	10.970	3.862
350	CT-L3S2	50	47.5	5.14	10.980	3.858
350	CT-L3S2	50	47.5	5.41	11.090	3.795
351	CT-L3S2	50	47.5	5.42	11.100	3.791

351	CT-L3S2	50	47.5	5.67	11.180	3.742
352	CT-L3S2	50	47.5	5.68	11.180	3.741
352	CT-L3S2	50	47.5	5.91	11.250	3.697
353	CT-L3S2	50	47.5	5.92	11.240	3.699
353	CT-L3S2	50	47.5	6.13	11.360	3.642
354	CT-L3S2	50	47.5	6.14	11.370	3.638
354	CT-L3S2	50	47.5	6.33	11.470	3.589
355	CT-L3S2	50	47.5	6.34	11.470	3.588
355	CT-L3S2	50	47.5	6.51	11.550	3.549
356	CT-L3S2	50	47.5	6.52	11.550	3.548
356	CT-L3S2	50	47.5	6.67	11.700	3.490
357	CT-L3S2	50	47.5	6.67	11.690	3.493
357	CT-L3S2	50	47.5	6.81	11.820	3.442
358	CT-L3S2	50	47.5	6.81	11.810	3.445
358	CT-L3S2	50	47.5	6.87	11.830	3.434
359	CT-L3S2	50	47.5	6.87	11.830	3.434
359	CT-L3S2	50	47.5	6.92	11.940	3.399
360	CT-L3S2	50	47.5	6.92	11.920	3.404
360	CT-L3S2	50	47.5	7.01	12.030	3.366
361	CT-L3S2	50	47.5	7.01	12.010	3.371
361	CT-L3S2	50	47.5	7.08	12.080	3.346
362	CT-L3S2	50	47.5	7.08	12.070	3.349
362	CT-L3S2	50	47.5	7.13	12.110	3.334
363	CT-L3S2	50	47.5	7.13	12.100	3.336
363	CT-L3S2	50	47.5	7.16	12.130	3.326
364	CT-L3S2	50	47.5	7.16	12.130	3.326
364	CT-L3S2	50	47.5	7.17	12.130	3.325
365	CT-L3S2	50	47.5	7.17	12.130	3.325
365	CT-L3S2	50	47.5	7.16	12.090	3.337
366	CT-L3S2	50	47.5	7.16	12.090	3.337
366	CT-L3S2	50	47.5	7.12	12.020	3.359
367	CT-L3S2	50	47.5	7.12	12.020	3.359
367	CT-L3S2	50	47.5	7.07	11.910	3.395
368	CT-L3S2	50	47.5	7.07	11.910	3.395
368	CT-L3S2	50	47.5	6.99	11.770	3.442
369	CT-L3S2	50	47.5	6.99	11.770	3.442
369	CT-L3S2	50	47.5	6.9	11.580	3.506
370	CT-L3S2	50	47.5	6.89	11.590	3.504
370	CT-L3S2	50	47.5	6.78	11.360	3.585
371	CT-L3S2	50	47.5	6.77	11.360	3.585
371	CT-L3S2	50	47.5	6.64	11.100	3.681
372	CT-L3S2	50	47.5	6.63	11.100	3.682
372	CT-L3S2	50	47.5	6.48	10.790	3.802
373	CT-L3S2	50	47.5	6.47	10.790	3.803
373	CT-L3S2	50	47.5	6.3	10.440	3.946
374	CT-L3S2	50	47.5	6.29	10.450	3.944
374	CT-L3S2	50	47.5	6.1	10.050	4.119
375	CT-L3S2	50	47.5	6.09	10.050	4.120
375	CT-L3S2	50	47.5	6.04	9.890	4.192
376	CT-L3S2	50	47.5	6.04	9.890	4.192
376	CT-L3S2	50	47.5	5.87	9.640	4.318
377	CT-L3S2	50	47.5	5.87	9.640	4.318
377	CT-L3S2	50	47.5	5.63	9.190	4.556
378	CT-L3S2	50	47.5	5.62	9.190	4.557
378	CT-L3S2	50	47.5	5.36	8.690	4.849

379	CT-L3S2	50	47.5	5.35	8.690	4.850
379	CT-L3S2	50	47.5	5.07	8.140	5.213
380	CT-L3S2	50	47.5	5.06	8.140	5.214
380	CT-L3S2	50	47.5	4.76	7.560	5.653
381	CT-L3S2	50	47.5	4.76	7.570	5.646
381	CT-L3S2	50	47.5	4.44	7.100	6.065
382	CT-L3S2	50	47.5	4.43	7.100	6.066
382	CT-L3S2	50	47.5	4.09	6.600	6.577
383	CT-L3S2	50	47.5	4.08	6.610	6.569
383	CT-L3S2	50	47.5	3.72	6.070	7.213
384	CT-L3S2	50	47.5	3.71	6.080	7.202
384	CT-L3S2	50	47.5	3.32	5.500	8.033
385	CT-L3S2	50	47.5	3.31	5.510	8.020
385	CT-L3S2	50	47.5	2.91	4.890	9.119
386	CT-L3S2	50	47.5	2.9	4.910	9.084
386	CT-L3S2	50	47.5	2.48	4.240	10.618
387	CT-L3S2	50	47.5	2.47	4.260	10.570
387	CT-L3S2	50	47.5	2.02	3.540	12.847
388	CT-L3S2	50	47.5	2.02	3.570	12.739
388	CT-L3S2	50	47.5	1.55	2.780	16.529
389	CT-L3S2	50	47.5	1.55	2.810	16.352
389	CT-L3S2	50	47.5	1.06	1.950	23.815
390	CT-L3S2	50	47.5	1.05	1.980	23.460
390	CT-L3S2	50	47.5	0.54	1.020	46.039
391	CT-L3S2	50	47.5	0.54	1.050	44.724
391	CT-L3S2	50	47.5	0.01	-0.060	791.500

LOAD RATING FIXED SPAN -GIRDER 4

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
100	CT-L3S2	50	47.5	0.11	0.250	189.560
100	CT-L3S2	50	47.5	0.48	0.980	47.980
101	CT-L3S2	50	47.5	0.53	1.090	43.092
101	CT-L3S2	50	47.5	0.96	1.900	24.495
102	CT-L3S2	50	47.5	1.01	2.020	23.015
102	CT-L3S2	50	47.5	1.44	2.770	16.628
103	CT-L3S2	50	47.5	1.49	2.880	15.976
103	CT-L3S2	50	47.5	1.9	3.580	12.737
104	CT-L3S2	50	47.5	1.95	3.690	12.344
104	CT-L3S2	50	47.5	2.35	4.340	10.403
105	CT-L3S2	50	47.5	2.4	4.440	10.158
105	CT-L3S2	50	47.5	2.78	5.050	8.855
106	CT-L3S2	50	47.5	2.83	5.150	8.674
106	CT-L3S2	50	47.5	3.19	5.720	7.747
107	CT-L3S2	50	47.5	3.25	5.820	7.603
107	CT-L3S2	50	47.5	3.58	6.360	6.906
108	CT-L3S2	50	47.5	3.65	6.450	6.798
108	CT-L3S2	50	47.5	3.96	6.950	6.265
109	CT-L3S2	50	47.5	4.02	7.040	6.176
109	CT-L3S2	50	47.5	4.31	7.510	5.751
110	CT-L3S2	50	47.5	4.38	7.590	5.681
110	CT-L3S2	50	47.5	4.65	8.040	5.330
111	CT-L3S2	50	47.5	4.71	8.110	5.276
111	CT-L3S2	50	47.5	4.96	8.530	4.987
112	CT-L3S2	50	47.5	5.02	8.590	4.945
112	CT-L3S2	50	47.5	5.25	9.080	4.653
113	CT-L3S2	50	47.5	5.31	9.130	4.621
113	CT-L3S2	50	47.5	5.53	9.590	4.376
114	CT-L3S2	50	47.5	5.58	9.630	4.353
114	CT-L3S2	50	47.5	5.78	10.050	4.151
115	CT-L3S2	50	47.5	5.82	10.080	4.135
115	CT-L3S2	50	47.5	5.96	10.340	4.017
116	CT-L3S2	50	47.5	5.96	10.340	4.017
116	CT-L3S2	50	47.5	6	10.470	3.964
117	CT-L3S2	50	47.5	6.05	10.480	3.955
117	CT-L3S2	50	47.5	6.21	10.830	3.813
118	CT-L3S2	50	47.5	6.25	10.860	3.798
118	CT-L3S2	50	47.5	6.4	11.150	3.686
119	CT-L3S2	50	47.5	6.43	11.190	3.670
119	CT-L3S2	50	47.5	6.56	11.440	3.579
120	CT-L3S2	50	47.5	6.59	11.470	3.567
120	CT-L3S2	50	47.5	6.7	11.700	3.487
121	CT-L3S2	50	47.5	6.73	11.730	3.476
121	CT-L3S2	50	47.5	6.82	11.910	3.416
122	CT-L3S2	50	47.5	6.85	11.940	3.405
122	CT-L3S2	50	47.5	6.92	12.090	3.356

Minimum Rating Factor 3.220

123	CT-L3S2	50	47.5	6.94	12.120	3.347
123	CT-L3S2	50	47.5	7	12.250	3.306
124	CT-L3S2	50	47.5	7.02	12.270	3.299
124	CT-L3S2	50	47.5	7.06	12.360	3.272
125	CT-L3S2	50	47.5	7.07	12.380	3.266
125	CT-L3S2	50	47.5	7.1	12.450	3.245
126	CT-L3S2	50	47.5	7.11	12.460	3.242
126	CT-L3S2	50	47.5	7.11	12.500	3.231
127	CT-L3S2	50	47.5	7.12	12.510	3.228
127	CT-L3S2	50	47.5	7.11	12.520	3.226
128	CT-L3S2	50	47.5	7.11	12.530	3.223
128	CT-L3S2	50	47.5	7.08	12.510	3.231
129	CT-L3S2	50	47.5	7.08	12.510	3.231
129	CT-L3S2	50	47.5	7.04	12.470	3.245
130	CT-L3S2	50	47.5	7.03	12.470	3.245
130	CT-L3S2	50	47.5	6.97	12.400	3.269
131	CT-L3S2	50	47.5	6.96	12.400	3.269
131	CT-L3S2	50	47.5	6.88	12.330	3.294
132	CT-L3S2	50	47.5	6.86	12.320	3.299
132	CT-L3S2	50	47.5	6.82	12.260	3.318
133	CT-L3S2	50	47.5	6.82	12.260	3.318
133	CT-L3S2	50	47.5	6.77	12.230	3.330
134	CT-L3S2	50	47.5	6.75	12.230	3.332
134	CT-L3S2	50	47.5	6.64	12.110	3.374
135	CT-L3S2	50	47.5	6.61	12.090	3.382
135	CT-L3S2	50	47.5	6.48	11.970	3.427
136	CT-L3S2	50	47.5	6.45	11.960	3.432
136	CT-L3S2	50	47.5	6.31	11.850	3.476
137	CT-L3S2	50	47.5	6.27	11.830	3.485
137	CT-L3S2	50	47.5	6.11	11.710	3.535
138	CT-L3S2	50	47.5	6.07	11.700	3.541
138	CT-L3S2	50	47.5	5.9	11.580	3.592
139	CT-L3S2	50	47.5	5.85	11.590	3.594
139	CT-L3S2	50	47.5	5.66	11.510	3.635
140	CT-L3S2	50	47.5	5.61	11.490	3.646
140	CT-L3S2	50	47.5	5.4	11.410	3.690
141	CT-L3S2	50	47.5	5.35	11.400	3.697
141	CT-L3S2	50	47.5	5.12	11.290	3.754
142	CT-L3S2	50	47.5	5.06	11.270	3.766
142	CT-L3S2	50	47.5	4.82	11.160	3.824
143	CT-L3S2	50	47.5	4.76	11.130	3.840
143	CT-L3S2	50	47.5	4.5	11.010	3.906
144	CT-L3S2	50	47.5	4.44	10.980	3.922
144	CT-L3S2	50	47.5	4.16	10.820	4.006
145	CT-L3S2	50	47.5	4.09	10.790	4.023
145	CT-L3S2	50	47.5	3.79	10.590	4.127
146	CT-L3S2	50	47.5	3.73	10.560	4.145
146	CT-L3S2	50	47.5	3.41	10.340	4.264
147	CT-L3S2	50	47.5	3.34	10.300	4.287
147	CT-L3S2	50	47.5	3.01	10.040	4.431
148	CT-L3S2	50	47.5	2.94	10.000	4.456
148	CT-L3S2	50	47.5	2.58	9.710	4.626
149	CT-L3S2	50	47.5	2.51	9.680	4.648
149	CT-L3S2	50	47.5	2.41	9.540	4.726
150	CT-L3S2	50	47.5	2.41	9.550	4.721

150	CT-L3S2	50	47.5	2.13	9.340	4.858
151	CT-L3S2	50	47.5	2.06	9.310	4.881
151	CT-L3S2	50	47.5	1.67	8.940	5.126
152	CT-L3S2	50	47.5	1.59	8.890	5.164
152	CT-L3S2	50	47.5	1.18	8.510	5.443
153	CT-L3S2	50	47.5	1.1	8.450	5.491
153	CT-L3S2	50	47.5	0.67	8.040	5.825
154	CT-L3S2	50	47.5	0.59	7.970	5.886
154	CT-L3S2	50	47.5	0.14	7.530	6.290
155	CT-L3S2	50	47.5	0.06	7.470	6.351
155	CT-L3S2	50	47.5	-0.45	7.000	6.721
156	CT-L3S2	50	47.5	-0.51	6.930	6.781
156	CT-L3S2	50	47.5	-1.02	6.500	7.151
157	CT-L3S2	50	47.5	-1.09	6.420	7.229
157	CT-L3S2	50	47.5	-1.61	6.000	7.648
158	CT-L3S2	50	47.5	-1.68	5.910	7.753
158	CT-L3S2	50	47.5	-2.22	-5.650	8.014
159	CT-L3S2	50	47.5	-2.29	-5.660	7.988
159	CT-L3S2	50	47.5	-2.84	-5.770	7.740
160	CT-L3S2	50	47.5	-2.93	-5.780	7.711
160	CT-L3S2	50	47.5	-3.49	-5.880	7.485
161	CT-L3S2	50	47.5	-3.58	-5.900	7.444
161	CT-L3S2	50	47.5	-4.16	-6.000	7.223
162	CT-L3S2	50	47.5	-4.25	-6.020	7.184
162	CT-L3S2	50	47.5	-4.85	-6.130	6.958
163	CT-L3S2	50	47.5	-4.94	-6.140	6.932
163	CT-L3S2	50	47.5	-5.55	-6.250	6.712
164	CT-L3S2	50	47.5	-5.65	-6.270	6.675
164	CT-L3S2	50	47.5	-6.27	-6.370	6.473
165	CT-L3S2	50	47.5	-6.38	-6.390	6.435
165	CT-L3S2	50	47.5	-7.02	-6.500	6.228
166	CT-L3S2	50	47.5	-7.13	-6.520	6.192
166	CT-L3S2	50	47.5	-7.78	-6.630	5.991
167	CT-L3S2	50	47.5	-7.9	-6.650	5.955
167	CT-L3S2	50	47.5	-8.57	-7.100	5.483
168	CT-L3S2	50	47.5	-8.7	-7.120	5.449
168	CT-L3S2	50	47.5	-9.39	-7.590	5.021
169	CT-L3S2	50	47.5	-9.51	-7.620	4.986
169	CT-L3S2	50	47.5	-10.23	-8.100	4.601
170	CT-L3S2	50	47.5	-10.35	-8.130	4.569
170	CT-L3S2	50	47.5	-11.08	-8.700	4.186
171	CT-L3S2	50	47.5	-11.2	-8.780	4.134
171	CT-L3S2	50	47.5	-11.96	-9.520	3.733
172	CT-L3S2	50	47.5	-12.04	-9.570	3.705
172	CT-L3S2	50	47.5	-12.85	-10.380	3.338
173	CT-L3S2	50	47.5	-12.83	-10.370	3.343
173	CT-L3S2	50	47.5	-12.02	-9.570	3.707
174	CT-L3S2	50	47.5	-11.94	-9.530	3.731
174	CT-L3S2	50	47.5	-11.18	-8.770	4.141
175	CT-L3S2	50	47.5	-11.07	-8.700	4.187
175	CT-L3S2	50	47.5	-10.33	-8.160	4.555
176	CT-L3S2	50	47.5	-10.21	-8.120	4.592
176	CT-L3S2	50	47.5	-9.5	-7.650	4.967
177	CT-L3S2	50	47.5	-9.37	-7.610	5.011
177	CT-L3S2	50	47.5	-8.68	-7.150	5.429

178	CT-L3S2	50	47.5	-8.56	-7.130	5.461
178	CT-L3S2	50	47.5	-7.89	-6.680	5.930
179	CT-L3S2	50	47.5	-7.76	-6.650	5.976
179	CT-L3S2	50	47.5	-7.12	-6.550	6.165
180	CT-L3S2	50	47.5	-7	-6.530	6.202
180	CT-L3S2	50	47.5	-6.37	-6.420	6.407
181	CT-L3S2	50	47.5	-6.26	-6.400	6.444
181	CT-L3S2	50	47.5	-5.64	-6.290	6.655
182	CT-L3S2	50	47.5	-5.54	-6.280	6.682
182	CT-L3S2	50	47.5	-4.93	-6.170	6.900
183	CT-L3S2	50	47.5	-4.83	-6.150	6.938
183	CT-L3S2	50	47.5	-4.24	-6.050	7.150
184	CT-L3S2	50	47.5	-4.15	-6.030	7.189
184	CT-L3S2	50	47.5	-3.57	-5.920	7.421
185	CT-L3S2	50	47.5	-3.48	-5.910	7.448
185	CT-L3S2	50	47.5	-2.91	-5.800	7.688
186	CT-L3S2	50	47.5	-2.83	-5.790	7.715
186	CT-L3S2	50	47.5	-2.28	-5.690	7.947
187	CT-L3S2	50	47.5	-2.21	-5.680	7.974
187	CT-L3S2	50	47.5	-1.67	5.920	7.742
188	CT-L3S2	50	47.5	-1.6	6.000	7.650
188	CT-L3S2	50	47.5	-1.08	6.420	7.231
189	CT-L3S2	50	47.5	-1.01	6.500	7.152
189	CT-L3S2	50	47.5	-0.5	6.970	6.743
190	CT-L3S2	50	47.5	-0.44	7.040	6.685
190	CT-L3S2	50	47.5	0.07	7.500	6.324
191	CT-L3S2	50	47.5	0.15	7.570	6.255
191	CT-L3S2	50	47.5	0.6	8.010	5.855
192	CT-L3S2	50	47.5	0.68	8.070	5.802
192	CT-L3S2	50	47.5	1.11	8.490	5.464
193	CT-L3S2	50	47.5	1.19	8.540	5.423
193	CT-L3S2	50	47.5	1.6	8.930	5.140
194	CT-L3S2	50	47.5	1.68	8.980	5.102
194	CT-L3S2	50	47.5	2.07	9.350	4.859
195	CT-L3S2	50	47.5	2.14	9.380	4.836
195	CT-L3S2	50	47.5	2.42	9.590	4.701
196	CT-L3S2	50	47.5	2.42	9.580	4.706
196	CT-L3S2	50	47.5	2.52	9.720	4.628
197	CT-L3S2	50	47.5	2.59	9.750	4.606
197	CT-L3S2	50	47.5	2.95	10.040	4.437
198	CT-L3S2	50	47.5	3.01	10.080	4.414
198	CT-L3S2	50	47.5	3.35	10.340	4.270
199	CT-L3S2	50	47.5	3.42	10.380	4.247
199	CT-L3S2	50	47.5	3.73	10.600	4.129
200	CT-L3S2	50	47.5	3.8	10.640	4.107
200	CT-L3S2	50	47.5	4.1	10.830	4.007
201	CT-L3S2	50	47.5	4.16	10.860	3.991
201	CT-L3S2	50	47.5	4.44	11.020	3.907
202	CT-L3S2	50	47.5	4.51	11.050	3.890
202	CT-L3S2	50	47.5	4.77	11.180	3.822
203	CT-L3S2	50	47.5	4.83	11.200	3.810
203	CT-L3S2	50	47.5	5.07	11.290	3.758
204	CT-L3S2	50	47.5	5.13	11.320	3.743
204	CT-L3S2	50	47.5	5.35	11.420	3.691
205	CT-L3S2	50	47.5	5.41	11.440	3.679

205	CT-L3S2	50	47.5	5.62	11.520	3.635
206	CT-L3S2	50	47.5	5.66	11.540	3.626
206	CT-L3S2	50	47.5	5.86	11.610	3.587
207	CT-L3S2	50	47.5	5.9	11.610	3.583
207	CT-L3S2	50	47.5	6.08	11.710	3.537
208	CT-L3S2	50	47.5	6.12	11.720	3.531
208	CT-L3S2	50	47.5	6.28	11.850	3.478
209	CT-L3S2	50	47.5	6.32	11.860	3.472
209	CT-L3S2	50	47.5	6.46	11.970	3.429
210	CT-L3S2	50	47.5	6.49	11.980	3.423
210	CT-L3S2	50	47.5	6.62	12.110	3.376
211	CT-L3S2	50	47.5	6.65	12.130	3.368
211	CT-L3S2	50	47.5	6.76	12.240	3.328
212	CT-L3S2	50	47.5	6.78	12.250	3.324
212	CT-L3S2	50	47.5	6.83	12.280	3.312
213	CT-L3S2	50	47.5	6.83	12.280	3.312
213	CT-L3S2	50	47.5	6.87	12.340	3.293
214	CT-L3S2	50	47.5	6.89	12.350	3.288
214	CT-L3S2	50	47.5	6.97	12.410	3.266
215	CT-L3S2	50	47.5	6.98	12.410	3.265
215	CT-L3S2	50	47.5	7.04	12.490	3.239
216	CT-L3S2	50	47.5	7.05	12.480	3.241
216	CT-L3S2	50	47.5	7.09	12.530	3.225
217	CT-L3S2	50	47.5	7.09	12.520	3.228
217	CT-L3S2	50	47.5	7.12	12.540	3.220
218	CT-L3S2	50	47.5	7.12	12.530	3.223
218	CT-L3S2	50	47.5	7.13	12.530	3.222
219	CT-L3S2	50	47.5	7.13	12.510	3.227
219	CT-L3S2	50	47.5	7.12	12.480	3.236
220	CT-L3S2	50	47.5	7.11	12.460	3.242
220	CT-L3S2	50	47.5	7.09	12.400	3.259
221	CT-L3S2	50	47.5	7.07	12.380	3.266
221	CT-L3S2	50	47.5	7.03	12.280	3.296
222	CT-L3S2	50	47.5	7.02	12.260	3.302
222	CT-L3S2	50	47.5	6.96	12.130	3.342
223	CT-L3S2	50	47.5	6.94	12.110	3.349
223	CT-L3S2	50	47.5	6.86	11.950	3.401
224	CT-L3S2	50	47.5	6.84	11.930	3.408
224	CT-L3S2	50	47.5	6.75	11.740	3.471
225	CT-L3S2	50	47.5	6.72	11.710	3.482
225	CT-L3S2	50	47.5	6.61	11.490	3.559
226	CT-L3S2	50	47.5	6.58	11.450	3.574
226	CT-L3S2	50	47.5	6.46	11.200	3.664
227	CT-L3S2	50	47.5	6.42	11.160	3.681
227	CT-L3S2	50	47.5	6.28	10.870	3.792
228	CT-L3S2	50	47.5	6.24	10.840	3.806
228	CT-L3S2	50	47.5	6.08	10.490	3.949
229	CT-L3S2	50	47.5	6.03	10.480	3.957
229	CT-L3S2	50	47.5	5.99	10.350	4.011
230	CT-L3S2	50	47.5	5.99	10.350	4.011
230	CT-L3S2	50	47.5	5.86	10.090	4.127
231	CT-L3S2	50	47.5	5.81	10.060	4.144
231	CT-L3S2	50	47.5	5.61	9.630	4.350
232	CT-L3S2	50	47.5	5.56	9.600	4.369
232	CT-L3S2	50	47.5	5.35	9.140	4.612

233	CT-L3S2	50	47.5	5.29	9.090	4.644
233	CT-L3S2	50	47.5	5.07	8.600	4.934
234	CT-L3S2	50	47.5	5	8.530	4.982
234	CT-L3S2	50	47.5	4.76	8.110	5.270
235	CT-L3S2	50	47.5	4.69	8.040	5.325
235	CT-L3S2	50	47.5	4.44	7.590	5.673
236	CT-L3S2	50	47.5	4.37	7.520	5.735
236	CT-L3S2	50	47.5	4.09	7.040	6.166
237	CT-L3S2	50	47.5	4.02	6.960	6.247
237	CT-L3S2	50	47.5	3.72	6.440	6.798
238	CT-L3S2	50	47.5	3.65	6.360	6.895
238	CT-L3S2	50	47.5	3.34	5.810	7.601
239	CT-L3S2	50	47.5	3.26	5.730	7.721
239	CT-L3S2	50	47.5	2.93	5.140	8.671
240	CT-L3S2	50	47.5	2.85	5.050	8.842
240	CT-L3S2	50	47.5	2.5	4.430	10.158
241	CT-L3S2	50	47.5	2.43	4.330	10.409
241	CT-L3S2	50	47.5	2.05	3.670	12.384
242	CT-L3S2	50	47.5	1.98	3.560	12.787
242	CT-L3S2	50	47.5	1.59	2.860	16.052
243	CT-L3S2	50	47.5	1.51	2.750	16.724
243	CT-L3S2	50	47.5	1.1	1.990	23.317
244	CT-L3S2	50	47.5	1.03	1.880	24.718
244	CT-L3S2	50	47.5	0.59	1.070	43.841
245	CT-L3S2	50	47.5	0.52	0.970	48.433
245	CT-L3S2	50	47.5	0.07	0.260	182.423

LOAD RATING FIXED SPAN -GIRDER 1

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
538	CT-L73.0	50	47.5	0.06	0.330	143.758
538	CT-L73.0	50	47.5	0.53	1.330	35.316
539	CT-L73.0	50	47.5	0.53	1.440	32.618
539	CT-L73.0	50	47.5	1.05	2.580	18.004
540	CT-L73.0	50	47.5	1.07	2.700	17.196
540	CT-L73.0	50	47.5	1.56	3.750	12.251
541	CT-L73.0	50	47.5	1.59	3.880	11.832
541	CT-L73.0	50	47.5	2.06	4.860	9.350
542	CT-L73.0	50	47.5	2.09	4.990	9.100
542	CT-L73.0	50	47.5	2.54	5.900	7.620
543	CT-L73.0	50	47.5	2.57	6.020	7.463
543	CT-L73.0	50	47.5	3.01	6.890	6.457
544	CT-L73.0	50	47.5	3.03	6.990	6.362
544	CT-L73.0	50	47.5	3.45	7.810	5.640
545	CT-L73.0	50	47.5	3.47	7.910	5.566
545	CT-L73.0	50	47.5	3.87	8.680	5.026
546	CT-L73.0	50	47.5	3.89	8.770	4.973
546	CT-L73.0	50	47.5	4.26	9.490	4.556
547	CT-L73.0	50	47.5	4.29	9.580	4.510
547	CT-L73.0	50	47.5	4.64	10.250	4.181
548	CT-L73.0	50	47.5	4.67	10.330	4.146
548	CT-L73.0	50	47.5	4.99	10.970	3.875
549	CT-L73.0	50	47.5	5.02	11.050	3.844
549	CT-L73.0	50	47.5	5.32	11.690	3.608
550	CT-L73.0	50	47.5	5.35	11.760	3.584
550	CT-L73.0	50	47.5	5.63	12.390	3.379
551	CT-L73.0	50	47.5	5.66	12.450	3.361
551	CT-L73.0	50	47.5	5.92	13.030	3.191
552	CT-L73.0	50	47.5	5.94	13.080	3.177
552	CT-L73.0	50	47.5	6.18	13.630	3.032
553	CT-L73.0	50	47.5	6.2	13.660	3.023
553	CT-L73.0	50	47.5	6.37	14.030	2.932
554	CT-L73.0	50	47.5	6.37	14.030	2.932
554	CT-L73.0	50	47.5	6.42	14.170	2.899
555	CT-L73.0	50	47.5	6.44	14.190	2.894
555	CT-L73.0	50	47.5	6.64	14.650	2.789
556	CT-L73.0	50	47.5	6.65	14.690	2.781
556	CT-L73.0	50	47.5	6.83	15.090	2.695
557	CT-L73.0	50	47.5	6.84	15.130	2.687
557	CT-L73.0	50	47.5	7	15.490	2.615
558	CT-L73.0	50	47.5	7.01	15.530	2.607
558	CT-L73.0	50	47.5	7.15	15.860	2.544
559	CT-L73.0	50	47.5	7.16	15.890	2.539
559	CT-L73.0	50	47.5	7.27	16.180	2.486
560	CT-L73.0	50	47.5	7.28	16.210	2.481
560	CT-L73.0	50	47.5	7.38	16.460	2.437

Minimum Rating Factor 2.292

561	CT-L73.0	50	47.5	7.38	16.490	2.433
561	CT-L73.0	50	47.5	7.46	16.710	2.396
562	CT-L73.0	50	47.5	7.46	16.740	2.392
562	CT-L73.0	50	47.5	7.52	16.920	2.363
563	CT-L73.0	50	47.5	7.52	16.940	2.360
563	CT-L73.0	50	47.5	7.56	17.090	2.337
564	CT-L73.0	50	47.5	7.56	17.110	2.334
564	CT-L73.0	50	47.5	7.58	17.230	2.317
565	CT-L73.0	50	47.5	7.58	17.250	2.314
565	CT-L73.0	50	47.5	7.58	17.330	2.304
566	CT-L73.0	50	47.5	7.57	17.350	2.301
566	CT-L73.0	50	47.5	7.55	17.400	2.296
567	CT-L73.0	50	47.5	7.54	17.410	2.295
567	CT-L73.0	50	47.5	7.5	17.430	2.295
568	CT-L73.0	50	47.5	7.5	17.440	2.294
568	CT-L73.0	50	47.5	7.43	17.420	2.300
569	CT-L73.0	50	47.5	7.43	17.430	2.299
569	CT-L73.0	50	47.5	7.34	17.390	2.309
570	CT-L73.0	50	47.5	7.33	17.380	2.311
570	CT-L73.0	50	47.5	7.28	17.340	2.319
571	CT-L73.0	50	47.5	7.28	17.340	2.319
571	CT-L73.0	50	47.5	7.23	17.310	2.326
572	CT-L73.0	50	47.5	7.22	17.300	2.328
572	CT-L73.0	50	47.5	7.09	17.240	2.344
573	CT-L73.0	50	47.5	7.08	17.220	2.347
573	CT-L73.0	50	47.5	6.93	17.160	2.364
574	CT-L73.0	50	47.5	6.92	17.140	2.368
574	CT-L73.0	50	47.5	6.75	17.050	2.390
575	CT-L73.0	50	47.5	6.73	17.020	2.395
575	CT-L73.0	50	47.5	6.55	16.900	2.423
576	CT-L73.0	50	47.5	6.53	16.870	2.429
576	CT-L73.0	50	47.5	6.33	16.720	2.462
577	CT-L73.0	50	47.5	6.3	16.690	2.469
577	CT-L73.0	50	47.5	6.08	16.500	2.510
578	CT-L73.0	50	47.5	6.05	16.470	2.517
578	CT-L73.0	50	47.5	5.81	16.260	2.564
579	CT-L73.0	50	47.5	5.78	16.230	2.571
579	CT-L73.0	50	47.5	5.52	15.980	2.627
580	CT-L73.0	50	47.5	5.49	15.950	2.634
580	CT-L73.0	50	47.5	5.21	15.670	2.699
581	CT-L73.0	50	47.5	5.18	15.640	2.706
581	CT-L73.0	50	47.5	4.88	15.340	2.778
582	CT-L73.0	50	47.5	4.84	15.290	2.790
582	CT-L73.0	50	47.5	4.52	14.970	2.871
583	CT-L73.0	50	47.5	4.48	14.930	2.881
583	CT-L73.0	50	47.5	4.14	14.580	2.974
584	CT-L73.0	50	47.5	4.1	14.530	2.987
584	CT-L73.0	50	47.5	3.74	14.160	3.090
585	CT-L73.0	50	47.5	3.7	14.110	3.104
585	CT-L73.0	50	47.5	3.32	13.700	3.225
586	CT-L73.0	50	47.5	3.28	13.660	3.237
586	CT-L73.0	50	47.5	2.87	13.220	3.376
587	CT-L73.0	50	47.5	2.83	13.190	3.387
587	CT-L73.0	50	47.5	2.72	13.030	3.437
588	CT-L73.0	50	47.5	2.72	13.030	3.437

588	CT-L73.0	50	47.5	2.41	12.710	3.548
589	CT-L73.0	50	47.5	2.36	12.670	3.563
589	CT-L73.0	50	47.5	1.91	12.170	3.746
590	CT-L73.0	50	47.5	1.86	12.110	3.769
590	CT-L73.0	50	47.5	1.4	11.600	3.974
591	CT-L73.0	50	47.5	1.34	11.530	4.003
591	CT-L73.0	50	47.5	0.86	11.000	4.240
592	CT-L73.0	50	47.5	0.8	10.920	4.277
592	CT-L73.0	50	47.5	0.3	10.380	4.547
593	CT-L73.0	50	47.5	0.24	10.300	4.588
593	CT-L73.0	50	47.5	-0.33	9.730	4.848
594	CT-L73.0	50	47.5	-0.37	9.650	4.884
594	CT-L73.0	50	47.5	-0.94	9.060	5.139
595	CT-L73.0	50	47.5	-0.98	8.980	5.180
595	CT-L73.0	50	47.5	-1.57	8.370	5.487
596	CT-L73.0	50	47.5	-1.62	8.290	5.534
596	CT-L73.0	50	47.5	-2.22	7.660	5.911
597	CT-L73.0	50	47.5	-2.28	7.570	5.974
597	CT-L73.0	50	47.5	-2.9	-7.410	6.019
598	CT-L73.0	50	47.5	-2.96	-7.430	5.995
598	CT-L73.0	50	47.5	-3.61	-7.560	5.806
599	CT-L73.0	50	47.5	-3.66	-7.580	5.784
599	CT-L73.0	50	47.5	-4.33	-7.720	5.592
600	CT-L73.0	50	47.5	-4.39	-7.740	5.570
600	CT-L73.0	50	47.5	-5.09	-7.870	5.389
601	CT-L73.0	50	47.5	-5.15	-7.890	5.368
601	CT-L73.0	50	47.5	-5.86	-8.030	5.186
602	CT-L73.0	50	47.5	-5.93	-8.060	5.158
602	CT-L73.0	50	47.5	-6.66	-8.200	4.980
603	CT-L73.0	50	47.5	-6.74	-8.220	4.959
603	CT-L73.0	50	47.5	-7.49	-8.360	4.786
604	CT-L73.0	50	47.5	-7.57	-8.390	4.759
604	CT-L73.0	50	47.5	-8.34	-8.530	4.591
605	CT-L73.0	50	47.5	-8.43	-8.560	4.564
605	CT-L73.0	50	47.5	-9.22	-8.700	4.400
606	CT-L73.0	50	47.5	-9.33	-8.730	4.372
606	CT-L73.0	50	47.5	-10.13	-8.870	4.213
607	CT-L73.0	50	47.5	-10.25	-8.910	4.181
607	CT-L73.0	50	47.5	-11.07	-9.060	4.021
608	CT-L73.0	50	47.5	-11.2	-9.100	3.989
608	CT-L73.0	50	47.5	-12.06	-9.290	3.815
609	CT-L73.0	50	47.5	-12.18	-9.300	3.798
609	CT-L73.0	50	47.5	-13.08	-10.030	3.432
610	CT-L73.0	50	47.5	-13.17	-9.980	3.440
610	CT-L73.0	50	47.5	-14.14	-10.850	3.075
611	CT-L73.0	50	47.5	-14.16	-10.880	3.064
611	CT-L73.0	50	47.5	-13.19	-10.030	3.421
612	CT-L73.0	50	47.5	-13.1	-10.070	3.416
612	CT-L73.0	50	47.5	-12.2	-9.310	3.792
613	CT-L73.0	50	47.5	-12.08	-9.330	3.796
613	CT-L73.0	50	47.5	-11.22	-9.110	3.982
614	CT-L73.0	50	47.5	-11.09	-9.070	4.014
614	CT-L73.0	50	47.5	-10.27	-8.920	4.174
615	CT-L73.0	50	47.5	-10.14	-8.890	4.202
615	CT-L73.0	50	47.5	-9.34	-8.740	4.366

616	CT-L73.0	50	47.5	-9.24	-8.710	4.393
616	CT-L73.0	50	47.5	-8.45	-8.570	4.557
617	CT-L73.0	50	47.5	-8.36	-8.540	4.583
617	CT-L73.0	50	47.5	-7.58	-8.400	4.752
618	CT-L73.0	50	47.5	-7.5	-8.380	4.773
618	CT-L73.0	50	47.5	-6.75	-8.230	4.951
619	CT-L73.0	50	47.5	-6.68	-8.210	4.972
619	CT-L73.0	50	47.5	-5.94	-8.070	5.150
620	CT-L73.0	50	47.5	-5.87	-8.050	5.171
620	CT-L73.0	50	47.5	-5.16	-7.910	5.353
621	CT-L73.0	50	47.5	-5.1	-7.890	5.374
621	CT-L73.0	50	47.5	-4.41	-7.750	5.560
622	CT-L73.0	50	47.5	-4.34	-7.730	5.583
622	CT-L73.0	50	47.5	-3.68	-7.590	5.773
623	CT-L73.0	50	47.5	-3.62	-7.580	5.789
623	CT-L73.0	50	47.5	-2.97	-7.440	5.985
624	CT-L73.0	50	47.5	-2.91	-7.420	6.009
624	CT-L73.0	50	47.5	-2.29	7.580	5.964
625	CT-L73.0	50	47.5	-2.23	7.670	5.902
625	CT-L73.0	50	47.5	-1.63	8.290	5.533
626	CT-L73.0	50	47.5	-1.58	8.380	5.480
626	CT-L73.0	50	47.5	-0.99	8.990	5.174
627	CT-L73.0	50	47.5	-0.94	9.070	5.133
627	CT-L73.0	50	47.5	-0.38	9.660	4.878
628	CT-L73.0	50	47.5	-0.33	9.740	4.843
628	CT-L73.0	50	47.5	0.23	10.310	4.585
629	CT-L73.0	50	47.5	0.29	10.390	4.544
629	CT-L73.0	50	47.5	0.79	10.930	4.274
630	CT-L73.0	50	47.5	0.85	11.010	4.237
630	CT-L73.0	50	47.5	1.34	11.540	4.000
631	CT-L73.0	50	47.5	1.39	11.610	3.972
631	CT-L73.0	50	47.5	1.85	12.120	3.767
632	CT-L73.0	50	47.5	1.91	12.180	3.743
632	CT-L73.0	50	47.5	2.35	12.680	3.561
633	CT-L73.0	50	47.5	2.4	12.720	3.546
633	CT-L73.0	50	47.5	2.71	13.050	3.432
634	CT-L73.0	50	47.5	2.71	13.050	3.432
634	CT-L73.0	50	47.5	2.82	13.210	3.382
635	CT-L73.0	50	47.5	2.87	13.230	3.373
635	CT-L73.0	50	47.5	3.27	13.680	3.233
636	CT-L73.0	50	47.5	3.31	13.720	3.221
636	CT-L73.0	50	47.5	3.7	14.130	3.100
637	CT-L73.0	50	47.5	3.74	14.170	3.088
637	CT-L73.0	50	47.5	4.1	14.550	2.983
638	CT-L73.0	50	47.5	4.14	14.600	2.970
638	CT-L73.0	50	47.5	4.48	14.950	2.878
639	CT-L73.0	50	47.5	4.52	14.990	2.867
639	CT-L73.0	50	47.5	4.84	15.310	2.786
640	CT-L73.0	50	47.5	4.87	15.360	2.775
640	CT-L73.0	50	47.5	5.17	15.660	2.703
641	CT-L73.0	50	47.5	5.21	15.690	2.695
641	CT-L73.0	50	47.5	5.49	15.970	2.631
642	CT-L73.0	50	47.5	5.52	16.000	2.624
642	CT-L73.0	50	47.5	5.78	16.250	2.567
643	CT-L73.0	50	47.5	5.81	16.280	2.561

643	CT-L73.0	50	47.5	6.05	16.490	2.514
644	CT-L73.0	50	47.5	6.08	16.530	2.506
644	CT-L73.0	50	47.5	6.3	16.710	2.466
645	CT-L73.0	50	47.5	6.32	16.740	2.460
645	CT-L73.0	50	47.5	6.53	16.900	2.424
646	CT-L73.0	50	47.5	6.55	16.920	2.420
646	CT-L73.0	50	47.5	6.73	17.050	2.391
647	CT-L73.0	50	47.5	6.75	17.070	2.387
647	CT-L73.0	50	47.5	6.91	17.160	2.365
648	CT-L73.0	50	47.5	6.93	17.180	2.361
648	CT-L73.0	50	47.5	7.08	17.240	2.345
649	CT-L73.0	50	47.5	7.09	17.260	2.341
649	CT-L73.0	50	47.5	7.22	17.310	2.327
650	CT-L73.0	50	47.5	7.23	17.330	2.324
650	CT-L73.0	50	47.5	7.28	17.350	2.318
651	CT-L73.0	50	47.5	7.28	17.350	2.318
651	CT-L73.0	50	47.5	7.33	17.390	2.310
652	CT-L73.0	50	47.5	7.34	17.410	2.307
652	CT-L73.0	50	47.5	7.43	17.440	2.298
653	CT-L73.0	50	47.5	7.43	17.440	2.298
653	CT-L73.0	50	47.5	7.5	17.450	2.292
654	CT-L73.0	50	47.5	7.5	17.450	2.292
654	CT-L73.0	50	47.5	7.55	17.430	2.292
655	CT-L73.0	50	47.5	7.55	17.410	2.295
655	CT-L73.0	50	47.5	7.57	17.360	2.300
656	CT-L73.0	50	47.5	7.58	17.350	2.301
656	CT-L73.0	50	47.5	7.58	17.260	2.313
657	CT-L73.0	50	47.5	7.58	17.250	2.314
657	CT-L73.0	50	47.5	7.57	17.130	2.331
658	CT-L73.0	50	47.5	7.57	17.110	2.334
658	CT-L73.0	50	47.5	7.53	16.960	2.357
659	CT-L73.0	50	47.5	7.53	16.940	2.360
659	CT-L73.0	50	47.5	7.47	16.750	2.390
660	CT-L73.0	50	47.5	7.47	16.730	2.393
660	CT-L73.0	50	47.5	7.39	16.510	2.429
661	CT-L73.0	50	47.5	7.39	16.480	2.434
661	CT-L73.0	50	47.5	7.29	16.230	2.478
662	CT-L73.0	50	47.5	7.29	16.200	2.482
662	CT-L73.0	50	47.5	7.17	15.910	2.535
663	CT-L73.0	50	47.5	7.16	15.870	2.542
663	CT-L73.0	50	47.5	7.03	15.550	2.603
664	CT-L73.0	50	47.5	7.02	15.510	2.610
664	CT-L73.0	50	47.5	6.86	15.150	2.683
665	CT-L73.0	50	47.5	6.85	15.110	2.690
665	CT-L73.0	50	47.5	6.67	14.700	2.778
666	CT-L73.0	50	47.5	6.66	14.670	2.784
666	CT-L73.0	50	47.5	6.46	14.210	2.888
667	CT-L73.0	50	47.5	6.45	14.190	2.893
667	CT-L73.0	50	47.5	6.39	14.040	2.928
668	CT-L73.0	50	47.5	6.39	14.040	2.928
668	CT-L73.0	50	47.5	6.23	13.670	3.019
669	CT-L73.0	50	47.5	6.21	13.640	3.027
669	CT-L73.0	50	47.5	5.97	13.090	3.173
670	CT-L73.0	50	47.5	5.95	13.040	3.186
670	CT-L73.0	50	47.5	5.69	12.460	3.356

671	CT-L73.0	50	47.5	5.67	12.400	3.373
671	CT-L73.0	50	47.5	5.39	11.770	3.578
672	CT-L73.0	50	47.5	5.37	11.700	3.601
672	CT-L73.0	50	47.5	5.07	11.050	3.840
673	CT-L73.0	50	47.5	5.04	10.970	3.871
673	CT-L73.0	50	47.5	4.72	10.330	4.141
674	CT-L73.0	50	47.5	4.69	10.260	4.173
674	CT-L73.0	50	47.5	4.36	9.570	4.508
675	CT-L73.0	50	47.5	4.32	9.490	4.550
675	CT-L73.0	50	47.5	3.97	8.760	4.969
676	CT-L73.0	50	47.5	3.93	8.680	5.020
676	CT-L73.0	50	47.5	3.56	7.900	5.562
677	CT-L73.0	50	47.5	3.52	7.810	5.631
677	CT-L73.0	50	47.5	3.12	6.980	6.358
678	CT-L73.0	50	47.5	3.08	6.880	6.456
678	CT-L73.0	50	47.5	2.66	6.000	7.473
679	CT-L73.0	50	47.5	2.62	5.900	7.607
679	CT-L73.0	50	47.5	2.18	4.960	9.137
680	CT-L73.0	50	47.5	2.14	4.850	9.353
680	CT-L73.0	50	47.5	1.67	3.850	11.904
681	CT-L73.0	50	47.5	1.64	3.740	12.262
681	CT-L73.0	50	47.5	1.15	2.670	17.360
682	CT-L73.0	50	47.5	1.11	2.570	18.051
682	CT-L73.0	50	47.5	0.59	1.420	33.035
683	CT-L73.0	50	47.5	0.57	1.330	35.286
683	CT-L73.0	50	47.5	0.04	0.340	139.588

LOAD RATING FIXED SPAN -GIRDER 2

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
392	CT-L73.0	50	47.5	0.05	-0.070	677.857
392	CT-L73.0	50	47.5	0.67	1.350	34.689
393	CT-L73.0	50	47.5	0.63	1.300	36.054
393	CT-L73.0	50	47.5	1.24	2.570	18.000
394	CT-L73.0	50	47.5	1.2	2.520	18.373
394	CT-L73.0	50	47.5	1.74	3.690	12.401
395	CT-L73.0	50	47.5	1.71	3.640	12.580
395	CT-L73.0	50	47.5	2.21	4.720	9.595
396	CT-L73.0	50	47.5	2.19	4.690	9.661
396	CT-L73.0	50	47.5	2.65	5.710	7.855
397	CT-L73.0	50	47.5	2.64	5.680	7.898
397	CT-L73.0	50	47.5	3.08	6.640	6.690
398	CT-L73.0	50	47.5	3.07	6.620	6.711
398	CT-L73.0	50	47.5	3.48	7.520	5.854
399	CT-L73.0	50	47.5	3.47	7.500	5.871
399	CT-L73.0	50	47.5	3.87	8.350	5.225
400	CT-L73.0	50	47.5	3.86	8.330	5.239
400	CT-L73.0	50	47.5	4.24	9.130	4.738
401	CT-L73.0	50	47.5	4.23	9.110	4.750
401	CT-L73.0	50	47.5	4.59	9.860	4.352
402	CT-L73.0	50	47.5	4.58	9.850	4.357
402	CT-L73.0	50	47.5	4.92	10.540	4.040
403	CT-L73.0	50	47.5	4.91	10.530	4.045
403	CT-L73.0	50	47.5	5.23	11.180	3.781
404	CT-L73.0	50	47.5	5.22	11.170	3.785
404	CT-L73.0	50	47.5	5.52	11.770	3.567
405	CT-L73.0	50	47.5	5.51	11.760	3.571
405	CT-L73.0	50	47.5	5.78	12.350	3.378
406	CT-L73.0	50	47.5	5.78	12.350	3.378
406	CT-L73.0	50	47.5	6.03	12.910	3.212
407	CT-L73.0	50	47.5	6.03	12.890	3.217
407	CT-L73.0	50	47.5	6.2	13.300	3.105
408	CT-L73.0	50	47.5	6.2	13.300	3.105
408	CT-L73.0	50	47.5	6.26	13.450	3.066
409	CT-L73.0	50	47.5	6.25	13.440	3.069
409	CT-L73.0	50	47.5	6.46	13.960	2.940
410	CT-L73.0	50	47.5	6.46	13.960	2.940
410	CT-L73.0	50	47.5	6.64	14.430	2.832
411	CT-L73.0	50	47.5	6.64	14.430	2.832
411	CT-L73.0	50	47.5	6.8	14.860	2.739
412	CT-L73.0	50	47.5	6.8	14.860	2.739
412	CT-L73.0	50	47.5	6.94	15.250	2.660
413	CT-L73.0	50	47.5	6.94	15.250	2.660
413	CT-L73.0	50	47.5	7.06	15.580	2.596
414	CT-L73.0	50	47.5	7.06	15.580	2.596
414	CT-L73.0	50	47.5	7.16	15.880	2.540

Minimum Rating Factor 2.396

415	CT-L73.0	50	47.5	7.15	15.880	2.541
415	CT-L73.0	50	47.5	7.23	16.130	2.497
416	CT-L73.0	50	47.5	7.23	16.130	2.497
416	CT-L73.0	50	47.5	7.29	16.340	2.461
417	CT-L73.0	50	47.5	7.29	16.340	2.461
417	CT-L73.0	50	47.5	7.32	16.500	2.435
418	CT-L73.0	50	47.5	7.32	16.500	2.435
418	CT-L73.0	50	47.5	7.33	16.630	2.416
419	CT-L73.0	50	47.5	7.33	16.630	2.416
419	CT-L73.0	50	47.5	7.32	16.710	2.405
420	CT-L73.0	50	47.5	7.33	16.710	2.404
420	CT-L73.0	50	47.5	7.29	16.750	2.401
421	CT-L73.0	50	47.5	7.3	16.760	2.399
421	CT-L73.0	50	47.5	7.24	16.760	2.402
422	CT-L73.0	50	47.5	7.25	16.760	2.402
422	CT-L73.0	50	47.5	7.17	16.720	2.412
423	CT-L73.0	50	47.5	7.17	16.720	2.412
423	CT-L73.0	50	47.5	7.08	16.660	2.426
424	CT-L73.0	50	47.5	7.08	16.660	2.426
424	CT-L73.0	50	47.5	7.03	16.590	2.439
425	CT-L73.0	50	47.5	7.02	16.590	2.440
425	CT-L73.0	50	47.5	6.96	16.570	2.447
426	CT-L73.0	50	47.5	6.97	16.560	2.447
426	CT-L73.0	50	47.5	6.83	16.490	2.466
427	CT-L73.0	50	47.5	6.83	16.490	2.466
427	CT-L73.0	50	47.5	6.67	16.450	2.482
428	CT-L73.0	50	47.5	6.67	16.460	2.481
428	CT-L73.0	50	47.5	6.49	16.380	2.504
429	CT-L73.0	50	47.5	6.49	16.380	2.504
429	CT-L73.0	50	47.5	6.29	16.260	2.534
430	CT-L73.0	50	47.5	6.29	16.260	2.534
430	CT-L73.0	50	47.5	6.06	16.100	2.574
431	CT-L73.0	50	47.5	6.07	16.110	2.572
431	CT-L73.0	50	47.5	5.82	15.910	2.620
432	CT-L73.0	50	47.5	5.82	15.920	2.618
432	CT-L73.0	50	47.5	5.55	15.680	2.675
433	CT-L73.0	50	47.5	5.56	15.690	2.673
433	CT-L73.0	50	47.5	5.27	15.420	2.739
434	CT-L73.0	50	47.5	5.27	15.430	2.737
434	CT-L73.0	50	47.5	4.96	15.130	2.812
435	CT-L73.0	50	47.5	4.97	15.130	2.811
435	CT-L73.0	50	47.5	4.63	14.790	2.899
436	CT-L73.0	50	47.5	4.64	14.800	2.896
436	CT-L73.0	50	47.5	4.28	14.430	2.995
437	CT-L73.0	50	47.5	4.29	14.440	2.992
437	CT-L73.0	50	47.5	3.91	14.040	3.105
438	CT-L73.0	50	47.5	3.92	14.040	3.104
438	CT-L73.0	50	47.5	3.52	13.610	3.231
439	CT-L73.0	50	47.5	3.52	13.610	3.231
439	CT-L73.0	50	47.5	3.11	13.150	3.376
440	CT-L73.0	50	47.5	3.11	13.150	3.376
440	CT-L73.0	50	47.5	2.67	12.680	3.535
441	CT-L73.0	50	47.5	2.67	12.680	3.535
441	CT-L73.0	50	47.5	2.56	12.510	3.592
442	CT-L73.0	50	47.5	2.56	12.510	3.592

442	CT-L73.0	50	47.5	2.21	12.170	3.721
443	CT-L73.0	50	47.5	2.22	12.180	3.718
443	CT-L73.0	50	47.5	1.73	11.670	3.922
444	CT-L73.0	50	47.5	1.74	11.670	3.921
444	CT-L73.0	50	47.5	1.23	11.130	4.157
445	CT-L73.0	50	47.5	1.23	11.140	4.154
445	CT-L73.0	50	47.5	0.71	10.580	4.422
446	CT-L73.0	50	47.5	0.71	10.580	4.422
446	CT-L73.0	50	47.5	0.17	9.990	4.738
447	CT-L73.0	50	47.5	0.17	10.000	4.733
447	CT-L73.0	50	47.5	-0.4	9.390	5.016
448	CT-L73.0	50	47.5	-0.41	9.390	5.015
448	CT-L73.0	50	47.5	-0.99	8.760	5.309
449	CT-L73.0	50	47.5	-0.99	8.770	5.303
449	CT-L73.0	50	47.5	-1.6	8.120	5.653
450	CT-L73.0	50	47.5	-1.6	8.120	5.653
450	CT-L73.0	50	47.5	-2.23	7.460	6.068
451	CT-L73.0	50	47.5	-2.23	7.460	6.068
451	CT-L73.0	50	47.5	-2.88	-7.230	6.172
452	CT-L73.0	50	47.5	-2.88	-7.220	6.180
452	CT-L73.0	50	47.5	-3.55	-7.360	5.971
453	CT-L73.0	50	47.5	-3.55	-7.360	5.971
453	CT-L73.0	50	47.5	-4.24	-7.500	5.768
454	CT-L73.0	50	47.5	-4.24	-7.500	5.768
454	CT-L73.0	50	47.5	-4.95	-7.630	5.577
455	CT-L73.0	50	47.5	-4.95	-7.630	5.577
455	CT-L73.0	50	47.5	-5.69	-7.770	5.381
456	CT-L73.0	50	47.5	-5.69	-7.770	5.381
456	CT-L73.0	50	47.5	-6.45	-7.910	5.190
457	CT-L73.0	50	47.5	-6.45	-7.910	5.190
457	CT-L73.0	50	47.5	-7.22	-8.050	5.004
458	CT-L73.0	50	47.5	-7.22	-8.050	5.004
458	CT-L73.0	50	47.5	-8.03	-8.200	4.813
459	CT-L73.0	50	47.5	-8.03	-8.200	4.813
459	CT-L73.0	50	47.5	-8.85	-8.340	4.634
460	CT-L73.0	50	47.5	-8.85	-8.340	4.634
460	CT-L73.0	50	47.5	-9.69	-8.490	4.453
461	CT-L73.0	50	47.5	-9.7	-8.490	4.452
461	CT-L73.0	50	47.5	-10.56	-8.640	4.275
462	CT-L73.0	50	47.5	-10.56	-8.640	4.275
462	CT-L73.0	50	47.5	-11.44	-8.790	4.102
463	CT-L73.0	50	47.5	-11.44	-8.790	4.102
463	CT-L73.0	50	47.5	-12.33	-8.930	3.938
464	CT-L73.0	50	47.5	-12.33	-8.930	3.938
464	CT-L73.0	50	47.5	-13.23	-9.200	3.725
465	CT-L73.0	50	47.5	-13.24	-9.210	3.720
465	CT-L73.0	50	47.5	-12.34	-8.960	3.924
466	CT-L73.0	50	47.5	-12.34	-8.960	3.924
466	CT-L73.0	50	47.5	-11.45	-8.820	4.087
467	CT-L73.0	50	47.5	-11.44	-8.820	4.088
467	CT-L73.0	50	47.5	-10.56	-8.670	4.261
468	CT-L73.0	50	47.5	-10.56	-8.670	4.261
468	CT-L73.0	50	47.5	-9.7	-8.520	4.437
469	CT-L73.0	50	47.5	-9.7	-8.520	4.437
469	CT-L73.0	50	47.5	-8.86	-8.380	4.611

470	CT-L73.0	50	47.5	-8.85	-8.380	4.612
470	CT-L73.0	50	47.5	-8.03	-8.230	4.796
471	CT-L73.0	50	47.5	-8.03	-8.230	4.796
471	CT-L73.0	50	47.5	-7.23	-8.080	4.984
472	CT-L73.0	50	47.5	-7.23	-8.080	4.984
472	CT-L73.0	50	47.5	-6.45	-7.940	5.170
473	CT-L73.0	50	47.5	-6.45	-7.940	5.170
473	CT-L73.0	50	47.5	-5.69	-7.800	5.360
474	CT-L73.0	50	47.5	-5.69	-7.800	5.360
474	CT-L73.0	50	47.5	-4.96	-7.660	5.554
475	CT-L73.0	50	47.5	-4.96	-7.660	5.554
475	CT-L73.0	50	47.5	-4.24	-7.520	5.753
476	CT-L73.0	50	47.5	-4.24	-7.530	5.745
476	CT-L73.0	50	47.5	-3.55	-7.390	5.947
477	CT-L73.0	50	47.5	-3.55	-7.390	5.947
477	CT-L73.0	50	47.5	-2.88	-7.250	6.154
478	CT-L73.0	50	47.5	-2.88	-7.260	6.146
478	CT-L73.0	50	47.5	-2.23	7.480	6.052
479	CT-L73.0	50	47.5	-2.23	7.470	6.060
479	CT-L73.0	50	47.5	-1.6	8.140	5.639
480	CT-L73.0	50	47.5	-1.6	8.130	5.646
480	CT-L73.0	50	47.5	-0.99	8.780	5.297
481	CT-L73.0	50	47.5	-0.99	8.780	5.297
481	CT-L73.0	50	47.5	-0.41	9.410	5.004
482	CT-L73.0	50	47.5	-0.41	9.410	5.004
482	CT-L73.0	50	47.5	0.17	10.010	4.728
483	CT-L73.0	50	47.5	0.17	10.010	4.728
483	CT-L73.0	50	47.5	0.71	10.600	4.414
484	CT-L73.0	50	47.5	0.71	10.590	4.418
484	CT-L73.0	50	47.5	1.23	11.150	4.150
485	CT-L73.0	50	47.5	1.23	11.150	4.150
485	CT-L73.0	50	47.5	1.73	11.690	3.915
486	CT-L73.0	50	47.5	1.73	11.690	3.915
486	CT-L73.0	50	47.5	2.21	12.200	3.712
487	CT-L73.0	50	47.5	2.21	12.200	3.712
487	CT-L73.0	50	47.5	2.56	12.540	3.584
488	CT-L73.0	50	47.5	2.56	12.540	3.584
488	CT-L73.0	50	47.5	2.67	12.700	3.530
489	CT-L73.0	50	47.5	2.67	12.700	3.530
489	CT-L73.0	50	47.5	3.11	13.180	3.368
490	CT-L73.0	50	47.5	3.1	13.170	3.371
490	CT-L73.0	50	47.5	3.52	13.640	3.224
491	CT-L73.0	50	47.5	3.52	13.630	3.227
491	CT-L73.0	50	47.5	3.91	14.060	3.100
492	CT-L73.0	50	47.5	3.91	14.060	3.100
492	CT-L73.0	50	47.5	4.28	14.460	2.989
493	CT-L73.0	50	47.5	4.28	14.450	2.991
493	CT-L73.0	50	47.5	4.63	14.820	2.893
494	CT-L73.0	50	47.5	4.63	14.820	2.893
494	CT-L73.0	50	47.5	4.96	15.150	2.808
495	CT-L73.0	50	47.5	4.96	15.150	2.808
495	CT-L73.0	50	47.5	5.27	15.450	2.733
496	CT-L73.0	50	47.5	5.27	15.450	2.733
496	CT-L73.0	50	47.5	5.56	15.710	2.670
497	CT-L73.0	50	47.5	5.55	15.710	2.670

497	CT-L73.0	50	47.5	5.82	15.940	2.615
498	CT-L73.0	50	47.5	5.82	15.940	2.615
498	CT-L73.0	50	47.5	6.06	16.130	2.569
499	CT-L73.0	50	47.5	6.06	16.130	2.569
499	CT-L73.0	50	47.5	6.29	16.290	2.530
500	CT-L73.0	50	47.5	6.28	16.280	2.532
500	CT-L73.0	50	47.5	6.49	16.400	2.501
501	CT-L73.0	50	47.5	6.48	16.400	2.501
501	CT-L73.0	50	47.5	6.67	16.480	2.478
502	CT-L73.0	50	47.5	6.66	16.480	2.478
502	CT-L73.0	50	47.5	6.82	16.520	2.462
503	CT-L73.0	50	47.5	6.82	16.520	2.462
503	CT-L73.0	50	47.5	6.96	16.580	2.445
504	CT-L73.0	50	47.5	6.96	16.590	2.444
504	CT-L73.0	50	47.5	7.02	16.610	2.437
505	CT-L73.0	50	47.5	7.02	16.610	2.437
505	CT-L73.0	50	47.5	7.08	16.680	2.423
506	CT-L73.0	50	47.5	7.07	16.680	2.424
506	CT-L73.0	50	47.5	7.17	16.740	2.409
507	CT-L73.0	50	47.5	7.17	16.740	2.409
507	CT-L73.0	50	47.5	7.24	16.780	2.399
508	CT-L73.0	50	47.5	7.24	16.780	2.399
508	CT-L73.0	50	47.5	7.29	16.780	2.396
509	CT-L73.0	50	47.5	7.29	16.770	2.398
509	CT-L73.0	50	47.5	7.32	16.730	2.402
510	CT-L73.0	50	47.5	7.32	16.730	2.402
510	CT-L73.0	50	47.5	7.33	16.650	2.413
511	CT-L73.0	50	47.5	7.33	16.650	2.413
511	CT-L73.0	50	47.5	7.31	16.520	2.433
512	CT-L73.0	50	47.5	7.31	16.520	2.433
512	CT-L73.0	50	47.5	7.28	16.360	2.458
513	CT-L73.0	50	47.5	7.28	16.360	2.458
513	CT-L73.0	50	47.5	7.22	16.150	2.494
514	CT-L73.0	50	47.5	7.22	16.150	2.494
514	CT-L73.0	50	47.5	7.14	15.900	2.538
515	CT-L73.0	50	47.5	7.14	15.900	2.538
515	CT-L73.0	50	47.5	7.04	15.600	2.594
516	CT-L73.0	50	47.5	7.04	15.600	2.594
516	CT-L73.0	50	47.5	6.92	15.270	2.657
517	CT-L73.0	50	47.5	6.92	15.270	2.657
517	CT-L73.0	50	47.5	6.78	14.880	2.737
518	CT-L73.0	50	47.5	6.78	14.880	2.737
518	CT-L73.0	50	47.5	6.62	14.450	2.829
519	CT-L73.0	50	47.5	6.62	14.450	2.829
519	CT-L73.0	50	47.5	6.43	13.980	2.938
520	CT-L73.0	50	47.5	6.43	13.980	2.938
520	CT-L73.0	50	47.5	6.23	13.460	3.066
521	CT-L73.0	50	47.5	6.23	13.470	3.064
521	CT-L73.0	50	47.5	6.17	13.320	3.103
522	CT-L73.0	50	47.5	6.17	13.320	3.103
522	CT-L73.0	50	47.5	6	12.910	3.215
523	CT-L73.0	50	47.5	6	12.930	3.210
523	CT-L73.0	50	47.5	5.75	12.370	3.375
524	CT-L73.0	50	47.5	5.75	12.370	3.375
524	CT-L73.0	50	47.5	5.48	11.780	3.567

525	CT-L73.0	50	47.5	5.48	11.790	3.564
525	CT-L73.0	50	47.5	5.18	11.190	3.782
526	CT-L73.0	50	47.5	5.19	11.200	3.778
526	CT-L73.0	50	47.5	4.87	10.550	4.041
527	CT-L73.0	50	47.5	4.87	10.560	4.037
527	CT-L73.0	50	47.5	4.53	9.860	4.358
528	CT-L73.0	50	47.5	4.54	9.880	4.348
528	CT-L73.0	50	47.5	4.18	9.130	4.745
529	CT-L73.0	50	47.5	4.18	9.150	4.734
529	CT-L73.0	50	47.5	3.8	8.350	5.234
530	CT-L73.0	50	47.5	3.8	8.370	5.221
530	CT-L73.0	50	47.5	3.4	7.520	5.864
531	CT-L73.0	50	47.5	3.4	7.550	5.841
531	CT-L73.0	50	47.5	2.98	6.640	6.705
532	CT-L73.0	50	47.5	2.98	6.670	6.675
532	CT-L73.0	50	47.5	2.53	5.710	7.876
533	CT-L73.0	50	47.5	2.54	5.740	7.833
533	CT-L73.0	50	47.5	2.07	4.720	9.625
534	CT-L73.0	50	47.5	2.07	4.750	9.564
534	CT-L73.0	50	47.5	1.58	3.660	12.546
535	CT-L73.0	50	47.5	1.58	3.710	12.377
535	CT-L73.0	50	47.5	1.08	2.540	18.276
536	CT-L73.0	50	47.5	1.07	2.590	17.927
536	CT-L73.0	50	47.5	0.55	1.320	35.568
537	CT-L73.0	50	47.5	0.55	1.370	34.270
537	CT-L73.0	50	47.5	0.01	-0.070	678.429

LOAD RATING FIXED SPAN -GIRDER 3

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
246	CT-L73.0	50	47.5	0.05	-0.070	677.857
246	CT-L73.0	50	47.5	0.67	1.350	34.689
247	CT-L73.0	50	47.5	0.62	1.300	36.062
247	CT-L73.0	50	47.5	1.22	2.570	18.008
248	CT-L73.0	50	47.5	1.18	2.520	18.381
248	CT-L73.0	50	47.5	1.71	3.690	12.409
249	CT-L73.0	50	47.5	1.68	3.640	12.588
249	CT-L73.0	50	47.5	2.16	4.720	9.606
250	CT-L73.0	50	47.5	2.14	4.690	9.672
250	CT-L73.0	50	47.5	2.59	5.710	7.865
251	CT-L73.0	50	47.5	2.57	5.680	7.910
251	CT-L73.0	50	47.5	3	6.640	6.702
252	CT-L73.0	50	47.5	2.99	6.620	6.724
252	CT-L73.0	50	47.5	3.4	7.520	5.864
253	CT-L73.0	50	47.5	3.39	7.500	5.881
253	CT-L73.0	50	47.5	3.77	8.350	5.237
254	CT-L73.0	50	47.5	3.77	8.330	5.250
254	CT-L73.0	50	47.5	4.14	9.130	4.749
255	CT-L73.0	50	47.5	4.14	9.110	4.760
255	CT-L73.0	50	47.5	4.48	9.860	4.363
256	CT-L73.0	50	47.5	4.48	9.850	4.368
256	CT-L73.0	50	47.5	4.8	10.540	4.051
257	CT-L73.0	50	47.5	4.81	10.530	4.054
257	CT-L73.0	50	47.5	5.11	11.180	3.792
258	CT-L73.0	50	47.5	5.11	11.170	3.795
258	CT-L73.0	50	47.5	5.39	11.770	3.578
259	CT-L73.0	50	47.5	5.39	11.760	3.581
259	CT-L73.0	50	47.5	5.65	12.350	3.389
260	CT-L73.0	50	47.5	5.66	12.350	3.388
260	CT-L73.0	50	47.5	5.9	12.910	3.222
261	CT-L73.0	50	47.5	5.9	12.890	3.227
261	CT-L73.0	50	47.5	6.07	13.300	3.115
262	CT-L73.0	50	47.5	6.07	13.300	3.115
262	CT-L73.0	50	47.5	6.12	13.450	3.077
263	CT-L73.0	50	47.5	6.12	13.440	3.079
263	CT-L73.0	50	47.5	6.32	13.960	2.950
264	CT-L73.0	50	47.5	6.32	13.960	2.950
264	CT-L73.0	50	47.5	6.49	14.430	2.842
265	CT-L73.0	50	47.5	6.5	14.430	2.841
265	CT-L73.0	50	47.5	6.65	14.860	2.749
266	CT-L73.0	50	47.5	6.65	14.860	2.749
266	CT-L73.0	50	47.5	6.79	15.250	2.670
267	CT-L73.0	50	47.5	6.79	15.250	2.670
267	CT-L73.0	50	47.5	6.9	15.580	2.606
268	CT-L73.0	50	47.5	6.91	15.580	2.605
268	CT-L73.0	50	47.5	7	15.880	2.550

Minimum Rating Factor 2.406

269	CT-L73.0	50	47.5	7	15.880	2.550
269	CT-L73.0	50	47.5	7.08	16.130	2.506
270	CT-L73.0	50	47.5	7.08	16.130	2.506
270	CT-L73.0	50	47.5	7.13	16.330	2.472
271	CT-L73.0	50	47.5	7.13	16.340	2.471
271	CT-L73.0	50	47.5	7.16	16.500	2.445
272	CT-L73.0	50	47.5	7.16	16.500	2.445
272	CT-L73.0	50	47.5	7.18	16.620	2.426
273	CT-L73.0	50	47.5	7.18	16.630	2.425
273	CT-L73.0	50	47.5	7.17	16.710	2.414
274	CT-L73.0	50	47.5	7.17	16.710	2.414
274	CT-L73.0	50	47.5	7.14	16.750	2.410
275	CT-L73.0	50	47.5	7.14	16.750	2.410
275	CT-L73.0	50	47.5	7.09	16.760	2.411
276	CT-L73.0	50	47.5	7.09	16.760	2.411
276	CT-L73.0	50	47.5	7.02	16.720	2.421
277	CT-L73.0	50	47.5	7.01	16.720	2.422
277	CT-L73.0	50	47.5	6.92	16.660	2.436
278	CT-L73.0	50	47.5	6.92	16.660	2.436
278	CT-L73.0	50	47.5	6.87	16.590	2.449
279	CT-L73.0	50	47.5	6.87	16.590	2.449
279	CT-L73.0	50	47.5	6.81	16.570	2.456
280	CT-L73.0	50	47.5	6.81	16.560	2.457
280	CT-L73.0	50	47.5	6.67	16.490	2.476
281	CT-L73.0	50	47.5	6.67	16.490	2.476
281	CT-L73.0	50	47.5	6.52	16.450	2.491
282	CT-L73.0	50	47.5	6.51	16.460	2.490
282	CT-L73.0	50	47.5	6.34	16.370	2.514
283	CT-L73.0	50	47.5	6.33	16.380	2.513
283	CT-L73.0	50	47.5	6.14	16.260	2.544
284	CT-L73.0	50	47.5	6.13	16.260	2.544
284	CT-L73.0	50	47.5	5.92	16.100	2.583
285	CT-L73.0	50	47.5	5.91	16.110	2.582
285	CT-L73.0	50	47.5	5.68	15.910	2.629
286	CT-L73.0	50	47.5	5.67	15.910	2.629
286	CT-L73.0	50	47.5	5.42	15.680	2.684
287	CT-L73.0	50	47.5	5.41	15.690	2.683
287	CT-L73.0	50	47.5	5.14	15.420	2.747
288	CT-L73.0	50	47.5	5.13	15.430	2.746
288	CT-L73.0	50	47.5	4.83	15.120	2.822
289	CT-L73.0	50	47.5	4.82	15.130	2.821
289	CT-L73.0	50	47.5	4.51	14.790	2.907
290	CT-L73.0	50	47.5	4.5	14.800	2.905
290	CT-L73.0	50	47.5	4.16	14.430	3.003
291	CT-L73.0	50	47.5	4.15	14.440	3.002
291	CT-L73.0	50	47.5	3.8	14.040	3.113
292	CT-L73.0	50	47.5	3.79	14.040	3.113
292	CT-L73.0	50	47.5	3.41	13.610	3.240
293	CT-L73.0	50	47.5	3.4	13.610	3.240
293	CT-L73.0	50	47.5	3.01	13.150	3.383
294	CT-L73.0	50	47.5	2.99	13.150	3.385
294	CT-L73.0	50	47.5	2.58	12.680	3.543
295	CT-L73.0	50	47.5	2.57	12.680	3.543
295	CT-L73.0	50	47.5	2.46	12.510	3.600
296	CT-L73.0	50	47.5	2.46	12.510	3.600

296	CT-L73.0	50	47.5	2.13	12.170	3.728
297	CT-L73.0	50	47.5	2.12	12.180	3.726
297	CT-L73.0	50	47.5	1.66	11.670	3.928
298	CT-L73.0	50	47.5	1.65	11.670	3.929
298	CT-L73.0	50	47.5	1.16	11.130	4.164
299	CT-L73.0	50	47.5	1.15	11.130	4.164
299	CT-L73.0	50	47.5	0.65	10.580	4.428
300	CT-L73.0	50	47.5	0.64	10.580	4.429
300	CT-L73.0	50	47.5	0.12	9.990	4.743
301	CT-L73.0	50	47.5	0.11	10.000	4.739
301	CT-L73.0	50	47.5	-0.45	9.390	5.011
302	CT-L73.0	50	47.5	-0.45	9.390	5.011
302	CT-L73.0	50	47.5	-1.02	8.760	5.306
303	CT-L73.0	50	47.5	-1.02	8.770	5.300
303	CT-L73.0	50	47.5	-1.61	8.120	5.651
304	CT-L73.0	50	47.5	-1.62	8.120	5.650
304	CT-L73.0	50	47.5	-2.22	7.460	6.070
305	CT-L73.0	50	47.5	-2.23	7.460	6.068
305	CT-L73.0	50	47.5	-2.85	-7.230	6.176
306	CT-L73.0	50	47.5	-2.86	-7.220	6.183
306	CT-L73.0	50	47.5	-3.51	-7.360	5.977
307	CT-L73.0	50	47.5	-3.52	-7.360	5.976
307	CT-L73.0	50	47.5	-4.18	-7.500	5.776
308	CT-L73.0	50	47.5	-4.19	-7.500	5.775
308	CT-L73.0	50	47.5	-4.87	-7.630	5.587
309	CT-L73.0	50	47.5	-4.89	-7.630	5.585
309	CT-L73.0	50	47.5	-5.58	-7.770	5.395
310	CT-L73.0	50	47.5	-5.6	-7.770	5.393
310	CT-L73.0	50	47.5	-6.32	-7.910	5.206
311	CT-L73.0	50	47.5	-6.33	-7.910	5.205
311	CT-L73.0	50	47.5	-7.07	-8.050	5.022
312	CT-L73.0	50	47.5	-7.08	-8.050	5.021
312	CT-L73.0	50	47.5	-7.84	-8.200	4.837
313	CT-L73.0	50	47.5	-7.85	-8.200	4.835
313	CT-L73.0	50	47.5	-8.63	-8.340	4.661
314	CT-L73.0	50	47.5	-8.64	-8.340	4.659
314	CT-L73.0	50	47.5	-9.44	-8.490	4.483
315	CT-L73.0	50	47.5	-9.45	-8.490	4.482
315	CT-L73.0	50	47.5	-10.27	-8.640	4.309
316	CT-L73.0	50	47.5	-10.28	-8.640	4.308
316	CT-L73.0	50	47.5	-11.11	-8.780	4.145
317	CT-L73.0	50	47.5	-11.12	-8.790	4.139
317	CT-L73.0	50	47.5	-11.96	-8.930	3.980
318	CT-L73.0	50	47.5	-11.97	-8.930	3.979
318	CT-L73.0	50	47.5	-12.83	-9.200	3.768
319	CT-L73.0	50	47.5	-12.83	-9.210	3.764
319	CT-L73.0	50	47.5	-11.96	-8.960	3.967
320	CT-L73.0	50	47.5	-11.96	-8.960	3.967
320	CT-L73.0	50	47.5	-11.11	-8.820	4.126
321	CT-L73.0	50	47.5	-11.1	-8.820	4.127
321	CT-L73.0	50	47.5	-10.27	-8.670	4.294
322	CT-L73.0	50	47.5	-10.26	-8.670	4.295
322	CT-L73.0	50	47.5	-9.45	-8.520	4.466
323	CT-L73.0	50	47.5	-9.44	-8.520	4.467
323	CT-L73.0	50	47.5	-8.64	-8.380	4.637

324	CT-L73.0	50	47.5	-8.63	-8.370	4.644
324	CT-L73.0	50	47.5	-7.85	-8.230	4.818
325	CT-L73.0	50	47.5	-7.84	-8.230	4.819
325	CT-L73.0	50	47.5	-7.08	-8.080	5.002
326	CT-L73.0	50	47.5	-7.06	-8.080	5.005
326	CT-L73.0	50	47.5	-6.33	-7.940	5.185
327	CT-L73.0	50	47.5	-6.31	-7.940	5.188
327	CT-L73.0	50	47.5	-5.59	-7.800	5.373
328	CT-L73.0	50	47.5	-5.58	-7.800	5.374
328	CT-L73.0	50	47.5	-4.88	-7.660	5.564
329	CT-L73.0	50	47.5	-4.87	-7.660	5.565
329	CT-L73.0	50	47.5	-4.19	-7.520	5.759
330	CT-L73.0	50	47.5	-4.17	-7.530	5.754
330	CT-L73.0	50	47.5	-3.51	-7.390	5.953
331	CT-L73.0	50	47.5	-3.5	-7.390	5.954
331	CT-L73.0	50	47.5	-2.86	-7.250	6.157
332	CT-L73.0	50	47.5	-2.85	-7.250	6.159
332	CT-L73.0	50	47.5	-2.23	7.480	6.052
333	CT-L73.0	50	47.5	-2.22	7.470	6.062
333	CT-L73.0	50	47.5	-1.61	8.140	5.638
334	CT-L73.0	50	47.5	-1.61	8.130	5.645
334	CT-L73.0	50	47.5	-1.02	8.780	5.294
335	CT-L73.0	50	47.5	-1.02	8.780	5.294
335	CT-L73.0	50	47.5	-0.45	9.410	5.000
336	CT-L73.0	50	47.5	-0.44	9.410	5.001
336	CT-L73.0	50	47.5	0.11	10.010	4.734
337	CT-L73.0	50	47.5	0.12	10.010	4.733
337	CT-L73.0	50	47.5	0.65	10.600	4.420
338	CT-L73.0	50	47.5	0.65	10.590	4.424
338	CT-L73.0	50	47.5	1.16	11.150	4.156
339	CT-L73.0	50	47.5	1.17	11.150	4.155
339	CT-L73.0	50	47.5	1.65	11.690	3.922
340	CT-L73.0	50	47.5	1.66	11.690	3.921
340	CT-L73.0	50	47.5	2.12	12.200	3.720
341	CT-L73.0	50	47.5	2.13	12.200	3.719
341	CT-L73.0	50	47.5	2.46	12.540	3.592
342	CT-L73.0	50	47.5	2.46	12.540	3.592
342	CT-L73.0	50	47.5	2.57	12.700	3.538
343	CT-L73.0	50	47.5	2.58	12.700	3.537
343	CT-L73.0	50	47.5	3	13.180	3.376
344	CT-L73.0	50	47.5	3.01	13.170	3.378
344	CT-L73.0	50	47.5	3.4	13.640	3.233
345	CT-L73.0	50	47.5	3.41	13.630	3.235
345	CT-L73.0	50	47.5	3.79	14.060	3.109
346	CT-L73.0	50	47.5	3.8	14.060	3.108
346	CT-L73.0	50	47.5	4.16	14.460	2.997
347	CT-L73.0	50	47.5	4.17	14.450	2.999
347	CT-L73.0	50	47.5	4.5	14.820	2.901
348	CT-L73.0	50	47.5	4.51	14.820	2.901
348	CT-L73.0	50	47.5	4.83	15.150	2.817
349	CT-L73.0	50	47.5	4.83	15.150	2.817
349	CT-L73.0	50	47.5	5.13	15.450	2.742
350	CT-L73.0	50	47.5	5.14	15.450	2.742
350	CT-L73.0	50	47.5	5.41	15.710	2.679
351	CT-L73.0	50	47.5	5.42	15.710	2.679

351	CT-L73.0	50	47.5	5.67	15.940	2.624
352	CT-L73.0	50	47.5	5.68	15.940	2.624
352	CT-L73.0	50	47.5	5.91	16.130	2.578
353	CT-L73.0	50	47.5	5.92	16.130	2.578
353	CT-L73.0	50	47.5	6.13	16.290	2.540
354	CT-L73.0	50	47.5	6.14	16.280	2.541
354	CT-L73.0	50	47.5	6.33	16.400	2.510
355	CT-L73.0	50	47.5	6.34	16.400	2.510
355	CT-L73.0	50	47.5	6.51	16.480	2.487
356	CT-L73.0	50	47.5	6.52	16.480	2.487
356	CT-L73.0	50	47.5	6.67	16.520	2.472
357	CT-L73.0	50	47.5	6.67	16.520	2.472
357	CT-L73.0	50	47.5	6.81	16.580	2.454
358	CT-L73.0	50	47.5	6.81	16.590	2.453
358	CT-L73.0	50	47.5	6.87	16.610	2.446
359	CT-L73.0	50	47.5	6.87	16.610	2.446
359	CT-L73.0	50	47.5	6.92	16.680	2.433
360	CT-L73.0	50	47.5	6.92	16.680	2.433
360	CT-L73.0	50	47.5	7.01	16.740	2.419
361	CT-L73.0	50	47.5	7.01	16.740	2.419
361	CT-L73.0	50	47.5	7.08	16.780	2.409
362	CT-L73.0	50	47.5	7.08	16.780	2.409
362	CT-L73.0	50	47.5	7.13	16.780	2.406
363	CT-L73.0	50	47.5	7.13	16.770	2.407
363	CT-L73.0	50	47.5	7.16	16.730	2.411
364	CT-L73.0	50	47.5	7.16	16.730	2.411
364	CT-L73.0	50	47.5	7.17	16.650	2.422
365	CT-L73.0	50	47.5	7.17	16.650	2.422
365	CT-L73.0	50	47.5	7.16	16.520	2.442
366	CT-L73.0	50	47.5	7.16	16.520	2.442
366	CT-L73.0	50	47.5	7.12	16.360	2.468
367	CT-L73.0	50	47.5	7.12	16.360	2.468
367	CT-L73.0	50	47.5	7.07	16.150	2.503
368	CT-L73.0	50	47.5	7.07	16.150	2.503
368	CT-L73.0	50	47.5	6.99	15.900	2.548
369	CT-L73.0	50	47.5	6.99	15.900	2.548
369	CT-L73.0	50	47.5	6.9	15.600	2.603
370	CT-L73.0	50	47.5	6.89	15.600	2.603
370	CT-L73.0	50	47.5	6.78	15.270	2.667
371	CT-L73.0	50	47.5	6.77	15.270	2.667
371	CT-L73.0	50	47.5	6.64	14.880	2.746
372	CT-L73.0	50	47.5	6.63	14.880	2.747
372	CT-L73.0	50	47.5	6.48	14.450	2.839
373	CT-L73.0	50	47.5	6.47	14.450	2.839
373	CT-L73.0	50	47.5	6.3	13.980	2.947
374	CT-L73.0	50	47.5	6.29	13.980	2.948
374	CT-L73.0	50	47.5	6.1	13.460	3.076
375	CT-L73.0	50	47.5	6.09	13.470	3.074
375	CT-L73.0	50	47.5	6.04	13.320	3.113
376	CT-L73.0	50	47.5	6.04	13.320	3.113
376	CT-L73.0	50	47.5	5.87	12.910	3.225
377	CT-L73.0	50	47.5	5.87	12.930	3.220
377	CT-L73.0	50	47.5	5.63	12.370	3.385
378	CT-L73.0	50	47.5	5.62	12.370	3.386
378	CT-L73.0	50	47.5	5.36	11.780	3.577

379	CT-L73.0	50	47.5	5.35	11.790	3.575
379	CT-L73.0	50	47.5	5.07	11.190	3.792
380	CT-L73.0	50	47.5	5.06	11.200	3.789
380	CT-L73.0	50	47.5	4.76	10.550	4.051
381	CT-L73.0	50	47.5	4.76	10.560	4.047
381	CT-L73.0	50	47.5	4.44	9.860	4.367
382	CT-L73.0	50	47.5	4.43	9.880	4.359
382	CT-L73.0	50	47.5	4.09	9.130	4.755
383	CT-L73.0	50	47.5	4.08	9.150	4.745
383	CT-L73.0	50	47.5	3.72	8.350	5.243
384	CT-L73.0	50	47.5	3.71	8.370	5.232
384	CT-L73.0	50	47.5	3.32	7.520	5.875
385	CT-L73.0	50	47.5	3.31	7.550	5.853
385	CT-L73.0	50	47.5	2.91	6.640	6.715
386	CT-L73.0	50	47.5	2.9	6.670	6.687
386	CT-L73.0	50	47.5	2.48	5.710	7.884
387	CT-L73.0	50	47.5	2.47	5.740	7.845
387	CT-L73.0	50	47.5	2.02	4.720	9.636
388	CT-L73.0	50	47.5	2.02	4.750	9.575
388	CT-L73.0	50	47.5	1.55	3.660	12.555
389	CT-L73.0	50	47.5	1.55	3.710	12.385
389	CT-L73.0	50	47.5	1.06	2.540	18.283
390	CT-L73.0	50	47.5	1.05	2.590	17.934
390	CT-L73.0	50	47.5	0.54	1.320	35.576
391	CT-L73.0	50	47.5	0.54	1.370	34.277
391	CT-L73.0	50	47.5	0.01	-0.070	678.429

LOAD RATING FIXED SPAN -GIRDER 4

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
100	CT-L73.0	50	47.5	0.11	0.330	143.606
100	CT-L73.0	50	47.5	0.48	1.330	35.353
101	CT-L73.0	50	47.5	0.53	1.440	32.618
101	CT-L73.0	50	47.5	0.96	2.580	18.039
102	CT-L73.0	50	47.5	1.01	2.700	17.219
102	CT-L73.0	50	47.5	1.44	3.750	12.283
103	CT-L73.0	50	47.5	1.49	3.880	11.858
103	CT-L73.0	50	47.5	1.9	4.860	9.383
104	CT-L73.0	50	47.5	1.95	4.990	9.128
104	CT-L73.0	50	47.5	2.35	5.900	7.653
105	CT-L73.0	50	47.5	2.4	6.020	7.492
105	CT-L73.0	50	47.5	2.78	6.880	6.500
106	CT-L73.0	50	47.5	2.83	6.990	6.391
106	CT-L73.0	50	47.5	3.19	7.810	5.673
107	CT-L73.0	50	47.5	3.25	7.910	5.594
107	CT-L73.0	50	47.5	3.58	8.680	5.060
108	CT-L73.0	50	47.5	3.65	8.770	5.000
108	CT-L73.0	50	47.5	3.96	9.490	4.588
109	CT-L73.0	50	47.5	4.02	9.580	4.539
109	CT-L73.0	50	47.5	4.31	10.250	4.214
110	CT-L73.0	50	47.5	4.38	10.330	4.174
110	CT-L73.0	50	47.5	4.65	10.970	3.906
111	CT-L73.0	50	47.5	4.71	11.040	3.876
111	CT-L73.0	50	47.5	4.96	11.690	3.639
112	CT-L73.0	50	47.5	5.02	11.760	3.612
112	CT-L73.0	50	47.5	5.25	12.380	3.413
113	CT-L73.0	50	47.5	5.31	12.450	3.389
113	CT-L73.0	50	47.5	5.53	13.030	3.221
114	CT-L73.0	50	47.5	5.58	13.080	3.205
114	CT-L73.0	50	47.5	5.78	13.630	3.061
115	CT-L73.0	50	47.5	5.82	13.660	3.051
115	CT-L73.0	50	47.5	5.96	14.030	2.961
116	CT-L73.0	50	47.5	5.96	14.020	2.963
116	CT-L73.0	50	47.5	6	14.170	2.929
117	CT-L73.0	50	47.5	6.05	14.190	2.921
117	CT-L73.0	50	47.5	6.21	14.650	2.818
118	CT-L73.0	50	47.5	6.25	14.690	2.808
118	CT-L73.0	50	47.5	6.4	15.090	2.724
119	CT-L73.0	50	47.5	6.43	15.130	2.714
119	CT-L73.0	50	47.5	6.56	15.490	2.643
120	CT-L73.0	50	47.5	6.59	15.530	2.634
120	CT-L73.0	50	47.5	6.7	15.850	2.574
121	CT-L73.0	50	47.5	6.73	15.890	2.566
121	CT-L73.0	50	47.5	6.82	16.180	2.514
122	CT-L73.0	50	47.5	6.85	16.210	2.508
122	CT-L73.0	50	47.5	6.92	16.460	2.465

Minimum Rating Factor 2.318

123	CT-L73.0	50	47.5	6.94	16.490	2.460
123	CT-L73.0	50	47.5	7	16.710	2.424
124	CT-L73.0	50	47.5	7.02	16.730	2.420
124	CT-L73.0	50	47.5	7.06	16.920	2.390
125	CT-L73.0	50	47.5	7.07	16.940	2.387
125	CT-L73.0	50	47.5	7.1	17.090	2.364
126	CT-L73.0	50	47.5	7.11	17.110	2.361
126	CT-L73.0	50	47.5	7.11	17.230	2.344
127	CT-L73.0	50	47.5	7.12	17.240	2.342
127	CT-L73.0	50	47.5	7.11	17.330	2.331
128	CT-L73.0	50	47.5	7.11	17.340	2.329
128	CT-L73.0	50	47.5	7.08	17.390	2.324
129	CT-L73.0	50	47.5	7.08	17.410	2.322
129	CT-L73.0	50	47.5	7.04	17.430	2.321
130	CT-L73.0	50	47.5	7.03	17.430	2.322
130	CT-L73.0	50	47.5	6.97	17.420	2.327
131	CT-L73.0	50	47.5	6.96	17.430	2.326
131	CT-L73.0	50	47.5	6.88	17.390	2.336
132	CT-L73.0	50	47.5	6.86	17.380	2.338
132	CT-L73.0	50	47.5	6.82	17.330	2.347
133	CT-L73.0	50	47.5	6.82	17.330	2.347
133	CT-L73.0	50	47.5	6.77	17.310	2.353
134	CT-L73.0	50	47.5	6.75	17.300	2.355
134	CT-L73.0	50	47.5	6.64	17.230	2.371
135	CT-L73.0	50	47.5	6.61	17.220	2.375
135	CT-L73.0	50	47.5	6.48	17.160	2.390
136	CT-L73.0	50	47.5	6.45	17.130	2.396
136	CT-L73.0	50	47.5	6.31	17.040	2.417
137	CT-L73.0	50	47.5	6.27	17.020	2.422
137	CT-L73.0	50	47.5	6.11	16.900	2.449
138	CT-L73.0	50	47.5	6.07	16.870	2.456
138	CT-L73.0	50	47.5	5.9	16.710	2.490
139	CT-L73.0	50	47.5	5.85	16.690	2.496
139	CT-L73.0	50	47.5	5.66	16.500	2.536
140	CT-L73.0	50	47.5	5.61	16.470	2.543
140	CT-L73.0	50	47.5	5.4	16.260	2.589
141	CT-L73.0	50	47.5	5.35	16.220	2.599
141	CT-L73.0	50	47.5	5.12	15.980	2.652
142	CT-L73.0	50	47.5	5.06	15.940	2.662
142	CT-L73.0	50	47.5	4.82	15.670	2.724
143	CT-L73.0	50	47.5	4.76	15.630	2.734
143	CT-L73.0	50	47.5	4.5	15.340	2.803
144	CT-L73.0	50	47.5	4.44	15.290	2.816
144	CT-L73.0	50	47.5	4.16	14.970	2.895
145	CT-L73.0	50	47.5	4.09	14.930	2.908
145	CT-L73.0	50	47.5	3.79	14.580	2.998
146	CT-L73.0	50	47.5	3.73	14.530	3.012
146	CT-L73.0	50	47.5	3.41	14.160	3.114
147	CT-L73.0	50	47.5	3.34	14.110	3.130
147	CT-L73.0	50	47.5	3.01	13.700	3.247
148	CT-L73.0	50	47.5	2.94	13.660	3.262
148	CT-L73.0	50	47.5	2.58	13.220	3.398
149	CT-L73.0	50	47.5	2.51	13.190	3.411
149	CT-L73.0	50	47.5	2.41	13.030	3.460
150	CT-L73.0	50	47.5	2.41	13.030	3.460

150	CT-L73.0	50	47.5	2.13	12.710	3.570
151	CT-L73.0	50	47.5	2.06	12.670	3.586
151	CT-L73.0	50	47.5	1.67	12.170	3.766
152	CT-L73.0	50	47.5	1.59	12.110	3.791
152	CT-L73.0	50	47.5	1.18	11.600	3.993
153	CT-L73.0	50	47.5	1.1	11.520	4.028
153	CT-L73.0	50	47.5	0.67	11.000	4.257
154	CT-L73.0	50	47.5	0.59	10.920	4.296
154	CT-L73.0	50	47.5	0.14	10.370	4.567
155	CT-L73.0	50	47.5	0.06	10.300	4.606
155	CT-L73.0	50	47.5	-0.45	9.730	4.836
156	CT-L73.0	50	47.5	-0.51	9.650	4.869
156	CT-L73.0	50	47.5	-1.02	9.060	5.130
157	CT-L73.0	50	47.5	-1.09	8.980	5.168
157	CT-L73.0	50	47.5	-1.61	8.370	5.483
158	CT-L73.0	50	47.5	-1.68	8.280	5.534
158	CT-L73.0	50	47.5	-2.22	7.660	5.911
159	CT-L73.0	50	47.5	-2.29	7.570	5.972
159	CT-L73.0	50	47.5	-2.84	-7.410	6.027
160	CT-L73.0	50	47.5	-2.93	-7.430	5.999
160	CT-L73.0	50	47.5	-3.49	-7.560	5.821
161	CT-L73.0	50	47.5	-3.58	-7.580	5.794
161	CT-L73.0	50	47.5	-4.16	-7.720	5.614
162	CT-L73.0	50	47.5	-4.25	-7.730	5.595
162	CT-L73.0	50	47.5	-4.85	-7.870	5.419
163	CT-L73.0	50	47.5	-4.94	-7.890	5.394
163	CT-L73.0	50	47.5	-5.55	-8.030	5.224
164	CT-L73.0	50	47.5	-5.65	-8.050	5.199
164	CT-L73.0	50	47.5	-6.27	-8.190	5.034
165	CT-L73.0	50	47.5	-6.38	-8.220	5.002
165	CT-L73.0	50	47.5	-7.02	-8.360	4.842
166	CT-L73.0	50	47.5	-7.13	-8.390	4.812
166	CT-L73.0	50	47.5	-7.78	-8.530	4.657
167	CT-L73.0	50	47.5	-7.9	-8.560	4.626
167	CT-L73.0	50	47.5	-8.57	-8.700	4.475
168	CT-L73.0	50	47.5	-8.7	-8.730	4.444
168	CT-L73.0	50	47.5	-9.39	-8.870	4.297
169	CT-L73.0	50	47.5	-9.51	-8.910	4.264
169	CT-L73.0	50	47.5	-10.23	-9.050	4.118
170	CT-L73.0	50	47.5	-10.35	-9.100	4.082
170	CT-L73.0	50	47.5	-11.08	-9.290	3.920
171	CT-L73.0	50	47.5	-11.2	-9.300	3.903
171	CT-L73.0	50	47.5	-11.96	-10.030	3.543
172	CT-L73.0	50	47.5	-12.04	-9.990	3.550
172	CT-L73.0	50	47.5	-12.85	-10.850	3.194
173	CT-L73.0	50	47.5	-12.83	-10.880	3.187
173	CT-L73.0	50	47.5	-12.02	-10.030	3.537
174	CT-L73.0	50	47.5	-11.94	-10.070	3.531
174	CT-L73.0	50	47.5	-11.18	-9.310	3.901
175	CT-L73.0	50	47.5	-11.07	-9.330	3.905
175	CT-L73.0	50	47.5	-10.33	-9.110	4.080
176	CT-L73.0	50	47.5	-10.21	-9.060	4.116
176	CT-L73.0	50	47.5	-9.5	-8.920	4.260
177	CT-L73.0	50	47.5	-9.37	-8.880	4.294
177	CT-L73.0	50	47.5	-8.68	-8.740	4.442

178	CT-L73.0	50	47.5	-8.56	-8.710	4.471
178	CT-L73.0	50	47.5	-7.89	-8.570	4.622
179	CT-L73.0	50	47.5	-7.76	-8.540	4.653
179	CT-L73.0	50	47.5	-7.12	-8.400	4.807
180	CT-L73.0	50	47.5	-7	-8.370	4.839
180	CT-L73.0	50	47.5	-6.37	-8.230	4.998
181	CT-L73.0	50	47.5	-6.26	-8.210	5.023
181	CT-L73.0	50	47.5	-5.64	-8.070	5.187
182	CT-L73.0	50	47.5	-5.54	-8.050	5.212
182	CT-L73.0	50	47.5	-4.93	-7.910	5.382
183	CT-L73.0	50	47.5	-4.83	-7.890	5.408
183	CT-L73.0	50	47.5	-4.24	-7.750	5.582
184	CT-L73.0	50	47.5	-4.15	-7.730	5.608
184	CT-L73.0	50	47.5	-3.57	-7.590	5.788
185	CT-L73.0	50	47.5	-3.48	-7.570	5.815
185	CT-L73.0	50	47.5	-2.91	-7.440	5.993
186	CT-L73.0	50	47.5	-2.83	-7.420	6.020
186	CT-L73.0	50	47.5	-2.28	7.580	5.966
187	CT-L73.0	50	47.5	-2.21	7.670	5.905
187	CT-L73.0	50	47.5	-1.67	8.290	5.528
188	CT-L73.0	50	47.5	-1.6	8.380	5.477
188	CT-L73.0	50	47.5	-1.08	8.990	5.164
189	CT-L73.0	50	47.5	-1.01	9.070	5.126
189	CT-L73.0	50	47.5	-0.5	9.660	4.865
190	CT-L73.0	50	47.5	-0.44	9.740	4.832
190	CT-L73.0	50	47.5	0.07	10.310	4.600
191	CT-L73.0	50	47.5	0.15	10.390	4.557
191	CT-L73.0	50	47.5	0.6	10.930	4.291
192	CT-L73.0	50	47.5	0.68	11.010	4.252
192	CT-L73.0	50	47.5	1.11	11.540	4.020
193	CT-L73.0	50	47.5	1.19	11.610	3.989
193	CT-L73.0	50	47.5	1.6	12.120	3.787
194	CT-L73.0	50	47.5	1.68	12.180	3.762
194	CT-L73.0	50	47.5	2.07	12.680	3.583
195	CT-L73.0	50	47.5	2.14	12.720	3.566
195	CT-L73.0	50	47.5	2.42	13.050	3.454
196	CT-L73.0	50	47.5	2.42	13.050	3.454
196	CT-L73.0	50	47.5	2.52	13.210	3.405
197	CT-L73.0	50	47.5	2.59	13.230	3.395
197	CT-L73.0	50	47.5	2.95	13.680	3.257
198	CT-L73.0	50	47.5	3.01	13.720	3.243
198	CT-L73.0	50	47.5	3.35	14.130	3.125
199	CT-L73.0	50	47.5	3.42	14.170	3.111
199	CT-L73.0	50	47.5	3.73	14.550	3.008
200	CT-L73.0	50	47.5	3.8	14.600	2.993
200	CT-L73.0	50	47.5	4.1	14.950	2.903
201	CT-L73.0	50	47.5	4.16	14.990	2.891
201	CT-L73.0	50	47.5	4.44	15.310	2.813
202	CT-L73.0	50	47.5	4.51	15.360	2.799
202	CT-L73.0	50	47.5	4.77	15.660	2.729
203	CT-L73.0	50	47.5	4.83	15.690	2.720
203	CT-L73.0	50	47.5	5.07	15.970	2.657
204	CT-L73.0	50	47.5	5.13	16.000	2.648
204	CT-L73.0	50	47.5	5.35	16.250	2.594
205	CT-L73.0	50	47.5	5.41	16.280	2.585

205	CT-L73.0	50	47.5	5.62	16.490	2.540
206	CT-L73.0	50	47.5	5.66	16.530	2.531
206	CT-L73.0	50	47.5	5.86	16.710	2.492
207	CT-L73.0	50	47.5	5.9	16.740	2.485
207	CT-L73.0	50	47.5	6.08	16.900	2.451
208	CT-L73.0	50	47.5	6.12	16.920	2.446
208	CT-L73.0	50	47.5	6.28	17.050	2.418
209	CT-L73.0	50	47.5	6.32	17.070	2.412
209	CT-L73.0	50	47.5	6.46	17.160	2.392
210	CT-L73.0	50	47.5	6.49	17.180	2.387
210	CT-L73.0	50	47.5	6.62	17.240	2.371
211	CT-L73.0	50	47.5	6.65	17.260	2.367
211	CT-L73.0	50	47.5	6.76	17.310	2.354
212	CT-L73.0	50	47.5	6.78	17.330	2.350
212	CT-L73.0	50	47.5	6.83	17.350	2.344
213	CT-L73.0	50	47.5	6.83	17.350	2.344
213	CT-L73.0	50	47.5	6.87	17.390	2.336
214	CT-L73.0	50	47.5	6.89	17.410	2.333
214	CT-L73.0	50	47.5	6.97	17.440	2.324
215	CT-L73.0	50	47.5	6.98	17.440	2.323
215	CT-L73.0	50	47.5	7.04	17.450	2.319
216	CT-L73.0	50	47.5	7.05	17.450	2.318
216	CT-L73.0	50	47.5	7.09	17.430	2.318
217	CT-L73.0	50	47.5	7.09	17.410	2.321
217	CT-L73.0	50	47.5	7.12	17.360	2.326
218	CT-L73.0	50	47.5	7.12	17.350	2.327
218	CT-L73.0	50	47.5	7.13	17.260	2.339
219	CT-L73.0	50	47.5	7.13	17.250	2.340
219	CT-L73.0	50	47.5	7.12	17.130	2.357
220	CT-L73.0	50	47.5	7.11	17.110	2.361
220	CT-L73.0	50	47.5	7.09	16.960	2.383
221	CT-L73.0	50	47.5	7.07	16.940	2.387
221	CT-L73.0	50	47.5	7.03	16.750	2.416
222	CT-L73.0	50	47.5	7.02	16.730	2.420
222	CT-L73.0	50	47.5	6.96	16.510	2.455
223	CT-L73.0	50	47.5	6.94	16.480	2.461
223	CT-L73.0	50	47.5	6.86	16.230	2.504
224	CT-L73.0	50	47.5	6.84	16.200	2.510
224	CT-L73.0	50	47.5	6.75	15.910	2.561
225	CT-L73.0	50	47.5	6.72	15.870	2.570
225	CT-L73.0	50	47.5	6.61	15.550	2.630
226	CT-L73.0	50	47.5	6.58	15.510	2.638
226	CT-L73.0	50	47.5	6.46	15.150	2.709
227	CT-L73.0	50	47.5	6.42	15.110	2.719
227	CT-L73.0	50	47.5	6.28	14.700	2.804
228	CT-L73.0	50	47.5	6.24	14.670	2.813
228	CT-L73.0	50	47.5	6.08	14.210	2.915
229	CT-L73.0	50	47.5	6.03	14.190	2.922
229	CT-L73.0	50	47.5	5.99	14.040	2.957
230	CT-L73.0	50	47.5	5.99	14.040	2.957
230	CT-L73.0	50	47.5	5.86	13.670	3.046
231	CT-L73.0	50	47.5	5.81	13.640	3.056
231	CT-L73.0	50	47.5	5.61	13.090	3.200
232	CT-L73.0	50	47.5	5.56	13.040	3.216
232	CT-L73.0	50	47.5	5.35	12.460	3.383

233	CT-L73.0	50	47.5	5.29	12.400	3.404
233	CT-L73.0	50	47.5	5.07	11.770	3.605
234	CT-L73.0	50	47.5	5	11.700	3.632
234	CT-L73.0	50	47.5	4.76	11.050	3.868
235	CT-L73.0	50	47.5	4.69	10.970	3.902
235	CT-L73.0	50	47.5	4.44	10.330	4.168
236	CT-L73.0	50	47.5	4.37	10.260	4.204
236	CT-L73.0	50	47.5	4.09	9.570	4.536
237	CT-L73.0	50	47.5	4.02	9.490	4.582
237	CT-L73.0	50	47.5	3.72	8.760	4.998
238	CT-L73.0	50	47.5	3.65	8.680	5.052
238	CT-L73.0	50	47.5	3.34	7.900	5.590
239	CT-L73.0	50	47.5	3.26	7.810	5.665
239	CT-L73.0	50	47.5	2.93	6.980	6.385
240	CT-L73.0	50	47.5	2.85	6.880	6.490
240	CT-L73.0	50	47.5	2.5	6.000	7.500
241	CT-L73.0	50	47.5	2.43	5.900	7.639
241	CT-L73.0	50	47.5	2.05	4.960	9.163
242	CT-L73.0	50	47.5	1.98	4.850	9.386
242	CT-L73.0	50	47.5	1.59	3.850	11.925
243	CT-L73.0	50	47.5	1.51	3.740	12.297
243	CT-L73.0	50	47.5	1.1	2.670	17.378
244	CT-L73.0	50	47.5	1.03	2.570	18.082
244	CT-L73.0	50	47.5	0.59	1.420	33.035
245	CT-L73.0	50	47.5	0.52	1.330	35.323
245	CT-L73.0	50	47.5	0.07	0.340	139.500

LOAD RATING FIXED SPAN -GIRDER 1

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=Y_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
538	CT-L3S2 PLUS LANE LOAD	50	47.5	0.06	0.250	189.760
538	CT-L3S2 PLUS LANE LOAD	50	47.5	0.53	0.980	47.929
539	CT-L3S2 PLUS LANE LOAD	50	47.5	0.53	1.090	43.092
539	CT-L3S2 PLUS LANE LOAD	50	47.5	1.05	1.900	24.447
540	CT-L3S2 PLUS LANE LOAD	50	47.5	1.07	2.020	22.985
540	CT-L3S2 PLUS LANE LOAD	50	47.5	1.56	2.770	16.585
541	CT-L3S2 PLUS LANE LOAD	50	47.5	1.59	2.880	15.941
541	CT-L3S2 PLUS LANE LOAD	50	47.5	2.06	3.580	12.693
542	CT-L3S2 PLUS LANE LOAD	50	47.5	2.09	3.690	12.306
542	CT-L3S2 PLUS LANE LOAD	50	47.5	2.54	4.340	10.359
543	CT-L3S2 PLUS LANE LOAD	50	47.5	2.57	4.440	10.119
543	CT-L3S2 PLUS LANE LOAD	50	47.5	3.01	5.050	8.810
544	CT-L3S2 PLUS LANE LOAD	50	47.5	3.03	5.150	8.635
544	CT-L3S2 PLUS LANE LOAD	50	47.5	3.45	5.730	7.688
545	CT-L3S2 PLUS LANE LOAD	50	47.5	3.47	5.820	7.565
545	CT-L3S2 PLUS LANE LOAD	50	47.5	3.87	6.360	6.860
546	CT-L3S2 PLUS LANE LOAD	50	47.5	3.89	6.450	6.761
546	CT-L3S2 PLUS LANE LOAD	50	47.5	4.26	6.960	6.213
547	CT-L3S2 PLUS LANE LOAD	50	47.5	4.29	7.040	6.138
547	CT-L3S2 PLUS LANE LOAD	50	47.5	4.64	7.510	5.707
548	CT-L3S2 PLUS LANE LOAD	50	47.5	4.67	7.590	5.643
548	CT-L3S2 PLUS LANE LOAD	50	47.5	4.99	8.040	5.287
549	CT-L3S2 PLUS LANE LOAD	50	47.5	5.02	8.110	5.238
549	CT-L3S2 PLUS LANE LOAD	50	47.5	5.32	8.530	4.945
550	CT-L3S2 PLUS LANE LOAD	50	47.5	5.35	8.590	4.907
550	CT-L3S2 PLUS LANE LOAD	50	47.5	5.63	9.080	4.611
551	CT-L3S2 PLUS LANE LOAD	50	47.5	5.66	9.130	4.583
551	CT-L3S2 PLUS LANE LOAD	50	47.5	5.92	9.590	4.336
552	CT-L3S2 PLUS LANE LOAD	50	47.5	5.94	9.630	4.316
552	CT-L3S2 PLUS LANE LOAD	50	47.5	6.18	10.050	4.111
553	CT-L3S2 PLUS LANE LOAD	50	47.5	6.2	10.080	4.097
553	CT-L3S2 PLUS LANE LOAD	50	47.5	6.37	10.340	3.978
554	CT-L3S2 PLUS LANE LOAD	50	47.5	6.37	10.340	3.978
554	CT-L3S2 PLUS LANE LOAD	50	47.5	6.42	10.470	3.924
555	CT-L3S2 PLUS LANE LOAD	50	47.5	6.44	10.480	3.918
555	CT-L3S2 PLUS LANE LOAD	50	47.5	6.64	10.830	3.773
556	CT-L3S2 PLUS LANE LOAD	50	47.5	6.65	10.860	3.762
556	CT-L3S2 PLUS LANE LOAD	50	47.5	6.83	11.150	3.648
557	CT-L3S2 PLUS LANE LOAD	50	47.5	6.84	11.190	3.634
557	CT-L3S2 PLUS LANE LOAD	50	47.5	7	11.440	3.540
558	CT-L3S2 PLUS LANE LOAD	50	47.5	7.01	11.480	3.527
558	CT-L3S2 PLUS LANE LOAD	50	47.5	7.15	11.700	3.449
559	CT-L3S2 PLUS LANE LOAD	50	47.5	7.16	11.730	3.439
559	CT-L3S2 PLUS LANE LOAD	50	47.5	7.27	11.910	3.378
560	CT-L3S2 PLUS LANE LOAD	50	47.5	7.28	11.940	3.369
560	CT-L3S2 PLUS LANE LOAD	50	47.5	7.38	12.100	3.316
561	CT-L3S2 PLUS LANE LOAD	50	47.5	7.38	12.120	3.310
561	CT-L3S2 PLUS LANE LOAD	50	47.5	7.46	12.250	3.269
562	CT-L3S2 PLUS LANE LOAD	50	47.5	7.46	12.270	3.263
562	CT-L3S2 PLUS LANE LOAD	50	47.5	7.52	12.360	3.235
563	CT-L3S2 PLUS LANE LOAD	50	47.5	7.52	12.380	3.229
563	CT-L3S2 PLUS LANE LOAD	50	47.5	7.56	12.450	3.208

Minimum Rating Factor 3.184

564	CT-L3S2 PLUS LANE LOAD	50	47.5	7.56	12.460	3.205
564	CT-L3S2 PLUS LANE LOAD	50	47.5	7.58	12.500	3.194
565	CT-L3S2 PLUS LANE LOAD	50	47.5	7.58	12.510	3.191
565	CT-L3S2 PLUS LANE LOAD	50	47.5	7.58	12.520	3.188
566	CT-L3S2 PLUS LANE LOAD	50	47.5	7.57	12.530	3.187
566	CT-L3S2 PLUS LANE LOAD	50	47.5	7.55	12.510	3.193
567	CT-L3S2 PLUS LANE LOAD	50	47.5	7.54	12.520	3.192
567	CT-L3S2 PLUS LANE LOAD	50	47.5	7.5	12.470	3.208
568	CT-L3S2 PLUS LANE LOAD	50	47.5	7.5	12.470	3.208
568	CT-L3S2 PLUS LANE LOAD	50	47.5	7.43	12.400	3.231
569	CT-L3S2 PLUS LANE LOAD	50	47.5	7.43	12.400	3.231
569	CT-L3S2 PLUS LANE LOAD	50	47.5	7.34	12.330	3.257
570	CT-L3S2 PLUS LANE LOAD	50	47.5	7.33	12.330	3.258
570	CT-L3S2 PLUS LANE LOAD	50	47.5	7.28	12.270	3.278
571	CT-L3S2 PLUS LANE LOAD	50	47.5	7.28	12.270	3.278
571	CT-L3S2 PLUS LANE LOAD	50	47.5	7.23	12.230	3.293
572	CT-L3S2 PLUS LANE LOAD	50	47.5	7.22	12.230	3.294
572	CT-L3S2 PLUS LANE LOAD	50	47.5	7.09	12.110	3.337
573	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	12.100	3.340
573	CT-L3S2 PLUS LANE LOAD	50	47.5	6.93	11.970	3.389
574	CT-L3S2 PLUS LANE LOAD	50	47.5	6.92	11.960	3.393
574	CT-L3S2 PLUS LANE LOAD	50	47.5	6.75	11.850	3.439
575	CT-L3S2 PLUS LANE LOAD	50	47.5	6.73	11.840	3.443
575	CT-L3S2 PLUS LANE LOAD	50	47.5	6.55	11.710	3.497
576	CT-L3S2 PLUS LANE LOAD	50	47.5	6.53	11.700	3.502
576	CT-L3S2 PLUS LANE LOAD	50	47.5	6.33	11.590	3.552
577	CT-L3S2 PLUS LANE LOAD	50	47.5	6.3	11.590	3.555
577	CT-L3S2 PLUS LANE LOAD	50	47.5	6.08	11.510	3.599
578	CT-L3S2 PLUS LANE LOAD	50	47.5	6.05	11.500	3.604
578	CT-L3S2 PLUS LANE LOAD	50	47.5	5.81	11.420	3.651
579	CT-L3S2 PLUS LANE LOAD	50	47.5	5.78	11.400	3.660
579	CT-L3S2 PLUS LANE LOAD	50	47.5	5.52	11.290	3.718
580	CT-L3S2 PLUS LANE LOAD	50	47.5	5.49	11.270	3.728
580	CT-L3S2 PLUS LANE LOAD	50	47.5	5.21	11.160	3.789
581	CT-L3S2 PLUS LANE LOAD	50	47.5	5.18	11.140	3.799
581	CT-L3S2 PLUS LANE LOAD	50	47.5	4.88	11.010	3.871
582	CT-L3S2 PLUS LANE LOAD	50	47.5	4.84	10.980	3.885
582	CT-L3S2 PLUS LANE LOAD	50	47.5	4.52	10.820	3.972
583	CT-L3S2 PLUS LANE LOAD	50	47.5	4.48	10.790	3.987
583	CT-L3S2 PLUS LANE LOAD	50	47.5	4.14	10.600	4.091
584	CT-L3S2 PLUS LANE LOAD	50	47.5	4.1	10.570	4.106
584	CT-L3S2 PLUS LANE LOAD	50	47.5	3.74	10.340	4.232
585	CT-L3S2 PLUS LANE LOAD	50	47.5	3.7	10.300	4.252
585	CT-L3S2 PLUS LANE LOAD	50	47.5	3.32	10.040	4.400
586	CT-L3S2 PLUS LANE LOAD	50	47.5	3.28	10.010	4.418
586	CT-L3S2 PLUS LANE LOAD	50	47.5	2.87	9.710	4.596
587	CT-L3S2 PLUS LANE LOAD	50	47.5	2.83	9.690	4.610
587	CT-L3S2 PLUS LANE LOAD	50	47.5	2.72	9.550	4.689
588	CT-L3S2 PLUS LANE LOAD	50	47.5	2.72	9.550	4.689
588	CT-L3S2 PLUS LANE LOAD	50	47.5	2.41	9.350	4.822
589	CT-L3S2 PLUS LANE LOAD	50	47.5	2.36	9.310	4.849
589	CT-L3S2 PLUS LANE LOAD	50	47.5	1.91	8.950	5.094
590	CT-L3S2 PLUS LANE LOAD	50	47.5	1.86	8.900	5.128
590	CT-L3S2 PLUS LANE LOAD	50	47.5	1.4	8.510	5.417
591	CT-L3S2 PLUS LANE LOAD	50	47.5	1.34	8.450	5.463
591	CT-L3S2 PLUS LANE LOAD	50	47.5	0.86	8.040	5.801
592	CT-L3S2 PLUS LANE LOAD	50	47.5	0.8	7.980	5.852
592	CT-L3S2 PLUS LANE LOAD	50	47.5	0.3	7.540	6.260
593	CT-L3S2 PLUS LANE LOAD	50	47.5	0.24	7.470	6.327
593	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.33	7.000	6.739
594	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.37	6.930	6.801

594	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.94	6.500	7.163
595	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.98	6.420	7.246
595	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.57	6.000	7.655
596	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.62	5.920	7.750
596	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.22	-5.650	8.014
597	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.28	-5.660	7.989
597	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.9	-5.770	7.730
598	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.96	-5.780	7.706
598	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.61	-5.890	7.452
599	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.66	-5.900	7.431
599	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.33	-6.000	7.195
600	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.39	-6.020	7.161
600	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.09	-6.130	6.918
601	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.15	-6.140	6.897
601	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.86	-6.250	6.662
602	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.93	-6.270	6.630
602	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.66	-6.370	6.411
603	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.74	-6.390	6.379
603	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.49	-6.500	6.155
604	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.57	-6.520	6.124
604	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.34	-6.630	5.906
605	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.43	-6.650	5.875
605	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.22	-7.100	5.392
606	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.33	-7.120	5.361
606	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.13	-7.590	4.924
607	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.25	-7.620	4.888
607	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.07	-8.100	4.498
608	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.2	-8.130	4.465
608	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.06	-8.700	4.074
609	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.18	-8.780	4.023
609	CT-L3S2 PLUS LANE LOAD	50	47.5	-13.08	-9.520	3.616
610	CT-L3S2 PLUS LANE LOAD	50	47.5	-13.17	-9.570	3.587
610	CT-L3S2 PLUS LANE LOAD	50	47.5	-14.14	-10.380	3.214
611	CT-L3S2 PLUS LANE LOAD	50	47.5	-14.16	-10.370	3.215
611	CT-L3S2 PLUS LANE LOAD	50	47.5	-13.19	-9.570	3.585
612	CT-L3S2 PLUS LANE LOAD	50	47.5	-13.1	-9.530	3.610
612	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.2	-8.770	4.025
613	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.08	-8.700	4.071
613	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.22	-8.160	4.446
614	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.09	-8.120	4.484
614	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.27	-7.650	4.867
615	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.14	-7.610	4.909
615	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.34	-7.150	5.337
616	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.24	-7.130	5.366
616	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.45	-6.680	5.846
617	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.36	-6.650	5.886
617	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.58	-6.550	6.095
618	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.5	-6.530	6.126
618	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.75	-6.420	6.347
619	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.68	-6.400	6.378
619	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.94	-6.290	6.607
620	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.87	-6.280	6.629
620	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.16	-6.170	6.862
621	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.1	-6.150	6.894
621	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.41	-6.050	7.122
622	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.34	-6.030	7.158
622	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.68	-5.920	7.402
623	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.62	-5.910	7.425
623	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.97	-5.810	7.664
624	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.91	-5.790	7.701
624	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.29	-5.690	7.946

625	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.23	-5.680	7.970
625	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.63	5.920	7.748
626	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.58	6.000	7.653
626	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.99	6.420	7.245
627	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.94	6.500	7.163
627	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.38	6.970	6.760
628	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.33	7.040	6.700
628	CT-L3S2 PLUS LANE LOAD	50	47.5	0.23	7.500	6.303
629	CT-L3S2 PLUS LANE LOAD	50	47.5	0.29	7.570	6.236
629	CT-L3S2 PLUS LANE LOAD	50	47.5	0.79	8.010	5.831
630	CT-L3S2 PLUS LANE LOAD	50	47.5	0.85	8.070	5.781
630	CT-L3S2 PLUS LANE LOAD	50	47.5	1.34	8.490	5.437
631	CT-L3S2 PLUS LANE LOAD	50	47.5	1.39	8.540	5.399
631	CT-L3S2 PLUS LANE LOAD	50	47.5	1.85	8.930	5.112
632	CT-L3S2 PLUS LANE LOAD	50	47.5	1.91	8.980	5.077
632	CT-L3S2 PLUS LANE LOAD	50	47.5	2.35	9.350	4.829
633	CT-L3S2 PLUS LANE LOAD	50	47.5	2.4	9.380	4.808
633	CT-L3S2 PLUS LANE LOAD	50	47.5	2.71	9.590	4.670
634	CT-L3S2 PLUS LANE LOAD	50	47.5	2.71	9.580	4.675
634	CT-L3S2 PLUS LANE LOAD	50	47.5	2.82	9.720	4.597
635	CT-L3S2 PLUS LANE LOAD	50	47.5	2.87	9.750	4.577
635	CT-L3S2 PLUS LANE LOAD	50	47.5	3.27	10.040	4.405
636	CT-L3S2 PLUS LANE LOAD	50	47.5	3.31	10.080	4.384
636	CT-L3S2 PLUS LANE LOAD	50	47.5	3.7	10.340	4.236
637	CT-L3S2 PLUS LANE LOAD	50	47.5	3.74	10.380	4.216
637	CT-L3S2 PLUS LANE LOAD	50	47.5	4.1	10.600	4.094
638	CT-L3S2 PLUS LANE LOAD	50	47.5	4.14	10.640	4.075
638	CT-L3S2 PLUS LANE LOAD	50	47.5	4.48	10.830	3.972
639	CT-L3S2 PLUS LANE LOAD	50	47.5	4.52	10.860	3.958
639	CT-L3S2 PLUS LANE LOAD	50	47.5	4.84	11.020	3.871
640	CT-L3S2 PLUS LANE LOAD	50	47.5	4.87	11.050	3.858
640	CT-L3S2 PLUS LANE LOAD	50	47.5	5.17	11.180	3.786
641	CT-L3S2 PLUS LANE LOAD	50	47.5	5.21	11.200	3.776
641	CT-L3S2 PLUS LANE LOAD	50	47.5	5.49	11.290	3.721
642	CT-L3S2 PLUS LANE LOAD	50	47.5	5.52	11.320	3.708
642	CT-L3S2 PLUS LANE LOAD	50	47.5	5.78	11.420	3.653
643	CT-L3S2 PLUS LANE LOAD	50	47.5	5.81	11.440	3.644
643	CT-L3S2 PLUS LANE LOAD	50	47.5	6.05	11.520	3.598
644	CT-L3S2 PLUS LANE LOAD	50	47.5	6.08	11.540	3.589
644	CT-L3S2 PLUS LANE LOAD	50	47.5	6.3	11.610	3.549
645	CT-L3S2 PLUS LANE LOAD	50	47.5	6.32	11.610	3.547
645	CT-L3S2 PLUS LANE LOAD	50	47.5	6.53	11.710	3.499
646	CT-L3S2 PLUS LANE LOAD	50	47.5	6.55	11.720	3.494
646	CT-L3S2 PLUS LANE LOAD	50	47.5	6.73	11.850	3.441
647	CT-L3S2 PLUS LANE LOAD	50	47.5	6.75	11.860	3.436
647	CT-L3S2 PLUS LANE LOAD	50	47.5	6.91	11.970	3.391
648	CT-L3S2 PLUS LANE LOAD	50	47.5	6.93	11.980	3.386
648	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	12.110	3.338
649	CT-L3S2 PLUS LANE LOAD	50	47.5	7.09	12.130	3.331
649	CT-L3S2 PLUS LANE LOAD	50	47.5	7.22	12.240	3.291
650	CT-L3S2 PLUS LANE LOAD	50	47.5	7.23	12.250	3.287
650	CT-L3S2 PLUS LANE LOAD	50	47.5	7.28	12.280	3.275
651	CT-L3S2 PLUS LANE LOAD	50	47.5	7.28	12.280	3.275
651	CT-L3S2 PLUS LANE LOAD	50	47.5	7.33	12.340	3.255
652	CT-L3S2 PLUS LANE LOAD	50	47.5	7.34	12.350	3.252
652	CT-L3S2 PLUS LANE LOAD	50	47.5	7.43	12.410	3.229
653	CT-L3S2 PLUS LANE LOAD	50	47.5	7.43	12.410	3.229
653	CT-L3S2 PLUS LANE LOAD	50	47.5	7.5	12.490	3.203
654	CT-L3S2 PLUS LANE LOAD	50	47.5	7.5	12.480	3.205
654	CT-L3S2 PLUS LANE LOAD	50	47.5	7.55	12.530	3.188
655	CT-L3S2 PLUS LANE LOAD	50	47.5	7.55	12.520	3.191

655	CT-L3S2 PLUS LANE LOAD	50	47.5	7.57	12.540	3.184
656	CT-L3S2 PLUS LANE LOAD	50	47.5	7.58	12.530	3.186
656	CT-L3S2 PLUS LANE LOAD	50	47.5	7.58	12.530	3.186
657	CT-L3S2 PLUS LANE LOAD	50	47.5	7.58	12.510	3.191
657	CT-L3S2 PLUS LANE LOAD	50	47.5	7.57	12.480	3.200
658	CT-L3S2 PLUS LANE LOAD	50	47.5	7.57	12.460	3.205
658	CT-L3S2 PLUS LANE LOAD	50	47.5	7.53	12.400	3.223
659	CT-L3S2 PLUS LANE LOAD	50	47.5	7.53	12.380	3.229
659	CT-L3S2 PLUS LANE LOAD	50	47.5	7.47	12.280	3.260
660	CT-L3S2 PLUS LANE LOAD	50	47.5	7.47	12.260	3.265
660	CT-L3S2 PLUS LANE LOAD	50	47.5	7.39	12.130	3.307
661	CT-L3S2 PLUS LANE LOAD	50	47.5	7.39	12.110	3.312
661	CT-L3S2 PLUS LANE LOAD	50	47.5	7.29	11.950	3.365
662	CT-L3S2 PLUS LANE LOAD	50	47.5	7.29	11.930	3.370
662	CT-L3S2 PLUS LANE LOAD	50	47.5	7.17	11.740	3.435
663	CT-L3S2 PLUS LANE LOAD	50	47.5	7.16	11.710	3.445
663	CT-L3S2 PLUS LANE LOAD	50	47.5	7.03	11.490	3.522
664	CT-L3S2 PLUS LANE LOAD	50	47.5	7.02	11.450	3.535
664	CT-L3S2 PLUS LANE LOAD	50	47.5	6.86	11.200	3.629
665	CT-L3S2 PLUS LANE LOAD	50	47.5	6.85	11.160	3.642
665	CT-L3S2 PLUS LANE LOAD	50	47.5	6.67	10.870	3.756
666	CT-L3S2 PLUS LANE LOAD	50	47.5	6.66	10.840	3.768
666	CT-L3S2 PLUS LANE LOAD	50	47.5	6.46	10.490	3.912
667	CT-L3S2 PLUS LANE LOAD	50	47.5	6.45	10.480	3.917
667	CT-L3S2 PLUS LANE LOAD	50	47.5	6.39	10.350	3.972
668	CT-L3S2 PLUS LANE LOAD	50	47.5	6.39	10.350	3.972
668	CT-L3S2 PLUS LANE LOAD	50	47.5	6.23	10.090	4.090
669	CT-L3S2 PLUS LANE LOAD	50	47.5	6.21	10.060	4.104
669	CT-L3S2 PLUS LANE LOAD	50	47.5	5.97	9.630	4.313
670	CT-L3S2 PLUS LANE LOAD	50	47.5	5.95	9.600	4.328
670	CT-L3S2 PLUS LANE LOAD	50	47.5	5.69	9.140	4.574
671	CT-L3S2 PLUS LANE LOAD	50	47.5	5.67	9.090	4.602
671	CT-L3S2 PLUS LANE LOAD	50	47.5	5.39	8.600	4.897
672	CT-L3S2 PLUS LANE LOAD	50	47.5	5.37	8.530	4.939
672	CT-L3S2 PLUS LANE LOAD	50	47.5	5.07	8.110	5.232
673	CT-L3S2 PLUS LANE LOAD	50	47.5	5.04	8.040	5.281
673	CT-L3S2 PLUS LANE LOAD	50	47.5	4.72	7.590	5.636
674	CT-L3S2 PLUS LANE LOAD	50	47.5	4.69	7.520	5.693
674	CT-L3S2 PLUS LANE LOAD	50	47.5	4.36	7.040	6.128
675	CT-L3S2 PLUS LANE LOAD	50	47.5	4.32	6.960	6.204
675	CT-L3S2 PLUS LANE LOAD	50	47.5	3.97	6.440	6.759
676	CT-L3S2 PLUS LANE LOAD	50	47.5	3.93	6.360	6.851
676	CT-L3S2 PLUS LANE LOAD	50	47.5	3.56	5.810	7.563
677	CT-L3S2 PLUS LANE LOAD	50	47.5	3.52	5.730	7.675
677	CT-L3S2 PLUS LANE LOAD	50	47.5	3.12	5.140	8.634
678	CT-L3S2 PLUS LANE LOAD	50	47.5	3.08	5.050	8.796
678	CT-L3S2 PLUS LANE LOAD	50	47.5	2.66	4.430	10.122
679	CT-L3S2 PLUS LANE LOAD	50	47.5	2.62	4.330	10.365
679	CT-L3S2 PLUS LANE LOAD	50	47.5	2.18	3.670	12.349
680	CT-L3S2 PLUS LANE LOAD	50	47.5	2.14	3.560	12.742
680	CT-L3S2 PLUS LANE LOAD	50	47.5	1.67	2.860	16.024
681	CT-L3S2 PLUS LANE LOAD	50	47.5	1.64	2.750	16.676
681	CT-L3S2 PLUS LANE LOAD	50	47.5	1.15	1.990	23.291
682	CT-L3S2 PLUS LANE LOAD	50	47.5	1.11	1.880	24.676
682	CT-L3S2 PLUS LANE LOAD	50	47.5	0.59	1.070	43.841
683	CT-L3S2 PLUS LANE LOAD	50	47.5	0.57	0.970	48.381
683	CT-L3S2 PLUS LANE LOAD	50	47.5	0.04	0.260	182.538

LOAD RATING FIXED SPAN -GIRDER 2

RF= RATING FACTOR

$$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	.95F_Y (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
392	CT-L3S2 PLUS LANE LOAD	50	47.5	0.05	-0.050	949.000
392	CT-L3S2 PLUS LANE LOAD	50	47.5	0.67	1.040	45.029
393	CT-L3S2 PLUS LANE LOAD	50	47.5	0.63	1.010	46.406
393	CT-L3S2 PLUS LANE LOAD	50	47.5	1.24	1.970	23.482
394	CT-L3S2 PLUS LANE LOAD	50	47.5	1.2	1.930	23.990
394	CT-L3S2 PLUS LANE LOAD	50	47.5	1.74	2.790	16.401
395	CT-L3S2 PLUS LANE LOAD	50	47.5	1.71	2.760	16.591
395	CT-L3S2 PLUS LANE LOAD	50	47.5	2.21	3.550	12.758
396	CT-L3S2 PLUS LANE LOAD	50	47.5	2.19	3.520	12.872
396	CT-L3S2 PLUS LANE LOAD	50	47.5	2.65	4.250	10.553
397	CT-L3S2 PLUS LANE LOAD	50	47.5	2.64	4.220	10.630
397	CT-L3S2 PLUS LANE LOAD	50	47.5	3.08	4.890	9.084
398	CT-L3S2 PLUS LANE LOAD	50	47.5	3.07	4.870	9.123
398	CT-L3S2 PLUS LANE LOAD	50	47.5	3.48	5.490	8.018
399	CT-L3S2 PLUS LANE LOAD	50	47.5	3.47	5.490	8.020
399	CT-L3S2 PLUS LANE LOAD	50	47.5	3.87	6.070	7.188
400	CT-L3S2 PLUS LANE LOAD	50	47.5	3.86	6.060	7.201
400	CT-L3S2 PLUS LANE LOAD	50	47.5	4.24	6.600	6.555
401	CT-L3S2 PLUS LANE LOAD	50	47.5	4.23	6.590	6.566
401	CT-L3S2 PLUS LANE LOAD	50	47.5	4.59	7.090	6.052
402	CT-L3S2 PLUS LANE LOAD	50	47.5	4.58	7.080	6.062
402	CT-L3S2 PLUS LANE LOAD	50	47.5	4.92	7.550	5.640
403	CT-L3S2 PLUS LANE LOAD	50	47.5	4.91	7.550	5.641
403	CT-L3S2 PLUS LANE LOAD	50	47.5	5.23	8.130	5.199
404	CT-L3S2 PLUS LANE LOAD	50	47.5	5.22	8.130	5.200
404	CT-L3S2 PLUS LANE LOAD	50	47.5	5.52	8.670	4.842
405	CT-L3S2 PLUS LANE LOAD	50	47.5	5.51	8.670	4.843
405	CT-L3S2 PLUS LANE LOAD	50	47.5	5.78	9.170	4.550
406	CT-L3S2 PLUS LANE LOAD	50	47.5	5.78	9.170	4.550
406	CT-L3S2 PLUS LANE LOAD	50	47.5	6.03	9.620	4.311
407	CT-L3S2 PLUS LANE LOAD	50	47.5	6.03	9.620	4.311
407	CT-L3S2 PLUS LANE LOAD	50	47.5	6.2	9.880	4.180
408	CT-L3S2 PLUS LANE LOAD	50	47.5	6.2	9.880	4.180
408	CT-L3S2 PLUS LANE LOAD	50	47.5	6.26	10.030	4.112
409	CT-L3S2 PLUS LANE LOAD	50	47.5	6.25	10.030	4.113
409	CT-L3S2 PLUS LANE LOAD	50	47.5	6.46	10.430	3.935
410	CT-L3S2 PLUS LANE LOAD	50	47.5	6.46	10.430	3.935
410	CT-L3S2 PLUS LANE LOAD	50	47.5	6.64	10.780	3.790
411	CT-L3S2 PLUS LANE LOAD	50	47.5	6.64	10.780	3.790
411	CT-L3S2 PLUS LANE LOAD	50	47.5	6.8	11.080	3.673
412	CT-L3S2 PLUS LANE LOAD	50	47.5	6.8	11.080	3.673
412	CT-L3S2 PLUS LANE LOAD	50	47.5	6.94	11.350	3.574
413	CT-L3S2 PLUS LANE LOAD	50	47.5	6.94	11.350	3.574
413	CT-L3S2 PLUS LANE LOAD	50	47.5	7.06	11.570	3.495
414	CT-L3S2 PLUS LANE LOAD	50	47.5	7.06	11.570	3.495
414	CT-L3S2 PLUS LANE LOAD	50	47.5	7.16	11.750	3.433
415	CT-L3S2 PLUS LANE LOAD	50	47.5	7.15	11.750	3.434
415	CT-L3S2 PLUS LANE LOAD	50	47.5	7.23	11.900	3.384
416	CT-L3S2 PLUS LANE LOAD	50	47.5	7.23	11.900	3.384
416	CT-L3S2 PLUS LANE LOAD	50	47.5	7.29	12.010	3.348
417	CT-L3S2 PLUS LANE LOAD	50	47.5	7.29	12.000	3.351
417	CT-L3S2 PLUS LANE LOAD	50	47.5	7.32	12.080	3.326

Minimum Rating Factor 3.312

418	CT-L3S2 PLUS LANE LOAD	50	47.5	7.32	12.080	3.326
418	CT-L3S2 PLUS LANE LOAD	50	47.5	7.33	12.110	3.317
419	CT-L3S2 PLUS LANE LOAD	50	47.5	7.33	12.110	3.317
419	CT-L3S2 PLUS LANE LOAD	50	47.5	7.32	12.110	3.318
420	CT-L3S2 PLUS LANE LOAD	50	47.5	7.33	12.110	3.317
420	CT-L3S2 PLUS LANE LOAD	50	47.5	7.29	12.090	3.326
421	CT-L3S2 PLUS LANE LOAD	50	47.5	7.3	12.090	3.325
421	CT-L3S2 PLUS LANE LOAD	50	47.5	7.24	12.050	3.341
422	CT-L3S2 PLUS LANE LOAD	50	47.5	7.25	12.070	3.335
422	CT-L3S2 PLUS LANE LOAD	50	47.5	7.17	11.990	3.364
423	CT-L3S2 PLUS LANE LOAD	50	47.5	7.17	12.010	3.358
423	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	11.900	3.397
424	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	11.920	3.391
424	CT-L3S2 PLUS LANE LOAD	50	47.5	7.03	11.810	3.427
425	CT-L3S2 PLUS LANE LOAD	50	47.5	7.02	11.810	3.428
425	CT-L3S2 PLUS LANE LOAD	50	47.5	6.96	11.790	3.439
426	CT-L3S2 PLUS LANE LOAD	50	47.5	6.97	11.800	3.435
426	CT-L3S2 PLUS LANE LOAD	50	47.5	6.83	11.680	3.482
427	CT-L3S2 PLUS LANE LOAD	50	47.5	6.83	11.680	3.482
427	CT-L3S2 PLUS LANE LOAD	50	47.5	6.67	11.540	3.538
428	CT-L3S2 PLUS LANE LOAD	50	47.5	6.67	11.540	3.538
428	CT-L3S2 PLUS LANE LOAD	50	47.5	6.49	11.460	3.579
429	CT-L3S2 PLUS LANE LOAD	50	47.5	6.49	11.450	3.582
429	CT-L3S2 PLUS LANE LOAD	50	47.5	6.29	11.350	3.631
430	CT-L3S2 PLUS LANE LOAD	50	47.5	6.29	11.350	3.631
430	CT-L3S2 PLUS LANE LOAD	50	47.5	6.06	11.230	3.690
431	CT-L3S2 PLUS LANE LOAD	50	47.5	6.07	11.220	3.693
431	CT-L3S2 PLUS LANE LOAD	50	47.5	5.82	11.150	3.738
432	CT-L3S2 PLUS LANE LOAD	50	47.5	5.82	11.150	3.738
432	CT-L3S2 PLUS LANE LOAD	50	47.5	5.55	11.060	3.793
433	CT-L3S2 PLUS LANE LOAD	50	47.5	5.56	11.060	3.792
433	CT-L3S2 PLUS LANE LOAD	50	47.5	5.27	10.950	3.857
434	CT-L3S2 PLUS LANE LOAD	50	47.5	5.27	10.940	3.860
434	CT-L3S2 PLUS LANE LOAD	50	47.5	4.96	10.800	3.939
435	CT-L3S2 PLUS LANE LOAD	50	47.5	4.97	10.800	3.938
435	CT-L3S2 PLUS LANE LOAD	50	47.5	4.63	10.640	4.029
436	CT-L3S2 PLUS LANE LOAD	50	47.5	4.64	10.650	4.024
436	CT-L3S2 PLUS LANE LOAD	50	47.5	4.28	10.470	4.128
437	CT-L3S2 PLUS LANE LOAD	50	47.5	4.29	10.480	4.123
437	CT-L3S2 PLUS LANE LOAD	50	47.5	3.91	10.260	4.249
438	CT-L3S2 PLUS LANE LOAD	50	47.5	3.92	10.270	4.243
438	CT-L3S2 PLUS LANE LOAD	50	47.5	3.52	10.010	4.394
439	CT-L3S2 PLUS LANE LOAD	50	47.5	3.52	10.010	4.394
439	CT-L3S2 PLUS LANE LOAD	50	47.5	3.11	9.720	4.567
440	CT-L3S2 PLUS LANE LOAD	50	47.5	3.11	9.720	4.567
440	CT-L3S2 PLUS LANE LOAD	50	47.5	2.67	9.380	4.779
441	CT-L3S2 PLUS LANE LOAD	50	47.5	2.67	9.390	4.774
441	CT-L3S2 PLUS LANE LOAD	50	47.5	2.56	9.220	4.874
442	CT-L3S2 PLUS LANE LOAD	50	47.5	2.56	9.220	4.874
442	CT-L3S2 PLUS LANE LOAD	50	47.5	2.21	9.040	5.010
443	CT-L3S2 PLUS LANE LOAD	50	47.5	2.22	9.050	5.003
443	CT-L3S2 PLUS LANE LOAD	50	47.5	1.73	8.670	5.279
444	CT-L3S2 PLUS LANE LOAD	50	47.5	1.74	8.680	5.272
444	CT-L3S2 PLUS LANE LOAD	50	47.5	1.23	8.270	5.595
445	CT-L3S2 PLUS LANE LOAD	50	47.5	1.23	8.270	5.595
445	CT-L3S2 PLUS LANE LOAD	50	47.5	0.71	7.830	5.976
446	CT-L3S2 PLUS LANE LOAD	50	47.5	0.71	7.830	5.976
446	CT-L3S2 PLUS LANE LOAD	50	47.5	0.17	7.350	6.439
447	CT-L3S2 PLUS LANE LOAD	50	47.5	0.17	7.360	6.431
447	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.4	6.850	6.876
448	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.41	6.850	6.874

448	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.99	6.320	7.359
449	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.99	6.320	7.359
449	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.6	5.820	7.887
450	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.6	5.830	7.873
450	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.23	-5.510	8.216
451	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.23	-5.510	8.216
451	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.88	-5.620	7.940
452	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.88	-5.620	7.940
452	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.55	-5.720	7.684
453	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.55	-5.720	7.684
453	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.24	-5.830	7.420
454	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.24	-5.830	7.420
454	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.95	-5.940	7.163
455	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.95	-5.940	7.163
455	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.69	-6.050	6.911
456	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.69	-6.050	6.911
456	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.45	-6.160	6.664
457	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.45	-6.160	6.664
457	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.22	-6.270	6.424
458	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.22	-6.280	6.414
458	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.03	-6.390	6.177
459	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.03	-6.390	6.177
459	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.85	-6.510	5.937
460	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.85	-6.510	5.937
460	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.69	-6.870	5.504
461	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.7	-6.890	5.486
461	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.56	-7.440	4.965
462	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.56	-7.440	4.965
462	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.44	-8.040	4.485
463	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.44	-8.040	4.485
463	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.33	-8.630	4.075
464	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.33	-8.630	4.075
464	CT-L3S2 PLUS LANE LOAD	50	47.5	-13.23	-9.240	3.709
465	CT-L3S2 PLUS LANE LOAD	50	47.5	-13.24	-9.240	3.708
465	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.34	-8.630	4.074
466	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.34	-8.630	4.074
466	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.45	-8.040	4.484
467	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.44	-8.040	4.485
467	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.56	-7.450	4.958
468	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.56	-7.450	4.958
468	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.7	-6.910	5.470
469	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.7	-6.900	5.478
469	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.86	-6.550	5.899
470	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.85	-6.550	5.901
470	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.03	-6.430	6.138
471	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.03	-6.430	6.138
471	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.23	-6.320	6.372
472	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.23	-6.310	6.382
472	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.45	-6.200	6.621
473	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.45	-6.200	6.621
473	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.69	-6.090	6.865
474	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.69	-6.090	6.865
474	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.96	-5.980	7.114
475	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.96	-5.980	7.114
475	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.24	-5.870	7.370
476	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.24	-5.870	7.370
476	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.55	-5.760	7.630
477	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.55	-5.760	7.630
477	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.88	-5.650	7.897
478	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.88	-5.660	7.883
478	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.23	-5.550	8.157

479	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.23	-5.550	8.157
479	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.6	5.840	7.860
480	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.6	5.840	7.860
480	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.99	6.360	7.313
481	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.99	6.350	7.324
481	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.41	6.890	6.835
482	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.41	6.880	6.844
482	CT-L3S2 PLUS LANE LOAD	50	47.5	0.17	7.390	6.405
483	CT-L3S2 PLUS LANE LOAD	50	47.5	0.17	7.390	6.405
483	CT-L3S2 PLUS LANE LOAD	50	47.5	0.71	7.860	5.953
484	CT-L3S2 PLUS LANE LOAD	50	47.5	0.71	7.860	5.953
484	CT-L3S2 PLUS LANE LOAD	50	47.5	1.23	8.310	5.568
485	CT-L3S2 PLUS LANE LOAD	50	47.5	1.23	8.300	5.575
485	CT-L3S2 PLUS LANE LOAD	50	47.5	1.73	8.710	5.255
486	CT-L3S2 PLUS LANE LOAD	50	47.5	1.73	8.710	5.255
486	CT-L3S2 PLUS LANE LOAD	50	47.5	2.21	9.080	4.988
487	CT-L3S2 PLUS LANE LOAD	50	47.5	2.21	9.080	4.988
487	CT-L3S2 PLUS LANE LOAD	50	47.5	2.56	9.260	4.853
488	CT-L3S2 PLUS LANE LOAD	50	47.5	2.56	9.260	4.853
488	CT-L3S2 PLUS LANE LOAD	50	47.5	2.67	9.430	4.754
489	CT-L3S2 PLUS LANE LOAD	50	47.5	2.67	9.420	4.759
489	CT-L3S2 PLUS LANE LOAD	50	47.5	3.11	9.760	4.548
490	CT-L3S2 PLUS LANE LOAD	50	47.5	3.1	9.750	4.554
490	CT-L3S2 PLUS LANE LOAD	50	47.5	3.52	10.050	4.376
491	CT-L3S2 PLUS LANE LOAD	50	47.5	3.52	10.040	4.380
491	CT-L3S2 PLUS LANE LOAD	50	47.5	3.91	10.300	4.232
492	CT-L3S2 PLUS LANE LOAD	50	47.5	3.91	10.300	4.232
492	CT-L3S2 PLUS LANE LOAD	50	47.5	4.28	10.520	4.108
493	CT-L3S2 PLUS LANE LOAD	50	47.5	4.28	10.510	4.112
493	CT-L3S2 PLUS LANE LOAD	50	47.5	4.63	10.690	4.010
494	CT-L3S2 PLUS LANE LOAD	50	47.5	4.63	10.680	4.014
494	CT-L3S2 PLUS LANE LOAD	50	47.5	4.96	10.830	3.928
495	CT-L3S2 PLUS LANE LOAD	50	47.5	4.96	10.840	3.924
495	CT-L3S2 PLUS LANE LOAD	50	47.5	5.27	10.970	3.850
496	CT-L3S2 PLUS LANE LOAD	50	47.5	5.27	10.980	3.846
496	CT-L3S2 PLUS LANE LOAD	50	47.5	5.56	11.090	3.782
497	CT-L3S2 PLUS LANE LOAD	50	47.5	5.55	11.100	3.779
497	CT-L3S2 PLUS LANE LOAD	50	47.5	5.82	11.180	3.728
498	CT-L3S2 PLUS LANE LOAD	50	47.5	5.82	11.180	3.728
498	CT-L3S2 PLUS LANE LOAD	50	47.5	6.06	11.250	3.684
499	CT-L3S2 PLUS LANE LOAD	50	47.5	6.06	11.240	3.687
499	CT-L3S2 PLUS LANE LOAD	50	47.5	6.29	11.360	3.628
500	CT-L3S2 PLUS LANE LOAD	50	47.5	6.28	11.370	3.625
500	CT-L3S2 PLUS LANE LOAD	50	47.5	6.49	11.470	3.575
501	CT-L3S2 PLUS LANE LOAD	50	47.5	6.48	11.470	3.576
501	CT-L3S2 PLUS LANE LOAD	50	47.5	6.67	11.550	3.535
502	CT-L3S2 PLUS LANE LOAD	50	47.5	6.66	11.550	3.536
502	CT-L3S2 PLUS LANE LOAD	50	47.5	6.82	11.700	3.477
503	CT-L3S2 PLUS LANE LOAD	50	47.5	6.82	11.690	3.480
503	CT-L3S2 PLUS LANE LOAD	50	47.5	6.96	11.820	3.430
504	CT-L3S2 PLUS LANE LOAD	50	47.5	6.96	11.810	3.433
504	CT-L3S2 PLUS LANE LOAD	50	47.5	7.02	11.830	3.422
505	CT-L3S2 PLUS LANE LOAD	50	47.5	7.02	11.830	3.422
505	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	11.940	3.385
506	CT-L3S2 PLUS LANE LOAD	50	47.5	7.07	11.920	3.392
506	CT-L3S2 PLUS LANE LOAD	50	47.5	7.17	12.030	3.352
507	CT-L3S2 PLUS LANE LOAD	50	47.5	7.17	12.010	3.358
507	CT-L3S2 PLUS LANE LOAD	50	47.5	7.24	12.080	3.333
508	CT-L3S2 PLUS LANE LOAD	50	47.5	7.24	12.070	3.336
508	CT-L3S2 PLUS LANE LOAD	50	47.5	7.29	12.110	3.320
509	CT-L3S2 PLUS LANE LOAD	50	47.5	7.29	12.100	3.323

509	CT-L3S2 PLUS LANE LOAD	50	47.5	7.32	12.130	3.312
510	CT-L3S2 PLUS LANE LOAD	50	47.5	7.32	12.130	3.312
510	CT-L3S2 PLUS LANE LOAD	50	47.5	7.33	12.130	3.312
511	CT-L3S2 PLUS LANE LOAD	50	47.5	7.33	12.130	3.312
511	CT-L3S2 PLUS LANE LOAD	50	47.5	7.31	12.090	3.324
512	CT-L3S2 PLUS LANE LOAD	50	47.5	7.31	12.090	3.324
512	CT-L3S2 PLUS LANE LOAD	50	47.5	7.28	12.020	3.346
513	CT-L3S2 PLUS LANE LOAD	50	47.5	7.28	12.020	3.346
513	CT-L3S2 PLUS LANE LOAD	50	47.5	7.22	11.910	3.382
514	CT-L3S2 PLUS LANE LOAD	50	47.5	7.22	11.910	3.382
514	CT-L3S2 PLUS LANE LOAD	50	47.5	7.14	11.770	3.429
515	CT-L3S2 PLUS LANE LOAD	50	47.5	7.14	11.770	3.429
515	CT-L3S2 PLUS LANE LOAD	50	47.5	7.04	11.580	3.494
516	CT-L3S2 PLUS LANE LOAD	50	47.5	7.04	11.590	3.491
516	CT-L3S2 PLUS LANE LOAD	50	47.5	6.92	11.360	3.572
517	CT-L3S2 PLUS LANE LOAD	50	47.5	6.92	11.360	3.572
517	CT-L3S2 PLUS LANE LOAD	50	47.5	6.78	11.100	3.668
518	CT-L3S2 PLUS LANE LOAD	50	47.5	6.78	11.100	3.668
518	CT-L3S2 PLUS LANE LOAD	50	47.5	6.62	10.790	3.789
519	CT-L3S2 PLUS LANE LOAD	50	47.5	6.62	10.790	3.789
519	CT-L3S2 PLUS LANE LOAD	50	47.5	6.43	10.440	3.934
520	CT-L3S2 PLUS LANE LOAD	50	47.5	6.43	10.450	3.930
520	CT-L3S2 PLUS LANE LOAD	50	47.5	6.23	10.050	4.106
521	CT-L3S2 PLUS LANE LOAD	50	47.5	6.23	10.050	4.106
521	CT-L3S2 PLUS LANE LOAD	50	47.5	6.17	9.890	4.179
522	CT-L3S2 PLUS LANE LOAD	50	47.5	6.17	9.890	4.179
522	CT-L3S2 PLUS LANE LOAD	50	47.5	6	9.640	4.305
523	CT-L3S2 PLUS LANE LOAD	50	47.5	6	9.640	4.305
523	CT-L3S2 PLUS LANE LOAD	50	47.5	5.75	9.190	4.543
524	CT-L3S2 PLUS LANE LOAD	50	47.5	5.75	9.190	4.543
524	CT-L3S2 PLUS LANE LOAD	50	47.5	5.48	8.690	4.835
525	CT-L3S2 PLUS LANE LOAD	50	47.5	5.48	8.690	4.835
525	CT-L3S2 PLUS LANE LOAD	50	47.5	5.18	8.140	5.199
526	CT-L3S2 PLUS LANE LOAD	50	47.5	5.19	8.140	5.198
526	CT-L3S2 PLUS LANE LOAD	50	47.5	4.87	7.560	5.639
527	CT-L3S2 PLUS LANE LOAD	50	47.5	4.87	7.570	5.631
527	CT-L3S2 PLUS LANE LOAD	50	47.5	4.53	7.100	6.052
528	CT-L3S2 PLUS LANE LOAD	50	47.5	4.54	7.100	6.051
528	CT-L3S2 PLUS LANE LOAD	50	47.5	4.18	6.600	6.564
529	CT-L3S2 PLUS LANE LOAD	50	47.5	4.18	6.610	6.554
529	CT-L3S2 PLUS LANE LOAD	50	47.5	3.8	6.070	7.199
530	CT-L3S2 PLUS LANE LOAD	50	47.5	3.8	6.080	7.188
530	CT-L3S2 PLUS LANE LOAD	50	47.5	3.4	5.500	8.018
531	CT-L3S2 PLUS LANE LOAD	50	47.5	3.4	5.510	8.004
531	CT-L3S2 PLUS LANE LOAD	50	47.5	2.98	4.890	9.104
532	CT-L3S2 PLUS LANE LOAD	50	47.5	2.98	4.910	9.067
532	CT-L3S2 PLUS LANE LOAD	50	47.5	2.53	4.240	10.606
533	CT-L3S2 PLUS LANE LOAD	50	47.5	2.54	4.260	10.554
533	CT-L3S2 PLUS LANE LOAD	50	47.5	2.07	3.540	12.833
534	CT-L3S2 PLUS LANE LOAD	50	47.5	2.07	3.570	12.725
534	CT-L3S2 PLUS LANE LOAD	50	47.5	1.58	2.780	16.518
535	CT-L3S2 PLUS LANE LOAD	50	47.5	1.58	2.810	16.342
535	CT-L3S2 PLUS LANE LOAD	50	47.5	1.08	1.950	23.805
536	CT-L3S2 PLUS LANE LOAD	50	47.5	1.07	1.980	23.449
536	CT-L3S2 PLUS LANE LOAD	50	47.5	0.55	1.020	46.029
537	CT-L3S2 PLUS LANE LOAD	50	47.5	0.55	1.050	44.714
537	CT-L3S2 PLUS LANE LOAD	50	47.5	0.01	-0.060	791.500

LOAD RATING FIXED SPAN -GIRDER 3

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=Y_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
246	CT-L3S2 PLUS LANE LOAD	50	47.5	0.05	-0.050	949.000
246	CT-L3S2 PLUS LANE LOAD	50	47.5	0.67	1.040	45.029
247	CT-L3S2 PLUS LANE LOAD	50	47.5	0.62	1.010	46.416
247	CT-L3S2 PLUS LANE LOAD	50	47.5	1.22	1.970	23.492
248	CT-L3S2 PLUS LANE LOAD	50	47.5	1.18	1.930	24.000
248	CT-L3S2 PLUS LANE LOAD	50	47.5	1.71	2.790	16.412
249	CT-L3S2 PLUS LANE LOAD	50	47.5	1.68	2.760	16.601
249	CT-L3S2 PLUS LANE LOAD	50	47.5	2.16	3.550	12.772
250	CT-L3S2 PLUS LANE LOAD	50	47.5	2.14	3.520	12.886
250	CT-L3S2 PLUS LANE LOAD	50	47.5	2.59	4.240	10.592
251	CT-L3S2 PLUS LANE LOAD	50	47.5	2.57	4.220	10.647
251	CT-L3S2 PLUS LANE LOAD	50	47.5	3	4.890	9.100
252	CT-L3S2 PLUS LANE LOAD	50	47.5	2.99	4.870	9.140
252	CT-L3S2 PLUS LANE LOAD	50	47.5	3.4	5.490	8.033
253	CT-L3S2 PLUS LANE LOAD	50	47.5	3.39	5.490	8.035
253	CT-L3S2 PLUS LANE LOAD	50	47.5	3.77	6.070	7.204
254	CT-L3S2 PLUS LANE LOAD	50	47.5	3.77	6.060	7.216
254	CT-L3S2 PLUS LANE LOAD	50	47.5	4.14	6.600	6.570
255	CT-L3S2 PLUS LANE LOAD	50	47.5	4.14	6.590	6.580
255	CT-L3S2 PLUS LANE LOAD	50	47.5	4.48	7.090	6.068
256	CT-L3S2 PLUS LANE LOAD	50	47.5	4.48	7.080	6.076
256	CT-L3S2 PLUS LANE LOAD	50	47.5	4.8	7.550	5.656
257	CT-L3S2 PLUS LANE LOAD	50	47.5	4.81	7.550	5.654
257	CT-L3S2 PLUS LANE LOAD	50	47.5	5.11	8.130	5.214
258	CT-L3S2 PLUS LANE LOAD	50	47.5	5.11	8.130	5.214
258	CT-L3S2 PLUS LANE LOAD	50	47.5	5.39	8.670	4.857
259	CT-L3S2 PLUS LANE LOAD	50	47.5	5.39	8.670	4.857
259	CT-L3S2 PLUS LANE LOAD	50	47.5	5.65	9.170	4.564
260	CT-L3S2 PLUS LANE LOAD	50	47.5	5.66	9.170	4.563
260	CT-L3S2 PLUS LANE LOAD	50	47.5	5.9	9.620	4.324
261	CT-L3S2 PLUS LANE LOAD	50	47.5	5.9	9.620	4.324
261	CT-L3S2 PLUS LANE LOAD	50	47.5	6.07	9.880	4.193
262	CT-L3S2 PLUS LANE LOAD	50	47.5	6.07	9.880	4.193
262	CT-L3S2 PLUS LANE LOAD	50	47.5	6.12	10.030	4.126
263	CT-L3S2 PLUS LANE LOAD	50	47.5	6.12	10.030	4.126
263	CT-L3S2 PLUS LANE LOAD	50	47.5	6.32	10.430	3.948
264	CT-L3S2 PLUS LANE LOAD	50	47.5	6.32	10.430	3.948
264	CT-L3S2 PLUS LANE LOAD	50	47.5	6.49	10.780	3.804
265	CT-L3S2 PLUS LANE LOAD	50	47.5	6.5	10.780	3.803
265	CT-L3S2 PLUS LANE LOAD	50	47.5	6.65	11.080	3.687
266	CT-L3S2 PLUS LANE LOAD	50	47.5	6.65	11.080	3.687
266	CT-L3S2 PLUS LANE LOAD	50	47.5	6.79	11.350	3.587
267	CT-L3S2 PLUS LANE LOAD	50	47.5	6.79	11.350	3.587
267	CT-L3S2 PLUS LANE LOAD	50	47.5	6.9	11.570	3.509
268	CT-L3S2 PLUS LANE LOAD	50	47.5	6.91	11.570	3.508
268	CT-L3S2 PLUS LANE LOAD	50	47.5	7	11.750	3.447
269	CT-L3S2 PLUS LANE LOAD	50	47.5	7	11.750	3.447
269	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	11.900	3.397
270	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	11.900	3.397
270	CT-L3S2 PLUS LANE LOAD	50	47.5	7.13	12.000	3.364
271	CT-L3S2 PLUS LANE LOAD	50	47.5	7.13	12.000	3.364
271	CT-L3S2 PLUS LANE LOAD	50	47.5	7.16	12.080	3.339

Minimum Rating Factor 3.325

272	CT-L3S2 PLUS LANE LOAD	50	47.5	7.16	12.070	3.342
272	CT-L3S2 PLUS LANE LOAD	50	47.5	7.18	12.110	3.329
273	CT-L3S2 PLUS LANE LOAD	50	47.5	7.18	12.110	3.329
273	CT-L3S2 PLUS LANE LOAD	50	47.5	7.17	12.110	3.330
274	CT-L3S2 PLUS LANE LOAD	50	47.5	7.17	12.110	3.330
274	CT-L3S2 PLUS LANE LOAD	50	47.5	7.14	12.080	3.341
275	CT-L3S2 PLUS LANE LOAD	50	47.5	7.14	12.090	3.338
275	CT-L3S2 PLUS LANE LOAD	50	47.5	7.09	12.050	3.354
276	CT-L3S2 PLUS LANE LOAD	50	47.5	7.09	12.070	3.348
276	CT-L3S2 PLUS LANE LOAD	50	47.5	7.02	11.990	3.376
277	CT-L3S2 PLUS LANE LOAD	50	47.5	7.01	12.010	3.371
277	CT-L3S2 PLUS LANE LOAD	50	47.5	6.92	11.900	3.410
278	CT-L3S2 PLUS LANE LOAD	50	47.5	6.92	11.920	3.404
278	CT-L3S2 PLUS LANE LOAD	50	47.5	6.87	11.810	3.440
279	CT-L3S2 PLUS LANE LOAD	50	47.5	6.87	11.810	3.440
279	CT-L3S2 PLUS LANE LOAD	50	47.5	6.81	11.790	3.451
280	CT-L3S2 PLUS LANE LOAD	50	47.5	6.81	11.800	3.448
280	CT-L3S2 PLUS LANE LOAD	50	47.5	6.67	11.680	3.496
281	CT-L3S2 PLUS LANE LOAD	50	47.5	6.67	11.680	3.496
281	CT-L3S2 PLUS LANE LOAD	50	47.5	6.52	11.540	3.551
282	CT-L3S2 PLUS LANE LOAD	50	47.5	6.51	11.540	3.552
282	CT-L3S2 PLUS LANE LOAD	50	47.5	6.34	11.460	3.592
283	CT-L3S2 PLUS LANE LOAD	50	47.5	6.33	11.450	3.596
283	CT-L3S2 PLUS LANE LOAD	50	47.5	6.14	11.350	3.644
284	CT-L3S2 PLUS LANE LOAD	50	47.5	6.13	11.350	3.645
284	CT-L3S2 PLUS LANE LOAD	50	47.5	5.92	11.230	3.703
285	CT-L3S2 PLUS LANE LOAD	50	47.5	5.91	11.220	3.707
285	CT-L3S2 PLUS LANE LOAD	50	47.5	5.68	11.150	3.751
286	CT-L3S2 PLUS LANE LOAD	50	47.5	5.67	11.150	3.752
286	CT-L3S2 PLUS LANE LOAD	50	47.5	5.42	11.060	3.805
287	CT-L3S2 PLUS LANE LOAD	50	47.5	5.41	11.060	3.806
287	CT-L3S2 PLUS LANE LOAD	50	47.5	5.14	10.950	3.868
288	CT-L3S2 PLUS LANE LOAD	50	47.5	5.13	10.930	3.876
288	CT-L3S2 PLUS LANE LOAD	50	47.5	4.83	10.800	3.951
289	CT-L3S2 PLUS LANE LOAD	50	47.5	4.82	10.800	3.952
289	CT-L3S2 PLUS LANE LOAD	50	47.5	4.51	10.640	4.040
290	CT-L3S2 PLUS LANE LOAD	50	47.5	4.5	10.650	4.038
290	CT-L3S2 PLUS LANE LOAD	50	47.5	4.16	10.470	4.139
291	CT-L3S2 PLUS LANE LOAD	50	47.5	4.15	10.480	4.136
291	CT-L3S2 PLUS LANE LOAD	50	47.5	3.8	10.260	4.259
292	CT-L3S2 PLUS LANE LOAD	50	47.5	3.79	10.270	4.256
292	CT-L3S2 PLUS LANE LOAD	50	47.5	3.41	10.010	4.405
293	CT-L3S2 PLUS LANE LOAD	50	47.5	3.4	10.010	4.406
293	CT-L3S2 PLUS LANE LOAD	50	47.5	3.01	9.720	4.577
294	CT-L3S2 PLUS LANE LOAD	50	47.5	2.99	9.720	4.579
294	CT-L3S2 PLUS LANE LOAD	50	47.5	2.58	9.380	4.789
295	CT-L3S2 PLUS LANE LOAD	50	47.5	2.57	9.390	4.785
295	CT-L3S2 PLUS LANE LOAD	50	47.5	2.46	9.220	4.885
296	CT-L3S2 PLUS LANE LOAD	50	47.5	2.46	9.220	4.885
296	CT-L3S2 PLUS LANE LOAD	50	47.5	2.13	9.040	5.019
297	CT-L3S2 PLUS LANE LOAD	50	47.5	2.12	9.040	5.020
297	CT-L3S2 PLUS LANE LOAD	50	47.5	1.66	8.670	5.287
298	CT-L3S2 PLUS LANE LOAD	50	47.5	1.65	8.670	5.288
298	CT-L3S2 PLUS LANE LOAD	50	47.5	1.16	8.270	5.603
299	CT-L3S2 PLUS LANE LOAD	50	47.5	1.15	8.270	5.605
299	CT-L3S2 PLUS LANE LOAD	50	47.5	0.65	7.830	5.983
300	CT-L3S2 PLUS LANE LOAD	50	47.5	0.64	7.830	5.985
300	CT-L3S2 PLUS LANE LOAD	50	47.5	0.12	7.350	6.446
301	CT-L3S2 PLUS LANE LOAD	50	47.5	0.11	7.360	6.439
301	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.45	6.850	6.869
302	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.45	6.850	6.869

302	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.02	6.320	7.354
303	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.02	6.320	7.354
303	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.61	5.820	7.885
304	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.62	5.830	7.870
304	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.22	-5.510	8.218
305	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.23	-5.510	8.216
305	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.85	-5.620	7.945
306	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.86	-5.620	7.943
306	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.51	-5.720	7.691
307	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.52	-5.720	7.689
307	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.18	-5.830	7.431
308	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.19	-5.830	7.429
308	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.87	-5.940	7.177
309	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.89	-5.940	7.173
309	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.58	-6.050	6.929
310	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.6	-6.050	6.926
310	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.32	-6.160	6.685
311	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.33	-6.160	6.683
311	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.07	-6.270	6.448
312	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.08	-6.280	6.436
312	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.84	-6.390	6.207
313	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.85	-6.390	6.205
313	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.63	-6.510	5.971
314	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.64	-6.510	5.969
314	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.44	-6.870	5.540
315	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.45	-6.890	5.522
315	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.27	-7.440	5.004
316	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.28	-7.440	5.003
316	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.11	-8.040	4.526
317	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.12	-8.040	4.525
317	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.96	-8.630	4.118
318	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.97	-8.630	4.117
318	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.83	-9.240	3.752
319	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.83	-9.240	3.752
319	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.96	-8.630	4.118
320	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.96	-8.630	4.118
320	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.11	-8.040	4.526
321	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.1	-8.040	4.527
321	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.27	-7.450	4.997
322	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.26	-7.450	4.999
322	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.45	-6.910	5.507
323	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.44	-6.900	5.516
323	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.64	-6.550	5.933
324	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.63	-6.550	5.934
324	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.85	-6.430	6.166
325	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.84	-6.430	6.168
325	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.08	-6.320	6.396
326	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.06	-6.310	6.409
326	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.33	-6.200	6.640
327	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.31	-6.200	6.644
327	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.59	-6.090	6.882
328	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.58	-6.090	6.883
328	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.88	-5.980	7.127
329	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.87	-5.980	7.129
329	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.19	-5.870	7.378
330	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.17	-5.870	7.382
330	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.51	-5.760	7.637
331	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.5	-5.760	7.639
331	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.86	-5.650	7.901
332	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.85	-5.660	7.889
332	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.23	-5.550	8.157

333	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.22	-5.550	8.159
333	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.61	5.840	7.858
334	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.61	5.840	7.858
334	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.02	6.360	7.308
335	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.02	6.350	7.320
335	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.45	6.890	6.829
336	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.44	6.880	6.840
336	CT-L3S2 PLUS LANE LOAD	50	47.5	0.11	7.390	6.413
337	CT-L3S2 PLUS LANE LOAD	50	47.5	0.12	7.390	6.411
337	CT-L3S2 PLUS LANE LOAD	50	47.5	0.65	7.860	5.961
338	CT-L3S2 PLUS LANE LOAD	50	47.5	0.65	7.860	5.961
338	CT-L3S2 PLUS LANE LOAD	50	47.5	1.16	8.300	5.583
339	CT-L3S2 PLUS LANE LOAD	50	47.5	1.17	8.300	5.582
339	CT-L3S2 PLUS LANE LOAD	50	47.5	1.65	8.710	5.264
340	CT-L3S2 PLUS LANE LOAD	50	47.5	1.66	8.710	5.263
340	CT-L3S2 PLUS LANE LOAD	50	47.5	2.12	9.080	4.998
341	CT-L3S2 PLUS LANE LOAD	50	47.5	2.13	9.080	4.997
341	CT-L3S2 PLUS LANE LOAD	50	47.5	2.46	9.260	4.864
342	CT-L3S2 PLUS LANE LOAD	50	47.5	2.46	9.260	4.864
342	CT-L3S2 PLUS LANE LOAD	50	47.5	2.57	9.430	4.765
343	CT-L3S2 PLUS LANE LOAD	50	47.5	2.58	9.420	4.769
343	CT-L3S2 PLUS LANE LOAD	50	47.5	3	9.760	4.559
344	CT-L3S2 PLUS LANE LOAD	50	47.5	3.01	9.750	4.563
344	CT-L3S2 PLUS LANE LOAD	50	47.5	3.4	10.050	4.388
345	CT-L3S2 PLUS LANE LOAD	50	47.5	3.41	10.040	4.391
345	CT-L3S2 PLUS LANE LOAD	50	47.5	3.79	10.300	4.244
346	CT-L3S2 PLUS LANE LOAD	50	47.5	3.8	10.300	4.243
346	CT-L3S2 PLUS LANE LOAD	50	47.5	4.16	10.520	4.120
347	CT-L3S2 PLUS LANE LOAD	50	47.5	4.17	10.510	4.123
347	CT-L3S2 PLUS LANE LOAD	50	47.5	4.5	10.690	4.022
348	CT-L3S2 PLUS LANE LOAD	50	47.5	4.51	10.680	4.025
348	CT-L3S2 PLUS LANE LOAD	50	47.5	4.83	10.830	3.940
349	CT-L3S2 PLUS LANE LOAD	50	47.5	4.83	10.840	3.936
349	CT-L3S2 PLUS LANE LOAD	50	47.5	5.13	10.970	3.862
350	CT-L3S2 PLUS LANE LOAD	50	47.5	5.14	10.980	3.858
350	CT-L3S2 PLUS LANE LOAD	50	47.5	5.41	11.090	3.795
351	CT-L3S2 PLUS LANE LOAD	50	47.5	5.42	11.100	3.791
351	CT-L3S2 PLUS LANE LOAD	50	47.5	5.67	11.180	3.742
352	CT-L3S2 PLUS LANE LOAD	50	47.5	5.68	11.180	3.741
352	CT-L3S2 PLUS LANE LOAD	50	47.5	5.91	11.250	3.697
353	CT-L3S2 PLUS LANE LOAD	50	47.5	5.92	11.240	3.699
353	CT-L3S2 PLUS LANE LOAD	50	47.5	6.13	11.360	3.642
354	CT-L3S2 PLUS LANE LOAD	50	47.5	6.14	11.370	3.638
354	CT-L3S2 PLUS LANE LOAD	50	47.5	6.33	11.470	3.589
355	CT-L3S2 PLUS LANE LOAD	50	47.5	6.34	11.470	3.588
355	CT-L3S2 PLUS LANE LOAD	50	47.5	6.51	11.550	3.549
356	CT-L3S2 PLUS LANE LOAD	50	47.5	6.52	11.550	3.548
356	CT-L3S2 PLUS LANE LOAD	50	47.5	6.67	11.700	3.490
357	CT-L3S2 PLUS LANE LOAD	50	47.5	6.67	11.690	3.493
357	CT-L3S2 PLUS LANE LOAD	50	47.5	6.81	11.820	3.442
358	CT-L3S2 PLUS LANE LOAD	50	47.5	6.81	11.810	3.445
358	CT-L3S2 PLUS LANE LOAD	50	47.5	6.87	11.830	3.434
359	CT-L3S2 PLUS LANE LOAD	50	47.5	6.87	11.830	3.434
359	CT-L3S2 PLUS LANE LOAD	50	47.5	6.92	11.940	3.399
360	CT-L3S2 PLUS LANE LOAD	50	47.5	6.92	11.920	3.404
360	CT-L3S2 PLUS LANE LOAD	50	47.5	7.01	12.030	3.366
361	CT-L3S2 PLUS LANE LOAD	50	47.5	7.01	12.010	3.371
361	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	12.080	3.346
362	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	12.070	3.349
362	CT-L3S2 PLUS LANE LOAD	50	47.5	7.13	12.110	3.334
363	CT-L3S2 PLUS LANE LOAD	50	47.5	7.13	12.100	3.336

363	CT-L3S2 PLUS LANE LOAD	50	47.5	7.16	12.130	3.326
364	CT-L3S2 PLUS LANE LOAD	50	47.5	7.16	12.130	3.326
364	CT-L3S2 PLUS LANE LOAD	50	47.5	7.17	12.130	3.325
365	CT-L3S2 PLUS LANE LOAD	50	47.5	7.17	12.130	3.325
365	CT-L3S2 PLUS LANE LOAD	50	47.5	7.16	12.090	3.337
366	CT-L3S2 PLUS LANE LOAD	50	47.5	7.16	12.090	3.337
366	CT-L3S2 PLUS LANE LOAD	50	47.5	7.12	12.020	3.359
367	CT-L3S2 PLUS LANE LOAD	50	47.5	7.12	12.020	3.359
367	CT-L3S2 PLUS LANE LOAD	50	47.5	7.07	11.910	3.395
368	CT-L3S2 PLUS LANE LOAD	50	47.5	7.07	11.910	3.395
368	CT-L3S2 PLUS LANE LOAD	50	47.5	6.99	11.770	3.442
369	CT-L3S2 PLUS LANE LOAD	50	47.5	6.99	11.770	3.442
369	CT-L3S2 PLUS LANE LOAD	50	47.5	6.9	11.580	3.506
370	CT-L3S2 PLUS LANE LOAD	50	47.5	6.89	11.590	3.504
370	CT-L3S2 PLUS LANE LOAD	50	47.5	6.78	11.360	3.585
371	CT-L3S2 PLUS LANE LOAD	50	47.5	6.77	11.360	3.585
371	CT-L3S2 PLUS LANE LOAD	50	47.5	6.64	11.100	3.681
372	CT-L3S2 PLUS LANE LOAD	50	47.5	6.63	11.100	3.682
372	CT-L3S2 PLUS LANE LOAD	50	47.5	6.48	10.790	3.802
373	CT-L3S2 PLUS LANE LOAD	50	47.5	6.47	10.790	3.803
373	CT-L3S2 PLUS LANE LOAD	50	47.5	6.3	10.440	3.946
374	CT-L3S2 PLUS LANE LOAD	50	47.5	6.29	10.450	3.944
374	CT-L3S2 PLUS LANE LOAD	50	47.5	6.1	10.050	4.119
375	CT-L3S2 PLUS LANE LOAD	50	47.5	6.09	10.050	4.120
375	CT-L3S2 PLUS LANE LOAD	50	47.5	6.04	9.890	4.192
376	CT-L3S2 PLUS LANE LOAD	50	47.5	6.04	9.890	4.192
376	CT-L3S2 PLUS LANE LOAD	50	47.5	5.87	9.640	4.318
377	CT-L3S2 PLUS LANE LOAD	50	47.5	5.87	9.640	4.318
377	CT-L3S2 PLUS LANE LOAD	50	47.5	5.63	9.190	4.556
378	CT-L3S2 PLUS LANE LOAD	50	47.5	5.62	9.190	4.557
378	CT-L3S2 PLUS LANE LOAD	50	47.5	5.36	8.690	4.849
379	CT-L3S2 PLUS LANE LOAD	50	47.5	5.35	8.690	4.850
379	CT-L3S2 PLUS LANE LOAD	50	47.5	5.07	8.140	5.213
380	CT-L3S2 PLUS LANE LOAD	50	47.5	5.06	8.140	5.214
380	CT-L3S2 PLUS LANE LOAD	50	47.5	4.76	7.560	5.653
381	CT-L3S2 PLUS LANE LOAD	50	47.5	4.76	7.570	5.646
381	CT-L3S2 PLUS LANE LOAD	50	47.5	4.44	7.100	6.065
382	CT-L3S2 PLUS LANE LOAD	50	47.5	4.43	7.100	6.066
382	CT-L3S2 PLUS LANE LOAD	50	47.5	4.09	6.600	6.577
383	CT-L3S2 PLUS LANE LOAD	50	47.5	4.08	6.610	6.569
383	CT-L3S2 PLUS LANE LOAD	50	47.5	3.72	6.070	7.213
384	CT-L3S2 PLUS LANE LOAD	50	47.5	3.71	6.080	7.202
384	CT-L3S2 PLUS LANE LOAD	50	47.5	3.32	5.500	8.033
385	CT-L3S2 PLUS LANE LOAD	50	47.5	3.31	5.510	8.020
385	CT-L3S2 PLUS LANE LOAD	50	47.5	2.91	4.890	9.119
386	CT-L3S2 PLUS LANE LOAD	50	47.5	2.9	4.910	9.084
386	CT-L3S2 PLUS LANE LOAD	50	47.5	2.48	4.240	10.618
387	CT-L3S2 PLUS LANE LOAD	50	47.5	2.47	4.260	10.570
387	CT-L3S2 PLUS LANE LOAD	50	47.5	2.02	3.540	12.847
388	CT-L3S2 PLUS LANE LOAD	50	47.5	2.02	3.570	12.739
388	CT-L3S2 PLUS LANE LOAD	50	47.5	1.55	2.780	16.529
389	CT-L3S2 PLUS LANE LOAD	50	47.5	1.55	2.810	16.352
389	CT-L3S2 PLUS LANE LOAD	50	47.5	1.06	1.950	23.815
390	CT-L3S2 PLUS LANE LOAD	50	47.5	1.05	1.980	23.460
390	CT-L3S2 PLUS LANE LOAD	50	47.5	0.54	1.020	46.039
391	CT-L3S2 PLUS LANE LOAD	50	47.5	0.54	1.050	44.724
391	CT-L3S2 PLUS LANE LOAD	50	47.5	0.01	-0.060	791.500

LOAD RATING FIXED SPAN -GIRDER 4

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=Y_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
100	CT-L3S2 PLUS LANE LOAD	50	47.5	0.11	0.250	189.560
100	CT-L3S2 PLUS LANE LOAD	50	47.5	0.48	0.980	47.980
101	CT-L3S2 PLUS LANE LOAD	50	47.5	0.53	1.090	43.092
101	CT-L3S2 PLUS LANE LOAD	50	47.5	0.96	1.900	24.495
102	CT-L3S2 PLUS LANE LOAD	50	47.5	1.01	2.020	23.015
102	CT-L3S2 PLUS LANE LOAD	50	47.5	1.44	2.770	16.628
103	CT-L3S2 PLUS LANE LOAD	50	47.5	1.49	2.880	15.976
103	CT-L3S2 PLUS LANE LOAD	50	47.5	1.9	3.580	12.737
104	CT-L3S2 PLUS LANE LOAD	50	47.5	1.95	3.690	12.344
104	CT-L3S2 PLUS LANE LOAD	50	47.5	2.35	4.340	10.403
105	CT-L3S2 PLUS LANE LOAD	50	47.5	2.4	4.440	10.158
105	CT-L3S2 PLUS LANE LOAD	50	47.5	2.78	5.050	8.855
106	CT-L3S2 PLUS LANE LOAD	50	47.5	2.83	5.150	8.674
106	CT-L3S2 PLUS LANE LOAD	50	47.5	3.19	5.720	7.747
107	CT-L3S2 PLUS LANE LOAD	50	47.5	3.25	5.820	7.603
107	CT-L3S2 PLUS LANE LOAD	50	47.5	3.58	6.360	6.906
108	CT-L3S2 PLUS LANE LOAD	50	47.5	3.65	6.450	6.798
108	CT-L3S2 PLUS LANE LOAD	50	47.5	3.96	6.950	6.265
109	CT-L3S2 PLUS LANE LOAD	50	47.5	4.02	7.040	6.176
109	CT-L3S2 PLUS LANE LOAD	50	47.5	4.31	7.510	5.751
110	CT-L3S2 PLUS LANE LOAD	50	47.5	4.38	7.590	5.681
110	CT-L3S2 PLUS LANE LOAD	50	47.5	4.65	8.040	5.330
111	CT-L3S2 PLUS LANE LOAD	50	47.5	4.71	8.110	5.276
111	CT-L3S2 PLUS LANE LOAD	50	47.5	4.96	8.530	4.987
112	CT-L3S2 PLUS LANE LOAD	50	47.5	5.02	8.590	4.945
112	CT-L3S2 PLUS LANE LOAD	50	47.5	5.25	9.080	4.653
113	CT-L3S2 PLUS LANE LOAD	50	47.5	5.31	9.130	4.621
113	CT-L3S2 PLUS LANE LOAD	50	47.5	5.53	9.590	4.376
114	CT-L3S2 PLUS LANE LOAD	50	47.5	5.58	9.630	4.353
114	CT-L3S2 PLUS LANE LOAD	50	47.5	5.78	10.050	4.151
115	CT-L3S2 PLUS LANE LOAD	50	47.5	5.82	10.080	4.135
115	CT-L3S2 PLUS LANE LOAD	50	47.5	5.96	10.340	4.017
116	CT-L3S2 PLUS LANE LOAD	50	47.5	5.96	10.340	4.017
116	CT-L3S2 PLUS LANE LOAD	50	47.5	6	10.470	3.964
117	CT-L3S2 PLUS LANE LOAD	50	47.5	6.05	10.480	3.955
117	CT-L3S2 PLUS LANE LOAD	50	47.5	6.21	10.830	3.813
118	CT-L3S2 PLUS LANE LOAD	50	47.5	6.25	10.860	3.798
118	CT-L3S2 PLUS LANE LOAD	50	47.5	6.4	11.150	3.686
119	CT-L3S2 PLUS LANE LOAD	50	47.5	6.43	11.190	3.670
119	CT-L3S2 PLUS LANE LOAD	50	47.5	6.56	11.440	3.579
120	CT-L3S2 PLUS LANE LOAD	50	47.5	6.59	11.470	3.567
120	CT-L3S2 PLUS LANE LOAD	50	47.5	6.7	11.700	3.487
121	CT-L3S2 PLUS LANE LOAD	50	47.5	6.73	11.730	3.476
121	CT-L3S2 PLUS LANE LOAD	50	47.5	6.82	11.910	3.416
122	CT-L3S2 PLUS LANE LOAD	50	47.5	6.85	11.940	3.405
122	CT-L3S2 PLUS LANE LOAD	50	47.5	6.92	12.090	3.356
123	CT-L3S2 PLUS LANE LOAD	50	47.5	6.94	12.120	3.347
123	CT-L3S2 PLUS LANE LOAD	50	47.5	7	12.250	3.306
124	CT-L3S2 PLUS LANE LOAD	50	47.5	7.02	12.270	3.299
124	CT-L3S2 PLUS LANE LOAD	50	47.5	7.06	12.360	3.272
125	CT-L3S2 PLUS LANE LOAD	50	47.5	7.07	12.380	3.266
125	CT-L3S2 PLUS LANE LOAD	50	47.5	7.1	12.450	3.245

Minimum Rating Factor 3.220

126	CT-L3S2 PLUS LANE LOAD	50	47.5	7.11	12.460	3.242
126	CT-L3S2 PLUS LANE LOAD	50	47.5	7.11	12.500	3.231
127	CT-L3S2 PLUS LANE LOAD	50	47.5	7.12	12.510	3.228
127	CT-L3S2 PLUS LANE LOAD	50	47.5	7.11	12.520	3.226
128	CT-L3S2 PLUS LANE LOAD	50	47.5	7.11	12.530	3.223
128	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	12.510	3.231
129	CT-L3S2 PLUS LANE LOAD	50	47.5	7.08	12.510	3.231
129	CT-L3S2 PLUS LANE LOAD	50	47.5	7.04	12.470	3.245
130	CT-L3S2 PLUS LANE LOAD	50	47.5	7.03	12.470	3.245
130	CT-L3S2 PLUS LANE LOAD	50	47.5	6.97	12.400	3.269
131	CT-L3S2 PLUS LANE LOAD	50	47.5	6.96	12.400	3.269
131	CT-L3S2 PLUS LANE LOAD	50	47.5	6.88	12.330	3.294
132	CT-L3S2 PLUS LANE LOAD	50	47.5	6.86	12.320	3.299
132	CT-L3S2 PLUS LANE LOAD	50	47.5	6.82	12.260	3.318
133	CT-L3S2 PLUS LANE LOAD	50	47.5	6.82	12.260	3.318
133	CT-L3S2 PLUS LANE LOAD	50	47.5	6.77	12.230	3.330
134	CT-L3S2 PLUS LANE LOAD	50	47.5	6.75	12.230	3.332
134	CT-L3S2 PLUS LANE LOAD	50	47.5	6.64	12.110	3.374
135	CT-L3S2 PLUS LANE LOAD	50	47.5	6.61	12.090	3.382
135	CT-L3S2 PLUS LANE LOAD	50	47.5	6.48	11.970	3.427
136	CT-L3S2 PLUS LANE LOAD	50	47.5	6.45	11.960	3.432
136	CT-L3S2 PLUS LANE LOAD	50	47.5	6.31	11.850	3.476
137	CT-L3S2 PLUS LANE LOAD	50	47.5	6.27	11.830	3.485
137	CT-L3S2 PLUS LANE LOAD	50	47.5	6.11	11.710	3.535
138	CT-L3S2 PLUS LANE LOAD	50	47.5	6.07	11.700	3.541
138	CT-L3S2 PLUS LANE LOAD	50	47.5	5.9	11.580	3.592
139	CT-L3S2 PLUS LANE LOAD	50	47.5	5.85	11.590	3.594
139	CT-L3S2 PLUS LANE LOAD	50	47.5	5.66	11.510	3.635
140	CT-L3S2 PLUS LANE LOAD	50	47.5	5.61	11.490	3.646
140	CT-L3S2 PLUS LANE LOAD	50	47.5	5.4	11.410	3.690
141	CT-L3S2 PLUS LANE LOAD	50	47.5	5.35	11.400	3.697
141	CT-L3S2 PLUS LANE LOAD	50	47.5	5.12	11.290	3.754
142	CT-L3S2 PLUS LANE LOAD	50	47.5	5.06	11.270	3.766
142	CT-L3S2 PLUS LANE LOAD	50	47.5	4.82	11.160	3.824
143	CT-L3S2 PLUS LANE LOAD	50	47.5	4.76	11.130	3.840
143	CT-L3S2 PLUS LANE LOAD	50	47.5	4.5	11.010	3.906
144	CT-L3S2 PLUS LANE LOAD	50	47.5	4.44	10.980	3.922
144	CT-L3S2 PLUS LANE LOAD	50	47.5	4.16	10.820	4.006
145	CT-L3S2 PLUS LANE LOAD	50	47.5	4.09	10.790	4.023
145	CT-L3S2 PLUS LANE LOAD	50	47.5	3.79	10.590	4.127
146	CT-L3S2 PLUS LANE LOAD	50	47.5	3.73	10.560	4.145
146	CT-L3S2 PLUS LANE LOAD	50	47.5	3.41	10.340	4.264
147	CT-L3S2 PLUS LANE LOAD	50	47.5	3.34	10.300	4.287
147	CT-L3S2 PLUS LANE LOAD	50	47.5	3.01	10.040	4.431
148	CT-L3S2 PLUS LANE LOAD	50	47.5	2.94	10.000	4.456
148	CT-L3S2 PLUS LANE LOAD	50	47.5	2.58	9.710	4.626
149	CT-L3S2 PLUS LANE LOAD	50	47.5	2.51	9.680	4.648
149	CT-L3S2 PLUS LANE LOAD	50	47.5	2.41	9.540	4.726
150	CT-L3S2 PLUS LANE LOAD	50	47.5	2.41	9.550	4.721
150	CT-L3S2 PLUS LANE LOAD	50	47.5	2.13	9.340	4.858
151	CT-L3S2 PLUS LANE LOAD	50	47.5	2.06	9.310	4.881
151	CT-L3S2 PLUS LANE LOAD	50	47.5	1.67	8.940	5.126
152	CT-L3S2 PLUS LANE LOAD	50	47.5	1.59	8.890	5.164
152	CT-L3S2 PLUS LANE LOAD	50	47.5	1.18	8.510	5.443
153	CT-L3S2 PLUS LANE LOAD	50	47.5	1.1	8.450	5.491
153	CT-L3S2 PLUS LANE LOAD	50	47.5	0.67	8.040	5.825
154	CT-L3S2 PLUS LANE LOAD	50	47.5	0.59	7.970	5.886
154	CT-L3S2 PLUS LANE LOAD	50	47.5	0.14	7.530	6.290
155	CT-L3S2 PLUS LANE LOAD	50	47.5	0.06	7.470	6.351
155	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.45	7.000	6.721
156	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.51	6.930	6.781

156	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.02	6.500	7.151
157	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.09	6.420	7.229
157	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.61	6.000	7.648
158	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.68	5.910	7.753
158	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.22	-5.650	8.014
159	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.29	-5.660	7.988
159	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.84	-5.770	7.740
160	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.93	-5.780	7.711
160	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.49	-5.880	7.485
161	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.58	-5.900	7.444
161	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.16	-6.000	7.223
162	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.25	-6.020	7.184
162	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.85	-6.130	6.958
163	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.94	-6.140	6.932
163	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.55	-6.250	6.712
164	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.65	-6.270	6.675
164	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.27	-6.370	6.473
165	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.38	-6.390	6.435
165	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.02	-6.500	6.228
166	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.13	-6.520	6.192
166	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.78	-6.630	5.991
167	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.9	-6.650	5.955
167	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.57	-7.100	5.483
168	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.7	-7.120	5.449
168	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.39	-7.590	5.021
169	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.51	-7.620	4.986
169	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.23	-8.100	4.601
170	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.35	-8.130	4.569
170	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.08	-8.700	4.186
171	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.2	-8.780	4.134
171	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.96	-9.520	3.733
172	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.04	-9.570	3.705
172	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.85	-10.380	3.338
173	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.83	-10.370	3.343
173	CT-L3S2 PLUS LANE LOAD	50	47.5	-12.02	-9.570	3.707
174	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.94	-9.530	3.731
174	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.18	-8.770	4.141
175	CT-L3S2 PLUS LANE LOAD	50	47.5	-11.07	-8.700	4.187
175	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.33	-8.160	4.555
176	CT-L3S2 PLUS LANE LOAD	50	47.5	-10.21	-8.120	4.592
176	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.5	-7.650	4.967
177	CT-L3S2 PLUS LANE LOAD	50	47.5	-9.37	-7.610	5.011
177	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.68	-7.150	5.429
178	CT-L3S2 PLUS LANE LOAD	50	47.5	-8.56	-7.130	5.461
178	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.89	-6.680	5.930
179	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.76	-6.650	5.976
179	CT-L3S2 PLUS LANE LOAD	50	47.5	-7.12	-6.550	6.165
180	CT-L3S2 PLUS LANE LOAD	50	47.5	-7	-6.530	6.202
180	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.37	-6.420	6.407
181	CT-L3S2 PLUS LANE LOAD	50	47.5	-6.26	-6.400	6.444
181	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.64	-6.290	6.655
182	CT-L3S2 PLUS LANE LOAD	50	47.5	-5.54	-6.280	6.682
182	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.93	-6.170	6.900
183	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.83	-6.150	6.938
183	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.24	-6.050	7.150
184	CT-L3S2 PLUS LANE LOAD	50	47.5	-4.15	-6.030	7.189
184	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.57	-5.920	7.421
185	CT-L3S2 PLUS LANE LOAD	50	47.5	-3.48	-5.910	7.448
185	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.91	-5.800	7.688
186	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.83	-5.790	7.715
186	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.28	-5.690	7.947

187	CT-L3S2 PLUS LANE LOAD	50	47.5	-2.21	-5.680	7.974
187	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.67	5.920	7.742
188	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.6	6.000	7.650
188	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.08	6.420	7.231
189	CT-L3S2 PLUS LANE LOAD	50	47.5	-1.01	6.500	7.152
189	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.5	6.970	6.743
190	CT-L3S2 PLUS LANE LOAD	50	47.5	-0.44	7.040	6.685
190	CT-L3S2 PLUS LANE LOAD	50	47.5	0.07	7.500	6.324
191	CT-L3S2 PLUS LANE LOAD	50	47.5	0.15	7.570	6.255
191	CT-L3S2 PLUS LANE LOAD	50	47.5	0.6	8.010	5.855
192	CT-L3S2 PLUS LANE LOAD	50	47.5	0.68	8.070	5.802
192	CT-L3S2 PLUS LANE LOAD	50	47.5	1.11	8.490	5.464
193	CT-L3S2 PLUS LANE LOAD	50	47.5	1.19	8.540	5.423
193	CT-L3S2 PLUS LANE LOAD	50	47.5	1.6	8.930	5.140
194	CT-L3S2 PLUS LANE LOAD	50	47.5	1.68	8.980	5.102
194	CT-L3S2 PLUS LANE LOAD	50	47.5	2.07	9.350	4.859
195	CT-L3S2 PLUS LANE LOAD	50	47.5	2.14	9.380	4.836
195	CT-L3S2 PLUS LANE LOAD	50	47.5	2.42	9.590	4.701
196	CT-L3S2 PLUS LANE LOAD	50	47.5	2.42	9.580	4.706
196	CT-L3S2 PLUS LANE LOAD	50	47.5	2.52	9.720	4.628
197	CT-L3S2 PLUS LANE LOAD	50	47.5	2.59	9.750	4.606
197	CT-L3S2 PLUS LANE LOAD	50	47.5	2.95	10.040	4.437
198	CT-L3S2 PLUS LANE LOAD	50	47.5	3.01	10.080	4.414
198	CT-L3S2 PLUS LANE LOAD	50	47.5	3.35	10.340	4.270
199	CT-L3S2 PLUS LANE LOAD	50	47.5	3.42	10.380	4.247
199	CT-L3S2 PLUS LANE LOAD	50	47.5	3.73	10.600	4.129
200	CT-L3S2 PLUS LANE LOAD	50	47.5	3.8	10.640	4.107
200	CT-L3S2 PLUS LANE LOAD	50	47.5	4.1	10.830	4.007
201	CT-L3S2 PLUS LANE LOAD	50	47.5	4.16	10.860	3.991
201	CT-L3S2 PLUS LANE LOAD	50	47.5	4.44	11.020	3.907
202	CT-L3S2 PLUS LANE LOAD	50	47.5	4.51	11.050	3.890
202	CT-L3S2 PLUS LANE LOAD	50	47.5	4.77	11.180	3.822
203	CT-L3S2 PLUS LANE LOAD	50	47.5	4.83	11.200	3.810
203	CT-L3S2 PLUS LANE LOAD	50	47.5	5.07	11.290	3.758
204	CT-L3S2 PLUS LANE LOAD	50	47.5	5.13	11.320	3.743
204	CT-L3S2 PLUS LANE LOAD	50	47.5	5.35	11.420	3.691
205	CT-L3S2 PLUS LANE LOAD	50	47.5	5.41	11.440	3.679
205	CT-L3S2 PLUS LANE LOAD	50	47.5	5.62	11.520	3.635
206	CT-L3S2 PLUS LANE LOAD	50	47.5	5.66	11.540	3.626
206	CT-L3S2 PLUS LANE LOAD	50	47.5	5.86	11.610	3.587
207	CT-L3S2 PLUS LANE LOAD	50	47.5	5.9	11.610	3.583
207	CT-L3S2 PLUS LANE LOAD	50	47.5	6.08	11.710	3.537
208	CT-L3S2 PLUS LANE LOAD	50	47.5	6.12	11.720	3.531
208	CT-L3S2 PLUS LANE LOAD	50	47.5	6.28	11.850	3.478
209	CT-L3S2 PLUS LANE LOAD	50	47.5	6.32	11.860	3.472
209	CT-L3S2 PLUS LANE LOAD	50	47.5	6.46	11.970	3.429
210	CT-L3S2 PLUS LANE LOAD	50	47.5	6.49	11.980	3.423
210	CT-L3S2 PLUS LANE LOAD	50	47.5	6.62	12.110	3.376
211	CT-L3S2 PLUS LANE LOAD	50	47.5	6.65	12.130	3.368
211	CT-L3S2 PLUS LANE LOAD	50	47.5	6.76	12.240	3.328
212	CT-L3S2 PLUS LANE LOAD	50	47.5	6.78	12.250	3.324
212	CT-L3S2 PLUS LANE LOAD	50	47.5	6.83	12.280	3.312
213	CT-L3S2 PLUS LANE LOAD	50	47.5	6.83	12.280	3.312
213	CT-L3S2 PLUS LANE LOAD	50	47.5	6.87	12.340	3.293
214	CT-L3S2 PLUS LANE LOAD	50	47.5	6.89	12.350	3.288
214	CT-L3S2 PLUS LANE LOAD	50	47.5	6.97	12.410	3.266
215	CT-L3S2 PLUS LANE LOAD	50	47.5	6.98	12.410	3.265
215	CT-L3S2 PLUS LANE LOAD	50	47.5	7.04	12.490	3.239
216	CT-L3S2 PLUS LANE LOAD	50	47.5	7.05	12.480	3.241
216	CT-L3S2 PLUS LANE LOAD	50	47.5	7.09	12.530	3.225
217	CT-L3S2 PLUS LANE LOAD	50	47.5	7.09	12.520	3.228

217	CT-L3S2 PLUS LANE LOAD	50	47.5	7.12	12.540	3.220
218	CT-L3S2 PLUS LANE LOAD	50	47.5	7.12	12.530	3.223
218	CT-L3S2 PLUS LANE LOAD	50	47.5	7.13	12.530	3.222
219	CT-L3S2 PLUS LANE LOAD	50	47.5	7.13	12.510	3.227
219	CT-L3S2 PLUS LANE LOAD	50	47.5	7.12	12.480	3.236
220	CT-L3S2 PLUS LANE LOAD	50	47.5	7.11	12.460	3.242
220	CT-L3S2 PLUS LANE LOAD	50	47.5	7.09	12.400	3.259
221	CT-L3S2 PLUS LANE LOAD	50	47.5	7.07	12.380	3.266
221	CT-L3S2 PLUS LANE LOAD	50	47.5	7.03	12.280	3.296
222	CT-L3S2 PLUS LANE LOAD	50	47.5	7.02	12.260	3.302
222	CT-L3S2 PLUS LANE LOAD	50	47.5	6.96	12.130	3.342
223	CT-L3S2 PLUS LANE LOAD	50	47.5	6.94	12.110	3.349
223	CT-L3S2 PLUS LANE LOAD	50	47.5	6.86	11.950	3.401
224	CT-L3S2 PLUS LANE LOAD	50	47.5	6.84	11.930	3.408
224	CT-L3S2 PLUS LANE LOAD	50	47.5	6.75	11.740	3.471
225	CT-L3S2 PLUS LANE LOAD	50	47.5	6.72	11.710	3.482
225	CT-L3S2 PLUS LANE LOAD	50	47.5	6.61	11.490	3.559
226	CT-L3S2 PLUS LANE LOAD	50	47.5	6.58	11.450	3.574
226	CT-L3S2 PLUS LANE LOAD	50	47.5	6.46	11.200	3.664
227	CT-L3S2 PLUS LANE LOAD	50	47.5	6.42	11.160	3.681
227	CT-L3S2 PLUS LANE LOAD	50	47.5	6.28	10.870	3.792
228	CT-L3S2 PLUS LANE LOAD	50	47.5	6.24	10.840	3.806
228	CT-L3S2 PLUS LANE LOAD	50	47.5	6.08	10.490	3.949
229	CT-L3S2 PLUS LANE LOAD	50	47.5	6.03	10.480	3.957
229	CT-L3S2 PLUS LANE LOAD	50	47.5	5.99	10.350	4.011
230	CT-L3S2 PLUS LANE LOAD	50	47.5	5.99	10.350	4.011
230	CT-L3S2 PLUS LANE LOAD	50	47.5	5.86	10.090	4.127
231	CT-L3S2 PLUS LANE LOAD	50	47.5	5.81	10.060	4.144
231	CT-L3S2 PLUS LANE LOAD	50	47.5	5.61	9.630	4.350
232	CT-L3S2 PLUS LANE LOAD	50	47.5	5.56	9.600	4.369
232	CT-L3S2 PLUS LANE LOAD	50	47.5	5.35	9.140	4.612
233	CT-L3S2 PLUS LANE LOAD	50	47.5	5.29	9.090	4.644
233	CT-L3S2 PLUS LANE LOAD	50	47.5	5.07	8.600	4.934
234	CT-L3S2 PLUS LANE LOAD	50	47.5	5	8.530	4.982
234	CT-L3S2 PLUS LANE LOAD	50	47.5	4.76	8.110	5.270
235	CT-L3S2 PLUS LANE LOAD	50	47.5	4.69	8.040	5.325
235	CT-L3S2 PLUS LANE LOAD	50	47.5	4.44	7.590	5.673
236	CT-L3S2 PLUS LANE LOAD	50	47.5	4.37	7.520	5.735
236	CT-L3S2 PLUS LANE LOAD	50	47.5	4.09	7.040	6.166
237	CT-L3S2 PLUS LANE LOAD	50	47.5	4.02	6.960	6.247
237	CT-L3S2 PLUS LANE LOAD	50	47.5	3.72	6.440	6.798
238	CT-L3S2 PLUS LANE LOAD	50	47.5	3.65	6.360	6.895
238	CT-L3S2 PLUS LANE LOAD	50	47.5	3.34	5.810	7.601
239	CT-L3S2 PLUS LANE LOAD	50	47.5	3.26	5.730	7.721
239	CT-L3S2 PLUS LANE LOAD	50	47.5	2.93	5.140	8.671
240	CT-L3S2 PLUS LANE LOAD	50	47.5	2.85	5.050	8.842
240	CT-L3S2 PLUS LANE LOAD	50	47.5	2.5	4.430	10.158
241	CT-L3S2 PLUS LANE LOAD	50	47.5	2.43	4.330	10.409
241	CT-L3S2 PLUS LANE LOAD	50	47.5	2.05	3.670	12.384
242	CT-L3S2 PLUS LANE LOAD	50	47.5	1.98	3.560	12.787
242	CT-L3S2 PLUS LANE LOAD	50	47.5	1.59	2.860	16.052
243	CT-L3S2 PLUS LANE LOAD	50	47.5	1.51	2.750	16.724
243	CT-L3S2 PLUS LANE LOAD	50	47.5	1.1	1.990	23.317
244	CT-L3S2 PLUS LANE LOAD	50	47.5	1.03	1.880	24.718
244	CT-L3S2 PLUS LANE LOAD	50	47.5	0.59	1.070	43.841
245	CT-L3S2 PLUS LANE LOAD	50	47.5	0.52	0.970	48.433
245	CT-L3S2 PLUS LANE LOAD	50	47.5	0.07	0.260	182.423

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

FIXED SPAN – LOAD COMBINATION ANALYSIS

PROJECT TITLE : Load Rating and Structural Analysis

MIDAS	**Company**	Close, Jensen and Miller PC	**Client**	CT DOT
	Author	Danielle Coutu	**File Name**	Fixed Span Girder 1 Analysis

```
**********************************************************************************************
**           MIDAS/Civil V.8.5.1    Modeling, Integrated Design & Analysis Software              **
**                             CIVIL STRUCTURE DESIGN SYSTEM                                    **
**********************************************************************************************

                    XXX   XXX     XX    XXXXXXXX      XXXXXXX    XXXXXXXX
                    XXXX XXXX     XX    XX     XX     XX   XX    XX    XX
                    XX XXX XX     XX    XX     XX     XX   XX    XX
                    XX  X  XX     XX    XX     XX     XXXXXXX    XXXXXXXX
                    XXX    XX    XXX    XXX    XX     XX   XX         XXX
                    XXX    XX    XXX    XXX    XX    XXX   XX    XX   XXX
                    XXX    XX    XXX    XXX    XX    XXX   XX    XX   XXX
                    XXX    XX    XXX    XXXXXXXX    XXX   XX    XXXXXXXX  /Civil

                                    VERSION 8.5.1

                 COPYRIGHT (C) SINCE 1989. MIDAS Information Technology Co.,Ltd.
                                   ALL RIGHTS RESERVED.             MIDAS TEAM

**********************************************************************************************
```

ANALYSIS RESULT OUTPUT

LOAD SET FOR DISPLACMENT OUTPUT - Strength I HL-93 Inv.

<< LOAD COMB/CASE/ENVEL ABBREVIATION TABLE >>

ABBREVIATION	FULL NAME	TYPE	DESCRIPTION
Self W~1	Self Weight	Static	
Guide ~1	Guide Rail	Static	
Wearin~1	Wearing Surface	Static	
S1 HL-~1	S1 HL-93 INV	Gen.Comb	

<< SELECTED LOAD CASE/COMBINATION DETAIL LIST >>

[Selected Load Combinations]

L. COMB	TYPE	COMBINATION DETAIL
S1 HL-~1	Gen.Comb	1.250 x Self W~1 + 1.250 x Guide ~1 + 1.250 x Sidewalk + 1.500 x Wearin~1 + 1.750 x HL-93

LOAD SET FOR REACTION OUTPUT - Strength I HL-93 Inv.

<< LOAD COMB/CASE/ENVEL ABBREVIATION TABLE >>

ABBREVIATION	FULL NAME	TYPE	DESCRIPTION
No Abbreviation was defined in this Load Set. All names are less than 8 char.'s			

<< SELECTED LOAD CASE/COMBINATION DETAIL LIST >>

[Selected Load Combinations]

L. COMB	TYPE	COMBINATION DETAIL
S1 HL-~1	Gen.Comb	1.250 x Self W~1 + 1.250 x Guide ~1 + 1.250 x Sidewalk + 1.500 x Wearin~1 + 1.750 x HL-93

LOAD SET FOR ELEMENT OUTPUT - Strength I HL-93 Inv.

<< LOAD COMB/CASE/ENVEL ABBREVIATION TABLE >>

ABBREVIATION	FULL NAME	TYPE	DESCRIPTION
No Abbreviation was defined in this Load Set. All names are less than 8 char.'s			

<< SELECTED LOAD CASE/COMBINATION DETAIL LIST >>

[Selected Load Combinations]

L. COMB	TYPE	COMBINATION DETAIL
S1 HL-~1	Gen.Comb	1.250 x Self W~1 + 1.250 x Guide ~1 + 1.250 x Sidewalk + 1.500 x Wearin~1 + 1.750 x HL-93

NODE DISPLACEMENT AND ROTATIONS DEFAULT PRINTOUT Unit System : kips , in

NODE	LC		UX	UY	UZ	RX	RY	RZ
541	S1 HL-~1	Max	0.046	0.023	-0.186	0.0	0.0	0.0
		Min	-0.126	-0.024	-0.342	-0.0	-0.0	-0.0
542	S1 HL-~1	Max	0.046	0.023	-0.180	0.0	0.0	0.0
		Min	-0.125	-0.025	-0.456	-0.0	-0.0	-0.0
543	S1 HL-~1	Max	0.046	0.024	-0.171	0.0	0.0	0.0
		Min	-0.125	-0.028	-0.626	-0.0	-0.0	-0.0
544	S1 HL-~1	Max	0.046	0.026	-0.162	0.0	0.0	0.0
		Min	-0.125	-0.030	-0.796	-0.0	-0.0	-0.0
545	S1 HL-~1	Max	0.046	0.029	-0.153	0.0	0.0	0.0
		Min	-0.124	-0.033	-0.965	-0.0	-0.0	-0.0
546	S1 HL-~1	Max	0.046	0.031	-0.144	0.0	0.0	0.0
		Min	-0.123	-0.035	-1.132	-0.0	-0.0	-0.0
547	S1 HL-~1	Max	0.046	0.034	-0.134	0.0	0.0	0.0
		Min	-0.122	-0.038	-1.297	-0.0	-0.0	-0.0
548	S1 HL-~1	Max	0.047	0.036	-0.124	0.0	0.0	0.0
		Min	-0.120	-0.041	-1.460	-0.0	-0.0	-0.0
549	S1 HL-~1	Max	0.047	0.039	-0.113	0.0	0.0	0.0
		Min	-0.119	-0.044	-1.619	-0.0	-0.0	-0.0
550	S1 HL-~1	Max	0.047	0.042	-0.102	0.0	0.0	0.0
		Min	-0.117	-0.046	-1.775	-0.0	-0.0	-0.0
551	S1 HL-~1	Max	0.047	0.044	-0.090	0.0	0.0	0.0
		Min	-0.115	-0.049	-1.927	-0.0	-0.0	-0.0
552	S1 HL-~1	Max	0.048	0.047	-0.078	0.0	0.0	0.0
		Min	-0.113	-0.052	-2.074	-0.0	-0.0	-0.0
553	S1 HL-~1	Max	0.048	0.050	-0.065	0.0	0.0	0.0
		Min	-0.111	-0.054	-2.218	-0.0	-0.0	-0.0
554	S1 HL-~1	Max	0.048	0.052	-0.052	0.0	0.0	0.0
		Min	-0.109	-0.057	-2.356	-0.0	-0.0	-0.0
555	S1 HL-~1	Max	0.048	0.055	-0.038	0.0	0.0	0.0
		Min	-0.106	-0.060	-2.488	-0.0	-0.0	-0.0
556	S1 HL-~1	Max	0.049	0.057	-0.023	0.0	0.0	0.0
		Min	-0.104	-0.062	-2.615	-0.0	-0.0	-0.0
557	S1 HL-~1	Max	0.049	0.059	-0.012	0.0	0.0	0.0
		Min	-0.102	-0.064	-2.707	-0.0	-0.0	-0.0
558	S1 HL-~1	Max	0.049	0.059	-0.008	0.0	0.0	0.0
		Min	-0.101	-0.065	-2.737	-0.0	-0.0	-0.0

559	S1 HL-~1	Max	0.049	0.062	0.008	0.0	0.0	0.0
		Min	-0.098	-0.067	-2.852	-0.0	-0.0	-0.0
560	S1 HL-~1	Max	0.050	0.064	0.025	0.0	0.0	0.0
		Min	-0.095	-0.069	-2.960	-0.0	-0.0	-0.0
561	S1 HL-~1	Max	0.050	0.066	0.042	0.0	0.0	0.0
		Min	-0.092	-0.071	-3.062	-0.0	-0.0	-0.0
562	S1 HL-~1	Max	0.050	0.067	0.060	0.0	0.0	0.0
		Min	-0.089	-0.073	-3.157	-0.0	-0.0	-0.0
563	S1 HL-~1	Max	0.051	0.069	0.079	0.0	0.0	0.0
		Min	-0.086	-0.074	-3.244	-0.0	-0.0	-0.0
564	S1 HL-~1	Max	0.051	0.071	0.098	0.0	0.0	0.0
		Min	-0.082	-0.076	-3.323	-0.0	-0.0	-0.0
565	S1 HL-~1	Max	0.051	0.072	0.117	0.0	0.0	0.0
		Min	-0.079	-0.078	-3.394	-0.0	-0.0	-0.0
566	S1 HL-~1	Max	0.051	0.074	0.137	0.0	0.0	0.0
		Min	-0.076	-0.079	-3.458	-0.0	-0.0	-0.0
567	S1 HL-~1	Max	0.052	0.075	0.158	0.0	0.0	0.0
		Min	-0.072	-0.080	-3.514	-0.0	-0.0	-0.0
568	S1 HL-~1	Max	0.052	0.076	0.179	0.0	0.0	0.0
		Min	-0.069	-0.081	-3.563	-0.0	-0.0	-0.0
569	S1 HL-~1	Max	0.052	0.077	0.200	0.0	0.0	0.0
		Min	-0.065	-0.082	-3.603	-0.0	-0.0	-0.0
570	S1 HL-~1	Max	0.052	0.078	0.222	0.0	0.0	0.0
		Min	-0.061	-0.083	-3.637	-0.0	-0.0	-0.0
571	S1 HL-~1	Max	0.052	0.079	0.244	0.0	0.0	0.0
		Min	-0.058	-0.084	-3.662	-0.0	-0.0	-0.0
572	S1 HL-~1	Max	0.052	0.079	0.267	0.0	0.0	0.0
		Min	-0.054	-0.085	-3.679	-0.0	-0.0	-0.0
573	S1 HL-~1	Max	0.053	0.080	0.289	0.0	0.0	0.0
		Min	-0.051	-0.085	-3.689	-0.0	-0.0	-0.0
574	S1 HL-~1	Max	0.053	0.080	0.300	0.0	0.0	0.0
		Min	-0.049	-0.086	-3.691	-0.0	-0.0	-0.0
575	S1 HL-~1	Max	0.053	0.080	0.311	0.0	0.0	0.0
		Min	-0.047	-0.086	-3.691	-0.0	-0.0	-0.0
576	S1 HL-~1	Max	0.053	0.080	0.334	0.0	0.0	0.0
		Min	-0.044	-0.086	-3.685	-0.0	-0.0	-0.0
577	S1 HL-~1	Max	0.053	0.080	0.356	0.0	0.0	0.0
		Min	-0.040	-0.086	-3.672	-0.0	-0.0	-0.0

578	S1 HL-~1	Max	0.053	0.080	0.379	0.0	-0.0	0.0
		Min	-0.037	-0.085	-3.650	-0.0	-0.0	-0.0
579	S1 HL-~1	Max	0.052	0.080	0.401	0.0	-0.0	0.0
		Min	-0.033	-0.085	-3.621	-0.0	-0.0	-0.0
580	S1 HL-~1	Max	0.052	0.080	0.422	0.0	-0.0	0.0
		Min	-0.030	-0.085	-3.585	-0.0	-0.0	-0.0
581	S1 HL-~1	Max	0.052	0.079	0.443	0.0	-0.0	0.0
		Min	-0.027	-0.084	-3.542	-0.0	-0.0	-0.0
582	S1 HL-~1	Max	0.052	0.079	0.464	0.0	-0.0	0.0
		Min	-0.024	-0.083	-3.492	-0.0	-0.0	-0.0
583	S1 HL-~1	Max	0.052	0.078	0.484	0.0	-0.0	0.0
		Min	-0.020	-0.083	-3.434	-0.0	-0.0	-0.0
584	S1 HL-~1	Max	0.051	0.077	0.503	0.0	-0.0	0.0
		Min	-0.018	-0.082	-3.371	-0.0	-0.0	-0.0
585	S1 HL-~1	Max	0.051	0.076	0.521	0.0	-0.0	0.0
		Min	-0.015	-0.080	-3.300	-0.0	-0.0	-0.0
586	S1 HL-~1	Max	0.051	0.075	0.538	0.0	-0.0	0.0
		Min	-0.012	-0.079	-3.223	-0.0	-0.0	-0.0
587	S1 HL-~1	Max	0.050	0.074	0.554	0.0	-0.0	0.0
		Min	-0.010	-0.078	-3.140	-0.0	-0.0	-0.0
588	S1 HL-~1	Max	0.050	0.073	0.569	0.0	-0.0	0.0
		Min	-0.008	-0.076	-3.051	-0.0	-0.0	-0.0
589	S1 HL-~1	Max	0.049	0.071	0.582	0.0	-0.0	0.0
		Min	-0.005	-0.074	-2.956	-0.0	-0.0	-0.0
590	S1 HL-~1	Max	0.048	0.069	0.593	0.0	-0.0	0.0
		Min	-0.003	-0.073	-2.855	-0.0	-0.0	-0.0
591	S1 HL-~1	Max	0.048	0.069	0.596	0.0	-0.0	0.0
		Min	-0.003	-0.072	-2.829	-0.0	-0.0	-0.0
592	S1 HL-~1	Max	0.048	0.068	0.603	0.0	-0.0	0.0
		Min	-0.001	-0.071	-2.748	-0.0	-0.0	-0.0
593	S1 HL-~1	Max	0.047	0.066	0.611	0.0	-0.0	0.0
		Min	0.001	-0.068	-2.637	-0.0	-0.0	-0.0
594	S1 HL-~1	Max	0.046	0.064	0.617	0.0	-0.0	0.0
		Min	0.002	-0.066	-2.521	-0.0	-0.0	-0.0
595	S1 HL-~1	Max	0.045	0.061	0.621	0.0	-0.0	0.0
		Min	0.004	-0.064	-2.401	-0.0	-0.0	-0.0
596	S1 HL-~1	Max	0.044	0.059	0.622	0.0	0.0	0.0
		Min	0.005	-0.061	-2.278	-0.0	-0.0	-0.0
597	S1 HL-~1	Max	0.043	0.057	0.620	0.0	0.0	0.0
		Min	0.006	-0.058	-2.151	-0.0	-0.0	-0.0

598	S1 HL-~1	Max	0.042	0.054	0.616	0.0	0.0	0.0
		Min	0.007	-0.056	-2.022	-0.0	-0.0	-0.0
599	S1 HL-~1	Max	0.040	0.051	0.609	0.0	0.0	0.0
		Min	0.007	-0.053	-1.890	-0.0	-0.0	-0.0
600	S1 HL-~1	Max	0.039	0.049	0.599	0.0	0.0	0.0
		Min	0.008	-0.050	-1.757	-0.0	-0.0	-0.0
601	S1 HL-~1	Max	0.037	0.046	0.585	0.0	0.0	0.0
		Min	0.008	-0.047	-1.622	-0.0	-0.0	-0.0
602	S1 HL-~1	Max	0.035	0.043	0.568	0.0	0.0	0.0
		Min	0.009	-0.043	-1.487	-0.0	-0.0	-0.0
603	S1 HL-~1	Max	0.033	0.039	0.547	0.0	0.0	0.0
		Min	0.009	-0.040	-1.352	-0.0	-0.0	-0.0
604	S1 HL-~1	Max	0.031	0.036	0.522	0.0	0.0	0.0
		Min	0.008	-0.037	-1.216	-0.0	-0.0	-0.0
605	S1 HL-~1	Max	0.029	0.033	0.493	0.0	0.0	0.0
		Min	0.008	-0.033	-1.082	-0.0	-0.0	-0.0
606	S1 HL-~1	Max	0.027	0.029	0.459	0.0	0.0	0.0
		Min	0.008	-0.030	-0.948	-0.0	-0.0	-0.0
607	S1 HL-~1	Max	0.024	0.026	0.421	0.0	0.0	0.0
		Min	0.007	-0.026	-0.817	-0.0	-0.0	-0.0
608	S1 HL-~1	Max	0.022	0.022	0.377	0.0	0.0	0.0
		Min	0.007	-0.023	-0.688	-0.0	-0.0	-0.0
609	S1 HL-~1	Max	0.019	0.019	0.329	0.0	0.0	0.0
		Min	0.006	-0.019	-0.562	-0.0	-0.0	-0.0
610	S1 HL-~1	Max	0.016	0.015	0.275	0.0	0.0	0.0
		Min	0.005	-0.016	-0.440	-0.0	-0.0	-0.0
611	S1 HL-~1	Max	0.012	0.011	0.215	0.0	0.0	0.0
		Min	0.004	-0.012	-0.322	-0.0	-0.0	-0.0
612	S1 HL-~1	Max	0.008	0.007	0.150	0.0	0.0	0.0
		Min	0.003	-0.008	-0.209	-0.0	-0.0	-0.0
613	S1 HL-~1	Max	0.004	0.003	0.078	0.0	0.0	0.0
		Min	0.001	-0.004	-0.102	-0.0	-0.0	-0.0
614	S1 HL-~1	Max	0.000	0.000	-0.000	0.0	0.0	0.0
		Min	-0.000	-0.000	-0.000	-0.0	-0.0	-0.0
615	S1 HL-~1	Max	-0.001	0.003	0.081	0.0	0.0	0.0
		Min	-0.004	-0.004	-0.098	-0.0	-0.0	-0.0
616	S1 HL-~1	Max	-0.003	0.007	0.156	0.0	0.0	0.0
		Min	-0.008	-0.008	-0.203	-0.0	-0.0	-0.0

617	S1 HL-~1	Max	-0.004	0.011	0.225	0.0	0.0	0.0
		Min	-0.012	-0.012	-0.312	-0.0	-0.0	-0.0
618	S1 HL-~1	Max	-0.005	0.015	0.287	0.0	0.0	0.0
		Min	-0.016	-0.015	-0.427	-0.0	-0.0	-0.0
619	S1 HL-~1	Max	-0.006	0.018	0.344	0.0	0.0	0.0
		Min	-0.019	-0.019	-0.546	-0.0	-0.0	-0.0
620	S1 HL-~1	Max	-0.007	0.022	0.396	0.0	0.0	0.0
		Min	-0.022	-0.022	-0.668	-0.0	-0.0	-0.0
621	S1 HL-~1	Max	-0.007	0.025	0.442	0.0	0.0	0.0
		Min	-0.024	-0.026	-0.794	-0.0	-0.0	-0.0
622	S1 HL-~1	Max	-0.008	0.029	0.484	0.0	0.0	0.0
		Min	-0.027	-0.029	-0.922	-0.0	-0.0	-0.0
623	S1 HL-~1	Max	-0.008	0.032	0.520	0.0	0.0	0.0
		Min	-0.029	-0.033	-1.052	-0.0	-0.0	-0.0
624	S1 HL-~1	Max	-0.008	0.035	0.553	0.0	0.0	0.0
		Min	-0.031	-0.036	-1.183	-0.0	-0.0	-0.0
625	S1 HL-~1	Max	-0.008	0.038	0.581	0.0	0.0	0.0
		Min	-0.033	-0.039	-1.315	-0.0	-0.0	-0.0
626	S1 HL-~1	Max	-0.008	0.041	0.605	0.0	0.0	0.0
		Min	-0.035	-0.042	-1.447	-0.0	-0.0	-0.0
627	S1 HL-~1	Max	-0.008	0.044	0.625	0.0	0.0	0.0
		Min	-0.037	-0.045	-1.579	-0.0	-0.0	-0.0
628	S1 HL-~1	Max	-0.008	0.047	0.641	0.0	0.0	0.0
		Min	-0.039	-0.048	-1.710	-0.0	-0.0	-0.0
629	S1 HL-~1	Max	-0.007	0.050	0.654	0.0	0.0	0.0
		Min	-0.040	-0.051	-1.840	-0.0	-0.0	-0.0
630	S1 HL-~1	Max	-0.007	0.052	0.664	0.0	0.0	0.0
		Min	-0.041	-0.053	-1.968	-0.0	-0.0	-0.0
631	S1 HL-~1	Max	-0.006	0.055	0.671	0.0	0.0	0.0
		Min	-0.043	-0.056	-2.093	-0.0	-0.0	-0.0
632	S1 HL-~1	Max	-0.005	0.057	0.676	0.0	0.0	0.0
		Min	-0.044	-0.058	-2.217	-0.0	-0.0	-0.0
633	S1 HL-~1	Max	-0.004	0.059	0.677	0.0	0.0	0.0
		Min	-0.045	-0.061	-2.336	-0.0	-0.0	-0.0
634	S1 HL-~1	Max	-0.002	0.061	0.676	0.0	0.0	0.0
		Min	-0.046	-0.063	-2.452	-0.0	-0.0	-0.0
635	S1 HL-~1	Max	-0.001	0.063	0.673	0.0	0.0	0.0
		Min	-0.047	-0.065	-2.564	-0.0	0.0	-0.0
636	S1 HL-~1	Max	0.001	0.065	0.668	0.0	0.0	0.0
		Min	-0.047	-0.067	-2.672	-0.0	0.0	-0.0

637	S1 HL-~1	Max	0.003	0.066	0.663	0.0	0.0	0.0
		Min	-0.048	-0.068	-2.750	-0.0	0.0	-0.0
638	S1 HL-~1	Max	0.003	0.066	0.661	0.0	0.0	0.0
		Min	-0.048	-0.069	-2.775	-0.0	0.0	-0.0
639	S1 HL-~1	Max	0.005	0.068	0.652	0.0	0.0	0.0
		Min	-0.049	-0.070	-2.873	-0.0	0.0	-0.0
640	S1 HL-~1	Max	0.007	0.069	0.642	0.0	0.0	0.0
		Min	-0.049	-0.072	-2.964	-0.0	0.0	-0.0
641	S1 HL-~1	Max	0.010	0.070	0.630	0.0	0.0	0.0
		Min	-0.050	-0.073	-3.049	-0.0	0.0	-0.0
642	S1 HL-~1	Max	0.012	0.071	0.617	0.0	0.0	0.0
		Min	-0.050	-0.074	-3.128	-0.0	0.0	-0.0
643	S1 HL-~1	Max	0.015	0.072	0.602	0.0	0.0	0.0
		Min	-0.051	-0.075	-3.201	-0.0	0.0	-0.0
644	S1 HL-~1	Max	0.017	0.073	0.587	0.0	0.0	0.0
		Min	-0.051	-0.076	-3.268	-0.0	0.0	-0.0
645	S1 HL-~1	Max	0.020	0.074	0.570	0.0	0.0	0.0
		Min	-0.051	-0.077	-3.328	-0.0	0.0	-0.0
646	S1 HL-~1	Max	0.023	0.074	0.553	0.0	0.0	0.0
		Min	-0.052	-0.078	-3.381	-0.0	0.0	-0.0
647	S1 HL-~1	Max	0.026	0.074	0.535	0.0	0.0	0.0
		Min	-0.052	-0.078	-3.428	-0.0	0.0	-0.0
648	S1 HL-~1	Max	0.030	0.075	0.517	0.0	0.0	0.0
		Min	-0.052	-0.078	-3.467	-0.0	0.0	-0.0
649	S1 HL-~1	Max	0.033	0.075	0.498	0.0	0.0	0.0
		Min	-0.052	-0.078	-3.499	-0.0	0.0	-0.0
650	S1 HL-~1	Max	0.036	0.075	0.478	0.0	0.0	0.0
		Min	-0.052	-0.078	-3.524	-0.0	-0.0	-0.0
651	S1 HL-~1	Max	0.040	0.074	0.459	0.0	0.0	0.0
		Min	-0.052	-0.078	-3.541	-0.0	-0.0	-0.0
652	S1 HL-~1	Max	0.043	0.074	0.439	0.0	0.0	0.0
		Min	-0.052	-0.078	-3.551	-0.0	-0.0	-0.0
653	S1 HL-~1	Max	0.047	0.074	0.419	0.0	0.0	0.0
		Min	-0.052	-0.078	-3.552	-0.0	-0.0	-0.0
654	S1 HL-~1	Max	0.049	0.073	0.409	0.0	0.0	0.0
		Min	-0.052	-0.078	-3.550	-0.0	-0.0	-0.0
655	S1 HL-~1	Max	0.051	0.073	0.399	0.0	0.0	0.0
		Min	-0.052	-0.077	-3.546	-0.0	-0.0	-0.0

656	S1 HL-~1	Max	0.054	0.072	0.379	0.0	0.0	0.0
		Min	-0.052	-0.076	-3.532	-0.0	-0.0	-0.0
657	S1 HL-~1	Max	0.058	0.071	0.360	0.0	0.0	0.0
		Min	-0.052	-0.075	-3.511	-0.0	-0.0	-0.0
658	S1 HL-~1	Max	0.061	0.070	0.340	0.0	0.0	0.0
		Min	-0.052	-0.074	-3.482	-0.0	-0.0	-0.0
659	S1 HL-~1	Max	0.065	0.069	0.321	0.0	0.0	0.0
		Min	-0.052	-0.073	-3.444	-0.0	-0.0	-0.0
660	S1 HL-~1	Max	0.069	0.068	0.302	0.0	0.0	0.0
		Min	-0.052	-0.072	-3.399	-0.0	-0.0	-0.0
661	S1 HL-~1	Max	0.072	0.067	0.283	0.0	0.0	0.0
		Min	-0.051	-0.070	-3.346	-0.0	-0.0	-0.0
662	S1 HL-~1	Max	0.076	0.065	0.265	0.0	0.0	0.0
		Min	-0.051	-0.069	-3.286	-0.0	-0.0	-0.0
663	S1 HL-~1	Max	0.079	0.064	0.248	0.0	0.0	0.0
		Min	-0.051	-0.067	-3.218	-0.0	-0.0	-0.0
664	S1 HL-~1	Max	0.082	0.062	0.231	0.0	0.0	0.0
		Min	-0.051	-0.065	-3.142	-0.0	-0.0	-0.0
665	S1 HL-~1	Max	0.086	0.060	0.214	0.0	0.0	0.0
		Min	-0.050	-0.063	-3.059	-0.0	-0.0	-0.0
666	S1 HL-~1	Max	0.089	0.058	0.198	0.0	0.0	0.0
		Min	-0.050	-0.061	-2.967	-0.0	-0.0	-0.0
667	S1 HL-~1	Max	0.092	0.056	0.183	0.0	0.0	0.0
		Min	-0.050	-0.059	-2.868	-0.0	-0.0	-0.0
668	S1 HL-~1	Max	0.095	0.054	0.168	0.0	0.0	0.0
		Min	-0.049	-0.057	-2.761	-0.0	-0.0	-0.0
669	S1 HL-~1	Max	0.098	0.051	0.154	0.0	0.0	0.0
		Min	-0.049	-0.054	-2.648	-0.0	-0.0	-0.0
670	S1 HL-~1	Max	0.101	0.049	0.140	0.0	0.0	0.0
		Min	-0.049	-0.052	-2.529	-0.0	-0.0	-0.0
671	S1 HL-~1	Max	0.102	0.048	0.137	0.0	0.0	0.0
		Min	-0.049	-0.051	-2.498	-0.0	-0.0	-0.0
672	S1 HL-~1	Max	0.104	0.047	0.127	0.0	0.0	0.0
		Min	-0.049	-0.049	-2.404	-0.0	-0.0	-0.0
673	S1 HL-~1	Max	0.107	0.044	0.115	0.0	0.0	0.0
		Min	-0.048	-0.046	-2.272	-0.0	-0.0	-0.0
674	S1 HL-~1	Max	0.109	0.041	0.103	0.0	0.0	0.0
		Min	-0.048	-0.043	-2.135	-0.0	-0.0	-0.0
675	S1 HL-~1	Max	0.111	0.038	0.092	0.0	0.0	0.0
		Min	-0.048	-0.040	-1.992	-0.0	-0.0	-0.0

676	S1 HL-~1	Max	0.114	0.035	0.082	0.0	0.0	0.0
		Min	-0.047	-0.037	-1.845	-0.0	-0.0	-0.0
677	S1 HL-~1	Max	0.116	0.033	0.072	0.0	0.0	0.0
		Min	-0.047	-0.034	-1.693	-0.0	-0.0	-0.0
678	S1 HL-~1	Max	0.118	0.030	0.063	0.0	0.0	0.0
		Min	-0.047	-0.031	-1.536	-0.0	-0.0	-0.0
679	S1 HL-~1	Max	0.119	0.026	0.054	0.0	0.0	0.0
		Min	-0.047	-0.028	-1.376	-0.0	-0.0	-0.0
680	S1 HL-~1	Max	0.121	0.023	0.046	0.0	0.0	0.0
		Min	-0.046	-0.024	-1.212	-0.0	-0.0	-0.0
681	S1 HL-~1	Max	0.122	0.020	0.039	0.0	0.0	0.0
		Min	-0.046	-0.021	-1.045	-0.0	-0.0	-0.0
682	S1 HL-~1	Max	0.123	0.017	0.031	0.0	0.0	0.0
		Min	-0.046	-0.018	-0.875	-0.0	-0.0	-0.0
683	S1 HL-~1	Max	0.124	0.013	0.025	0.0	0.0	0.0
		Min	-0.046	-0.014	-0.703	-0.0	-0.0	-0.0
684	S1 HL-~1	Max	0.125	0.010	0.018	0.0	0.0	0.0
		Min	-0.046	-0.011	-0.529	-0.0	-0.0	-0.0
685	S1 HL-~1	Max	0.126	0.007	0.012	0.0	0.0	0.0
		Min	-0.046	-0.007	-0.354	-0.0	-0.0	-0.0
686	S1 HL-~1	Max	0.126	0.004	0.006	0.0	0.0	0.0
		Min	-0.046	-0.004	-0.177	-0.0	-0.0	-0.0
687	S1 HL-~1	Max	0.126	0.000	0.000	0.0	0.0	0.0
		Min	-0.046	-0.000	-0.000	-0.0	-0.0	-0.0

BEAM ELEMENT FORCES & MOMENTS DEFAULT PRINTOUT Unit System : kips , in

ELEM	MAT	SEC	LC	PT	AXIAL	SHEAR-y	SHEAR-z	TORSION	MOMENT-y	MOMENT-z
538	13	13	S1 HL-~1 Max	I	4.2	-2.1	-9.3	63.6	302.4	-49.8
				J	4.2	-2.1	-8.2	63.6	1402.5	234.8
			Min	I	-0.7	-35.2	-118.6	-72.8	-274.2	-222.7
				J	-0.7	-35.2	-117.5	-72.8	127.4	-54.7
539	13	13	S1 HL-~1 Max	I	9.1	2.4	-10.8	69.9	1456.7	75.1
				J	9.1	2.4	-9.7	69.9	2759.8	280.4
			Min	I	-1.1	-23.4	-111.4	-68.9	139.6	-201.9
				J	-1.1	-23.4	-110.3	-68.9	277.4	-116.7
540	13	13	S1 HL-~1 Max	I	14.2	4.2	-11.3	70.0	2826.2	118.1
				J	14.2	4.2	-10.1	70.0	4064.5	262.0
			Min	I	-1.4	-19.6	-107.3	-70.8	291.4	-249.0
				J	-1.4	-19.6	-106.2	-70.8	431.0	-171.6
541	13	13	S1 HL-~1 Max	I	19.4	4.2	-11.0	68.9	4132.8	114.3
				J	19.4	4.2	-9.9	68.9	5308.7	233.2
			Min	I	-1.5	-19.5	-103.9	-71.2	443.0	-302.0
				J	-1.5	-19.5	-102.8	-71.2	578.1	-213.2
542	13	13	S1 HL-~1 Max	I	24.5	3.8	-10.4	67.5	5372.7	97.0
				J	24.5	3.8	-9.3	67.5	6490.2	216.1
			Min	I	-1.4	-19.9	-100.8	-70.9	587.9	-341.3
				J	-1.4	-19.9	-99.7	-70.9	714.8	-242.9
543	13	13	S1 HL-~1 Max	I	29.4	3.3	-9.4	67.0	6548.3	79.8
				J	29.4	3.3	-8.3	67.0	7609.3	206.4
			Min	I	-1.2	-20.5	-97.7	-70.2	722.7	-366.6
				J	-1.2	-20.5	-96.6	-70.2	839.5	-261.7
544	13	13	S1 HL-~1 Max	I	34.1	3.0	-7.8	66.1	7661.4	66.2
				J	34.1	3.0	-6.6	66.1	8668.2	202.6
			Min	I	-0.9	-20.9	-94.7	-69.3	845.9	-381.4
				J	-0.9	-20.9	-93.6	-69.3	951.3	-273.2
545	13	13	S1 HL-~1 Max	I	38.5	2.8	-6.1	65.1	8715.7	57.8
				J	38.5	2.8	-5.0	65.1	9669.4	203.6
			Min	I	-0.6	-21.1	-91.7	-68.2	956.8	-389.6
				J	-0.6	-21.1	-90.6	-68.2	1050.3	-281.2
546	13	13	S1 HL-~1 Max	I	42.6	2.6	-4.5	63.8	9711.9	62.1
				J	42.6	2.6	-3.4	63.8	10612.8	207.3
			Min	I	-0.3	-21.1	-88.7	-67.0	1055.2	-392.7
				J	-0.3	-21.1	-87.6	-67.0	1136.6	-288.8
547	13	13	S1 HL-~1 Max	I	46.4	2.5	-2.9	62.3	10650.9	75.1
				J	46.4	2.5	-1.8	62.3	11502.3	212.9
			Min	I	-0.0	-21.0	-85.8	-65.6	1139.9	-393.4
				J	-0.0	-21.0	-84.7	-65.6	1210.4	-301.0
548	13	13	S1 HL-~1 Max	I	50.0	2.4	-1.3	60.8	11537.3	90.4
				J	50.0	2.4	-0.2	60.8	12337.6	221.3
			Min	I	0.2	-20.9	-82.9	-64.1	1212.5	-392.5
				J	0.2	-20.9	-81.7	-64.1	1272.1	-310.9
549	13	13	S1 HL-~1 Max	I	53.2	2.3	0.2	59.1	12368.1	106.6
				J	53.2	2.3	1.4	59.1	13120.9	233.8
			Min	I	0.4	-20.8	-80.0	-62.4	1273.1	-397.5
				J	0.4	-20.8	-78.8	-62.4	1321.6	-318.2
550	13	13	S1 HL-~1 Max	I	56.2	2.1	1.8	57.3	13149.3	123.6
				J	56.2	2.1	2.9	57.3	13852.4	249.0
			Min	I	0.6	-20.8	-77.1	-60.7	1321.7	-400.0
				J	0.6	-20.8	-76.0	-60.7	1359.3	-322.4
551	13	13	S1 HL-~1 Max	I	59.0	1.7	3.4	55.4	13876.6	141.9
				J	59.0	1.7	4.5	55.4	14534.0	266.7
			Min	I	0.7	-21.1	-74.2	-58.8	1358.5	-398.8
				J	0.7	-21.1	-73.1	-58.8	1385.2	-320.4
552	13	13	S1 HL-~1 Max	I	61.5	2.2	5.1	53.5	14556.3	163.5

				J	61.5	2.2	6.2	53.5	15163.9	290.6
			Min	I	0.7	-21.8	-71.3	-57.0	1383.6	-391.3
				J	0.7	-21.8	-70.2	-57.0	1399.3	-307.1
553	13	13 S1 HL-~1	Max	I	63.8	2.8	7.2	53.2	15183.1	192.8
				J	63.8	2.8	8.1	53.2	15548.9	289.1
			Min	I	0.7	-22.9	-68.5	-61.9	1396.8	-370.4
				J	0.7	-22.9	-67.6	-61.9	1401.7	-285.4
554	13	13 S1 HL-~1	Max	I	63.8	8.6	8.2	84.4	15548.2	281.9
				J	63.8	8.6	8.5	84.4	15741.4	302.3
			Min	I	0.7	-12.8	-67.3	-45.0	1401.8	-281.1
				J	0.7	-12.8	-67.0	-45.0	1401.4	-294.6
555	13	13 S1 HL-~1	Max	I	65.9	8.0	9.4	51.0	15756.9	213.1
				J	65.9	8.0	10.6	51.0	16263.6	286.2
			Min	I	0.6	-12.5	-65.4	-50.2	1398.0	-346.5
				J	0.6	-12.5	-64.3	-50.2	1391.1	-336.0
556	13	13 S1 HL-~1	Max	I	67.7	6.8	11.6	48.5	16275.4	204.5
				J	67.7	6.8	12.7	48.5	16733.5	280.1
			Min	I	0.5	-13.5	-62.7	-48.6	1386.8	-378.9
				J	0.5	-13.5	-61.6	-48.6	1369.0	-357.0
557	13	13 S1 HL-~1	Max	I	69.6	6.4	13.7	46.8	16742.3	204.1
				J	69.6	6.4	14.8	46.8	17158.2	278.8
			Min	I	0.3	-14.0	-60.0	-46.4	1364.0	-393.8
				J	0.3	-14.0	-58.9	-46.4	1335.3	-368.4
558	13	13 S1 HL-~1	Max	I	71.1	6.3	15.8	45.1	17164.9	207.7
				J	71.1	6.3	16.9	45.1	17538.2	279.4
			Min	I	0.0	-14.0	-57.4	-44.3	1329.6	-400.4
				J	0.0	-14.0	-56.3	-44.3	1290.1	-375.8
559	13	13 S1 HL-~1	Max	I	72.5	6.5	17.8	43.5	17546.9	213.1
				J	72.5	6.5	19.0	43.5	17908.3	280.6
			Min	I	-0.3	-13.8	-54.8	-42.1	1283.6	-402.8
				J	-0.3	-13.8	-53.7	-42.1	1233.4	-381.2
560	13	13 S1 HL-~1	Max	I	73.7	6.8	19.9	41.9	17913.7	219.2
				J	73.7	6.8	21.0	41.9	18231.1	281.9
			Min	I	-0.6	-13.5	-52.3	-39.9	1226.2	-403.2
				J	-0.6	-13.5	-51.2	-39.9	1165.2	-385.9
561	13	13 S1 HL-~1	Max	I	74.7	7.1	21.9	40.4	18235.5	225.4
				J	74.7	7.1	23.0	40.4	18509.4	282.9
			Min	I	-1.0	-13.1	-49.8	-37.7	1157.3	-402.5
				J	-1.0	-13.1	-48.6	-37.7	1085.6	-390.5
562	13	13 S1 HL-~1	Max	I	75.5	7.6	24.0	39.0	18511.0	231.5
				J	75.5	7.6	25.1	39.0	18742.0	283.7
			Min	I	-1.5	-12.6	-47.3	-35.5	1077.0	-401.6
				J	-1.5	-12.6	-46.2	-35.5	994.5	-395.4
563	13	13 S1 HL-~1	Max	I	76.1	8.0	26.2	37.7	18742.7	237.3
				J	76.1	8.0	27.3	37.7	18931.3	284.4
			Min	I	-2.0	-12.2	-44.8	-33.9	985.2	-400.8
				J	-2.0	-12.2	-43.7	-33.9	892.1	-400.4
564	13	13 S1 HL-~1	Max	I	76.6	8.4	28.3	36.6	18929.7	243.1
				J	76.6	8.4	29.5	36.6	19075.5	284.9
			Min	I	-2.6	-11.7	-42.4	-32.8	882.1	-400.2
				J	-2.6	-11.7	-41.3	-32.8	778.2	-405.1
565	13	13 S1 HL-~1	Max	I	76.9	8.8	30.5	35.5	19073.1	248.8
				J	76.9	8.8	31.6	35.5	19178.0	285.8
			Min	I	-3.2	-11.4	-40.0	-31.7	767.5	-399.5
				J	-3.2	-11.4	-38.9	-31.7	652.9	-409.4
566	13	13 S1 HL-~1	Max	I	77.2	9.0	32.7	34.4	19173.6	254.8
				J	77.2	9.0	33.8	34.4	19235.8	287.7
			Min	I	-3.8	-11.2	-37.6	-31.3	641.4	-398.4
				J	-3.8	-11.2	-36.5	-31.3	516.1	-412.1
567	13	13 S1 HL-~1	Max	I	77.3	9.2	34.9	33.4	19230.3	262.2
				J	77.3	9.2	36.1	33.4	19252.6	291.7
			Min	I	-4.5	-11.2	-35.4	-31.6	503.9	-396.0
				J	-4.5	-11.2	-34.3	-31.6	367.8	-411.4

568	13	13 S1 HL-~1	Max	I	77.3	9.2	37.5	32.4	19245.7	272.0
				J	77.3	9.2	38.6	32.4	19225.3	300.2
			Min	I	-5.3	-11.5	-33.2	-32.1	354.9	-390.1
				J	-5.3	-11.5	-32.1	-32.1	208.0	-403.9
569	13	13 S1 HL-~1	Max	I	77.1	8.9	40.1	30.6	19216.3	286.7
				J	77.1	8.9	41.2	30.6	19155.7	317.1
			Min	I	-6.0	-12.4	-31.1	-33.3	194.3	-376.6
				J	-6.0	-12.4	-29.9	-33.3	36.5	-382.4
570	13	13 S1 HL-~1	Max	I	76.7	8.9	42.6	28.9	19144.3	311.5
				J	76.7	8.9	43.2	28.9	19048.3	324.6
			Min	I	-6.9	-13.4	-29.0	-61.3	21.9	-346.7
				J	-6.9	-13.4	-28.5	-61.3	-60.6	-318.2
571	13	13 S1 HL-~1	Max	I	76.7	17.8	43.5	61.1	19048.2	323.9
				J	76.7	17.8	44.1	61.1	19038.0	311.7
			Min	I	-6.9	-3.7	-28.2	-28.3	-60.5	-317.3
				J	-6.9	-3.7	-27.7	-28.3	-147.0	-389.2
572	13	13 S1 HL-~1	Max	I	76.1	16.8	45.6	34.0	19021.6	316.8
				J	76.1	16.8	46.7	34.0	18900.6	288.1
			Min	I	-7.8	-3.9	-26.8	-29.4	-162.6	-340.2
				J	-7.8	-3.9	-25.6	-29.4	-342.9	-421.0
573	13	13 S1 HL-~1	Max	I	75.4	16.1	48.2	32.7	18890.3	301.0
				J	75.4	16.1	49.4	32.7	18740.9	274.4
			Min	I	-8.7	-4.8	-24.6	-31.0	-359.5	-363.4
				J	-8.7	-4.8	-23.5	-31.0	-550.6	-435.9
574	13	13 S1 HL-~1	Max	I	74.5	15.8	50.9	32.2	18728.2	293.4
				J	74.5	15.8	52.1	32.2	18538.2	265.7
			Min	I	-9.6	-5.4	-22.5	-31.9	-568.0	-372.7
				J	-9.6	-5.4	-21.4	-31.9	-770.0	-443.3
575	13	13 S1 HL-~1	Max	I	73.4	15.8	53.6	31.7	18524.8	290.2
				J	73.4	15.8	54.7	31.7	18292.4	259.4
			Min	I	-10.6	-5.5	-20.5	-32.8	-788.3	-375.3
				J	-10.6	-5.5	-19.3	-32.8	-1001.1	-447.1
576	13	13 S1 HL-~1	Max	I	72.2	16.0	56.2	31.4	18277.9	289.2
				J	72.2	16.0	57.4	31.4	18007.5	255.4
			Min	I	-11.7	-5.4	-18.4	-33.6	-1020.2	-374.3
				J	-11.7	-5.4	-17.3	-33.6	-1243.9	-449.4
577	13	13 S1 HL-~1	Max	I	70.9	16.4	58.8	31.2	17992.4	289.1
				J	70.9	16.4	60.0	31.2	17680.9	253.1
			Min	I	-12.8	-5.2	-16.4	-34.5	-1263.8	-371.7
				J	-12.8	-5.2	-15.2	-34.5	-1498.3	-451.2
578	13	13 S1 HL-~1	Max	I	69.3	16.8	61.4	32.0	17663.7	289.5
				J	69.3	16.8	62.6	32.0	17313.5	251.0
			Min	I	-13.9	-4.9	-14.3	-35.5	-1519.2	-368.4
				J	-13.9	-4.9	-13.2	-35.5	-1764.6	-453.0
579	13	13 S1 HL-~1	Max	I	67.7	17.3	64.1	33.0	17295.5	292.1
				J	67.7	17.3	65.2	33.0	16904.6	248.9
			Min	I	-15.0	-4.6	-12.3	-36.4	-1786.3	-364.7
				J	-15.0	-4.6	-11.2	-36.4	-2042.6	-455.0
580	13	13 S1 HL-~1	Max	I	65.9	17.7	66.7	34.0	16884.8	294.7
				J	65.9	17.7	67.8	34.0	16456.6	246.8
			Min	I	-16.2	-4.3	-10.3	-37.5	-2065.2	-361.0
				J	-16.2	-4.3	-9.2	-37.5	-2332.4	-458.7
581	13	13 S1 HL-~1	Max	I	64.0	18.1	69.3	35.6	16435.4	297.3
				J	64.0	18.1	70.5	35.6	15967.4	244.8
			Min	I	-17.4	-4.0	-8.3	-38.5	-2356.1	-359.1
				J	-17.4	-4.0	-7.2	-38.5	-2634.2	-461.8
582	13	13 S1 HL-~1	Max	I	62.2	18.4	72.0	37.5	15945.2	299.9
				J	62.2	18.4	73.1	37.5	15439.5	243.5
			Min	I	-18.7	-3.8	-6.4	-39.7	-2658.8	-357.2
				J	-18.7	-3.8	-5.3	-39.7	-2948.0	-463.9
583	13	13 S1 HL-~1	Max	I	60.3	18.6	74.7	39.4	15414.7	303.0
				J	60.3	18.6	75.8	39.4	14870.9	243.4

			Min	I	-20.0	-3.8	-4.5	-40.8	-2973.6	-354.5
				J	-20.0	-3.8	-3.3	-40.8	-3273.9	-463.8
584	13	13 S1 HL-~1	Max	I	58.3	18.6	77.3	41.2	14845.3	306.9
				J	58.3	18.6	78.5	41.2	14261.6	245.3
			Min	I	-21.3	-4.0	-2.6	-42.1	-3300.5	-349.8
				J	-21.3	-4.0	-1.4	-42.1	-3612.0	-459.0
585	13	13 S1 HL-~1	Max	I	56.3	18.4	80.1	43.0	14234.4	313.2
				J	56.3	18.4	81.2	43.0	13613.2	251.6
			Min	I	-22.7	-4.7	-0.6	-43.4	-3639.7	-341.0
				J	-22.7	-4.7	0.5	-43.4	-3962.3	-446.0
586	13	13 S1 HL-~1	Max	I	54.5	17.7	82.8	44.3	13583.5	324.3
				J	54.5	17.7	83.9	44.3	12923.0	266.2
			Min	I	-24.1	-6.1	1.3	-45.6	-3991.2	-322.7
				J	-24.1	-6.1	2.4	-45.6	-4325.1	-415.1
587	13	13 S1 HL-~1	Max	I	53.0	17.9	85.5	39.5	12890.0	345.4
				J	53.0	17.9	85.8	39.5	12663.5	329.3
			Min	I	-26.1	-6.8	3.0	-81.3	-4355.3	-284.1
				J	-26.1	-6.8	3.3	-81.3	-4440.3	-291.0
588	13	13 S1 HL-~1	Max	I	52.9	27.0	86.2	57.5	12664.1	334.1
				J	52.9	27.0	87.0	57.5	12185.1	252.8
			Min	I	-26.0	2.4	3.5	-45.8	-4440.1	-293.4
				J	-26.0	2.4	4.4	-45.8	-4701.1	-440.1
589	13	13 S1 HL-~1	Max	I	51.2	25.8	88.7	50.0	12148.1	339.4
				J	51.2	25.8	89.8	50.0	11403.3	232.9
			Min	I	-28.3	1.7	5.1	-46.1	-4732.6	-298.7
				J	-28.3	1.7	6.2	-46.1	-5090.1	-462.8
590	13	13 S1 HL-~1	Max	I	49.3	25.0	91.5	51.4	11362.6	324.4
				J	49.3	25.0	92.7	51.4	10581.6	220.3
			Min	I	-30.8	0.8	7.0	-47.6	-5123.0	-315.4
				J	-30.8	0.8	8.1	-47.6	-5492.0	-471.5
591	13	13 S1 HL-~1	Max	I	47.4	24.6	94.3	53.0	10538.1	315.5
				J	47.4	24.6	95.5	53.0	9720.9	211.2
			Min	I	-33.5	0.4	8.8	-49.1	-5526.1	-320.4
				J	-33.5	0.4	10.0	-49.1	-5906.7	-473.2
592	13	13 S1 HL-~1	Max	I	45.3	24.5	97.1	54.4	9675.9	309.7
				J	45.3	24.5	98.3	54.4	8823.0	203.6
			Min	I	-36.7	0.2	10.7	-50.5	-5942.2	-319.7
				J	-36.7	0.2	11.8	-50.5	-6334.4	-471.8
593	13	13 S1 HL-~1	Max	I	43.1	24.5	99.9	55.7	8780.3	305.3
				J	43.1	24.5	101.1	55.7	7894.9	196.7
			Min	I	-40.0	0.2	12.6	-51.8	-6371.3	-316.1
				J	-40.0	0.2	13.7	-51.8	-6775.5	-468.6
594	13	13 S1 HL-~1	Max	I	40.7	24.6	102.7	56.8	7850.5	301.4
				J	40.7	24.6	103.8	56.8	6929.0	190.1
			Min	I	-43.6	0.2	14.4	-53.0	-6813.7	-311.1
				J	-43.6	0.2	15.6	-53.0	-7230.5	-464.5
595	13	13 S1 HL-~1	Max	I	38.3	24.7	105.5	57.9	6882.5	297.6
				J	38.3	24.7	106.6	57.9	5929.5	183.4
			Min	I	-47.4	0.3	16.3	-54.0	-7269.8	-305.8
				J	-47.4	0.3	17.4	-54.0	-7703.3	-459.7
596	13	13 S1 HL-~1	Max	I	35.8	24.9	108.3	58.7	5879.4	293.5
				J	35.8	24.9	109.4	58.7	4904.0	177.1
			Min	I	-51.5	0.3	18.1	-54.9	-7742.4	-300.7
				J	-51.5	0.3	19.2	-54.9	-8201.3	-454.0
597	13	13 S1 HL-~1	Max	I	33.3	24.9	111.1	59.4	4849.4	288.8
				J	33.3	24.9	112.2	59.4	3864.4	171.4
			Min	I	-55.8	0.3	19.6	-55.9	-8239.6	-295.3
				J	-55.8	0.3	20.8	-55.9	-8731.9	-447.5
598	13	13 S1 HL-~1	Max	I	30.6	24.8	114.0	59.9	3801.8	284.0
				J	30.6	24.8	115.1	59.9	2837.5	165.8
			Min	I	-60.5	0.2	21.2	-57.1	-8770.3	-295.1
				J	-60.5	0.2	22.3	-57.1	-9300.1	-442.4

599	13	13 S1 HL-~1	Max	I	28.9	24.6	116.8	60.1	2771.3	278.4
				J	28.9	24.6	117.9	60.1	1802.9	160.9
			Min	I	-65.5	-0.0	22.7	-58.3	-9339.9	-296.8
				J	-65.5	-0.0	23.9	-58.3	-9908.6	-437.7
600	13	13 S1 HL-~1	Max	I	27.5	24.0	119.7	60.1	1735.4	273.2
				J	27.5	24.0	120.9	60.1	767.1	157.8
			Min	I	-70.9	-0.4	24.3	-59.5	-9951.8	-297.5
				J	-70.9	-0.4	25.4	-59.5	-10559.7	-429.0
601	13	13 S1 HL-~1	Max	I	26.0	23.2	122.7	59.9	704.7	269.3
				J	26.0	23.2	123.8	59.9	-233.5	158.0
			Min	I	-76.6	-1.1	25.8	-60.6	-10607.3	-295.5
				J	-76.6	-1.1	27.0	-60.6	-11254.5	-414.5
602	13	13 S1 HL-~1	Max	I	24.5	21.8	125.7	60.1	-312.8	269.1
				J	24.5	21.8	126.8	60.1	-1088.3	167.8
			Min	I	-82.7	-2.3	27.1	-61.8	-11307.1	-288.6
				J	-82.7	-2.3	28.2	-61.8	-11992.9	-390.2
603	13	13 S1 HL-~1	Max	I	23.0	20.1	128.7	60.6	-1168.4	282.8
				J	23.0	20.1	129.9	60.6	-1941.8	200.9
			Min	I	-89.1	-4.1	28.3	-63.9	-12051.0	-273.5
				J	-89.1	-4.1	29.4	-63.9	-12774.8	-346.0
604	13	13 S1 HL-~1	Max	I	21.2	24.7	132.1	62.0	-2015.7	315.2
				J	21.2	24.7	133.2	62.0	-2732.4	207.0
			Min	I	-95.6	-0.3	29.3	-61.2	-12838.6	-229.5
				J	-95.6	-0.3	30.4	-61.2	-13602.1	-364.2
605	13	13 S1 HL-~1	Max	I	19.6	21.8	135.2	62.1	-2792.8	310.5
				J	19.6	21.8	136.4	62.1	-3502.6	228.7
			Min	I	-102.8	-3.0	30.3	-62.3	-13672.9	-247.2
				J	-102.8	-3.0	31.4	-62.3	-14474.5	-341.6
606	13	13 S1 HL-~1	Max	I	18.1	19.0	138.4	62.3	-3542.3	323.0
				J	18.1	19.0	139.6	62.3	-4241.7	266.0
			Min	I	-110.2	-5.7	31.3	-63.2	-14553.6	-232.3
				J	-110.2	-5.7	32.4	-63.2	-15394.0	-296.2
607	13	13 S1 HL-~1	Max	I	16.7	16.3	141.8	62.2	-4287.6	353.2
				J	16.7	16.3	142.9	62.2	-4992.3	318.0
			Min	I	-117.8	-8.5	32.2	-63.9	-15482.6	-205.1
				J	-117.8	-8.5	33.3	-63.9	-16363.5	-245.9
608	13	13 S1 HL-~1	Max	I	15.6	14.2	145.6	61.7	-5043.8	402.0
				J	15.6	14.2	146.7	61.7	-5756.0	382.1
			Min	I	-125.4	-10.8	33.1	-64.6	-16461.6	-163.2
				J	-125.4	-10.8	34.2	-64.6	-17388.3	-184.0
609	13	13 S1 HL-~1	Max	I	14.9	16.4	150.9	60.5	-5809.3	465.5
				J	14.9	16.4	152.0	60.5	-6526.7	436.1
			Min	I	-132.9	-11.4	34.4	-65.4	-17488.8	-110.2
				J	-132.9	-11.4	35.5	-65.4	-18544.5	-173.5
610	13	13 S1 HL-~1	Max	I	15.1	26.4	160.6	66.6	-6578.3	505.6
				J	15.1	26.4	161.8	66.6	-7235.8	419.8
			Min	I	-139.6	-8.5	36.2	-61.8	-18555.3	-89.0
				J	-139.6	-8.5	37.3	-61.8	-20082.6	-359.8
611	13	13 S1 HL-~1	Max	I	21.7	8.7	-37.6	61.3	-7276.6	441.2
				J	21.7	8.7	-36.4	61.3	-6582.9	489.7
			Min	I	-153.7	-26.2	-161.7	-65.6	-20062.5	-335.6
				J	-153.7	-26.2	-160.6	-65.6	-18581.5	-109.2
612	13	13 S1 HL-~1	Max	I	19.4	11.5	-35.7	65.4	-6531.9	458.1
				J	19.4	11.5	-34.6	65.4	-5812.9	461.6
			Min	I	-146.6	-16.4	-152.0	-60.2	-18523.8	-165.9
				J	-146.6	-16.4	-150.8	-60.2	-17514.9	-115.4
613	13	13 S1 HL-~1	Max	I	19.1	10.9	-34.4	64.6	-5759.6	403.6
				J	19.1	10.9	-33.3	64.6	-5046.5	412.6
			Min	I	-138.9	-14.1	-146.7	-61.4	-17413.8	-179.9
				J	-138.9	-14.1	-145.5	-61.4	-16487.7	-167.8
614	13	13 S1 HL-~1	Max	I	19.9	8.6	-33.5	63.9	-4994.9	340.4
				J	19.9	8.6	-32.3	63.9	-4289.4	370.0
			Min	I	-131.0	-16.3	-142.8	-61.9	-16388.9	-247.9

				J	-131.0	-16.3	-141.7	-61.9	-15508.7	-209.3
615	13	13 S1 HL-~1	Max	I	21.3	5.8	-32.6	63.1	-4243.5	288.4
				J	21.3	5.8	-31.4	63.1	-3543.1	339.8
			Min	I	-123.1	-19.0	-139.5	-62.0	-15419.4	-303.8
				J	-123.1	-19.0	-138.4	-62.0	-14579.7	-238.0
616	13	13 S1 HL-~1	Max	I	23.1	3.2	-31.6	62.2	-3503.4	251.6
				J	23.1	3.2	-30.5	62.2	-2792.6	330.0
			Min	I	-115.3	-21.8	-136.3	-61.8	-14499.8	-349.3
				J	-115.3	-21.8	-135.2	-61.8	-13699.0	-253.0
617	13	13 S1 HL-~1	Max	I	25.1	0.4	-30.5	61.0	-2732.2	229.9
				J	25.1	0.4	-29.4	61.0	-2014.4	334.5
			Min	I	-107.8	-24.7	-133.1	-61.6	-13627.4	-371.9
				J	-107.8	-24.7	-132.0	-61.6	-12864.8	-235.1
618	13	13 S1 HL-~1	Max	I	27.5	4.7	-29.5	63.7	-1939.5	224.8
				J	27.5	4.7	-28.4	63.7	-1164.9	301.7
			Min	I	-100.9	-20.1	-129.8	-60.2	-12800.3	-353.7
				J	-100.9	-20.1	-128.7	-60.2	-12077.4	-278.9
619	13	13 S1 HL-~1	Max	I	29.6	2.8	-28.3	61.5	-1084.7	193.0
				J	29.6	2.8	-27.2	61.5	-304.5	288.4
			Min	I	-94.0	-21.9	-126.7	-59.7	-12018.5	-400.3
				J	-94.0	-21.9	-125.6	-59.7	-11333.8	-294.1
620	13	13 S1 HL-~1	Max	I	31.7	1.7	-27.0	60.3	-228.7	186.9
				J	31.7	1.7	-25.9	60.3	719.4	290.2
			Min	I	-87.5	-23.2	-123.7	-59.4	-11280.3	-425.2
				J	-87.5	-23.2	-122.6	-59.4	-10634.4	-301.0
621	13	13 S1 HL-~1	Max	I	33.6	1.0	-25.4	59.1	781.6	187.0
				J	33.6	1.0	-24.3	59.1	1752.3	294.1
			Min	I	-81.2	-24.1	-120.8	-59.6	-10585.7	-439.7
				J	-81.2	-24.1	-119.7	-59.6	-9979.1	-302.9
622	13	13 S1 HL-~1	Max	I	35.6	0.6	-23.9	57.9	1819.5	190.1
				J	35.6	0.6	-22.7	57.9	2790.4	299.0
			Min	I	-75.3	-24.6	-117.9	-59.5	-9935.0	-448.2
				J	-75.3	-24.6	-116.8	-59.5	-9368.4	-302.0
623	13	13 S1 HL-~1	Max	I	37.4	0.4	-22.3	56.7	2856.2	194.7
				J	37.4	0.4	-21.2	56.7	3826.7	304.2
			Min	I	-69.8	-24.8	-115.0	-59.2	-9327.5	-453.9
				J	-69.8	-24.8	-113.9	-59.2	-8800.6	-300.6
624	13	13 S1 HL-~1	Max	I	39.2	0.3	-20.8	55.5	3886.0	200.1
				J	39.2	0.3	-19.7	55.5	4877.9	308.6
			Min	I	-64.6	-24.9	-112.2	-58.7	-8761.2	-461.6
				J	-64.6	-24.9	-111.1	-58.7	-8272.7	-304.8
625	13	13 S1 HL-~1	Max	I	40.9	0.3	-19.3	54.4	4932.1	206.0
				J	40.9	0.3	-18.1	54.4	5911.9	312.8
			Min	I	-59.6	-24.9	-109.4	-58.0	-8233.1	-467.8
				J	-59.6	-24.9	-108.2	-58.0	-7778.7	-309.9
626	13	13 S1 HL-~1	Max	I	43.1	0.3	-17.4	53.4	5961.2	212.1
				J	43.1	0.3	-16.3	53.4	6917.6	316.5
			Min	I	-55.0	-24.8	-106.6	-57.1	-7738.0	-473.1
				J	-55.0	-24.8	-105.4	-57.1	-7307.9	-314.8
627	13	13 S1 HL-~1	Max	I	45.3	0.4	-15.6	52.3	6963.7	218.3
				J	45.3	0.4	-14.4	52.3	7886.1	319.8
			Min	I	-50.6	-24.6	-103.8	-56.1	-7267.5	-477.6
				J	-50.6	-24.6	-102.7	-56.1	-6851.6	-320.0
628	13	13 S1 HL-~1	Max	I	47.5	0.5	-13.7	51.1	7930.5	224.3
				J	47.5	0.5	-12.6	51.1	8815.9	323.1
			Min	I	-46.5	-24.5	-101.0	-54.9	-6812.7	-481.1
				J	-46.5	-24.5	-99.9	-54.9	-6408.7	-324.5
629	13	13 S1 HL-~1	Max	I	49.5	0.4	-11.9	49.8	8858.8	230.5
				J	49.5	0.4	-10.7	49.8	9709.0	326.9
			Min	I	-42.7	-24.5	-98.2	-53.6	-6371.3	-483.7
				J	-42.7	-24.5	-97.1	-53.6	-5978.9	-327.7
630	13	13 S1 HL-~1	Max	I	51.4	0.3	-10.0	48.4	9754.1	237.4

				J	51.4	0.3	-8.9	48.4	10571.2	332.0
			Min	I	-39.1	-24.6	-95.4	-52.1	-5942.9	-484.7
				J	-39.1	-24.6	-94.3	-52.1	-5562.1	-328.0
631	13	13 S1 HL-~1	Max	I	53.2	-0.1	-8.1	46.9	10614.8	245.9
				J	53.2	-0.1	-7.0	46.9	11395.4	340.2
			Min	I	-35.7	-25.0	-92.6	-50.6	-5527.4	-482.4
				J	-35.7	-25.0	-91.5	-50.6	-5158.1	-322.7
632	13	13 S1 HL-~1	Max	I	54.8	-1.0	-6.2	45.3	11436.5	257.8
				J	54.8	-1.0	-5.1	45.3	12180.9	354.6
			Min	I	-34.0	-25.8	-89.8	-49.1	-5124.8	-473.2
				J	-34.0	-25.8	-88.6	-49.1	-4767.0	-305.5
633	13	13 S1 HL-~1	Max	I	56.4	-2.0	-4.4	45.0	12218.0	277.1
				J	56.4	-2.0	-3.5	45.0	12697.0	351.1
			Min	I	-32.3	-27.0	-87.0	-57.0	-4734.9	-450.0
				J	-32.3	-27.0	-86.1	-57.0	-4473.8	-300.6
634	13	13 S1 HL-~1	Max	I	56.5	7.0	-3.3	80.7	12696.4	346.5
				J	56.5	7.0	-3.0	80.7	12922.7	360.3
			Min	I	-32.4	-18.0	-85.7	-38.5	-4474.0	-298.3
				J	-32.4	-18.0	-85.4	-38.5	-4388.9	-290.6
635	13	13 S1 HL-~1	Max	I	57.9	6.3	-2.4	45.0	12955.8	290.0
				J	57.9	6.3	-1.3	45.0	13615.9	338.5
			Min	I	-30.8	-17.8	-83.9	-43.3	-4358.2	-424.5
				J	-30.8	-17.8	-82.7	-43.3	-4024.0	-328.8
636	13	13 S1 HL-~1	Max	I	59.2	4.9	-0.5	42.7	13645.9	274.8
				J	59.2	4.9	0.6	42.7	14266.4	326.8
			Min	I	-29.3	-18.5	-81.1	-42.0	-3994.7	-454.8
				J	-29.3	-18.5	-80.0	-42.0	-3671.8	-346.6
637	13	13 S1 HL-~1	Max	I	60.3	4.3	1.4	41.4	14294.1	267.7
				J	60.3	4.3	2.6	41.4	14877.2	319.9
			Min	I	-27.8	-18.6	-78.4	-40.2	-3643.5	-467.3
				J	-27.8	-18.6	-77.3	-40.2	-3331.8	-355.2
638	13	13 S1 HL-~1	Max	I	61.5	4.0	3.3	40.1	14903.1	265.0
				J	61.5	4.0	4.5	40.1	15446.4	315.4
			Min	I	-26.3	-18.6	-75.7	-38.4	-3304.7	-471.5
				J	-26.3	-18.6	-74.6	-38.4	-3004.2	-359.4
639	13	13 S1 HL-~1	Max	I	63.5	4.1	5.3	39.0	15471.4	265.0
				J	63.5	4.1	6.4	39.0	15976.4	311.7
			Min	I	-24.9	-18.4	-73.0	-36.5	-2978.1	-471.0
				J	-24.9	-18.4	-71.9	-36.5	-2688.6	-361.6
640	13	13 S1 HL-~1	Max	I	65.5	4.2	7.2	37.8	15999.0	266.0
				J	65.5	4.2	8.3	37.8	16466.3	308.5
			Min	I	-23.5	-18.1	-70.4	-34.6	-2663.5	-468.5
				J	-23.5	-18.1	-69.3	-34.6	-2385.1	-363.2
641	13	13 S1 HL-~1	Max	I	67.3	4.5	9.2	36.7	16487.9	267.4
				J	67.3	4.5	10.3	36.7	16915.3	305.3
			Min	I	-22.2	-17.7	-67.7	-33.2	-2361.0	-464.7
				J	-22.2	-17.7	-66.6	-33.2	-2093.5	-365.0
642	13	13 S1 HL-~1	Max	I	69.0	4.8	11.2	35.7	16935.7	268.8
				J	69.0	4.8	12.3	35.7	17325.7	302.1
			Min	I	-20.8	-17.3	-65.1	-32.1	-2070.3	-460.3
				J	-20.8	-17.3	-64.0	-32.1	-1813.8	-368.4
643	13	13 S1 HL-~1	Max	I	70.6	5.1	13.2	34.7	17344.1	270.3
				J	70.6	5.1	14.4	34.7	17693.5	298.9
			Min	I	-19.5	-16.8	-62.5	-31.1	-1791.6	-457.8
				J	-19.5	-16.8	-61.4	-31.1	-1545.9	-371.9
644	13	13 S1 HL-~1	Max	I	72.0	5.4	15.3	33.8	17711.2	271.9
				J	72.0	5.4	16.4	33.8	18021.7	295.8
			Min	I	-18.3	-16.4	-59.9	-30.8	-1524.6	-455.5
				J	-18.3	-16.4	-58.7	-30.8	-1289.8	-375.0
645	13	13 S1 HL-~1	Max	I	73.5	5.7	17.3	32.9	18037.3	273.4
				J	73.5	5.7	18.4	32.9	18306.8	293.1
			Min	I	-17.1	-16.0	-57.3	-31.1	-1269.4	-453.3
				J	-17.1	-16.0	-56.1	-31.1	-1045.4	-377.4

646	13	13 S1 HL-~1 Max	I	74.9	5.8	19.4	32.0	18321.9	275.5
			J	74.9	5.8	20.5	32.0	18553.0	292.1
		Min	I	-15.9	-15.8	-54.6	-31.4	-1025.8	-450.7
			J	-15.9	-15.8	-53.5	-31.4	-812.7	-378.1
647	13	13 S1 HL-~1 Max	I	76.1	5.6	21.5	31.1	18567.1	278.5
			J	76.1	5.6	22.6	31.1	18756.1	294.9
		Min	I	-14.7	-15.8	-51.9	-31.9	-794.0	-446.5
			J	-14.7	-15.8	-50.8	-31.9	-591.6	-375.4
648	13	13 S1 HL-~1 Max	I	77.1	5.1	23.6	30.3	18769.5	283.6
			J	77.1	5.1	24.7	30.3	18917.6	302.2
		Min	I	-13.6	-16.0	-49.3	-32.4	-573.8	-439.0
			J	-13.6	-16.0	-48.1	-32.4	-382.3	-366.0
649	13	13 S1 HL-~1 Max	I	77.9	4.2	25.7	28.8	18928.7	293.3
			J	77.9	4.2	26.8	28.8	19046.6	317.7
		Min	I	-12.5	-16.8	-46.6	-33.8	-365.3	-423.8
			J	-12.5	-16.8	-45.5	-33.8	-184.6	-342.5
650	13	13 S1 HL-~1 Max	I	78.5	4.1	27.7	27.7	19063.1	316.2
			J	78.5	4.1	28.3	27.7	19073.1	326.7
		Min	I	-11.5	-17.7	-44.0	-60.7	-168.6	-391.8
			J	-11.5	-17.7	-43.4	-60.7	-81.9	-319.8
651	13	13 S1 HL-~1 Max	I	78.4	13.7	28.5	61.1	19073.2	327.6
			J	78.4	13.7	29.1	61.1	19168.7	312.3
		Min	I	-11.4	-9.1	-43.0	-28.4	-82.0	-320.9
			J	-11.4	-9.1	-42.5	-28.4	0.7	-348.9
652	13	13 S1 HL-~1 Max	I	78.9	12.6	30.0	32.7	19180.4	321.4
			J	78.9	12.6	31.1	32.7	19240.4	287.3
		Min	I	-10.4	-8.8	-41.1	-30.5	15.8	-385.0
			J	-10.4	-8.8	-39.9	-30.5	173.9	-378.6
653	13	13 S1 HL-~1 Max	I	79.1	11.7	32.2	31.5	19249.7	304.1
			J	79.1	11.7	33.3	31.5	19269.4	272.3
		Min	I	-9.5	-9.2	-38.5	-32.2	188.0	-406.3
			J	-9.5	-9.2	-37.4	-32.2	335.4	-392.0
654	13	13 S1 HL-~1 Max	I	79.2	11.4	34.4	31.0	19276.6	295.3
			J	79.2	11.4	35.5	31.0	19253.5	262.6
		Min	I	-8.5	-9.1	-35.9	-33.3	348.7	-413.6
			J	-8.5	-9.1	-34.8	-33.3	485.4	-397.7
655	13	13 S1 HL-~1 Max	I	79.1	11.4	36.6	31.1	19259.5	290.9
			J	79.1	11.4	37.7	31.1	19196.6	255.3
		Min	I	-7.6	-9.0	-33.6	-34.4	497.9	-414.0
			J	-7.6	-9.0	-32.4	-34.4	623.8	-399.9
656	13	13 S1 HL-~1 Max	I	78.9	11.6	38.9	31.7	19201.4	288.7
			J	78.9	11.6	40.0	31.7	19095.6	249.1
		Min	I	-6.8	-8.7	-31.4	-35.4	635.6	-410.9
			J	-6.8	-8.7	-30.3	-35.4	750.8	-401.0
657	13	13 S1 HL-~1 Max	I	78.4	12.0	41.3	32.8	19098.4	287.5
			J	78.4	12.0	42.5	32.8	18951.9	243.2
		Min	I	-6.0	-8.3	-29.2	-36.6	761.9	-406.3
			J	-6.0	-8.3	-28.1	-36.6	866.4	-401.6
658	13	13 S1 HL-~1 Max	I	77.8	12.4	43.8	34.0	18954.0	286.8
			J	77.8	12.4	44.9	34.0	18764.5	237.3
		Min	I	-5.2	-7.9	-27.0	-37.7	876.7	-401.3
			J	-5.2	-7.9	-25.9	-37.7	970.7	-401.9
659	13	13 S1 HL-~1 Max	I	77.0	12.8	46.2	36.2	18764.4	285.9
			J	77.0	12.8	47.4	36.2	18532.5	231.4
		Min	I	-4.5	-7.5	-25.0	-39.0	980.2	-395.9
			J	-4.5	-7.5	-23.8	-39.0	1063.5	-402.5
660	13	13 S1 HL-~1 Max	I	76.2	13.3	48.7	38.4	18531.5	284.9
			J	76.2	13.3	49.8	38.4	18256.7	225.2
		Min	I	-3.8	-7.0	-22.9	-40.5	1072.3	-390.5
			J	-3.8	-7.0	-21.8	-40.5	1145.0	-403.3
661	13	13 S1 HL-~1 Max	I	75.3	13.8	51.2	40.7	18252.9	283.8
			J	75.3	13.8	52.3	40.7	17934.7	218.9

			Min	I	-3.2	-6.6	-20.9	-42.0	1153.0	-385.3
				J	-3.2	-6.6	-19.7	-42.0	1215.0	-403.9
662	13	13 S1 HL-~1	Max	I	74.1	14.1	53.7	42.9	17930.0	282.4
				J	74.1	14.1	54.9	42.9	17567.6	212.8
			Min	I	-2.7	-6.3	-18.8	-43.6	1222.4	-380.2
				J	-2.7	-6.3	-17.7	-43.6	1273.7	-403.4
663	13	13 S1 HL-~1	Max	I	72.8	14.3	56.3	45.2	17559.6	281.1
				J	72.8	14.3	57.4	45.2	17185.1	207.4
			Min	I	-2.1	-6.2	-16.8	-45.2	1280.3	-374.3
				J	-2.1	-6.2	-15.6	-45.2	1321.0	-400.9
664	13	13 S1 HL-~1	Max	I	71.3	14.3	58.9	47.4	17178.8	280.6
				J	71.3	14.3	60.1	47.4	16762.3	203.8
			Min	I	-1.6	-6.2	-14.7	-46.9	1326.9	-366.7
				J	-1.6	-6.2	-13.5	-46.9	1356.8	-394.1
665	13	13 S1 HL-~1	Max	I	69.5	13.8	61.6	49.6	16754.1	282.0
				J	69.5	13.8	62.7	49.6	16295.4	204.4
			Min	I	-1.2	-6.7	-12.6	-48.6	1362.0	-354.7
				J	-1.2	-6.7	-11.4	-48.6	1381.1	-379.0
666	13	13 S1 HL-~1	Max	I	67.5	12.9	64.3	51.3	16284.2	288.7
				J	67.5	12.9	65.5	51.3	15776.8	213.3
			Min	I	-0.8	-8.0	-10.4	-51.2	1385.5	-333.3
				J	-0.8	-8.0	-9.3	-51.2	1393.9	-346.2
667	13	13 S1 HL-~1	Max	I	65.5	13.4	67.0	45.7	15761.9	305.1
				J	65.5	13.4	67.3	45.7	15568.6	284.0
			Min	I	-0.4	-8.6	-8.4	-84.6	1397.4	-291.2
				J	-0.4	-8.6	-8.1	-84.6	1398.1	-278.4
668	13	13 S1 HL-~1	Max	I	65.6	23.3	67.7	63.1	15569.3	291.7
				J	65.6	23.3	68.5	63.1	15203.1	193.0
			Min	I	-0.3	-2.6	-8.0	-53.9	1398.1	-282.8
				J	-0.3	-2.6	-7.1	-53.9	1394.4	-370.7
669	13	13 S1 HL-~1	Max	I	63.4	22.2	70.2	58.3	15184.5	293.7
				J	63.4	22.2	71.4	58.3	14576.3	163.3
			Min	I	-0.0	-2.0	-6.1	-54.3	1396.9	-303.5
				J	-0.0	-2.0	-5.0	-54.3	1383.0	-392.0
670	13	13 S1 HL-~1	Max	I	60.9	21.5	73.1	60.1	14554.7	269.7
				J	60.9	21.5	74.2	60.1	13896.6	141.4
			Min	I	0.3	-1.5	-4.6	-56.2	1384.6	-316.9
				J	0.3	-1.5	-3.4	-56.2	1359.9	-399.8
671	13	13 S1 HL-~1	Max	I	58.2	21.3	76.0	62.0	13873.2	251.9
				J	58.2	21.3	77.1	62.0	13169.5	122.6
			Min	I	0.5	-1.7	-3.0	-58.0	1360.8	-319.0
				J	0.5	-1.7	-1.9	-58.0	1325.3	-401.9
672	13	13 S1 HL-~1	Max	I	55.3	21.3	78.9	63.8	13141.9	236.5
				J	55.3	21.3	80.0	63.8	12388.5	104.9
			Min	I	0.7	-1.8	-1.5	-59.8	1325.5	-315.3
				J	0.7	-1.8	-0.3	-59.8	1279.2	-400.7
673	13	13 S1 HL-~1	Max	I	52.1	21.5	81.8	65.5	12359.0	225.1
				J	52.1	21.5	82.9	65.5	11558.0	87.4
			Min	I	0.8	-1.8	0.1	-61.5	1278.6	-308.8
				J	0.8	-1.8	1.2	-61.5	1221.6	-397.5
674	13	13 S1 HL-~1	Max	I	48.6	21.7	84.7	67.1	11524.2	215.9
				J	48.6	21.7	85.8	67.1	10672.1	70.1
			Min	I	0.9	-1.7	1.7	-63.0	1220.2	-300.5
				J	0.9	-1.7	2.8	-63.0	1152.4	-400.2
675	13	13 S1 HL-~1	Max	I	44.8	21.9	87.6	68.6	10635.4	208.5
				J	44.8	21.9	88.8	68.6	9733.8	53.9
			Min	I	1.0	-1.6	3.3	-64.5	1150.3	-291.0
				J	1.0	-1.6	4.4	-64.5	1071.8	-403.0
676	13	13 S1 HL-~1	Max	I	40.7	22.0	90.6	69.8	9693.0	201.4
				J	40.7	22.0	91.7	69.8	8738.5	40.9
			Min	I	1.0	-1.6	4.9	-65.8	1068.9	-288.2
				J	1.0	-1.6	6.0	-65.8	978.6	-404.7

677	13	13 S1 HL-~1	Max	I	36.4	22.0	93.6	70.9	8693.3	195.3
				J	36.4	22.0	94.8	70.9	7685.4	34.4
			Min	I	1.0	-1.6	6.5	-66.9	975.8	-288.5
				J	1.0	-1.6	7.7	-66.9	873.3	-402.8
678	13	13 S1 HL-~1	Max	I	31.6	21.6	96.7	71.8	7636.2	191.5
				J	31.6	21.6	97.9	71.8	6573.6	31.4
			Min	I	0.9	-1.9	8.2	-67.9	871.1	-287.5
				J	0.9	-1.9	9.4	-67.9	756.3	-396.2
679	13	13 S1 HL-~1	Max	I	26.6	21.0	99.9	72.4	6519.4	191.2
				J	26.6	21.0	101.0	72.4	5399.2	33.2
			Min	I	0.8	-2.6	9.3	-68.7	754.7	-282.8
				J	0.8	-2.6	10.4	-68.7	627.4	-380.0
680	13	13 S1 HL-~1	Max	I	21.3	20.1	103.2	72.6	5340.2	195.4
				J	21.3	20.1	104.3	72.6	4159.4	39.0
			Min	I	0.7	-3.6	10.3	-69.9	626.5	-270.6
				J	0.7	-3.6	11.4	-69.9	486.4	-349.0
681	13	13 S1 HL-~1	Max	I	15.8	19.2	107.0	71.9	4097.6	204.6
				J	15.8	19.2	108.1	71.9	2849.6	42.7
			Min	I	0.4	-5.0	11.3	-71.6	486.2	-245.3
				J	0.4	-5.0	12.4	-71.6	332.8	-304.7
682	13	13 S1 HL-~1	Max	I	10.2	21.2	111.9	69.5	2791.8	209.3
				J	10.2	21.2	113.0	69.5	1472.0	22.0
			Min	I	0.2	-6.1	12.3	-72.5	333.9	-199.1
				J	0.2	-6.1	13.4	-72.5	165.3	-238.8
683	13	13 S1 HL-~1	Max	I	4.8	29.3	121.3	70.0	1426.8	174.1
				J	4.8	29.3	122.4	70.0	291.5	-6.1
			Min	I	-0.1	-7.0	13.4	-70.5	171.8	-128.4
				J	-0.1	-7.0	14.5	-70.5	-291.6	-202.9

BEAM ELEMENT FORCES & MOMENTS MIN/MAX SUMMARY BY PROPERTY PRINTOUT Unit System : kips , in

* LENGTH : the length between two nodes

[SECTION NAME : W27X146 , SECTION ID : 13]

** MAX

ELEM	COM	LC	PT	AXIAL	SHEAR-y	SHEAR-z	TORSION	MOMENT-y	MOMENT-z	LENGTH
654	AXL	S1 HL-~1 1	I	79.2	11.4	34.4	31.0	19276.6	295.3	12.00
683	SHY	S1 HL-~1 1	I	4.8	29.3	121.3	70.0	1426.8	174.1	12.00
610	SHZ	S1 HL-~1 1	J	15.1	26.4	161.8	66.6	-7235.8	419.8	12.00
554	TOR	S1 HL-~1 1	I	63.8	8.6	8.2	84.4	15548.2	281.9	3.00
654	MTY	S1 HL-~1 1	I	79.2	11.4	34.4	31.0	19276.6	295.3	12.00
610	MTZ	S1 HL-~1 1	I	15.1	26.4	160.6	66.6	-6578.3	505.6	12.00

** MIN

ELEM	COM	LC	PT	AXIAL	SHEAR-y	SHEAR-z	TORSION	MOMENT-y	MOMENT-z	LENGTH
611	AXL	S1 HL-~1 1	I	-153.7	-26.2	-161.7	-65.6	-20062.5	-335.6	12.00
538	SHY	S1 HL-~1 1	I	-0.7	-35.2	-118.6	-72.8	-274.2	-222.7	12.00
611	SHZ	S1 HL-~1 1	I	-153.7	-26.2	-161.7	-65.6	-20062.5	-335.6	12.00
667	TOR	S1 HL-~1 1	I	-0.4	-8.6	-8.4	-84.6	1397.4	-291.2	3.00
610	MTY	S1 HL-~1 1	J	-139.6	-8.5	37.3	-61.8	-20082.6	-359.8	12.00
630	MTZ	S1 HL-~1 1	I	-39.1	-24.6	-95.4	-52.1	-5942.9	-484.7	12.00

BEAM ELEMENT STRESSES DEFAULT PRINTOUT Unit System : kips , in

ELEM	MAT	SEC	LC	PT	AXIAL	SHEAR-y	SHEAR-z	(+y)-BENDING-(-y)		(+z)-BENDING-(-z)	
538	13	13	S1 HL-~1 Max	I	0.0	0.0	0.0	0.1	-0.0	0.1	0.6
				J	0.0	0.0	0.0	0.0	0.1	-0.1	2.6
			Min	I	-0.0	0.0	0.0	0.0	-0.1	-0.1	-0.5
				J	-0.0	0.0	0.0	-0.1	-0.0	-0.6	0.2
539	13	13	S1 HL-~1 Max	I	0.1	0.0	0.0	0.1	0.0	-0.1	2.7
				J	0.1	0.0	0.0	0.1	0.1	-0.1	5.2
			Min	I	-0.0	0.0	0.0	-0.0	-0.1	-0.6	0.3
				J	-0.0	0.0	0.0	-0.1	-0.1	-1.2	0.5
540	13	13	S1 HL-~1 Max	I	0.2	0.0	0.0	0.1	0.1	-0.1	5.3
				J	0.2	0.0	0.0	0.1	0.1	-0.2	7.6
			Min	I	-0.0	0.0	0.0	-0.1	-0.1	-1.2	0.5
				J	-0.0	0.0	0.0	-0.1	-0.1	-1.8	0.8
541	13	13	S1 HL-~1 Max	I	0.2	0.0	0.0	0.2	0.1	-0.2	7.8
				J	0.2	0.0	0.0	0.1	0.1	-0.2	10.0
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-1.8	0.8
				J	-0.0	0.0	0.0	-0.1	-0.1	-2.3	1.1
542	13	13	S1 HL-~1 Max	I	0.3	0.0	0.0	0.2	0.0	-0.3	10.1
				J	0.3	0.0	0.0	0.1	0.1	-0.3	12.2
			Min	I	-0.0	0.0	0.0	-0.0	-0.2	-2.3	1.1
				J	-0.0	0.0	0.0	-0.1	-0.1	-2.8	1.3
543	13	13	S1 HL-~1 Max	I	0.3	0.0	0.0	0.2	0.0	-0.3	12.3
				J	0.3	0.0	0.0	0.1	0.1	-0.4	14.3
			Min	I	-0.0	0.0	0.0	-0.0	-0.2	-2.8	1.4
				J	-0.0	0.0	0.0	-0.1	-0.1	-3.3	1.6
544	13	13	S1 HL-~1 Max	I	0.4	0.0	0.0	0.2	0.0	-0.4	14.4
				J	0.4	0.0	0.0	0.1	0.1	-0.4	16.3
			Min	I	-0.0	0.0	0.0	-0.0	-0.2	-3.3	1.6
				J	-0.0	0.0	0.0	-0.1	-0.1	-3.7	1.8
545	13	13	S1 HL-~1 Max	I	0.4	0.0	0.0	0.2	0.0	-0.4	16.4
				J	0.4	0.0	0.0	0.1	0.1	-0.5	18.2
			Min	I	-0.0	0.0	0.0	-0.0	-0.2	-3.8	1.8
				J	-0.0	0.0	0.0	-0.1	-0.1	-4.2	2.0

546	13	13 S1 HL-~1 Max	I	0.5	0.0	0.0	0.2	0.0	-0.5	18.3
			J	0.5	0.0	0.0	0.1	0.1	-0.5	19.9
		Min	I	-0.0	0.0	0.0	-0.0	-0.2	-4.2	2.0
			J	-0.0	0.0	0.0	-0.1	-0.1	-4.6	2.1
547	13	13 S1 HL-~1 Max	I	0.5	0.0	0.0	0.2	0.0	-0.5	20.0
			J	0.5	0.0	0.0	0.2	0.1	-0.5	21.6
		Min	I	-0.0	0.0	0.0	-0.0	-0.2	-4.6	2.1
			J	-0.0	0.0	0.0	-0.1	-0.2	-5.0	2.3
548	13	13 S1 HL-~1 Max	I	0.6	0.0	0.0	0.2	0.0	-0.5	21.7
			J	0.6	0.0	0.0	0.2	0.1	-0.5	23.2
		Min	I	0.0	0.0	0.0	-0.0	-0.2	-5.0	2.3
			J	0.0	0.0	0.0	-0.1	-0.2	-5.3	2.4
549	13	13 S1 HL-~1 Max	I	0.6	0.0	0.0	0.2	0.1	-0.5	23.2
			J	0.6	0.0	0.0	0.2	0.1	-0.6	24.7
		Min	I	0.0	0.0	0.0	-0.1	-0.2	-5.3	2.4
			J	0.0	0.0	0.0	-0.1	-0.2	-5.7	2.5
550	13	13 S1 HL-~1 Max	I	0.6	0.0	0.0	0.2	0.1	-0.6	24.7
			J	0.6	0.0	0.0	0.2	0.1	-0.6	26.0
		Min	I	0.0	0.0	0.0	-0.1	-0.2	-5.7	2.5
			J	0.0	0.0	0.0	-0.1	-0.2	-6.0	2.6
551	13	13 S1 HL-~1 Max	I	0.7	0.0	0.0	0.2	0.1	-0.6	26.1
			J	0.7	0.0	0.0	0.2	0.1	-0.6	27.3
		Min	I	0.0	0.0	0.0	-0.1	-0.2	-6.0	2.6
			J	0.0	0.0	0.0	-0.1	-0.2	-6.3	2.6
552	13	13 S1 HL-~1 Max	I	0.7	0.0	0.0	0.2	0.1	-0.6	27.4
			J	0.7	0.0	0.0	0.2	0.1	-0.6	28.5
		Min	I	0.0	0.0	0.0	-0.1	-0.2	-6.3	2.6
			J	0.0	0.0	0.0	-0.1	-0.2	-6.5	2.6
553	13	13 S1 HL-~1 Max	I	0.7	0.0	0.0	0.2	0.1	-0.6	28.5
			J	0.7	0.0	0.0	0.1	0.1	-0.6	29.2
		Min	I	0.0	0.0	0.0	-0.1	-0.2	-6.5	2.6
			J	0.0	0.0	0.0	-0.1	-0.1	-6.7	2.6
554	13	13 S1 HL-~1 Max	I	0.7	0.0	0.0	0.1	0.1	-0.6	29.2
			J	0.7	0.0	0.0	0.1	0.2	-0.6	29.6
		Min	I	0.0	0.0	0.0	-0.1	-0.1	-6.7	2.6
			J	0.0	0.0	0.0	-0.2	-0.1	-6.8	2.6
555	13	13 S1 HL-~1 Max	I	0.7	0.0	0.0	0.2	0.1	-0.6	29.6
			J	0.7	0.0	0.0	0.2	0.1	-0.6	30.6
		Min	I	0.0	0.0	0.0	-0.1	-0.2	-6.8	2.6
			J	0.0	0.0	0.0	-0.1	-0.2	-7.0	2.6
556	13	13 S1 HL-~1 Max	I	0.8	0.0	0.0	0.2	0.1	-0.6	30.6
			J	0.8	0.0	0.0	0.2	0.1	-0.6	31.4
		Min	I	0.0	0.0	0.0	-0.1	-0.2	-7.0	2.6
			J	0.0	0.0	0.0	-0.1	-0.2	-7.2	2.6
557	13	13 S1 HL-~1 Max	I	0.8	0.0	0.0	0.2	0.1	-0.6	31.5
			J	0.8	0.0	0.0	0.2	0.1	-0.6	32.2
		Min	I	0.0	0.0	0.0	-0.1	-0.2	-7.2	2.6
			J	0.0	0.0	0.0	-0.1	-0.2	-7.4	2.5
558	13	13 S1 HL-~1 Max	I	0.8	0.0	0.0	0.2	0.1	-0.6	32.3
			J	0.8	0.0	0.0	0.2	0.1	-0.6	33.0
		Min	I	0.0	0.0	0.0	-0.1	-0.2	-7.4	2.5
			J	0.0	0.0	0.0	-0.1	-0.2	-7.6	2.4
559	13	13 S1 HL-~1 Max	I	0.8	0.0	0.0	0.2	0.1	-0.6	33.0
			J	0.8	0.0	0.0	0.2	0.1	-0.5	33.7
		Min	I	-0.0	0.0	0.0	-0.1	-0.2	-7.6	2.4
			J	-0.0	0.0	0.0	-0.1	-0.2	-7.7	2.3
560	13	13 S1 HL-~1 Max	I	0.8	0.0	0.0	0.2	0.1	-0.5	33.7
			J	0.8	0.0	0.0	0.2	0.1	-0.5	34.3
		Min	I	-0.0	0.0	0.0	-0.1	-0.2	-7.7	2.3
			J	-0.0	0.0	0.0	-0.1	-0.2	-7.9	2.2
561	13	13 S1 HL-~1 Max	I	0.8	0.0	0.0	0.2	0.1	-0.5	34.3
			J	0.8	0.0	0.0	0.2	0.1	-0.5	34.8

			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-7.9	2.2
				J	-0.0	0.0	0.0	-0.1	-0.2	-8.0	2.0
562	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.5	34.8
				J	0.9	0.0	0.0	0.2	0.1	-0.4	35.2
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-8.0	2.0
				J	-0.0	0.0	0.0	-0.1	-0.2	-8.1	1.9
563	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.4	35.2
				J	0.9	0.0	0.0	0.2	0.1	-0.4	35.6
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-8.1	1.9
				J	-0.0	0.0	0.0	-0.1	-0.2	-8.2	1.7
564	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.4	35.6
				J	0.9	0.0	0.0	0.2	0.1	-0.3	35.9
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-8.2	1.7
				J	-0.0	0.0	0.0	-0.1	-0.2	-8.2	1.5
565	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.3	35.8
				J	0.9	0.0	0.0	0.2	0.1	-0.3	36.0
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-8.2	1.4
				J	-0.0	0.0	0.0	-0.1	-0.2	-8.3	1.2
566	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.3	36.0
				J	0.9	0.0	0.0	0.2	0.1	-0.2	36.2
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-8.3	1.2
				J	-0.0	0.0	0.0	-0.1	-0.2	-8.3	1.0
567	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.2	36.1
				J	0.9	0.0	0.0	0.2	0.1	-0.2	36.2
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.9
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.7
568	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.2	36.2
				J	0.9	0.0	0.0	0.2	0.1	-0.1	36.1
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.7
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.4
569	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.1	36.1
				J	0.9	0.0	0.0	0.2	0.2	-0.0	36.0
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.4
				J	-0.1	0.0	0.0	-0.2	-0.2	-8.3	0.1
570	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.2	-0.0	36.0
				J	0.9	0.0	0.0	0.2	0.2	0.0	35.8
			Min	I	-0.1	0.0	0.0	-0.2	-0.2	-8.2	0.0
				J	-0.1	0.0	0.0	-0.2	-0.2	-8.2	-0.1
571	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.2	0.0	35.8
				J	0.9	0.0	0.0	0.2	0.2	0.1	35.8
			Min	I	-0.1	0.0	0.0	-0.2	-0.2	-8.2	-0.1
				J	-0.1	0.0	0.0	-0.2	-0.2	-8.2	-0.3
572	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.2	0.1	35.7
				J	0.9	0.0	0.0	0.2	0.1	0.1	35.5
			Min	I	-0.1	0.0	0.0	-0.2	-0.2	-8.2	-0.3
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.1	-0.6
573	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.2	0.2	35.5
				J	0.9	0.0	0.0	0.2	0.1	0.2	35.2
			Min	I	-0.1	0.0	0.0	-0.2	-0.2	-8.1	-0.7
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.1	-1.0
574	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	0.2	35.2
				J	0.8	0.0	0.0	0.2	0.1	0.3	34.8
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.1	-1.1
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.0	-1.4
575	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	0.3	34.8
				J	0.8	0.0	0.0	0.2	0.1	0.4	34.4
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.0	-1.5
				J	-0.1	0.0	0.0	-0.1	-0.2	-7.9	-1.9
576	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	0.4	34.4
				J	0.8	0.0	0.0	0.2	0.1	0.5	33.8
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-7.9	-1.9
				J	-0.1	0.0	0.0	-0.1	-0.2	-7.8	-2.3

577	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	0.5	33.8
				J	0.8	0.0	0.0	0.2	0.1	0.6	33.2
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-7.7	-2.4
				J	-0.1	0.0	0.0	-0.1	-0.2	-7.6	-2.8
578	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	0.7	33.2
				J	0.8	0.0	0.0	0.2	0.1	0.8	32.5
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-7.6	-2.9
				J	-0.2	0.0	0.0	-0.1	-0.2	-7.5	-3.3
579	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	0.8	32.5
				J	0.8	0.0	0.0	0.2	0.1	0.9	31.8
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-7.4	-3.4
				J	-0.2	0.0	0.0	-0.1	-0.2	-7.3	-3.8
580	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.2	0.1	0.9	31.7
				J	0.7	0.0	0.0	0.2	0.1	1.0	30.9
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-7.3	-3.9
				J	-0.2	0.0	0.0	-0.1	-0.2	-7.1	-4.4
581	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.2	0.1	1.0	30.9
				J	0.7	0.0	0.0	0.2	0.1	1.1	30.0
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-7.1	-4.4
				J	-0.2	0.0	0.0	-0.1	-0.2	-6.9	-5.0
582	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.2	0.1	1.1	30.0
				J	0.7	0.0	0.0	0.2	0.1	1.3	29.0
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-6.9	-5.0
				J	-0.2	0.0	0.0	-0.1	-0.2	-6.7	-5.5
583	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.2	0.2	1.3	29.0
				J	0.7	0.0	0.0	0.2	0.1	1.4	27.9
			Min	I	-0.2	0.0	0.0	-0.2	-0.2	-6.6	-5.6
				J	-0.2	0.0	0.0	-0.1	-0.2	-6.4	-6.2
584	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.2	0.2	1.4	27.9
				J	0.7	0.0	0.0	0.2	0.1	1.6	26.8
			Min	I	-0.2	0.0	0.0	-0.2	-0.2	-6.4	-6.2
				J	-0.2	0.0	0.0	-0.1	-0.2	-6.1	-6.8
585	13	13 S1 HL-~1	Max	I	0.6	0.0	0.0	0.2	0.2	1.6	26.8
				J	0.6	0.0	0.0	0.2	0.1	1.7	25.6
			Min	I	-0.3	0.0	0.0	-0.2	-0.2	-6.1	-6.8
				J	-0.3	0.0	0.0	-0.1	-0.2	-5.9	-7.4
586	13	13 S1 HL-~1	Max	I	0.6	0.0	0.0	0.2	0.2	1.7	25.5
				J	0.6	0.0	0.0	0.2	0.1	1.9	24.3
			Min	I	-0.3	0.0	0.0	-0.2	-0.2	-5.9	-7.5
				J	-0.3	0.0	0.0	-0.1	-0.2	-5.6	-8.1
587	13	13 S1 HL-~1	Max	I	0.6	0.0	0.0	0.1	0.2	1.9	24.2
				J	0.6	0.0	0.0	0.1	0.2	1.9	23.8
			Min	I	-0.3	0.0	0.0	-0.2	-0.1	-5.6	-8.2
				J	-0.3	0.0	0.0	-0.2	-0.1	-5.5	-8.3
588	13	13 S1 HL-~1	Max	I	0.6	0.0	0.0	0.1	0.2	1.9	23.8
				J	0.6	0.0	0.0	0.2	0.1	2.0	22.9
			Min	I	-0.3	0.0	0.0	-0.2	-0.1	-5.5	-8.3
				J	-0.3	0.0	0.0	-0.1	-0.2	-5.2	-8.8
589	13	13 S1 HL-~1	Max	I	0.6	0.0	0.0	0.1	0.2	2.0	22.8
				J	0.6	0.0	0.0	0.2	0.1	2.2	21.4
			Min	I	-0.3	0.0	0.0	-0.2	-0.1	-5.2	-8.9
				J	-0.3	0.0	0.0	-0.1	-0.2	-4.9	-9.6
590	13	13 S1 HL-~1	Max	I	0.6	0.0	0.0	0.2	0.2	2.2	21.4
				J	0.6	0.0	0.0	0.2	0.1	2.4	19.9
			Min	I	-0.4	0.0	0.0	-0.2	-0.2	-4.9	-9.6
				J	-0.4	0.0	0.0	-0.1	-0.2	-4.6	-10.3
591	13	13 S1 HL-~1	Max	I	0.5	0.0	0.0	0.2	0.2	2.4	19.8
				J	0.5	0.0	0.0	0.2	0.1	2.5	18.3
			Min	I	-0.4	0.0	0.0	-0.2	-0.2	-4.5	-10.4
				J	-0.4	0.0	0.0	-0.1	-0.2	-4.2	-11.1
592	13	13 S1 HL-~1	Max	I	0.5	0.0	0.0	0.2	0.2	2.6	18.2
				J	0.5	0.0	0.0	0.2	0.1	2.7	16.6
			Min	I	-0.4	0.0	0.0	-0.2	-0.2	-4.2	-11.2

			J	-0.4	0.0	0.0	-0.1	-0.2	-3.8	-11.9
593	13	13 S1 HL-~1 Max	I	0.5	0.0	0.0	0.2	0.2	2.7	16.5
			J	0.5	0.0	0.0	0.2	0.1	2.9	14.8
		Min	I	-0.5	0.0	0.0	-0.2	-0.2	-3.8	-12.0
			J	-0.5	0.0	0.0	-0.1	-0.2	-3.4	-12.7
594	13	13 S1 HL-~1 Max	I	0.5	0.0	0.0	0.2	0.2	2.9	14.8
			J	0.5	0.0	0.0	0.2	0.1	3.1	13.0
		Min	I	-0.5	0.0	0.0	-0.2	-0.2	-3.4	-12.8
			J	-0.5	0.0	0.0	-0.1	-0.2	-3.0	-13.6
595	13	13 S1 HL-~1 Max	I	0.4	0.0	0.0	0.2	0.1	3.1	12.9
			J	0.4	0.0	0.0	0.2	0.1	3.3	11.1
		Min	I	-0.5	0.0	0.0	-0.1	-0.2	-3.0	-13.7
			J	-0.5	0.0	0.0	-0.1	-0.2	-2.6	-14.5
596	13	13 S1 HL-~1 Max	I	0.4	0.0	0.0	0.2	0.1	3.3	11.0
			J	0.4	0.0	0.0	0.2	0.1	3.5	9.2
		Min	I	-0.6	0.0	0.0	-0.1	-0.2	-2.5	-14.6
			J	-0.6	0.0	0.0	-0.1	-0.2	-2.1	-15.4
597	13	13 S1 HL-~1 Max	I	0.4	0.0	0.0	0.1	0.1	3.5	9.1
			J	0.4	0.0	0.0	0.2	0.1	3.8	7.3
		Min	I	-0.6	0.0	0.0	-0.1	-0.1	-2.1	-15.5
			J	-0.6	0.0	0.0	-0.1	-0.2	-1.7	-16.4
598	13	13 S1 HL-~1 Max	I	0.3	0.0	0.0	0.1	0.1	3.8	7.1
			J	0.3	0.0	0.0	0.2	0.1	4.0	5.3
		Min	I	-0.7	0.0	0.0	-0.1	-0.1	-1.6	-16.5
			J	-0.7	0.0	0.0	-0.1	-0.2	-1.2	-17.5
599	13	13 S1 HL-~1 Max	I	0.3	0.0	0.0	0.1	0.1	4.0	5.2
			J	0.3	0.0	0.0	0.2	0.1	4.3	3.4
		Min	I	-0.7	0.0	0.0	-0.1	-0.1	-1.2	-17.6
			J	-0.7	0.0	0.0	-0.1	-0.2	-0.8	-18.6
600	13	13 S1 HL-~1 Max	I	0.3	0.0	0.0	0.1	0.1	4.3	3.3
			J	0.3	0.0	0.0	0.2	0.1	4.5	1.4
		Min	I	-0.8	0.0	0.0	-0.1	-0.1	-0.7	-18.7
			J	-0.8	0.0	0.0	-0.1	-0.2	-0.3	-19.8
601	13	13 S1 HL-~1 Max	I	0.3	0.0	0.0	0.1	0.1	4.6	1.3
			J	0.3	0.0	0.0	0.2	0.1	4.8	-0.4
		Min	I	-0.9	0.0	0.0	-0.1	-0.1	-0.3	-19.9
			J	-0.9	0.0	0.0	-0.1	-0.2	0.1	-21.2
602	13	13 S1 HL-~1 Max	I	0.3	0.0	0.0	0.1	0.1	4.9	-0.6
			J	0.3	0.0	0.0	0.2	0.1	5.2	-2.0
		Min	I	-0.9	0.0	0.0	-0.1	-0.1	0.1	-21.3
			J	-0.9	0.0	0.0	-0.1	-0.2	0.5	-22.5
603	13	13 S1 HL-~1 Max	I	0.3	0.0	0.0	0.1	0.1	5.2	-2.2
			J	0.3	0.0	0.0	0.2	0.1	5.5	-3.6
		Min	I	-1.0	0.0	0.0	-0.1	-0.1	0.5	-22.6
			J	-1.0	0.0	0.0	-0.1	-0.2	0.8	-24.0
604	13	13 S1 HL-~1 Max	I	0.2	0.0	0.0	0.1	0.2	5.5	-3.8
			J	0.2	0.0	0.0	0.2	0.1	5.9	-5.1
		Min	I	-1.1	0.0	0.0	-0.2	-0.1	0.9	-24.1
			J	-1.1	0.0	0.0	-0.1	-0.2	1.2	-25.6
605	13	13 S1 HL-~1 Max	I	0.2	0.0	0.0	0.1	0.2	5.9	-5.2
			J	0.2	0.0	0.0	0.2	0.1	6.2	-6.6
		Min	I	-1.2	0.0	0.0	-0.2	-0.1	1.2	-25.7
			J	-1.2	0.0	0.0	-0.1	-0.2	1.5	-27.2
606	13	13 S1 HL-~1 Max	I	0.2	0.0	0.0	0.1	0.2	6.3	-6.7
			J	0.2	0.0	0.0	0.1	0.1	6.6	-8.0
		Min	I	-1.3	0.0	0.0	-0.2	-0.1	1.5	-27.4
			J	-1.3	0.0	0.0	-0.1	-0.1	1.8	-28.9
607	13	13 S1 HL-~1 Max	I	0.2	0.0	0.0	0.1	0.2	6.7	-8.1
			J	0.2	0.0	0.0	0.1	0.2	7.0	-9.4
		Min	I	-1.3	0.0	0.0	-0.2	-0.1	1.8	-29.1
			J	-1.3	0.0	0.0	-0.2	-0.1	2.2	-30.8
608	13	13 S1 HL-~1 Max	I	0.2	0.0	0.0	0.1	0.2	7.1	-9.5

				J	0.2	0.0	0.0	0.1	0.2	7.5	-10.8
			Min	I	-1.4	0.0	0.0	-0.2	-0.1	2.2	-30.9
				J	-1.4	0.0	0.0	-0.2	-0.1	2.5	-32.7
609	13	13 S1 HL-~1	Max	I	0.2	0.0	0.0	0.1	0.2	7.5	-10.9
				J	0.2	0.0	0.0	0.1	0.2	8.0	-12.3
			Min	I	-1.5	0.0	0.0	-0.2	-0.1	2.5	-32.9
				J	-1.5	0.0	0.0	-0.2	-0.1	2.8	-34.9
610	13	13 S1 HL-~1	Max	I	0.2	0.0	0.0	0.0	0.3	8.0	-12.4
				J	0.2	0.0	0.0	0.2	0.2	8.7	-13.6
			Min	I	-1.6	0.0	0.0	-0.3	-0.0	2.8	-34.9
				J	-1.6	0.0	0.0	-0.2	-0.2	3.1	-37.7
611	13	13 S1 HL-~1	Max	I	0.2	0.0	0.0	0.2	0.2	8.6	-13.7
				J	0.2	0.0	0.0	0.1	0.2	8.0	-12.4
			Min	I	-1.7	0.0	0.0	-0.2	-0.2	3.1	-37.7
				J	-1.7	0.0	0.0	-0.2	-0.1	2.8	-34.9
612	13	13 S1 HL-~1	Max	I	0.2	0.0	0.0	0.1	0.2	8.0	-12.3
				J	0.2	0.0	0.0	0.1	0.2	7.5	-10.9
			Min	I	-1.7	0.0	0.0	-0.2	-0.1	2.8	-34.8
				J	-1.7	0.0	0.0	-0.2	-0.1	2.5	-32.9
613	13	13 S1 HL-~1	Max	I	0.2	0.0	0.0	0.1	0.2	7.5	-10.8
				J	0.2	0.0	0.0	0.1	0.2	7.1	-9.5
			Min	I	-1.6	0.0	0.0	-0.2	-0.1	2.5	-32.7
				J	-1.6	0.0	0.0	-0.2	-0.1	2.2	-31.0
614	13	13 S1 HL-~1	Max	I	0.2	0.0	0.0	0.1	0.2	7.1	-9.4
				J	0.2	0.0	0.0	0.1	0.2	6.7	-8.1
			Min	I	-1.5	0.0	0.0	-0.2	-0.1	2.2	-30.8
				J	-1.5	0.0	0.0	-0.2	-0.1	1.8	-29.1
615	13	13 S1 HL-~1	Max	I	0.2	0.0	0.0	0.2	0.1	6.6	-8.0
				J	0.2	0.0	0.0	0.1	0.2	6.3	-6.7
			Min	I	-1.4	0.0	0.0	-0.1	-0.2	1.8	-29.0
				J	-1.4	0.0	0.0	-0.2	-0.1	1.5	-27.4
616	13	13 S1 HL-~1	Max	I	0.3	0.0	0.0	0.2	0.1	6.2	-6.6
				J	0.3	0.0	0.0	0.1	0.2	5.9	-5.2
			Min	I	-1.3	0.0	0.0	-0.1	-0.2	1.5	-27.3
				J	-1.3	0.0	0.0	-0.2	-0.1	1.2	-25.7
617	13	13 S1 HL-~1	Max	I	0.3	0.0	0.0	0.2	0.1	5.9	-5.1
				J	0.3	0.0	0.0	0.1	0.2	5.5	-3.8
			Min	I	-1.2	0.0	0.0	-0.1	-0.2	1.2	-25.6
				J	-1.2	0.0	0.0	-0.2	-0.1	0.9	-24.2
618	13	13 S1 HL-~1	Max	I	0.3	0.0	0.0	0.2	0.1	5.5	-3.6
				J	0.3	0.0	0.0	0.1	0.2	5.2	-2.2
			Min	I	-1.1	0.0	0.0	-0.1	-0.2	0.8	-24.1
				J	-1.1	0.0	0.0	-0.2	-0.1	0.5	-22.7
619	13	13 S1 HL-~1	Max	I	0.3	0.0	0.0	0.2	0.1	5.2	-2.0
				J	0.3	0.0	0.0	0.1	0.1	4.9	-0.6
			Min	I	-1.1	0.0	0.0	-0.1	-0.2	0.5	-22.6
				J	-1.1	0.0	0.0	-0.1	-0.1	0.1	-21.3
620	13	13 S1 HL-~1	Max	I	0.4	0.0	0.0	0.2	0.1	4.9	-0.4
				J	0.4	0.0	0.0	0.2	0.1	4.6	1.4
			Min	I	-1.0	0.0	0.0	-0.1	-0.2	0.1	-21.2
				J	-1.0	0.0	0.0	-0.1	-0.2	-0.3	-20.0
621	13	13 S1 HL-~1	Max	I	0.4	0.0	0.0	0.2	0.1	4.6	1.5
				J	0.4	0.0	0.0	0.2	0.1	4.3	3.3
			Min	I	-0.9	0.0	0.0	-0.1	-0.2	-0.3	-19.9
				J	-0.9	0.0	0.0	-0.1	-0.2	-0.8	-18.8
622	13	13 S1 HL-~1	Max	I	0.4	0.0	0.0	0.2	0.1	4.3	3.4
				J	0.4	0.0	0.0	0.2	0.1	4.0	5.2
			Min	I	-0.9	0.0	0.0	-0.1	-0.2	-0.8	-18.7
				J	-0.9	0.0	0.0	-0.1	-0.2	-1.2	-17.6
623	13	13 S1 HL-~1	Max	I	0.4	0.0	0.0	0.2	0.1	4.0	5.4
				J	0.4	0.0	0.0	0.2	0.2	3.8	7.2
			Min	I	-0.8	0.0	0.0	-0.1	-0.2	-1.2	-17.5
				J	-0.8	0.0	0.0	-0.2	-0.2	-1.6	-16.5

624	13	13 S1 HL-~1 Max	I	0.4	0.0	0.0	0.2	0.1	3.8	7.3
			J	0.4	0.0	0.0	0.2	0.2	3.6	9.2
		Min	I	-0.7	0.0	0.0	-0.1	-0.2	-1.7	-16.5
			J	-0.7	0.0	0.0	-0.2	-0.2	-2.1	-15.5
625	13	13 S1 HL-~1 Max	I	0.5	0.0	0.0	0.2	0.1	3.5	9.3
			J	0.5	0.0	0.0	0.2	0.2	3.4	11.1
		Min	I	-0.7	0.0	0.0	-0.1	-0.2	-2.1	-15.5
			J	-0.7	0.0	0.0	-0.2	-0.2	-2.5	-14.6
626	13	13 S1 HL-~1 Max	I	0.5	0.0	0.0	0.2	0.1	3.3	11.2
			J	0.5	0.0	0.0	0.2	0.2	3.1	13.0
		Min	I	-0.6	0.0	0.0	-0.1	-0.2	-2.6	-14.5
			J	-0.6	0.0	0.0	-0.2	-0.2	-3.0	-13.7
627	13	13 S1 HL-~1 Max	I	0.5	0.0	0.0	0.2	0.1	3.1	13.1
			J	0.5	0.0	0.0	0.2	0.2	3.0	14.8
		Min	I	-0.6	0.0	0.0	-0.1	-0.2	-3.0	-13.7
			J	-0.6	0.0	0.0	-0.2	-0.2	-3.4	-12.9
628	13	13 S1 HL-~1 Max	I	0.5	0.0	0.0	0.2	0.1	2.9	14.9
			J	0.5	0.0	0.0	0.2	0.2	2.8	16.6
		Min	I	-0.5	0.0	0.0	-0.1	-0.2	-3.4	-12.8
			J	-0.5	0.0	0.0	-0.2	-0.2	-3.8	-12.0
629	13	13 S1 HL-~1 Max	I	0.6	0.0	0.0	0.2	0.1	2.7	16.6
			J	0.6	0.0	0.0	0.2	0.2	2.6	18.2
		Min	I	-0.5	0.0	0.0	-0.1	-0.2	-3.8	-12.0
			J	-0.5	0.0	0.0	-0.2	-0.2	-4.2	-11.2
630	13	13 S1 HL-~1 Max	I	0.6	0.0	0.0	0.2	0.1	2.6	18.3
			J	0.6	0.0	0.0	0.2	0.2	2.4	19.9
		Min	I	-0.4	0.0	0.0	-0.1	-0.2	-4.2	-11.2
			J	-0.4	0.0	0.0	-0.2	-0.2	-4.6	-10.5
631	13	13 S1 HL-~1 Max	I	0.6	0.0	0.0	0.2	0.1	2.4	19.9
			J	0.6	0.0	0.0	0.2	0.2	2.2	21.4
		Min	I	-0.4	0.0	0.0	-0.1	-0.2	-4.6	-10.4
			J	-0.4	0.0	0.0	-0.2	-0.2	-4.9	-9.7
632	13	13 S1 HL-~1 Max	I	0.6	0.0	0.0	0.2	0.1	2.2	21.5
			J	0.6	0.0	0.0	0.2	0.2	2.1	22.9
		Min	I	-0.4	0.0	0.0	-0.1	-0.2	-4.9	-9.6
			J	-0.4	0.0	0.0	-0.2	-0.2	-5.2	-9.0
633	13	13 S1 HL-~1 Max	I	0.6	0.0	0.0	0.2	0.1	2.0	23.0
			J	0.6	0.0	0.0	0.2	0.2	1.9	23.9
		Min	I	-0.4	0.0	0.0	-0.1	-0.2	-5.3	-8.9
			J	-0.4	0.0	0.0	-0.2	-0.2	-5.5	-8.4
634	13	13 S1 HL-~1 Max	I	0.6	0.0	0.0	0.1	0.2	1.9	23.9
			J	0.6	0.0	0.0	0.1	0.2	1.9	24.3
		Min	I	-0.4	0.0	0.0	-0.2	-0.1	-5.5	-8.4
			J	-0.4	0.0	0.0	-0.2	-0.1	-5.6	-8.2
635	13	13 S1 HL-~1 Max	I	0.7	0.0	0.0	0.2	0.1	1.9	24.3
			J	0.7	0.0	0.0	0.2	0.2	1.7	25.6
		Min	I	-0.4	0.0	0.0	-0.1	-0.2	-5.6	-8.2
			J	-0.4	0.0	0.0	-0.2	-0.2	-5.9	-7.6
636	13	13 S1 HL-~1 Max	I	0.7	0.0	0.0	0.2	0.1	1.7	25.6
			J	0.7	0.0	0.0	0.2	0.2	1.6	26.8
		Min	I	-0.3	0.0	0.0	-0.1	-0.2	-5.9	-7.5
			J	-0.3	0.0	0.0	-0.2	-0.2	-6.1	-6.9
637	13	13 S1 HL-~1 Max	I	0.7	0.0	0.0	0.2	0.1	1.6	26.9
			J	0.7	0.0	0.0	0.2	0.2	1.4	28.0
		Min	I	-0.3	0.0	0.0	-0.1	-0.2	-6.2	-6.8
			J	-0.3	0.0	0.0	-0.2	-0.2	-6.4	-6.3
638	13	13 S1 HL-~1 Max	I	0.7	0.0	0.0	0.2	0.1	1.4	28.0
			J	0.7	0.0	0.0	0.2	0.2	1.3	29.0
		Min	I	-0.3	0.0	0.0	-0.1	-0.2	-6.4	-6.2
			J	-0.3	0.0	0.0	-0.2	-0.2	-6.7	-5.6
639	13	13 S1 HL-~1 Max	I	0.7	0.0	0.0	0.2	0.1	1.3	29.1
			J	0.7	0.0	0.0	0.2	0.2	1.2	30.0

			Min	I	-0.3	0.0	0.0	-0.1	-0.2	-6.7	-5.6
				J	-0.3	0.0	0.0	-0.2	-0.2	-6.9	-5.1
640	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.2	0.1	1.1	30.1
				J	0.7	0.0	0.0	0.2	0.2	1.0	30.9
			Min	I	-0.3	0.0	0.0	-0.1	-0.2	-6.9	-5.0
				J	-0.3	0.0	0.0	-0.2	-0.2	-7.1	-4.5
641	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	1.0	31.0
				J	0.8	0.0	0.0	0.2	0.2	0.9	31.8
			Min	I	-0.3	0.0	0.0	-0.1	-0.2	-7.1	-4.4
				J	-0.3	0.0	0.0	-0.2	-0.2	-7.3	-3.9
642	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	0.9	31.8
				J	0.8	0.0	0.0	0.2	0.2	0.8	32.6
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-7.3	-3.9
				J	-0.2	0.0	0.0	-0.2	-0.2	-7.5	-3.4
643	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	0.8	32.6
				J	0.8	0.0	0.0	0.2	0.1	0.7	33.3
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-7.5	-3.4
				J	-0.2	0.0	0.0	-0.1	-0.2	-7.6	-2.9
644	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	0.7	33.3
				J	0.8	0.0	0.0	0.2	0.1	0.6	33.9
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-7.6	-2.9
				J	-0.2	0.0	0.0	-0.1	-0.2	-7.8	-2.4
645	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	0.5	33.9
				J	0.8	0.0	0.0	0.2	0.1	0.5	34.4
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-7.8	-2.4
				J	-0.2	0.0	0.0	-0.1	-0.2	-7.9	-2.0
646	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	0.4	34.4
				J	0.9	0.0	0.0	0.2	0.1	0.4	34.9
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-7.9	-1.9
				J	-0.2	0.0	0.0	-0.1	-0.2	-8.0	-1.5
647	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	0.3	34.9
				J	0.9	0.0	0.0	0.2	0.1	0.3	35.3
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-8.0	-1.5
				J	-0.2	0.0	0.0	-0.1	-0.2	-8.1	-1.1
648	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	0.2	35.3
				J	0.9	0.0	0.0	0.2	0.2	0.2	35.6
			Min	I	-0.2	0.0	0.0	-0.1	-0.2	-8.1	-1.1
				J	-0.2	0.0	0.0	-0.2	-0.2	-8.1	-0.7
649	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	0.2	35.6
				J	0.9	0.0	0.0	0.2	0.2	0.1	35.8
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.2	-0.7
				J	-0.1	0.0	0.0	-0.2	-0.2	-8.2	-0.3
650	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.2	0.1	35.8
				J	0.9	0.0	0.0	0.2	0.2	0.0	35.8
			Min	I	-0.1	0.0	0.0	-0.2	-0.2	-8.2	-0.3
				J	-0.1	0.0	0.0	-0.2	-0.2	-8.2	-0.2
651	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.2	0.0	35.8
				J	0.9	0.0	0.0	0.2	0.2	-0.0	36.0
			Min	I	-0.1	0.0	0.0	-0.2	-0.2	-8.2	-0.2
				J	-0.1	0.0	0.0	-0.2	-0.2	-8.3	0.0
652	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.2	-0.0	36.0
				J	0.9	0.0	0.0	0.2	0.1	-0.1	36.2
			Min	I	-0.1	0.0	0.0	-0.2	-0.2	-8.3	0.0
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.3
653	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.2	-0.1	36.2
				J	0.9	0.0	0.0	0.2	0.1	-0.1	36.2
			Min	I	-0.1	0.0	0.0	-0.2	-0.2	-8.3	0.4
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.6
654	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.2	36.2
				J	0.9	0.0	0.0	0.2	0.1	-0.2	36.2
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.7
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.9

655	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.2	36.2
				J	0.9	0.0	0.0	0.2	0.1	-0.3	36.1
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.9
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.3	1.2
656	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.3	36.1
				J	0.9	0.0	0.0	0.2	0.1	-0.3	35.9
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.3	1.2
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.2	1.4
657	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.3	35.9
				J	0.9	0.0	0.0	0.2	0.1	-0.4	35.6
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.2	1.4
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.2	1.6
658	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.4	35.6
				J	0.9	0.0	0.0	0.2	0.1	-0.4	35.3
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.2	1.6
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.1	1.8
659	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.4	35.3
				J	0.9	0.0	0.0	0.2	0.1	-0.5	34.8
			Min	I	-0.1	0.0	0.0	-0.1	-0.2	-8.1	1.8
				J	-0.1	0.0	0.0	-0.1	-0.2	-8.0	2.0
660	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.5	34.8
				J	0.9	0.0	0.0	0.2	0.1	-0.5	34.3
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-8.0	2.0
				J	-0.0	0.0	0.0	-0.1	-0.2	-7.9	2.2
661	13	13 S1 HL-~1	Max	I	0.9	0.0	0.0	0.2	0.1	-0.5	34.3
				J	0.9	0.0	0.0	0.2	0.1	-0.5	33.7
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-7.9	2.2
				J	-0.0	0.0	0.0	-0.1	-0.2	-7.7	2.3
662	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	-0.5	33.7
				J	0.8	0.0	0.0	0.2	0.1	-0.5	33.0
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-7.7	2.3
				J	-0.0	0.0	0.0	-0.1	-0.2	-7.6	2.4
663	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	-0.6	33.0
				J	0.8	0.0	0.0	0.2	0.1	-0.6	32.3
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-7.6	2.4
				J	-0.0	0.0	0.0	-0.1	-0.2	-7.4	2.5
664	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	-0.6	32.3
				J	0.8	0.0	0.0	0.2	0.1	-0.6	31.5
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-7.4	2.5
				J	-0.0	0.0	0.0	-0.1	-0.2	-7.2	2.6
665	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	-0.6	31.5
				J	0.8	0.0	0.0	0.2	0.1	-0.6	30.6
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-7.2	2.6
				J	-0.0	0.0	0.0	-0.1	-0.2	-7.0	2.6
666	13	13 S1 HL-~1	Max	I	0.8	0.0	0.0	0.2	0.1	-0.6	30.6
				J	0.8	0.0	0.0	0.2	0.1	-0.6	29.7
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-7.0	2.6
				J	-0.0	0.0	0.0	-0.1	-0.2	-6.8	2.6
667	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.1	0.2	-0.6	29.6
				J	0.7	0.0	0.0	0.1	0.1	-0.6	29.3
			Min	I	-0.0	0.0	0.0	-0.2	-0.1	-6.8	2.6
				J	-0.0	0.0	0.0	-0.1	-0.1	-6.7	2.6
668	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.1	0.1	-0.6	29.3
				J	0.7	0.0	0.0	0.2	0.1	-0.6	28.6
			Min	I	-0.0	0.0	0.0	-0.1	-0.1	-6.7	2.6
				J	-0.0	0.0	0.0	-0.1	-0.2	-6.5	2.6
669	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.2	0.1	-0.6	28.5
				J	0.7	0.0	0.0	0.2	0.1	-0.6	27.4
			Min	I	-0.0	0.0	0.0	-0.1	-0.2	-6.5	2.6
				J	-0.0	0.0	0.0	-0.1	-0.2	-6.3	2.6
670	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.2	0.1	-0.6	27.4
				J	0.7	0.0	0.0	0.2	0.1	-0.6	26.1
			Min	I	0.0	0.0	0.0	-0.1	-0.2	-6.3	2.6

				J	0.0	0.0	0.0	-0.1	-0.2	-6.0	2.6
671	13	13 S1 HL-~1	Max	I	0.7	0.0	0.0	0.2	0.1	-0.6	26.1
				J	0.7	0.0	0.0	0.2	0.1	-0.6	24.8
			Min	I	0.0	0.0	0.0	-0.1	-0.2	-6.0	2.6
				J	0.0	0.0	0.0	-0.1	-0.2	-5.7	2.5
672	13	13 S1 HL-~1	Max	I	0.6	0.0	0.0	0.2	0.1	-0.6	24.7
				J	0.6	0.0	0.0	0.2	0.1	-0.6	23.3
			Min	I	0.0	0.0	0.0	-0.1	-0.2	-5.7	2.5
				J	0.0	0.0	0.0	-0.1	-0.2	-5.3	2.4
673	13	13 S1 HL-~1	Max	I	0.6	0.0	0.0	0.2	0.1	-0.6	23.2
				J	0.6	0.0	0.0	0.2	0.0	-0.5	21.7
			Min	I	0.0	0.0	0.0	-0.1	-0.2	-5.3	2.4
				J	0.0	0.0	0.0	-0.0	-0.2	-5.0	2.3
674	13	13 S1 HL-~1	Max	I	0.6	0.0	0.0	0.2	0.1	-0.5	21.7
				J	0.6	0.0	0.0	0.2	0.0	-0.5	20.1
			Min	I	0.0	0.0	0.0	-0.1	-0.2	-5.0	2.3
				J	0.0	0.0	0.0	-0.0	-0.2	-4.6	2.2
675	13	13 S1 HL-~1	Max	I	0.5	0.0	0.0	0.1	0.1	-0.5	20.0
				J	0.5	0.0	0.0	0.2	0.0	-0.5	18.3
			Min	I	0.0	0.0	0.0	-0.1	-0.1	-4.6	2.2
				J	0.0	0.0	0.0	-0.0	-0.2	-4.2	2.0
676	13	13 S1 HL-~1	Max	I	0.5	0.0	0.0	0.1	0.1	-0.5	18.2
				J	0.5	0.0	0.0	0.2	0.0	-0.4	16.4
			Min	I	0.0	0.0	0.0	-0.1	-0.1	-4.2	2.0
				J	0.0	0.0	0.0	-0.0	-0.2	-3.8	1.8
677	13	13 S1 HL-~1	Max	I	0.4	0.0	0.0	0.1	0.1	-0.4	16.3
				J	0.4	0.0	0.0	0.2	0.0	-0.4	14.4
			Min	I	0.0	0.0	0.0	-0.1	-0.1	-3.7	1.8
				J	0.0	0.0	0.0	-0.0	-0.2	-3.3	1.6
678	13	13 S1 HL-~1	Max	I	0.4	0.0	0.0	0.1	0.1	-0.4	14.4
				J	0.4	0.0	0.0	0.2	0.0	-0.3	12.4
			Min	I	0.0	0.0	0.0	-0.1	-0.1	-3.3	1.6
				J	0.0	0.0	0.0	-0.0	-0.2	-2.8	1.4
679	13	13 S1 HL-~1	Max	I	0.3	0.0	0.0	0.1	0.1	-0.3	12.3
				J	0.3	0.0	0.0	0.2	0.0	-0.3	10.1
			Min	I	0.0	0.0	0.0	-0.1	-0.1	-2.8	1.4
				J	0.0	0.0	0.0	-0.0	-0.2	-2.3	1.2
680	13	13 S1 HL-~1	Max	I	0.2	0.0	0.0	0.1	0.1	-0.3	10.0
				J	0.2	0.0	0.0	0.2	0.0	-0.2	7.8
			Min	I	0.0	0.0	0.0	-0.1	-0.1	-2.3	1.2
				J	0.0	0.0	0.0	-0.0	-0.2	-1.8	0.9
681	13	13 S1 HL-~1	Max	I	0.2	0.0	0.0	0.1	0.1	-0.2	7.7
				J	0.2	0.0	0.0	0.2	0.0	-0.1	5.4
			Min	I	0.0	0.0	0.0	-0.1	-0.1	-1.8	0.9
				J	0.0	0.0	0.0	-0.0	-0.2	-1.2	0.6
682	13	13 S1 HL-~1	Max	I	0.1	0.0	0.0	0.1	0.1	-0.1	5.2
				J	0.1	0.0	0.0	0.1	0.0	-0.1	2.8
			Min	I	0.0	0.0	0.0	-0.1	-0.1	-1.2	0.6
				J	0.0	0.0	0.0	-0.0	-0.1	-0.6	0.3
683	13	13 S1 HL-~1	Max	I	0.1	0.0	0.0	0.1	0.1	-0.1	2.7
				J	0.1	0.0	0.0	0.1	-0.0	0.1	0.5
			Min	I	-0.0	0.0	0.0	-0.1	-0.1	-0.6	0.3
				J	-0.0	0.0	0.0	0.0	-0.1	-0.1	-0.5

BEAM ELEMENT STRESSES MIN/MAX SUMMARY BY PROPERTY PRINTOUT Unit System : kips , in

[SECTION NAME : W27X146 , SECTION ID : 13]

** MAX

ELEM	COM	LC	PT	AXIAL	SHEAR-y	SHEAR-Z	(+y)-BENDING	-(-y)	(+z)-BENDING	-(-z)
654	AXL	S1 HL-~1	1 J	0.9	0.0	0.0	0.2	0.1	-0.2	36.2
538	SHY	S1 HL-~1	1 I	0.0	0.0	0.0	0.1	-0.0	0.1	0.6
538	SHZ	S1 HL-~1	1 I	0.0	0.0	0.0	0.1	-0.0	0.1	0.6
630	BY+	S1 HL-~1	1 I	0.6	0.0	0.0	0.2	0.1	2.6	18.3
610	BY-	S1 HL-~1	1 I	0.2	0.0	0.0	0.0	0.3	8.0	-12.4
610	BZ+	S1 HL-~1	1 J	0.2	0.0	0.0	0.2	0.2	8.7	-13.6
654	BZ-	S1 HL-~1	1 I	0.9	0.0	0.0	0.2	0.1	-0.2	36.2

** MIN

ELEM	COM	LC	PT	AXIAL	SHEAR-y	SHEAR-Z	(+y)-BENDING	-(-y)	(+z)-BENDING	-(-z)
611	AXL	S1 HL-~1	1 I	-1.7	0.0	0.0	-0.2	-0.2	3.1	-37.7
538	SHY	S1 HL-~1	1 I	0.0	0.0	0.0	0.1	-0.0	0.1	0.6
538	SHZ	S1 HL-~1	1 I	0.0	0.0	0.0	0.1	-0.0	0.1	0.6
610	BY+	S1 HL-~1	1 I	-1.6	0.0	0.0	-0.3	-0.0	2.8	-34.9
630	BY-	S1 HL-~1	1 I	-0.4	0.0	0.0	-0.1	-0.2	-4.2	-11.2
654	BZ+	S1 HL-~1	1 I	-0.1	0.0	0.0	-0.1	-0.2	-8.3	0.7
610	BZ-	S1 HL-~1	1 J	-1.6	0.0	0.0	-0.2	-0.2	3.1	-37.7

REACTION FORCES & MOMENTS DEFAULT PRINTOUT Unit System : kips , in

Node	LC	FX	FY	FZ	MX	MY	MZ

SUMMATION OF REACTION FORCES

LC	SUM-FX	SUM-FY	SUM-FZ

PROJECT TITLE : Load Rating and Structural Analysis

MIDAS	**Company**	Close, Jensen and Miller PC	**Client**	CT DOT
	Author	Danielle Coutu	**File Name**	Fixed Span Girder 1 Analysis

REACTION FORCES & MOMENTS LOCAL PRINTOUT Unit System : kips , in

Node	LC		FX	FY	FZ	MX	MY	MZ

PROJECT TITLE : Load Rating and Structural Analysis

MIDAS	**Company**	Close, Jensen and Miller PC	**Client**	CT DOT
	Author	Danielle Coutu	**File Name**	Fixed Span Girder 1 Analysis

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

FIXED SPAN

ALLOWABLE WIND SPEED ANALYSIS OF TRUSS

Rehabilitaion of Bridge 01349, Route 136 Over Saugatuck River, Westport, CT

Client: CT DOT
Date: 3/24/2016

Company: Close, Jensen, and Miller PC
Engineer: Danielle Coutu

Fixed truss - Fixed Moment Connections

Fixed Truss	Factored Dead Load and Wind Load (125 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (100 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (90 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (80 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (70 mph) (Strength III, Combine)	Displacement (Strength III)	Allowable Wind Speed
Cross Bracing	35.17 ksi	24.56 ksi	20.97 ksi	18.36 ksi	17.58 ksi	1.85 in	90 mph
Main Members	30.83 ksi	20.80 ksi	17.41 ksi	14.39 ksi	11.67 ksi	2.05 in	100mph

25.5 ksi Steel

Fixed Truss - Release Top and Bottom Cords Moment Connections

Fixed Truss	Factored Dead Load and Wind Load (125 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (100 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (90 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (80 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (70 mph) (Strength III, Combine)	Displacement (Strength III)	Allowable Wind Speed
Cross Bracing	31.29 ksi	21.10 ksi	19.24 ksi	18.37 ksi	17.59 ksi	3.54 in	100 mph
Main Members	31.29 ksi	21.10 ksi	17.65 ksi	14.59 ksi	11.82 ksi	2.08 in	100 mph

25.5 ksi Steel

Fixed Span - Proposed Widening (Fixed Moment Connections)

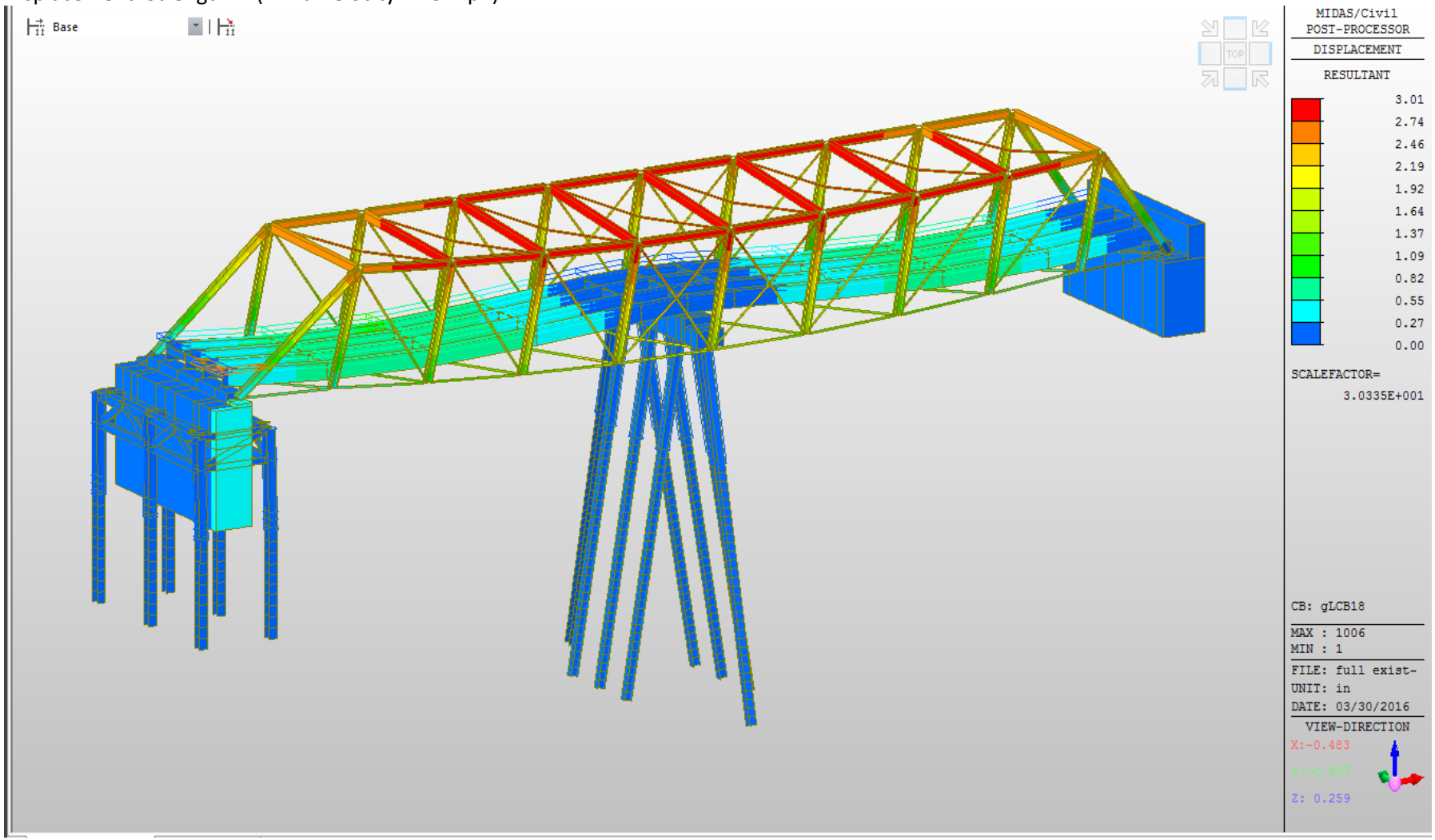
Fixed Truss	Factored Dead Load and Wind Load (125 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (100 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (90 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (80 mph) (Strength III, Combine)	Factored Dead Load and Wind Load (70 mph) (Strength III, Combine)	Displacement (Strength III)	Allowable Wind Speed
Cross Bracing	20.66 ksi	19.93 ksi	19.68 ksi	19.46 ksi	19.26 ksi	1.69 in	125 mph
Main Members	16.83 ksi	14.30 ksi	13.45 ksi	12.69 ksi	10.97 ksi	1.12 in	125 mph

25.5 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ± Sbz ± Sax (Warping).

Fixed Truss: Entire Truss

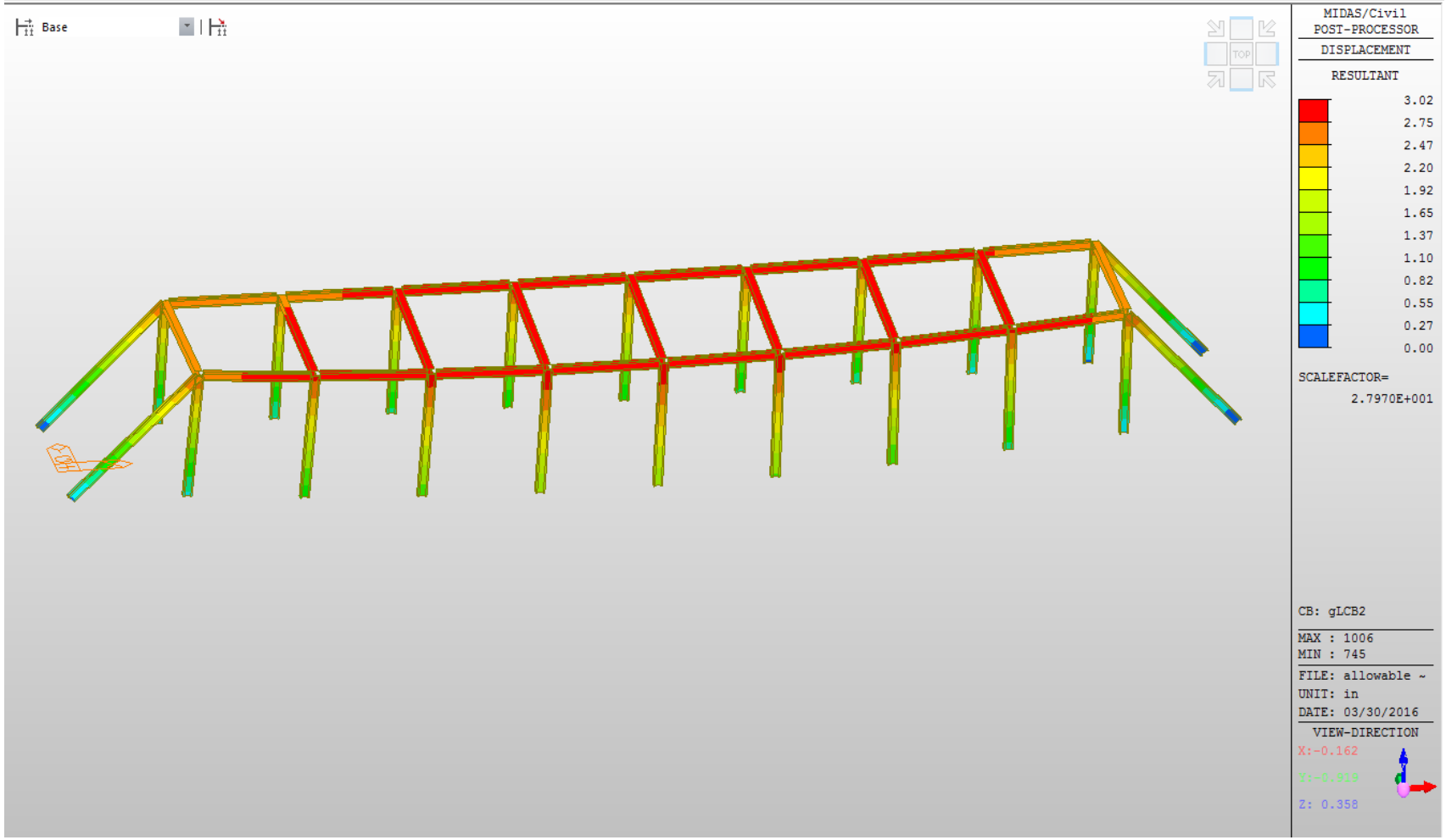
Displacement: Strength III (Wind Velocity=125 mph)



LRFD ANALYSIS

Fixed Truss: Main Members

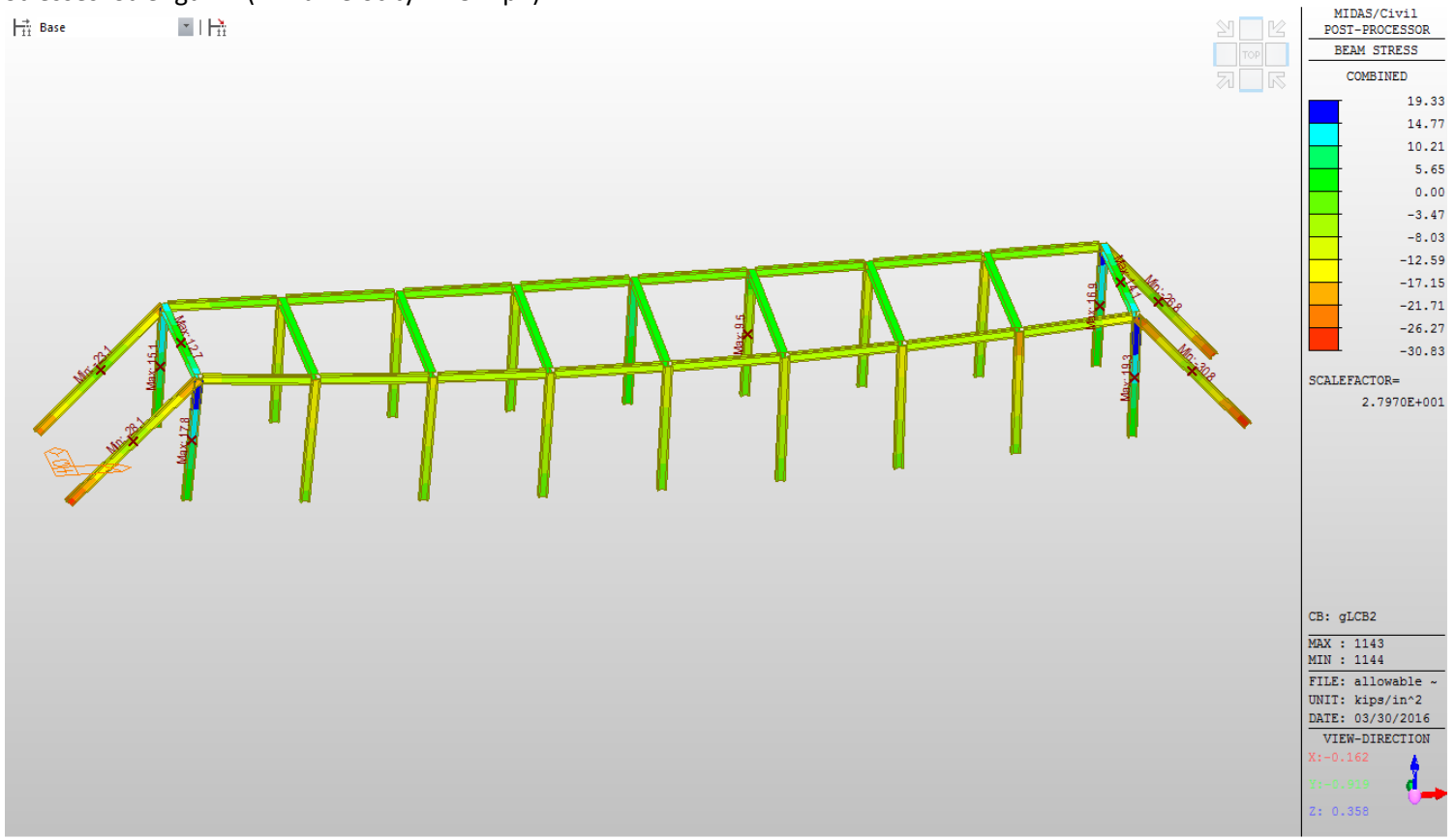
Displacement: Strength III (Wind Velocity=125 mph)



LRFD ANALYSIS

Fixed Truss: Main Members

Stresses: Strength III (Wind Velocity=125 mph)



Stress = 30.83 ksi 25.5 ksi Steel

Windward load = .08 ksf

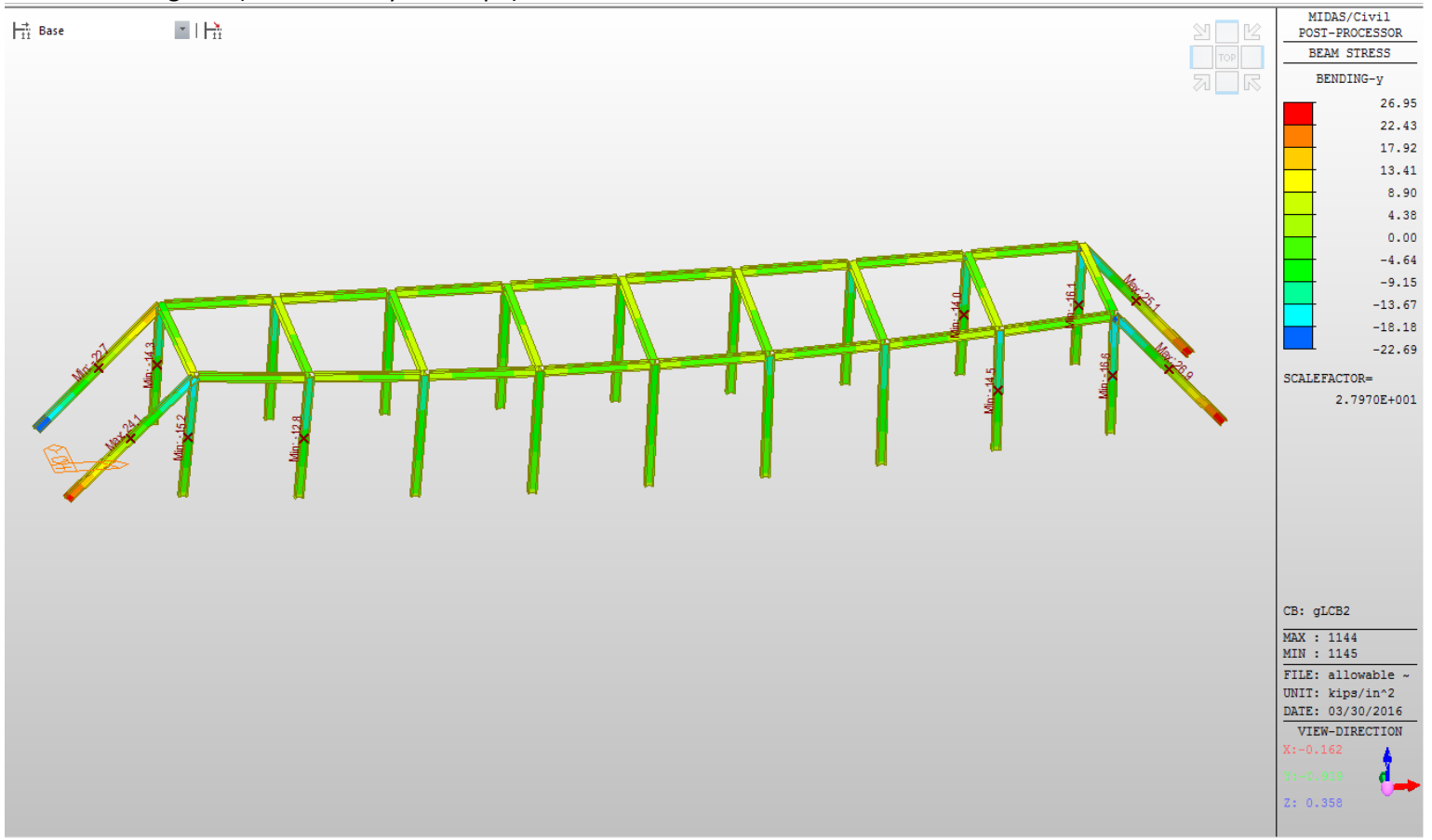
Leeward load = .04 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Fixed Truss: Main Members

Stresses: Strength III (Wind Velocity=125 mph)



Stress = 26.95 ksi 25.5 ksi Steel

Windward load = .08 ksf

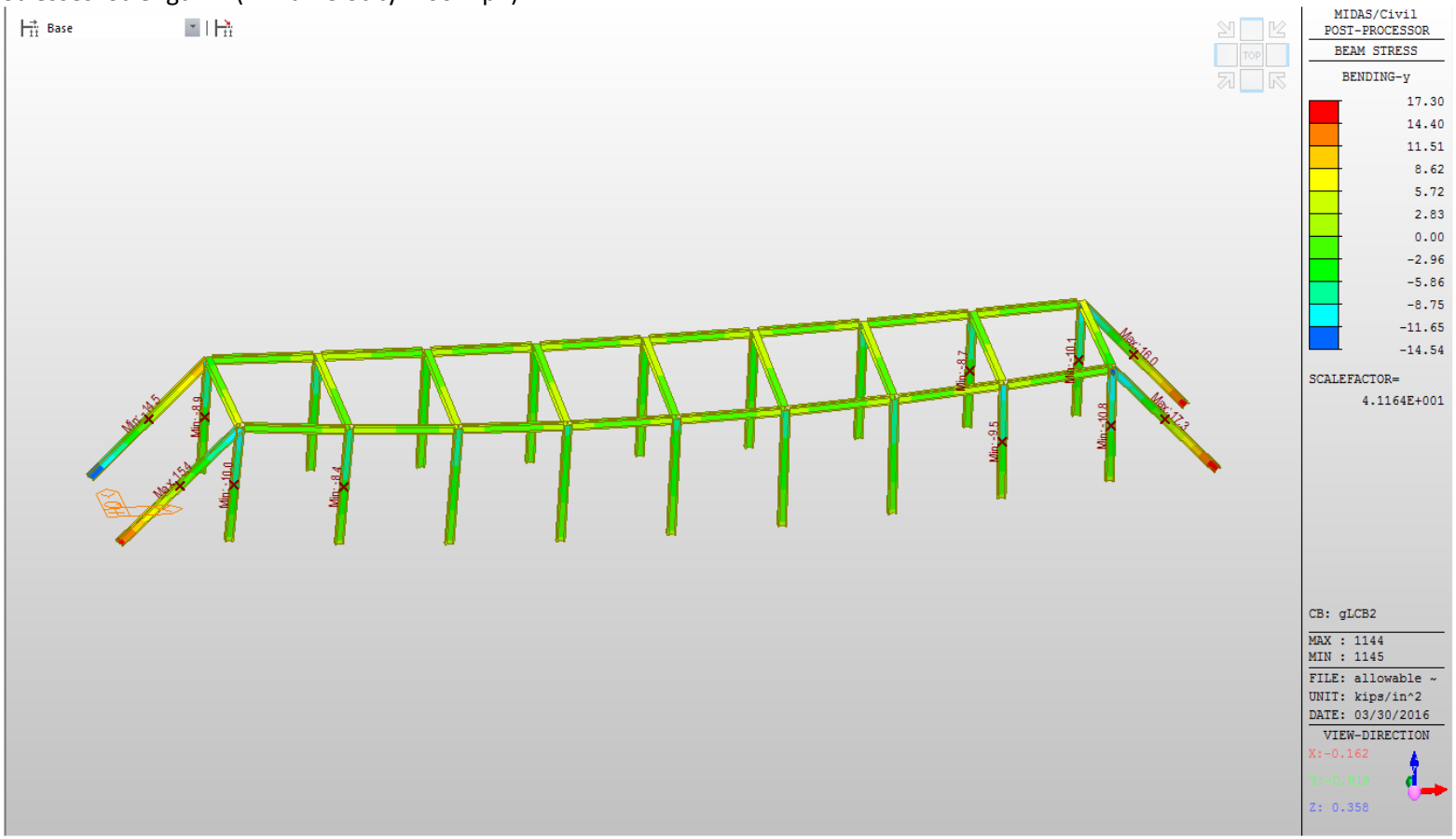
Leeward load = .04 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

LRFD ANALYSIS

Fixed Truss: Main Members

Stresses: Strength III (Wind Velocity=100 mph)



Stress = 17.30 ksi

25.5 ksi Steel

Windward load = .0512 ksf

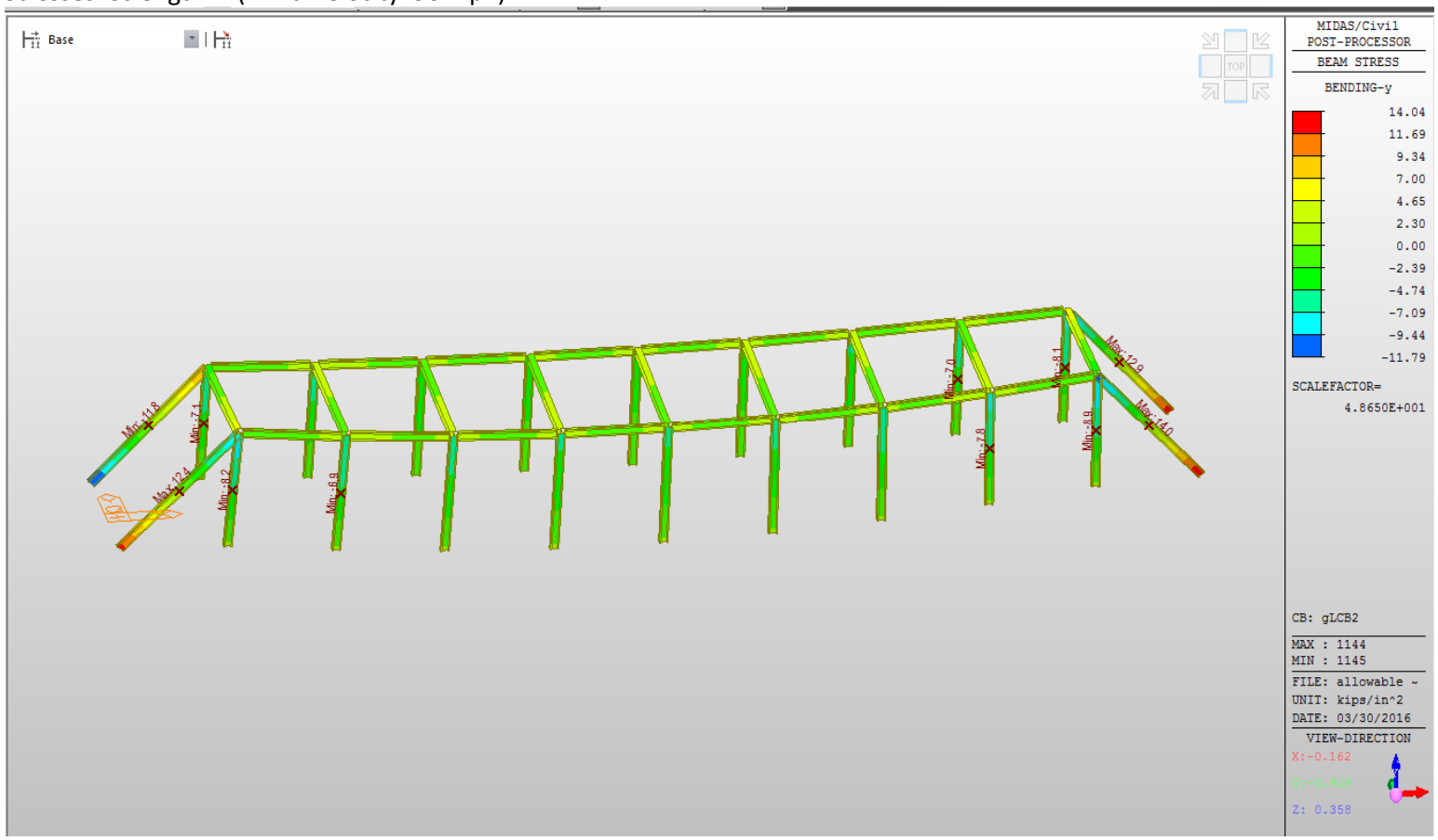
Leeward load = .0256 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

LRFD ANALYSIS

Fixed Truss: Main Members

Stresses: Strength III (Wind Velocity=90 mph)



Stress = 14.04 ksi 25.5 ksi Steel

Windward load = .0415 ksf

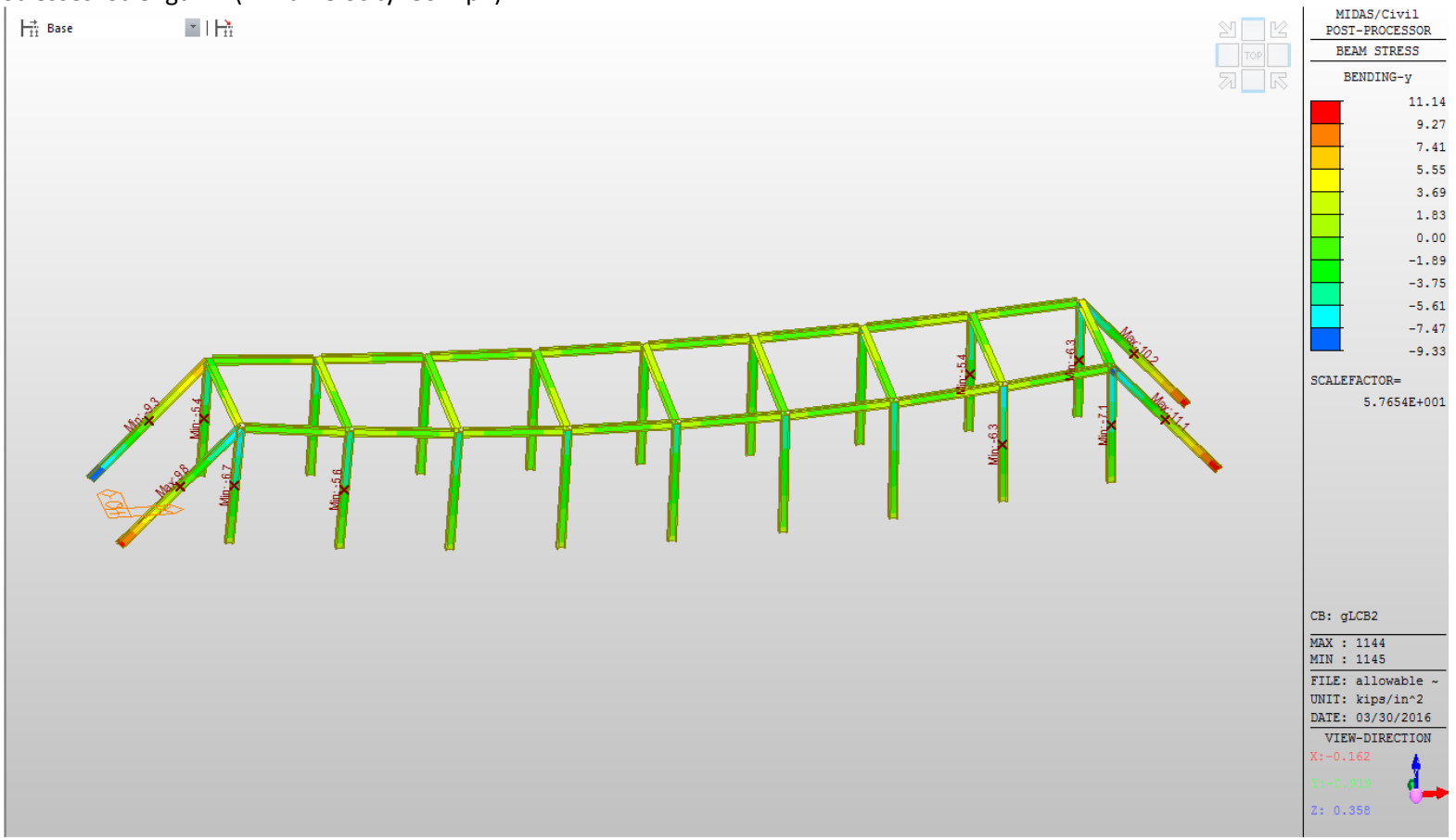
Leeward load = .0207 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

LRFD ANALYSIS

Fixed Truss: Main Members

Stresses: Strength III (Wind Velocity=80 mph)



Stress = 11.14 ksi 25.5 ksi Steel

Windward load = .0328 ksf

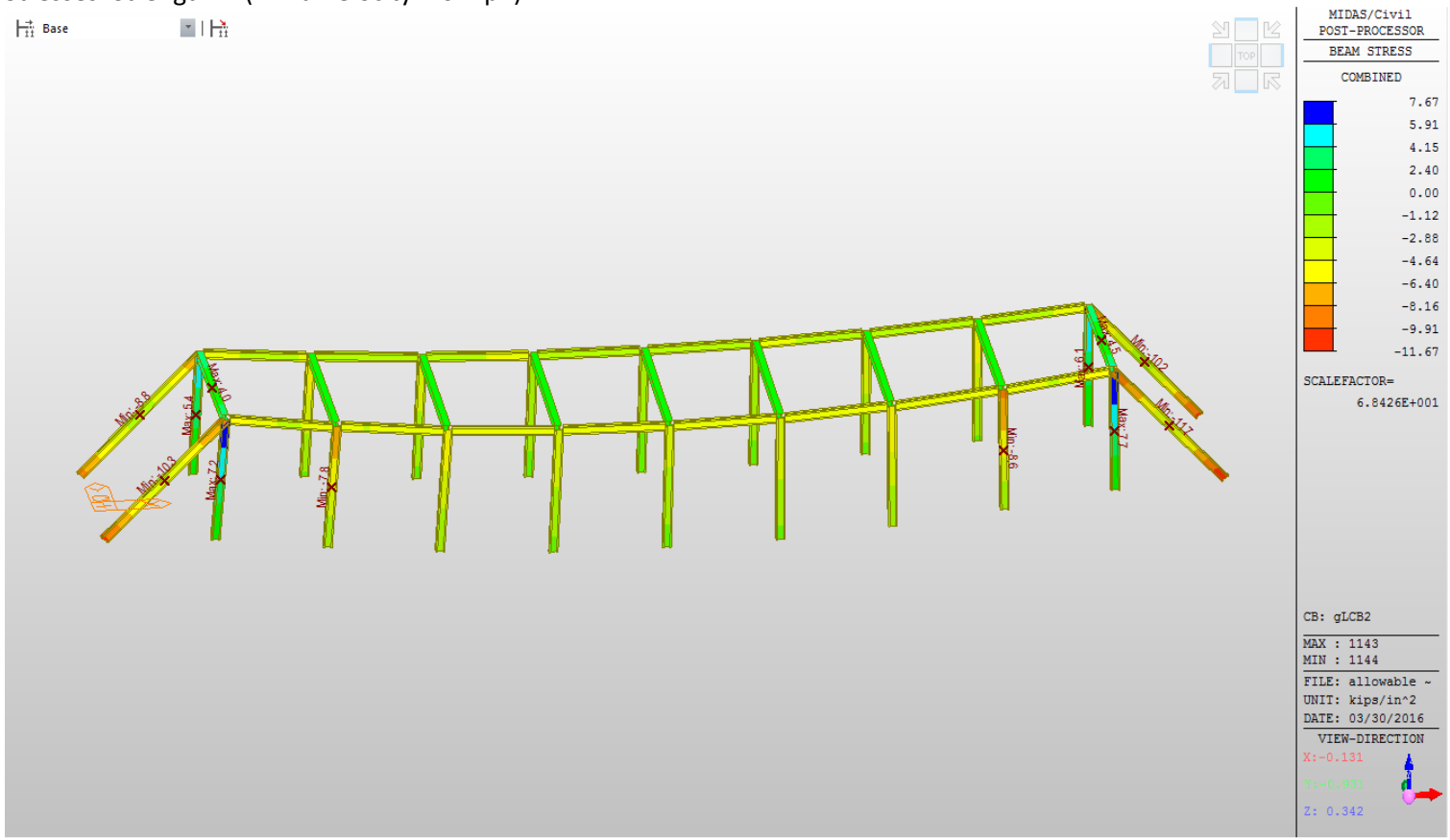
Leeward load = .0164 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

LRFD ANALYSIS

Fixed Truss: Main Members

Stresses: Strength III (Wind Velocity=70 mph)



Stress = 11.67 ksi

25.5 ksi Steel

Windward load = .025 ksf

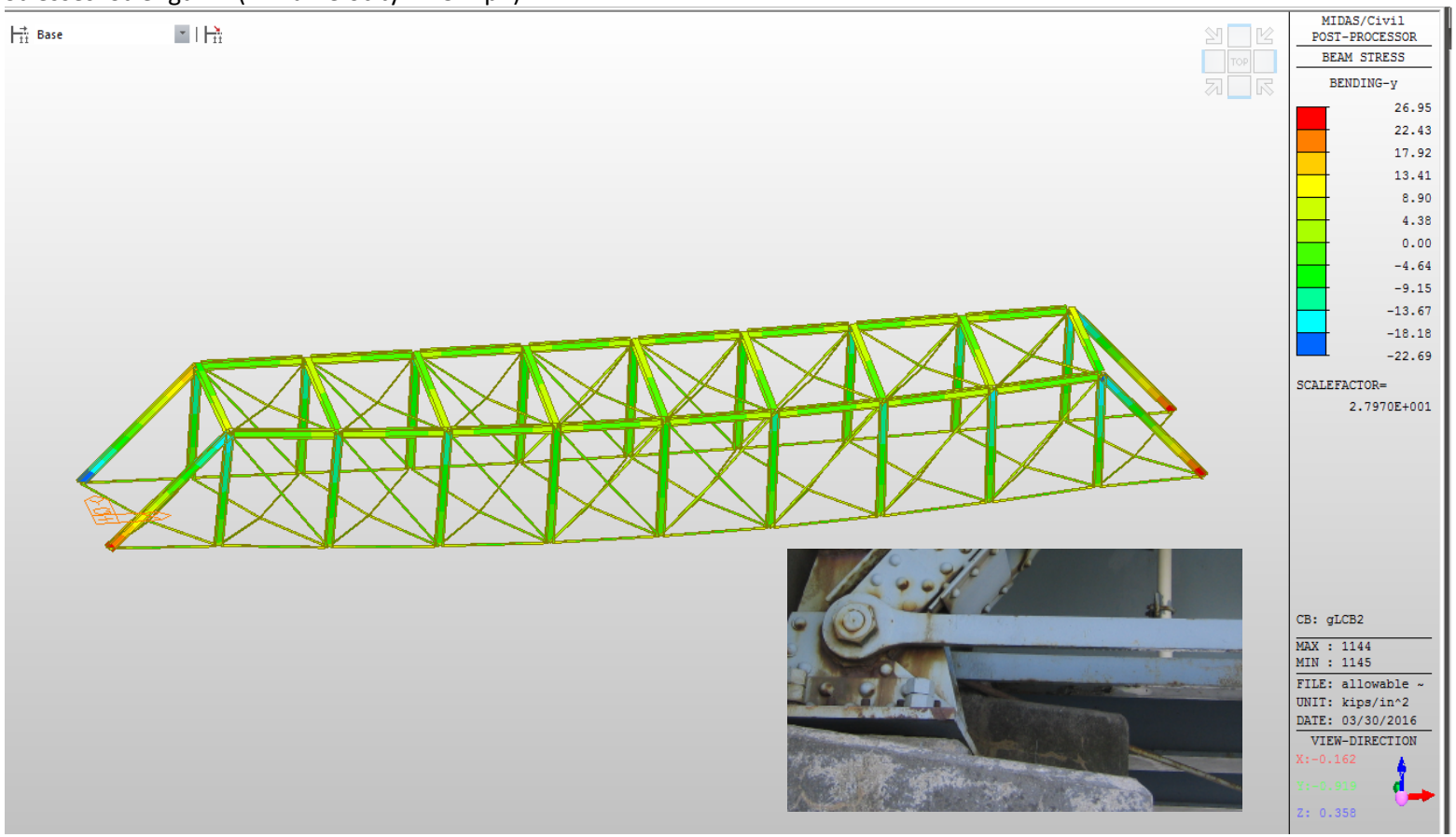
Leeward load = .0125 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Fixed Truss: Entire Truss

Stresses: Strength III (Wind Velocity=125 mph)



Stress = 26.95 ksi

25.5 ksi Steel

Windward load = .08 ksf

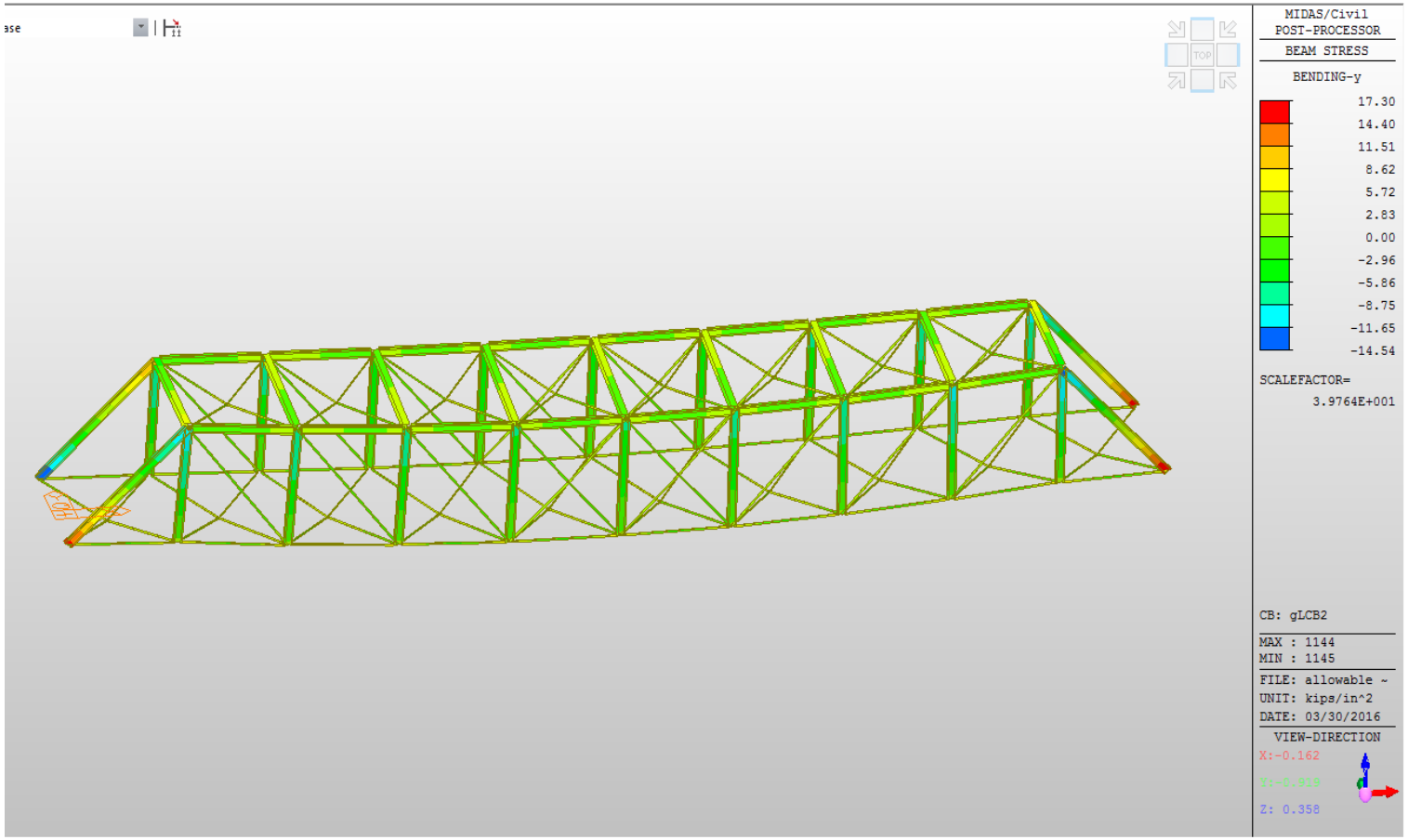
Leeward load = .04 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

LRFD ANALYSIS

Fixed Truss: Entire Truss

Stresses: Strength III (Wind Velocity=100 mph)



Stress = 17.30 ksi 25.5 ksi Steel

Windward load = .0512 ksf

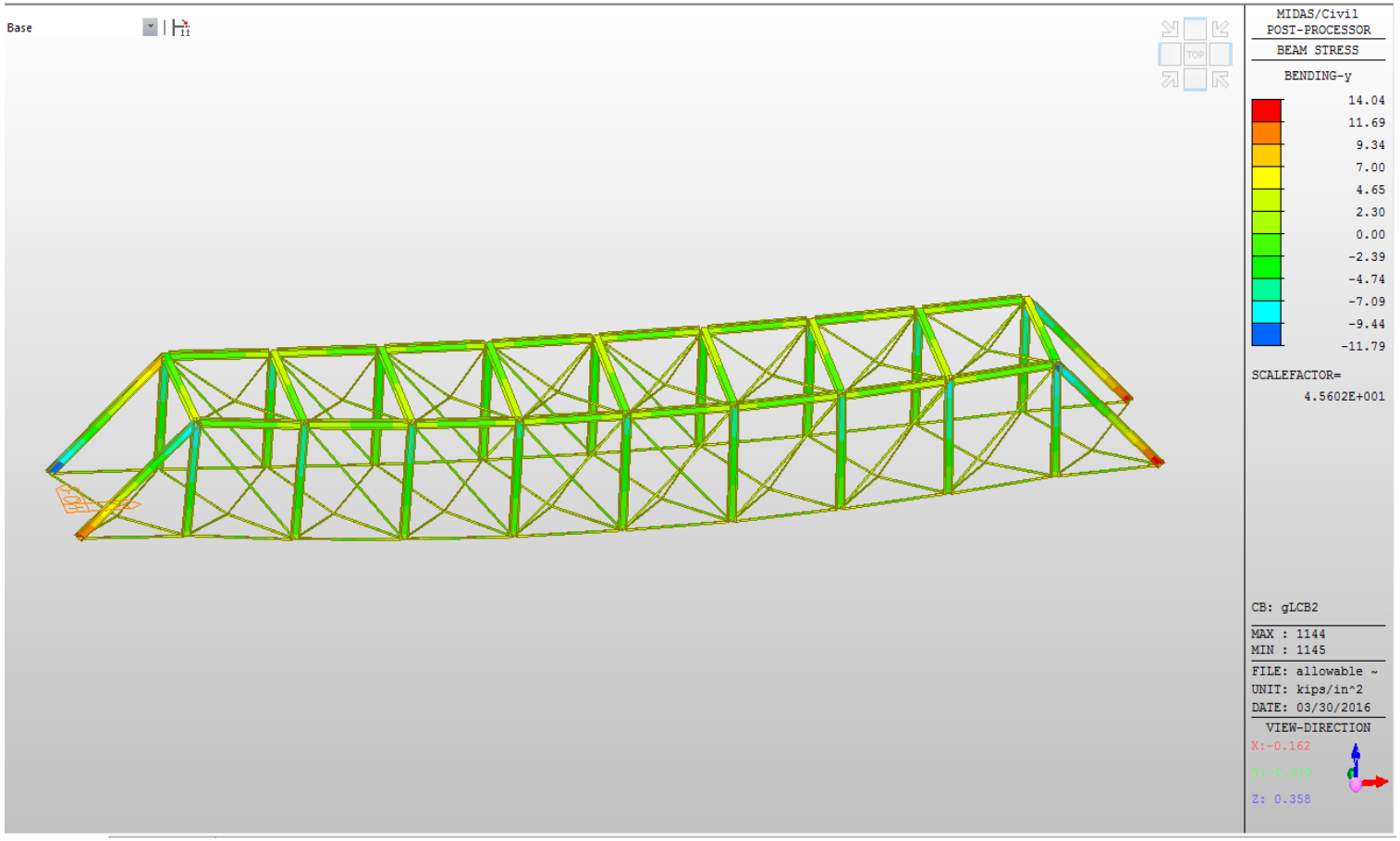
Leeward load = .0256 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

LRFD ANALYSIS

Fixed Truss: Entire Truss

Stresses: Strength III (Wind Velocity=90 mph)



Stress = 14.04 ksi 25.5 ksi Steel

Windward load = .0415 ksf

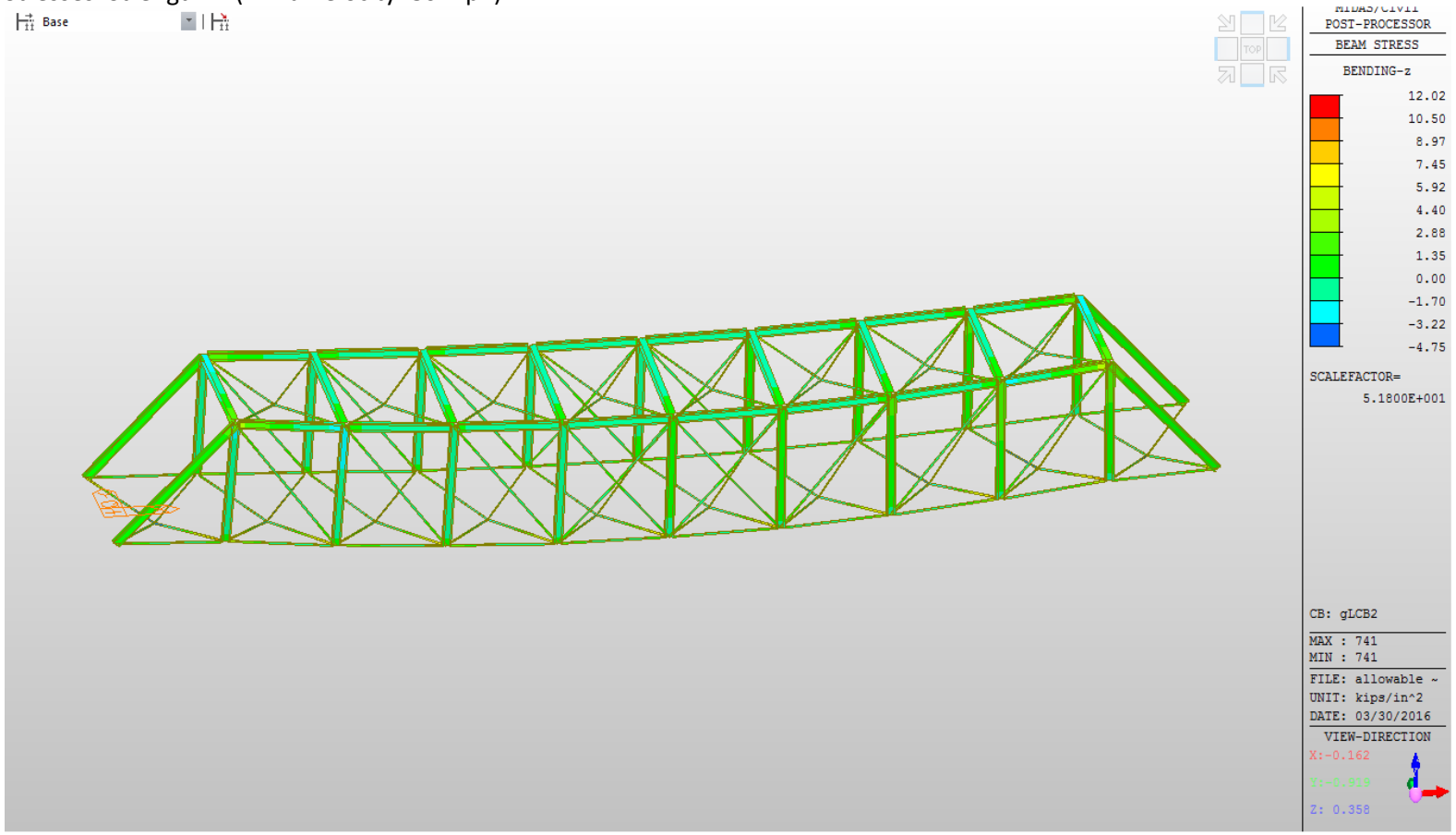
Leeward load = .0207 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

LRFD ANALYSIS

Fixed Truss: Entire Truss

Stresses: Strength III (Wind Velocity=80 mph)



Stress = 12.02 ksi 25.5 ksi Steel

Windward load = .0328 ksf

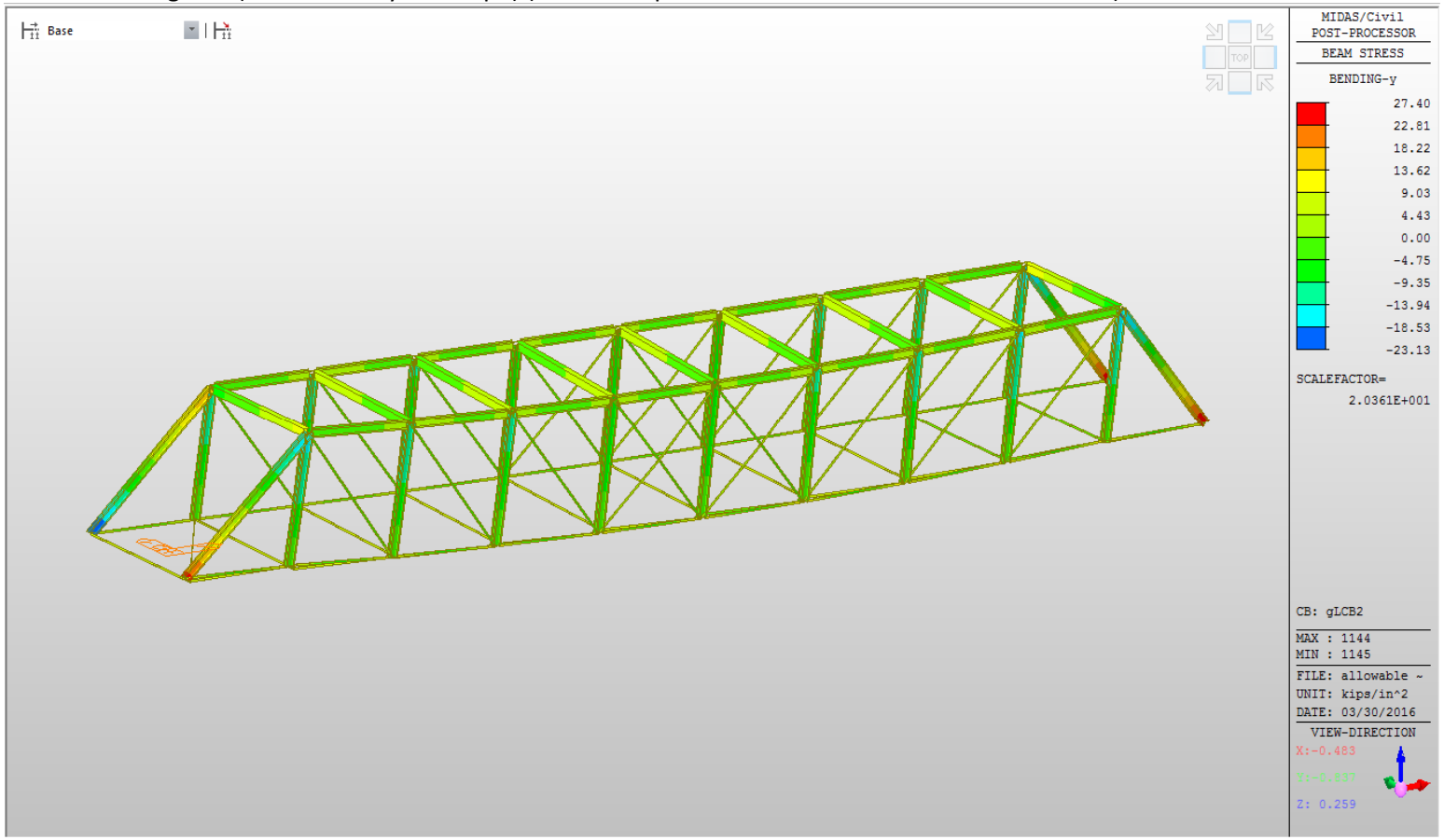
Leeward load = .0164 ksf

Sbz: Normal stress resulting from the moment (My) about the element's local y-axis

LRFD ANALYSIS

Fixed Truss: Entire Truss

Stresses: Strength III (Wind Velocity=125 mph) (Release Top and Bottom Cords Moment Connection)



Stress = 27.4 ksi 25.5 ksi Steel

Windward load = .08 ksf

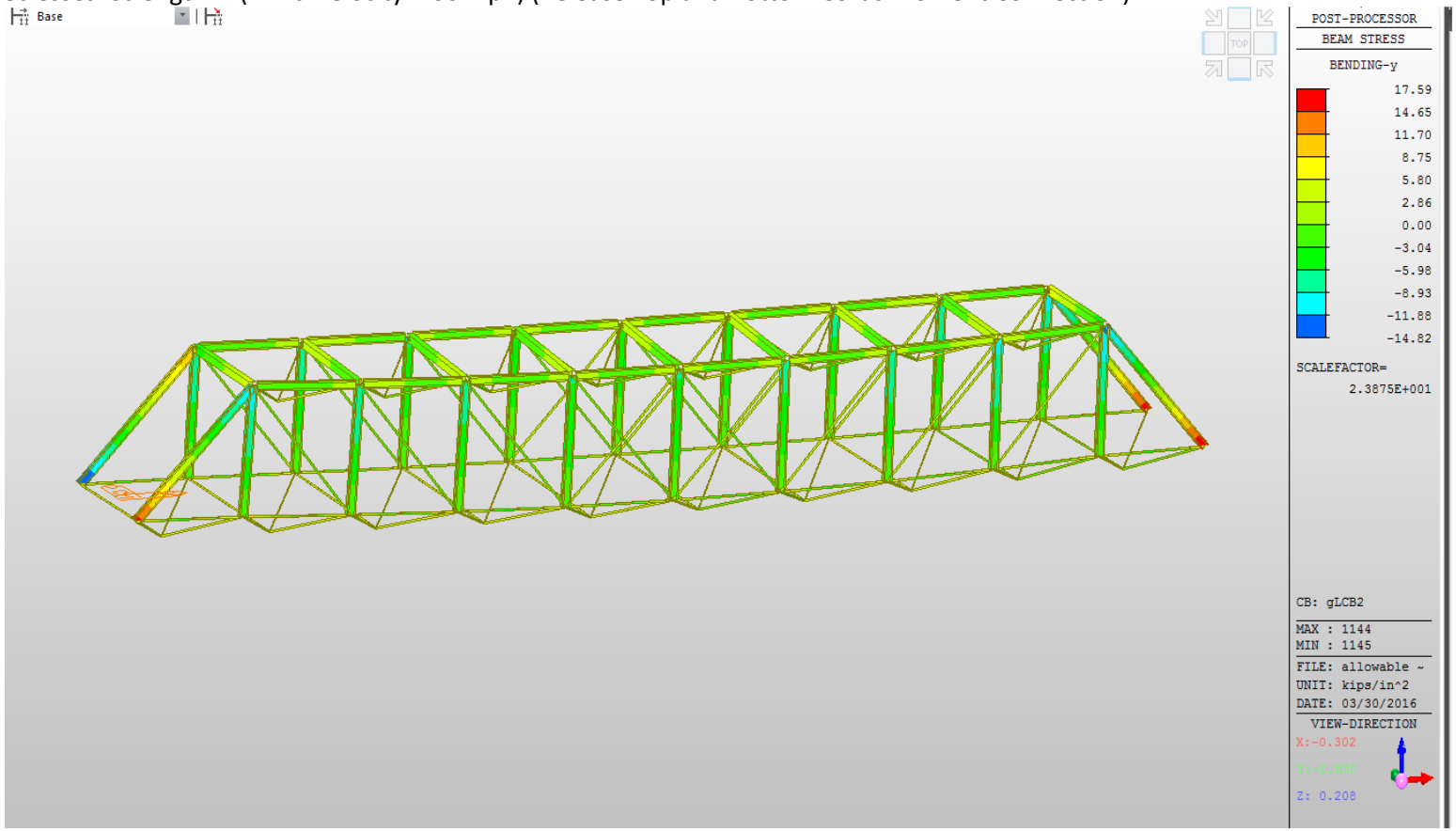
Leeward load = .04 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

LRFD ANALYSIS

Fixed Truss: Entire Truss

Stresses: Strength III (Wind Velocity=100 mph) (Release Top and Bottom Cords Moment Connection)



Stress = 17.59 ksi 25.5 ksi Steel

Windward load = .0512 ksf

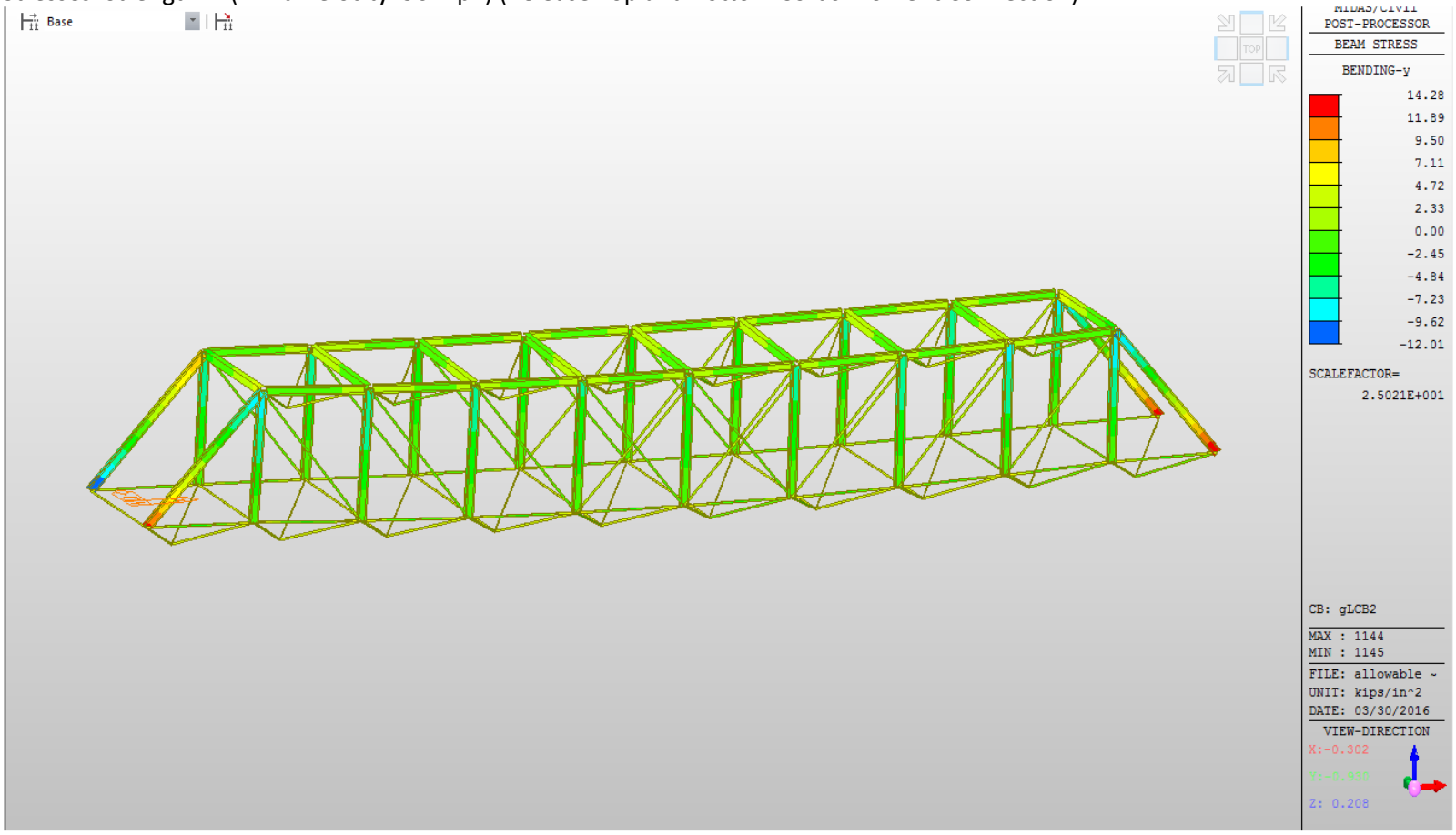
Leeward load = .0256 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

LRFD ANALYSIS

Fixed Truss: Entire Truss

Stresses: Strength III (Wind Velocity=90 mph) (Release Top and Bottom Cords Moment Connection)



Stress = 14.28 ksi 25.5 ksi Steel

Windward load = .0415 ksf

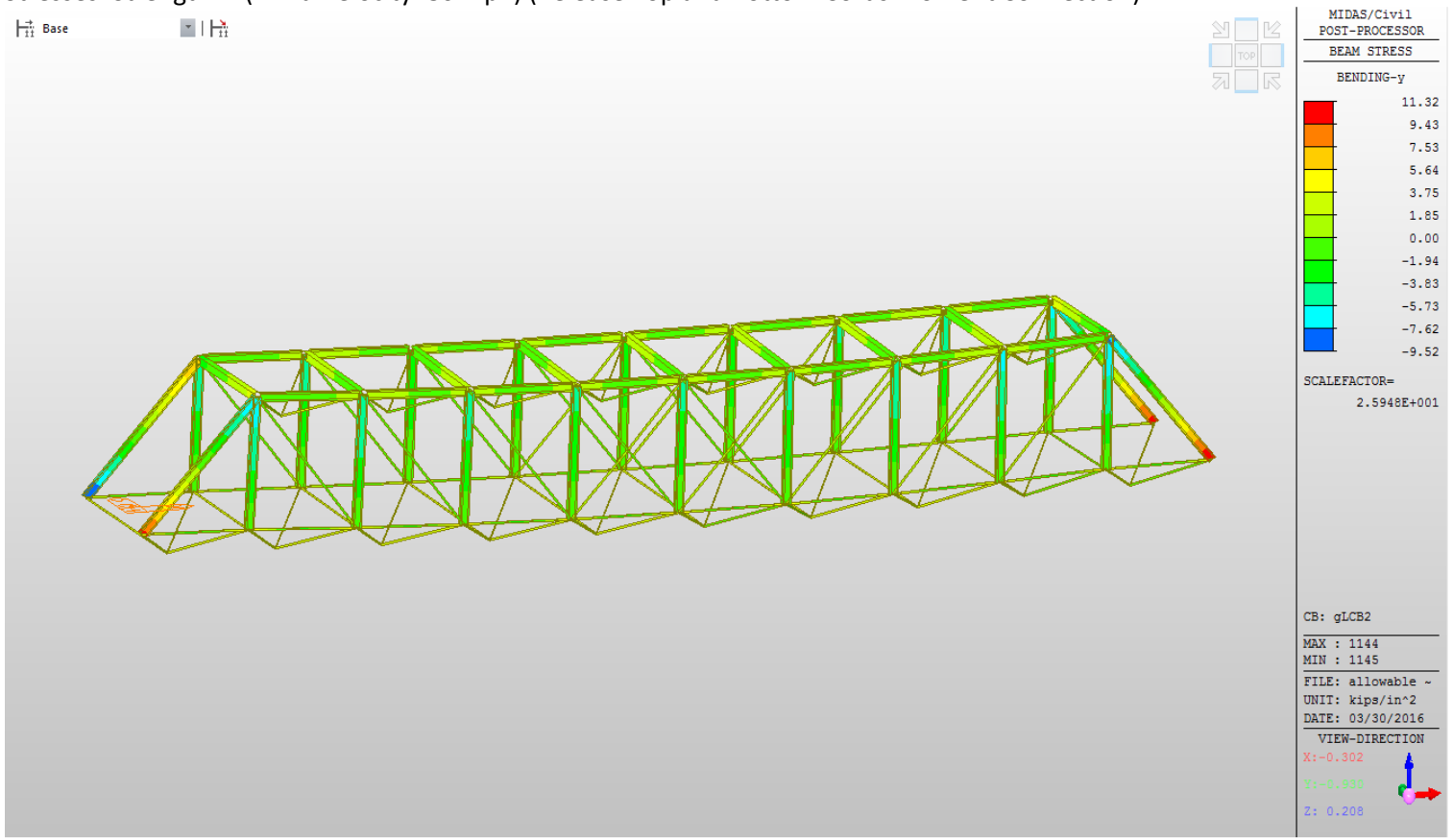
Leeward load = .0207 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

LRFD ANALYSIS

Fixed Truss: Entire Truss

Stresses: Strength III (Wind Velocity=80 mph) (Release Top and Bottom Cords Moment Connection)



Stress = 11.32 ksi 25.5 ksi Steel

Windward load = .0328 ksf

Leeward load = .0164 ksf

Sby: Normal stress resulting from the moment (Mz) about the element's local z-axis

Design wind Velocity

Allowable stress = 12 ksi

wind speed = 125 mph

$P_z = (2.56 \times 10^{-6})(V)^2 K_z G C_D$ (AASHTO 3.8.1.2.1-1)

$V = 125$ mph (AASHTO Figure 3.8.1.2.1-1)

$K_z = 1.0$ (AASHTO Table C3.8.1.2.1-1)

category C

$G = 1.0$ (AASHTO Table 3.8.1.2.1-1)

windward

$C_p = 2.0$ (AASHTO Table 3.8.1.2.1-2)

leeward

$C_p = 1.0$ (AASHTO Table 3.8.1.2.1-2)

windward pressure

$P_D = (2.56 \times 10^{-6})(125)^2 (1.0)(1.0)(2) = .08$ ksf

leeward pressure

$P_D = (2.56 \times 10^{-6})(125)^2 (1.0)(1.0)(1.0) = .04$ ksf

wind speed = 100 mph

$V = 100$ mph

windward pressure

$P_D = (2.56 \times 10^{-6})(100)^2 (1.0)(1.0)(2) = .0512$ ksf

leeward pressure

$P_D = (2.56 \times 10^{-6})(100)^2 (1.0)(1.0)(1.0) = .0256$ ksf

Design wind velocity

wind speed = 90 mph

windward pressure

$P_D = (2.56 \times 10^{-6})(90)^2 (1.0)(1.0)(2.0) = .0415$ ksf

leeward pressure

$P_D = (2.56 \times 10^{-6})(90)^2 (1.0)(1.0)(1.0) = .0207$ ksf

wind speed = 80 mph

windward pressure

$P_D = (2.56 \times 10^{-6})(80)^2 (1.0)(1.0)(2.0) = .0328$ ksf

leeward pressure

$P_D = (2.56 \times 10^{-6})(80)^2 (1.0)(1.0)(1.0) = .0164$ ksf

wind speed = 70 mph

windward pressure

$P_D = (2.56 \times 10^{-6})(70)^2 (1.0)(1.0)(2.0) = .025$ ksf

leeward pressure

$P_D = (2.56 \times 10^{-6})(70)^2 (1.0)(1.0)(1.0) = .0125$ ksf

- Ground Surface Roughness D: Flat, unobstructed areas and water surfaces; this category includes smooth mud flats, salt flats, and unbroken ice.

3.8.1.1.5—Wind Exposure Categories

C3.8.1.1.5

The exposure category of the structure shall be determined as follows:

- Wind Exposure Category B: Wind Exposure Category B shall apply where the Ground Surface Roughness Category B, as defined in Article 3.8.1.1.4, prevails in the upwind direction for a distance greater than 1,500 ft for structures with a mean height of less than or equal to 33 ft, and for a distance greater than 2,600 ft or 20 times the height of the structure, whichever is greater, for structures with a mean height greater than 33 ft.
- Wind Exposure Category C: Wind Exposure Category C shall apply for all cases where Wind Exposure Categories B or D do not apply.
- Wind Exposure Category D: Wind Exposure Category D shall apply where the Ground Surface Roughness Category D, as defined in Article 3.8.1.1.4, prevails in the upwind direction for a distance greater than 5,000 ft or 20 times the height of the structure, whichever is greater. Wind Exposure Category D shall also apply where the structure is within a distance of 600 ft or 20 times the height of the structure, whichever is greater, from a Ground Surface Roughness Category D condition, even if Ground Surface Roughness Category B or C exist immediately upwind of the structure.

Where Ground Surface Roughness Category D prevails in the upwind direction—except when Ground Surface Roughness Category B or C exist for a relatively short distance immediately upwind from the structure—the effect of the presence of Ground Surface Roughness Category B or C may not be significant. Ground Surface Roughness Category D is conservatively specified for these situations.

3.8.1.2—Wind Load on Structures: *WS*

3.8.1.2.1—General

C3.8.1.2.1

The wind pressure shall be determined as:

$$P_Z = 2.56 \times 10^{-6} V^2 K_z G C_D \qquad (3.8.1.2.1\text{-}1)$$

The basis for the development of wind load provisions exists in Wassef (2014).

where:

P_Z = design wind pressure (ksf)
V = design 3-second gust wind speed specified in Table 3.8.1.1.2-1 (mph)
K_Z = pressure exposure and elevation coefficient to be taken equal to K_Z (B), K_Z (C), or K_Z (D) determined using Eqs. 3.8.1.2.1-2, 3.8.1.2.1-3, or 3.8.1.2.1-4, respectively, for Strength III and Service IV load combinations and to be taken as 1.0 for other load combinations

For structure heights less than 33 ft, the proximity to the ground surface causes turbulence for which the effect on wind pressure cannot be accurately determined. Therefore, no reduction in the value of K_Z is shown in Table C3.8.1.2.1-1 for structure heights less than 33 ft.

© 2015 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication is a violation of applicable law.

G = gust effect factor determined using a structure-specific study or as specified in Table 3.8.1.2.1-1 for Strength III and Service IV load combinations and 1.0 for other load combinations

C_D = drag coefficient determined using a structure-specific study or as specified in Table 3.8.1.2.1-2

Strength V and Service I load combinations are based on constant wind speeds that are not functionsp of the bridge type, bridge height, or the wind exposure category at the location of the bridge. Therefore, the pressure exposure and elevation coefficient, K_Z, is taken as 1.0 for these load combinations.

Unlike ASCE 7-10 (2010), which is based on power law wind profiles, these Specifications have always been based on logarithmic wind profiles. Therefore, logarithmic wind profiles were assumed in the development of Eqs. 3.8.1.2.1-2, 3.8.1.2.1-3, and 3.8.1.2.1-4.

The value of K_z at different elevations for different wind exposure categories are shown in Table C3.8.1.2.1-1.

The gust effect factor, G, is a function of the size and dynamic characteristics of the structure including bridge natural frequency and damping. The values specified in Table 3.8.1.2.1-1 are average values for sound barriers and typical bridge structures. For long-span arches, and cable-stayed and suspension bridges, the use of wind tunnel testing to determine a project-specific gust effect factor is warranted.

The 0.85 gust effect factor specified for sound barriers in Table 3.8.1.2.1-1 is consistent with the gust effect factor in ASCE 7-10 (2010) for walls and implies that wind gusts are not likely to engulf the entire barrier. However, the loaded area required to produce the maximum wind load on a sound barrier panel and the panel's vertical supports, if used, is relatively small. A higher gust effect factor may be justifiable because wind gusts may engulf the entire panel.

Table C3.8.1.2.1-1—Pressure Exposure and Elevation Coefficients, K_Z

Structure Height, Z (ft)	Wind Exposure Category B	Wind Exposure Category C	Wind Exposure Category D
≤33	0.71	1.00	1.15
40	0.75	1.05	1.20
50	0.81	1.10	1.25
60	0.85	1.14	1.29
70	0.89	1.18	1.32
80	0.92	1.21	1.35
90	0.95	1.24	1.38
100	0.98	1.27	1.41
120	1.03	1.32	1.45
140	1.07	1.36	1.49
160	1.11	1.40	1.52
180	1.15	1.43	1.55
200	1.18	1.46	1.58
250	1.24	1.52	1.63
300	1.30	1.57	1.68

© 2015 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication is a violation of applicable law.

When the wind speed, K_Z, and G specified for Strength V and Service I load combinations are substituted in Eq. 3.8.1.2.1-1, the resulting wind pressure on bridge structures, P_Z, becomes a multiple of the drag coefficient, C_D, for the structure being considered. The wind pressure in these cases may be calculated using Table C3.8.1.2.1-2.

Table C3.8.1.2.1-2—Wind Pressure on the Bridge Structures for Strength V and Service I Load Combinations

Load Combination	Wind Pressure on the Structure, P_Z, for the Specified Wind Speed (ksf)
Strength V	0.0163 C_D
Service I	0.0125 C_D

The pressure exposure and elevation coefficient, K_Z, for Strength III and Service IV load combinations shall be determined as follows:

$$K_Z(B) = \frac{\left[2.5\ln\left(\frac{Z}{0.9834}\right)+6.87\right]^2}{345.6} \qquad (3.8.1.2.1\text{-}2)$$

$$K_Z(C) = \frac{\left[2.5\ln\left(\frac{Z}{0.0984}\right)+7.35\right]^2}{478.4} \qquad (3.8.1.2.1\text{-}3)$$

$$K_Z(D) = \frac{\left[2.5\ln\left(\frac{Z}{0.0164}\right)+7.65\right]^2}{616.1} \qquad (3.8.1.2.1\text{-}4)$$

where:

K_Z (B), K_Z (C), and K_Z (D) are K_Z for wind exposure Category B, C, and D, respectively.

The structure height, Z, used in determining the pressure exposure and elevation coefficient, K_Z, shall be taken as:

- For bridge superstructures: The average height of the top of the superstructure above the surrounding ground or water surface.

- For bridge substructures not extending above the elevation of the superstructure: Unless otherwise approved by the Owner, the height used in determining the wind pressure on the superstructure.

In the case of a long multi-span bridge with large variation in the ground surface elevation under the bridge, such as a bridge crossing a valley, the structure height, Z, may be varied from a span to span. For each span, the structure height, Z, may be taken as the largest value in the span.

Determining the wind pressure on substructures not extending above the elevation of the superstructure using the structure height used to determine the wind pressure on the superstructure results in slightly conservative values for most substructures. For

© 2015 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication is a violation of applicable law.

- For bridge substructures extending above the elevation of the superstructure: Unless otherwise approved by the Owner, the height of the top of the substructure.

- For ground-mounted sound barriers: The height of the top of the sound barrier above the lower surrounding ground surface.

- For structure- or traffic-barrier-mounted sound barriers: The height of the top of the sound barrier above the low ground or water surface surrounding the support structure.

In no case shall the structure height, Z, used in calculating K_Z be taken less than 33 ft.

extremely tall substructures, using a different height, including varying the height used for different segments of the substructure, may be allowed with the approval of the Owner.

Substructures extending above the elevation of the superstructure are typically associated with cable-stayed bridges and suspension bridges. Wind loads on such structures are typically determined using a structure-specific wind tunnel test.

Where the sound barrier is constructed directly atop an embankment, the height of the sound barrier should be measured from the lower ground surface surrounding the embankment.

Table 3.8.1.2.1-1—Gust Effect Factor, *G*

Structure Type	Gust Effect Factor, G
Sound Barriers	0.85
All other structures	1.00

Table 3.8.1.2.1-2—Drag Coefficient, C_D

Component		Drag Coefficient, C_D	
		Windward	Leeward
I-Girder and Box-Girder Bridge Superstructures		1.3	N/A
Trusses, Columns, and Arches	Sharp-Edged Member	2.0	1.0
	Round Member	1.0	0.5
Bridge Substructure		1.6	N/A
Sound Barriers		1.2	N/A

The term "columns" in Table 3.8.1.2.1-2 refers to columns in superstructures such as spandrel columns in arches.

3.8.1.2.2—Loads on the Superstructure

In the general case of wind analysis, the wind load shall be determined as specified in Article 3.8.1.1 and the wind direction shall be varied. The wind loads shall be taken as the algebraic transverse and longitudinal components of the wind load. The wind direction for design shall be that which produces the maximum force effect in the component under investigation. The transverse and longitudinal components of the wind load shall be applied simultaneously.

C3.8.1.2.2

For superstructure components, the wind load on different members should be calculated separately and used in designing the members themselves. For trusses, the wind loads from different members and from the flooring system are transferred to the top and bottom planes of wind bracing and are used in designing the wind bracing system, including the end portals and cross-frames.

© 2015 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication is a violation of applicable law.

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

SUBSTRUCTURE ANALYSIS

ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

PIER 2 ANALYSIS

Pier 2 (36 ksi steel) (carying Beams 33ksi)

	Midas Civil 2016 V2.1				
	Displacement (in)	Stress (ksi)	Rating Factor	Tonnage	Limit State
No Section Loss					
HL-93 Inventory	0.37	28.48	1.2609	N/A	Strength I
HL-93 Operating	0.34	26.04	1.6336	N/A	Strength I
HS-20	0.33	25.85	1.6772	60.38	Strength I
H20	0.29	23.01	2.6628	53.26	Strength I
CT-L3S2	0.28	22.58	2.8973	114.92	Strength I
CT-L73.0	0.31	24.11	2.1628	78.94	Strength I
CT-L3S2 + Lane Load	0.28	22.58	2.8973	N/A	Strength I
10% Section Loss					
HL-93 Inventory	0.42	32.90	**0.8713**	N/A	Strength I
HL-93 Operating	0.38	30.12	1.1285	N/A	Strength I
HS-20	0.37	29.90	1.1575	41.67	Strength I
H20	0.32	26.62	1.8336	36.67	Strength I
CT-L3S2	0.31	26.13	2.0078	80.31	Strength I
CT-L73.0	0.34	27.90	1.4928	54.49	Strength I
CT-L3S2 + Lane Load	0.31	26.13	2.0078	N/A	Strength I

PIER 2 - Pile Ananlysis No Section Loss

	Midas Civil 2016 V2.1		L-pile V2015		A-Pile		Allowable				
Live load	Shear (kip)	Axial (kip)	Max Moment in Pile (in-kip)	Max Deflection (in)	Bearing Capacity (kips)	Pile Type	Axial (kips)	Moment (kip-in)	C/D Ratio Axial	C_{Ma}=Combined Compressive and Flexural Resistance Factor* < 1	Rating Tons
HL-93 Inv.	10.5	379.8	1471.52	1.5026	520.0	HP14X89	567.3	2371	**0.896**	**1.508**	N/A
HL-93 Oper.	8.4	350.8	1144.859	1.1369	520.0	HP14X89	567.3	2371	0.970	1.313	N/A
HS-20	8.4	350.4	1131.133	1.1231	520.0	HP14X89	567.3	2371	0.971	1.306	27.72
H20	6.0	314.2	804.911	0.7968	520.0	HP14X89	567.3	2371	1.083	1.093	18.20
CT-L3S2	5.6	309.2	833.655	0.8256	520.0	HP14X89	567.3	2371	1.101	1.091	36.80
CT-L73.0	7.1	328.3	1085.494	1.0771	520.0	HP14X89	567.3	2371	1.037	1.234	29.57
CT-L3S2 + Lane Load	5.9	314.4	889.204	0.8810	520.0	HP14X89	567.3	2371	1.083	1.125	N/A

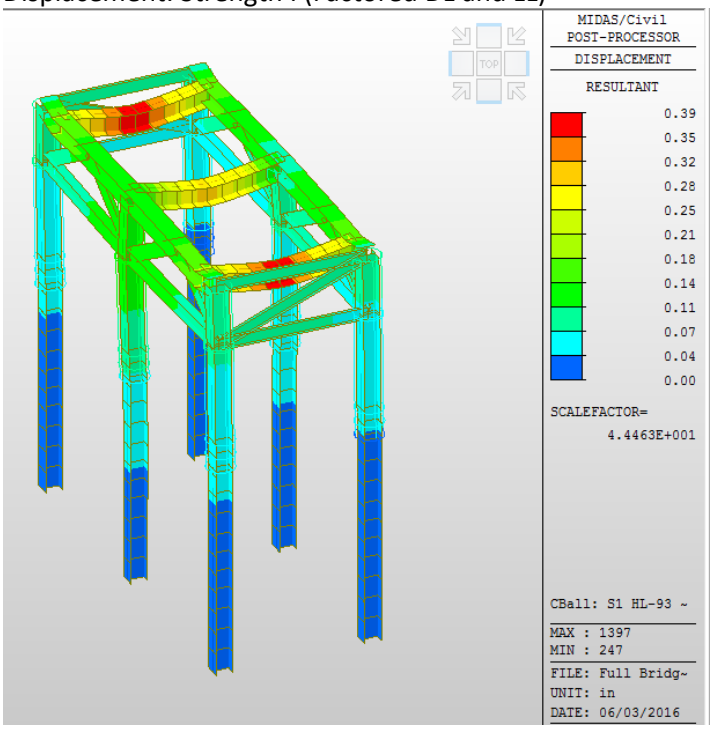
*$C_{Ma}=P_U/P_R+\gamma((M_{Ux}/M_{rx})+(M_{Uy}/M_{ry})) < 1.0$ AASHTO 6.9.2.2-2

*C/D Ratio AASHTO 6.9.4

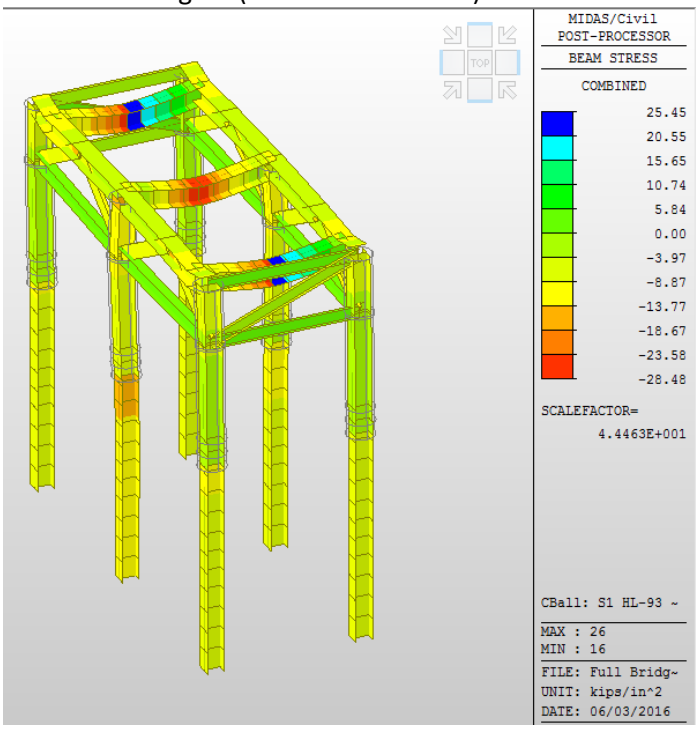
LRFD ANALYSIS

Pier 2 (No Section Loss)

Displacement: Strength I (Factored DL and LL)



Stresses: Strength I (Factored DL and LL)



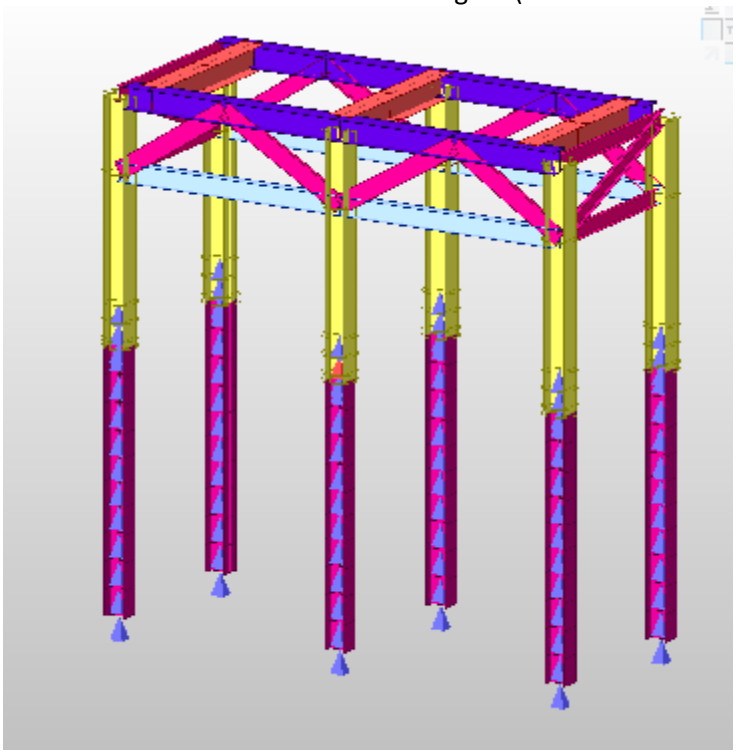
36 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ± Sbz ± Sax (Warping).

LRFD ANALYSIS

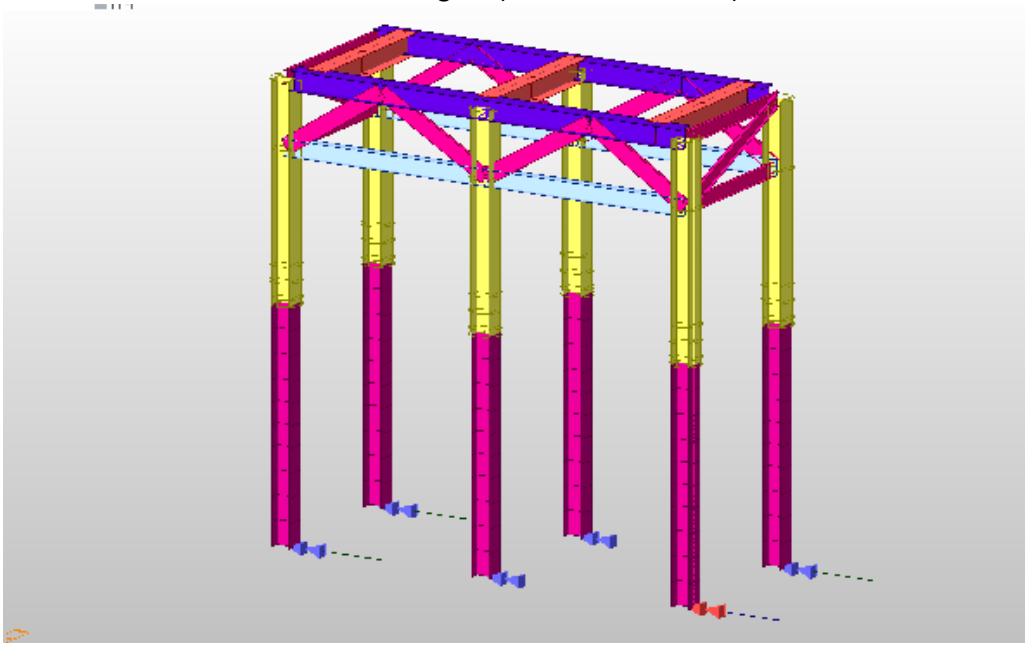
Pier 2 (No Section Loss)

Reactions: Maximum Axial Load-Strength I (Factored DL and LL)



Maximum Axial Load = 379.8 kips (Midas)

Reactions: Maximum Moment-Strength I (Factored DL and LL)



Maximum Moment = 1471.52 in-kips (L-Pile)

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH NO SECTION LOSS

RF= RATING FACTOR

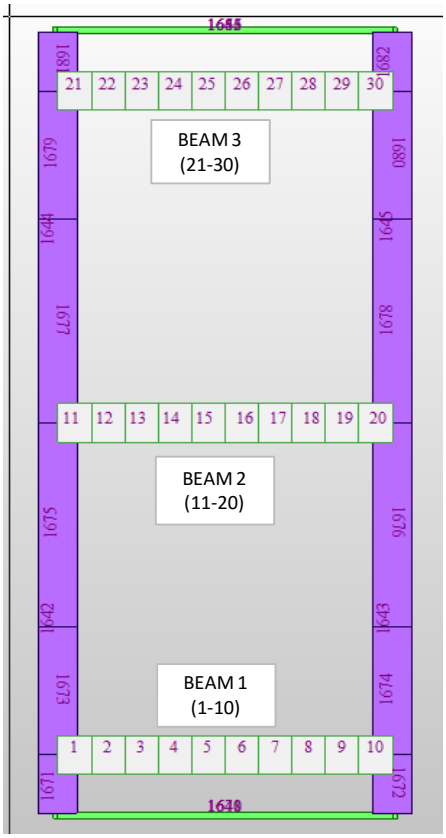
$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	.95F_Y (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	H-20	33	31.35	-3.000	1.120	25.313
1	H-20	33	31.35	-0.350	-0.170	182.353
2	H-20	33	31.35	-5.660	2.210	11.624
2	H-20	33	31.35	-3.000	1.120	25.313
3	H-20	33	31.35	-8.440	3.310	6.921
3	H-20	33	31.35	-5.660	2.210	11.624
4	H-20	33	31.35	-11.340	4.420	4.527
4	H-20	33	31.35	-8.440	3.310	6.921
5	H-20	33	31.35	-14.220	5.540	3.092
5	H-20	33	31.35	-11.340	4.420	4.527
6	H-20	33	31.35	10.600	4.430	4.684
6	H-20	33	31.35	13.230	5.550	3.265
7	H-20	33	31.35	8.140	3.310	7.012
7	H-20	33	31.35	10.600	4.430	4.684
8	H-20	33	31.35	5.680	2.190	11.721
8	H-20	33	31.35	8.140	3.310	7.012
9	H-20	33	31.35	3.200	1.110	25.360
9	H-20	33	31.35	5.680	2.190	11.721
10	H-20	33	31.35	0.730	0.160	191.375
10	H-20	33	31.35	3.200	1.110	25.360
11	H-20	33	31.35	-1.960	-0.520	56.519
11	H-20	33	31.35	-6.900	-1.450	16.862
12	H-20	33	31.35	-3.460	-1.240	22.492
12	H-20	33	31.35	-1.960	-0.520	56.519
13	H-20	33	31.35	-8.360	-2.450	9.384
13	H-20	33	31.35	-3.460	-1.240	22.492
14	H-20	33	31.35	-13.260	-3.670	4.929
14	H-20	33	31.35	-8.360	-2.450	9.384
15	H-20	33	31.35	-18.140	-4.880	2.707
15	H-20	33	31.35	-13.260	-3.670	4.929
16	H-20	33	31.35	-13.090	-3.900	4.682
16	H-20	33	31.35	-17.530	-5.190	2.663
17	H-20	33	31.35	-8.630	-2.600	8.738
17	H-20	33	31.35	-13.090	-3.900	4.682
18	H-20	33	31.35	-4.180	-1.300	20.900
18	H-20	33	31.35	-8.630	-2.600	8.738
19	H-20	33	31.35	-0.630	-0.520	59.077
19	H-20	33	31.35	-4.180	-1.300	20.900
20	H-20	33	31.35	-5.120	-1.480	17.723
20	H-20	33	31.35	-0.630	-0.520	59.077
21	H-20	33	31.35	-3.410	1.140	24.509
21	H-20	33	31.35	-0.780	-0.180	169.833
22	H-20	33	31.35	-6.060	2.220	11.392
22	H-20	33	31.35	-3.410	1.140	24.509
23	H-20	33	31.35	-8.700	3.300	6.864
23	H-20	33	31.35	-6.060	2.220	11.392
24	H-20	33	31.35	-11.470	4.420	4.498
24	H-20	33	31.35	-8.700	3.300	6.864
25	H-20	33	31.35	-14.470	5.540	3.047
25	H-20	33	31.35	-11.470	4.420	4.498
26	H-20	33	31.35	10.840	4.440	4.619
26	H-20	33	31.35	13.590	5.570	3.189
27	H-20	33	31.35	8.130	3.320	6.994
27	H-20	33	31.35	10.840	4.440	4.619
28	H-20	33	31.35	5.530	2.200	11.736
28	H-20	33	31.35	8.130	3.320	6.994
29	H-20	33	31.35	2.930	1.120	25.375
29	H-20	33	31.35	5.530	2.200	11.736
30	H-20	33	31.35	0.330	-0.170	182.471
30	H-20	33	31.35	2.930	1.120	25.375

Minimum Rating factor 2.663



LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH NO SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	HS-20	33	31.35	-3.000	1.790	15.838
1	HS-20	33	31.35	-0.350	-0.290	106.897
2	HS-20	33	31.35	-5.660	3.500	7.340
2	HS-20	33	31.35	-3.000	1.790	15.838
3	HS-20	33	31.35	-8.440	5.260	4.356
3	HS-20	33	31.35	-5.660	3.500	7.340
4	HS-20	33	31.35	-11.340	7.040	2.842
4	HS-20	33	31.35	-8.440	5.260	4.356
5	HS-20	33	31.35	-14.220	8.820	1.942
5	HS-20	33	31.35	-11.340	7.040	2.842
6	HS-20	33	31.35	10.600	7.060	2.939
6	HS-20	33	31.35	13.230	8.850	2.047
7	HS-20	33	31.35	8.140	5.270	4.404
7	HS-20	33	31.35	10.600	7.060	2.939
8	HS-20	33	31.35	5.680	3.480	7.376
8	HS-20	33	31.35	8.140	5.270	4.404
9	HS-20	33	31.35	3.200	1.780	15.815
9	HS-20	33	31.35	5.680	3.480	7.376
10	HS-20	33	31.35	0.730	0.280	109.357
10	HS-20	33	31.35	3.200	1.780	15.815
11	HS-20	33	31.35	-1.960	-0.830	35.410
11	HS-20	33	31.35	-6.900	-2.310	10.584
12	HS-20	33	31.35	-3.460	-1.960	14.230
12	HS-20	33	31.35	-1.960	-0.830	35.410
13	HS-20	33	31.35	-8.360	-3.880	5.925
13	HS-20	33	31.35	-3.460	-1.960	14.230
14	HS-20	33	31.35	-13.260	-5.810	3.114
14	HS-20	33	31.35	-8.360	-3.880	5.925
15	HS-20	33	31.35	-18.140	-7.730	1.709
15	HS-20	33	31.35	-13.260	-5.810	3.114
16	HS-20	33	31.35	-13.090	-6.180	2.955
16	HS-20	33	31.35	-17.530	-8.240	1.677
17	HS-20	33	31.35	-8.630	-4.120	5.515
17	HS-20	33	31.35	-13.090	-6.180	2.955
18	HS-20	33	31.35	-4.180	-2.060	13.189
18	HS-20	33	31.35	-8.630	-4.120	5.515
19	HS-20	33	31.35	-0.630	-0.820	37.463
19	HS-20	33	31.35	-4.180	-2.060	13.189
20	HS-20	33	31.35	-5.120	-2.380	11.021
20	HS-20	33	31.35	-0.630	-0.820	37.463
21	HS-20	33	31.35	-3.410	1.820	15.352
21	HS-20	33	31.35	-0.780	-0.310	98.613
22	HS-20	33	31.35	-6.060	3.520	7.185
22	HS-20	33	31.35	-3.410	1.820	15.352
23	HS-20	33	31.35	-8.700	5.250	4.314
23	HS-20	33	31.35	-6.060	3.520	7.185
24	HS-20	33	31.35	-11.470	7.040	2.824
24	HS-20	33	31.35	-8.700	5.250	4.314
25	HS-20	33	31.35	-14.470	8.830	1.912
25	HS-20	33	31.35	-11.470	7.040	2.824
26	HS-20	33	31.35	10.840	7.080	2.897
26	HS-20	33	31.35	13.590	8.870	2.002
27	HS-20	33	31.35	8.130	5.280	4.398
27	HS-20	33	31.35	10.840	7.080	2.897
28	HS-20	33	31.35	5.530	3.490	7.398
28	HS-20	33	31.35	8.130	5.280	4.398
29	HS-20	33	31.35	2.930	1.790	15.877
29	HS-20	33	31.35	5.530	3.490	7.398
30	HS-20	33	31.35	0.330	-0.290	106.966
30	HS-20	33	31.35	2.930	1.790	15.877

Minimum Rating factor 1.677

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH NO SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	.95F_Y (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	HL-93 Inventory	33	31.35	-3.000	2.400	11.813
1	HL-93 Inventory	33	31.35	-0.350	-0.430	72.093
2	HL-93 Inventory	33	31.35	-5.660	4.650	5.525
2	HL-93 Inventory	33	31.35	-3.000	2.400	11.813
3	HL-93 Inventory	33	31.35	-8.440	7.010	3.268
3	HL-93 Inventory	33	31.35	-5.660	4.650	5.525
4	HL-93 Inventory	33	31.35	-11.340	9.400	2.129
4	HL-93 Inventory	33	31.35	-8.440	7.010	3.268
5	HL-93 Inventory	33	31.35	-14.220	11.790	1.453
5	HL-93 Inventory	33	31.35	-11.340	9.400	2.129
6	HL-93 Inventory	33	31.35	10.600	9.430	2.200
6	HL-93 Inventory	33	31.35	13.230	11.830	1.532
7	HL-93 Inventory	33	31.35	8.140	7.030	3.302
7	HL-93 Inventory	33	31.35	10.600	9.430	2.200
8	HL-93 Inventory	33	31.35	5.680	4.630	5.544
8	HL-93 Inventory	33	31.35	8.140	7.030	3.302
9	HL-93 Inventory	33	31.35	3.200	2.380	11.828
9	HL-93 Inventory	33	31.35	5.680	4.630	5.544
10	HL-93 Inventory	33	31.35	0.730	-0.410	74.683
10	HL-93 Inventory	33	31.35	3.200	2.380	11.828
11	HL-93 Inventory	33	31.35	-1.960	-1.120	26.241
11	HL-93 Inventory	33	31.35	-6.900	-3.080	7.938
12	HL-93 Inventory	33	31.35	-3.460	-2.600	10.727
12	HL-93 Inventory	33	31.35	-1.960	-1.120	26.241
13	HL-93 Inventory	33	31.35	-8.360	-5.160	4.455
13	HL-93 Inventory	33	31.35	-3.460	-2.600	10.727
14	HL-93 Inventory	33	31.35	-13.260	-7.710	2.346
14	HL-93 Inventory	33	31.35	-8.360	-5.160	4.455
15	HL-93 Inventory	33	31.35	-18.140	-10.270	1.286
15	HL-93 Inventory	33	31.35	-13.260	-7.710	2.346
16	HL-93 Inventory	33	31.35	-13.090	-8.220	2.221
16	HL-93 Inventory	33	31.35	-17.530	-10.960	1.261
17	HL-93 Inventory	33	31.35	-8.630	-5.480	4.146
17	HL-93 Inventory	33	31.35	-13.090	-8.220	2.221
18	HL-93 Inventory	33	31.35	-4.180	-2.740	9.916
18	HL-93 Inventory	33	31.35	-8.630	-5.480	4.146
19	HL-93 Inventory	33	31.35	-0.630	-1.090	28.183
19	HL-93 Inventory	33	31.35	-4.180	-2.740	9.916
20	HL-93 Inventory	33	31.35	-5.120	-3.200	8.197
20	HL-93 Inventory	33	31.35	-0.630	-1.090	28.183
21	HL-93 Inventory	33	31.35	-3.410	2.440	11.451
21	HL-93 Inventory	33	31.35	-0.780	-0.460	66.457
22	HL-93 Inventory	33	31.35	-6.060	4.670	5.415
22	HL-93 Inventory	33	31.35	-3.410	2.440	11.451
23	HL-93 Inventory	33	31.35	-8.700	7.000	3.236
23	HL-93 Inventory	33	31.35	-6.060	4.670	5.415
24	HL-93 Inventory	33	31.35	-11.470	9.400	2.115
24	HL-93 Inventory	33	31.35	-8.700	7.000	3.236
25	HL-93 Inventory	33	31.35	-14.470	11.800	1.431
25	HL-93 Inventory	33	31.35	-11.470	9.400	2.115
26	HL-93 Inventory	33	31.35	10.840	9.450	2.170
26	HL-93 Inventory	33	31.35	13.590	11.860	1.497
27	HL-93 Inventory	33	31.35	8.130	7.040	3.298
27	HL-93 Inventory	33	31.35	10.840	9.450	2.170
28	HL-93 Inventory	33	31.35	5.530	4.630	5.577
28	HL-93 Inventory	33	31.35	8.130	7.040	3.298
29	HL-93 Inventory	33	31.35	2.930	2.400	11.842
29	HL-93 Inventory	33	31.35	5.530	4.630	5.577
30	HL-93 Inventory	33	31.35	0.330	-0.430	72.140
30	HL-93 Inventory	33	31.35	2.930	2.400	11.842

Minimum Rating factor 1.261

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH NO SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	.95F_Y (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	HL-93 Operating	33	31.35	-3.000	1.850	15.324
1	HL-93 Operating	33	31.35	-0.350	-0.330	93.939
2	HL-93 Operating	33	31.35	-5.660	3.580	7.176
2	HL-93 Operating	33	31.35	-3.000	1.850	15.324
3	HL-93 Operating	33	31.35	-8.440	5.410	4.235
3	HL-93 Operating	33	31.35	-5.660	3.580	7.176
4	HL-93 Operating	33	31.35	-11.340	7.250	2.760
4	HL-93 Operating	33	31.35	-8.440	5.410	4.235
5	HL-93 Operating	33	31.35	-14.220	9.090	1.884
5	HL-93 Operating	33	31.35	-11.340	7.250	2.760
6	HL-93 Operating	33	31.35	10.600	7.280	2.850
6	HL-93 Operating	33	31.35	13.230	9.130	1.985
7	HL-93 Operating	33	31.35	8.140	5.420	4.282
7	HL-93 Operating	33	31.35	10.600	7.280	2.850
8	HL-93 Operating	33	31.35	5.680	3.570	7.190
8	HL-93 Operating	33	31.35	8.140	5.420	4.282
9	HL-93 Operating	33	31.35	3.200	1.830	15.383
9	HL-93 Operating	33	31.35	5.680	3.570	7.190
10	HL-93 Operating	33	31.35	0.730	-0.310	98.774
10	HL-93 Operating	33	31.35	3.200	1.830	15.383
11	HL-93 Operating	33	31.35	-1.960	-0.860	34.174
11	HL-93 Operating	33	31.35	-6.900	-2.380	10.273
12	HL-93 Operating	33	31.35	-3.460	-2.010	13.876
12	HL-93 Operating	33	31.35	-1.960	-0.860	34.174
13	HL-93 Operating	33	31.35	-8.360	-3.980	5.776
13	HL-93 Operating	33	31.35	-3.460	-2.010	13.876
14	HL-93 Operating	33	31.35	-13.260	-5.950	3.040
14	HL-93 Operating	33	31.35	-8.360	-3.980	5.776
15	HL-93 Operating	33	31.35	-18.140	-7.920	1.668
15	HL-93 Operating	33	31.35	-13.260	-5.950	3.040
16	HL-93 Operating	33	31.35	-13.090	-6.340	2.880
16	HL-93 Operating	33	31.35	-17.530	-8.460	1.634
17	HL-93 Operating	33	31.35	-8.630	-4.230	5.371
17	HL-93 Operating	33	31.35	-13.090	-6.340	2.880
18	HL-93 Operating	33	31.35	-4.180	-2.110	12.877
18	HL-93 Operating	33	31.35	-8.630	-4.230	5.371
19	HL-93 Operating	33	31.35	-0.630	-0.840	36.571
19	HL-93 Operating	33	31.35	-4.180	-2.110	12.877
20	HL-93 Operating	33	31.35	-5.120	-2.470	10.619
20	HL-93 Operating	33	31.35	-0.630	-0.840	36.571
21	HL-93 Operating	33	31.35	-3.410	1.880	14.862
21	HL-93 Operating	33	31.35	-0.780	-0.360	84.917
22	HL-93 Operating	33	31.35	-6.060	3.600	7.025
22	HL-93 Operating	33	31.35	-3.410	1.880	14.862
23	HL-93 Operating	33	31.35	-8.700	5.400	4.194
23	HL-93 Operating	33	31.35	-6.060	3.600	7.025
24	HL-93 Operating	33	31.35	-11.470	7.250	2.742
24	HL-93 Operating	33	31.35	-8.700	5.400	4.194
25	HL-93 Operating	33	31.35	-14.470	9.100	1.855
25	HL-93 Operating	33	31.35	-11.470	7.250	2.742
26	HL-93 Operating	33	31.35	10.840	7.290	2.813
26	HL-93 Operating	33	31.35	13.590	9.150	1.941
27	HL-93 Operating	33	31.35	8.130	5.430	4.276
27	HL-93 Operating	33	31.35	10.840	7.290	2.813
28	HL-93 Operating	33	31.35	5.530	3.570	7.232
28	HL-93 Operating	33	31.35	8.130	5.430	4.276
29	HL-93 Operating	33	31.35	2.930	1.850	15.362
29	HL-93 Operating	33	31.35	5.530	3.570	7.232
30	HL-93 Operating	33	31.35	0.330	-0.330	94.000
30	HL-93 Operating	33	31.35	2.930	1.850	15.362

Minimum Rating factor 1.634

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH NO SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	CT-L3S2	33	31.35	-3.000	1.050	27.000
1	CT-L3S2	33	31.35	-0.350	-0.200	155.000
2	CT-L3S2	33	31.35	-5.660	2.010	12.781
2	CT-L3S2	33	31.35	-3.000	1.050	27.000
3	CT-L3S2	33	31.35	-8.440	3.050	7.511
3	CT-L3S2	33	31.35	-5.660	2.010	12.781
4	CT-L3S2	33	31.35	-11.340	4.100	4.880
4	CT-L3S2	33	31.35	-8.440	3.050	7.511
5	CT-L3S2	33	31.35	-14.220	5.150	3.326
5	CT-L3S2	33	31.35	-11.340	4.100	4.880
6	CT-L3S2	33	31.35	10.600	4.120	5.036
6	CT-L3S2	33	31.35	13.230	5.170	3.505
7	CT-L3S2	33	31.35	8.140	3.060	7.585
7	CT-L3S2	33	31.35	10.600	4.120	5.036
8	CT-L3S2	33	31.35	5.680	2.010	12.771
8	CT-L3S2	33	31.35	8.140	3.060	7.585
9	CT-L3S2	33	31.35	3.200	1.040	27.067
9	CT-L3S2	33	31.35	5.680	2.010	12.771
10	CT-L3S2	33	31.35	0.730	-0.180	170.111
10	CT-L3S2	33	31.35	3.200	1.040	27.067
11	CT-L3S2	33	31.35	-1.960	-0.490	59.980
11	CT-L3S2	33	31.35	-6.900	-1.350	18.111
12	CT-L3S2	33	31.35	-3.460	-1.130	24.681
12	CT-L3S2	33	31.35	-1.960	-0.490	59.980
13	CT-L3S2	33	31.35	-8.360	-2.240	10.263
13	CT-L3S2	33	31.35	-3.460	-1.130	24.681
14	CT-L3S2	33	31.35	-13.260	-3.350	5.400
14	CT-L3S2	33	31.35	-8.360	-2.240	10.263
15	CT-L3S2	33	31.35	-18.140	-4.450	2.969
15	CT-L3S2	33	31.35	-13.260	-3.350	5.400
16	CT-L3S2	33	31.35	-13.090	-3.580	5.101
16	CT-L3S2	33	31.35	-17.530	-4.770	2.897
17	CT-L3S2	33	31.35	-8.630	-2.380	9.546
17	CT-L3S2	33	31.35	-13.090	-3.580	5.101
18	CT-L3S2	33	31.35	-4.180	-1.190	22.832
18	CT-L3S2	33	31.35	-8.630	-2.380	9.546
19	CT-L3S2	33	31.35	-0.630	-0.470	65.362
19	CT-L3S2	33	31.35	-4.180	-1.190	22.832
20	CT-L3S2	33	31.35	-5.120	-1.410	18.603
20	CT-L3S2	33	31.35	-0.630	-0.470	65.362
21	CT-L3S2	33	31.35	-3.410	1.070	26.112
21	CT-L3S2	33	31.35	-0.780	-0.210	145.571
22	CT-L3S2	33	31.35	-6.060	2.020	12.520
22	CT-L3S2	33	31.35	-3.410	1.070	26.112
23	CT-L3S2	33	31.35	-8.700	3.050	7.426
23	CT-L3S2	33	31.35	-6.060	2.020	12.520
24	CT-L3S2	33	31.35	-11.470	4.100	4.849
24	CT-L3S2	33	31.35	-8.700	3.050	7.426
25	CT-L3S2	33	31.35	-14.470	5.150	3.278
25	CT-L3S2	33	31.35	-11.470	4.100	4.849
26	CT-L3S2	33	31.35	10.840	4.120	4.978
26	CT-L3S2	33	31.35	13.590	5.180	3.429
27	CT-L3S2	33	31.35	8.130	3.070	7.564
27	CT-L3S2	33	31.35	10.840	4.120	4.978
28	CT-L3S2	33	31.35	5.530	2.010	12.846
28	CT-L3S2	33	31.35	8.130	3.070	7.564
29	CT-L3S2	33	31.35	2.930	1.050	27.067
29	CT-L3S2	33	31.35	5.530	2.010	12.846
30	CT-L3S2	33	31.35	0.330	-0.200	155.100
30	CT-L3S2	33	31.35	2.930	1.050	27.067

Minimum Rating factor 2.897

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH NO SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	CT-L73.0	33	31.35	-3.000	1.390	20.396
1	CT-L73.0	33	31.35	-0.350	-0.230	134.783
2	CT-L73.0	33	31.35	-5.660	2.710	9.480
2	CT-L73.0	33	31.35	-3.000	1.390	20.396
3	CT-L73.0	33	31.35	-8.440	4.070	5.629
3	CT-L73.0	33	31.35	-5.660	2.710	9.480
4	CT-L73.0	33	31.35	-11.340	5.450	3.672
4	CT-L73.0	33	31.35	-8.440	4.070	5.629
5	CT-L73.0	33	31.35	-14.220	6.830	2.508
5	CT-L73.0	33	31.35	-11.340	5.450	3.672
6	CT-L73.0	33	31.35	10.600	5.470	3.793
6	CT-L73.0	33	31.35	13.230	6.850	2.645
7	CT-L73.0	33	31.35	8.140	4.080	5.689
7	CT-L73.0	33	31.35	10.600	5.470	3.793
8	CT-L73.0	33	31.35	5.680	2.700	9.507
8	CT-L73.0	33	31.35	8.140	4.080	5.689
9	CT-L73.0	33	31.35	3.200	1.370	20.547
9	CT-L73.0	33	31.35	5.680	2.700	9.507
10	CT-L73.0	33	31.35	0.730	0.220	139.182
10	CT-L73.0	33	31.35	3.200	1.370	20.547
11	CT-L73.0	33	31.35	-1.960	-0.640	45.922
11	CT-L73.0	33	31.35	-6.900	-1.790	13.659
12	CT-L73.0	33	31.35	-3.460	-1.520	18.349
12	CT-L73.0	33	31.35	-1.960	-0.640	45.922
13	CT-L73.0	33	31.35	-8.360	-3.010	7.638
13	CT-L73.0	33	31.35	-3.460	-1.520	18.349
14	CT-L73.0	33	31.35	-13.260	-4.500	4.020
14	CT-L73.0	33	31.35	-8.360	-3.010	7.638
15	CT-L73.0	33	31.35	-18.140	-5.990	2.205
15	CT-L73.0	33	31.35	-13.260	-4.500	4.020
16	CT-L73.0	33	31.35	-13.090	-4.790	3.812
16	CT-L73.0	33	31.35	-17.530	-6.390	2.163
17	CT-L73.0	33	31.35	-8.630	-3.190	7.122
17	CT-L73.0	33	31.35	-13.090	-4.790	3.812
18	CT-L73.0	33	31.35	-4.180	-1.600	16.981
18	CT-L73.0	33	31.35	-8.630	-3.190	7.122
19	CT-L73.0	33	31.35	-0.630	-0.640	48.000
19	CT-L73.0	33	31.35	-4.180	-1.600	16.981
20	CT-L73.0	33	31.35	-5.120	-1.840	14.255
20	CT-L73.0	33	31.35	-0.630	-0.640	48.000
21	CT-L73.0	33	31.35	-3.410	1.410	19.816
21	CT-L73.0	33	31.35	-0.780	-0.240	127.375
22	CT-L73.0	33	31.35	-6.060	2.730	9.264
22	CT-L73.0	33	31.35	-3.410	1.410	19.816
23	CT-L73.0	33	31.35	-8.700	4.070	5.565
23	CT-L73.0	33	31.35	-6.060	2.730	9.264
24	CT-L73.0	33	31.35	-11.470	5.450	3.648
24	CT-L73.0	33	31.35	-8.700	4.070	5.565
25	CT-L73.0	33	31.35	-14.470	6.840	2.468
25	CT-L73.0	33	31.35	-11.470	5.450	3.648
26	CT-L73.0	33	31.35	10.840	5.480	3.743
26	CT-L73.0	33	31.35	13.590	6.870	2.585
27	CT-L73.0	33	31.35	8.130	4.090	5.677
27	CT-L73.0	33	31.35	10.840	5.480	3.743
28	CT-L73.0	33	31.35	5.530	2.700	9.563
28	CT-L73.0	33	31.35	8.130	4.090	5.677
29	CT-L73.0	33	31.35	2.930	1.390	20.446
29	CT-L73.0	33	31.35	5.530	2.700	9.563
30	CT-L73.0	33	31.35	0.330	-0.230	134.870
30	CT-L73.0	33	31.35	2.930	1.390	20.446

Minimum Rating factor 2.163

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH NO SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=Y_{LL}$*LL

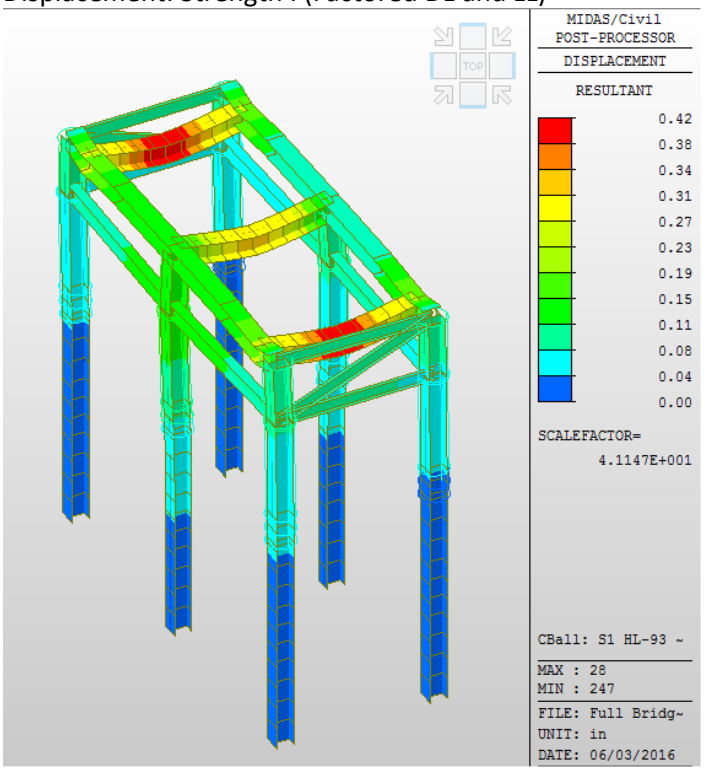
ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	CT-L3S2 + Lane Load	33	31.35	-3.000	1.050	27.000
1	CT-L3S2 + Lane Load	33	31.35	-0.350	-0.200	155.000
2	CT-L3S2 + Lane Load	33	31.35	-5.660	2.010	12.781
2	CT-L3S2 + Lane Load	33	31.35	-3.000	1.050	27.000
3	CT-L3S2 + Lane Load	33	31.35	-8.440	3.050	7.511
3	CT-L3S2 + Lane Load	33	31.35	-5.660	2.010	12.781
4	CT-L3S2 + Lane Load	33	31.35	-11.340	4.100	4.880
4	CT-L3S2 + Lane Load	33	31.35	-8.440	3.050	7.511
5	CT-L3S2 + Lane Load	33	31.35	-14.220	5.150	3.326
5	CT-L3S2 + Lane Load	33	31.35	-11.340	4.100	4.880
6	CT-L3S2 + Lane Load	33	31.35	10.600	4.120	5.036
6	CT-L3S2 + Lane Load	33	31.35	13.230	5.170	3.505
7	CT-L3S2 + Lane Load	33	31.35	8.140	3.060	7.585
7	CT-L3S2 + Lane Load	33	31.35	10.600	4.120	5.036
8	CT-L3S2 + Lane Load	33	31.35	5.680	2.010	12.771
8	CT-L3S2 + Lane Load	33	31.35	8.140	3.060	7.585
9	CT-L3S2 + Lane Load	33	31.35	3.200	1.040	27.067
9	CT-L3S2 + Lane Load	33	31.35	5.680	2.010	12.771
10	CT-L3S2 + Lane Load	33	31.35	0.730	-0.180	170.111
10	CT-L3S2 + Lane Load	33	31.35	3.200	1.040	27.067
11	CT-L3S2 + Lane Load	33	31.35	-1.960	-0.490	59.980
11	CT-L3S2 + Lane Load	33	31.35	-6.900	-1.350	18.111
12	CT-L3S2 + Lane Load	33	31.35	-3.460	-1.130	24.681
12	CT-L3S2 + Lane Load	33	31.35	-1.960	-0.490	59.980
13	CT-L3S2 + Lane Load	33	31.35	-8.360	-2.240	10.263
13	CT-L3S2 + Lane Load	33	31.35	-3.460	-1.130	24.681
14	CT-L3S2 + Lane Load	33	31.35	-13.260	-3.350	5.400
14	CT-L3S2 + Lane Load	33	31.35	-8.360	-2.240	10.263
15	CT-L3S2 + Lane Load	33	31.35	-18.140	-4.450	2.969
15	CT-L3S2 + Lane Load	33	31.35	-13.260	-3.350	5.400
16	CT-L3S2 + Lane Load	33	31.35	-13.090	-3.580	5.101
16	CT-L3S2 + Lane Load	33	31.35	-17.530	-4.770	2.897
17	CT-L3S2 + Lane Load	33	31.35	-8.630	-2.380	9.546
17	CT-L3S2 + Lane Load	33	31.35	-13.090	-3.580	5.101
18	CT-L3S2 + Lane Load	33	31.35	-4.180	-1.190	22.832
18	CT-L3S2 + Lane Load	33	31.35	-8.630	-2.380	9.546
19	CT-L3S2 + Lane Load	33	31.35	-0.630	-0.470	65.362
19	CT-L3S2 + Lane Load	33	31.35	-4.180	-1.190	22.832
20	CT-L3S2 + Lane Load	33	31.35	-5.120	-1.410	18.603
20	CT-L3S2 + Lane Load	33	31.35	-0.630	-0.470	65.362
21	CT-L3S2 + Lane Load	33	31.35	-3.410	1.070	26.112
21	CT-L3S2 + Lane Load	33	31.35	-0.780	-0.210	145.571
22	CT-L3S2 + Lane Load	33	31.35	-6.060	2.020	12.520
22	CT-L3S2 + Lane Load	33	31.35	-3.410	1.070	26.112
23	CT-L3S2 + Lane Load	33	31.35	-8.700	3.050	7.426
23	CT-L3S2 + Lane Load	33	31.35	-6.060	2.020	12.520
24	CT-L3S2 + Lane Load	33	31.35	-11.470	4.100	4.849
24	CT-L3S2 + Lane Load	33	31.35	-8.700	3.050	7.426
25	CT-L3S2 + Lane Load	33	31.35	-14.470	5.150	3.278
25	CT-L3S2 + Lane Load	33	31.35	-11.470	4.100	4.849
26	CT-L3S2 + Lane Load	33	31.35	10.840	4.120	4.978
26	CT-L3S2 + Lane Load	33	31.35	13.590	5.180	3.429
27	CT-L3S2 + Lane Load	33	31.35	8.130	3.070	7.564
27	CT-L3S2 + Lane Load	33	31.35	10.840	4.120	4.978
28	CT-L3S2 + Lane Load	33	31.35	5.530	2.010	12.846
28	CT-L3S2 + Lane Load	33	31.35	8.130	3.070	7.564
29	CT-L3S2 + Lane Load	33	31.35	2.930	1.050	27.067
29	CT-L3S2 + Lane Load	33	31.35	5.530	2.010	12.846
30	CT-L3S2 + Lane Load	33	31.35	0.330	-0.200	155.100
30	CT-L3S2 + Lane Load	33	31.35	2.930	1.050	27.067

Minimum Rating factor 2.897

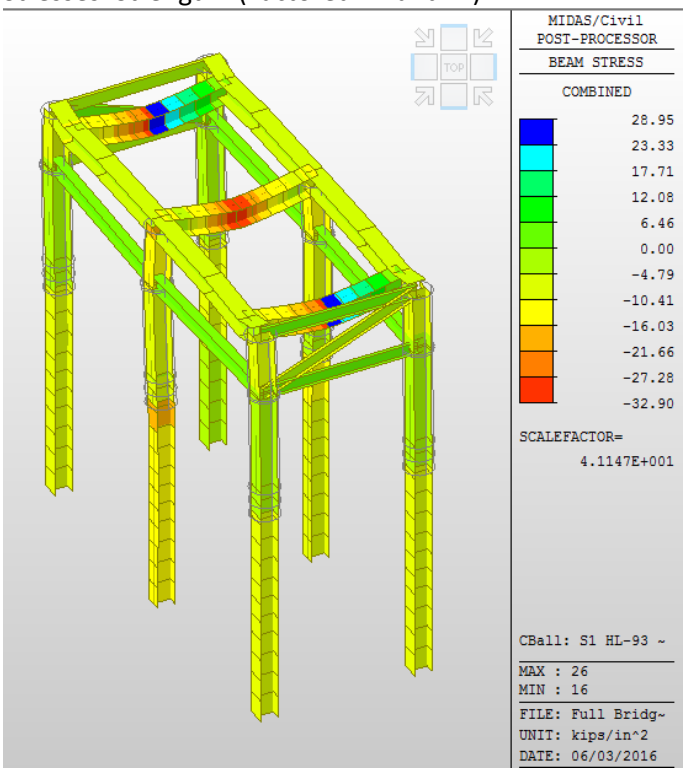
LRFD ANALYSIS

Pier 2 (With Section Loss)

Displacement: Strength I (Factored DL and LL)



Stresses: Strength I (Factored DL and LL)



36 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ± Sbz ± Sax (Warping).

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH 10% SECTION LOSS

RF= RATING FACTOR

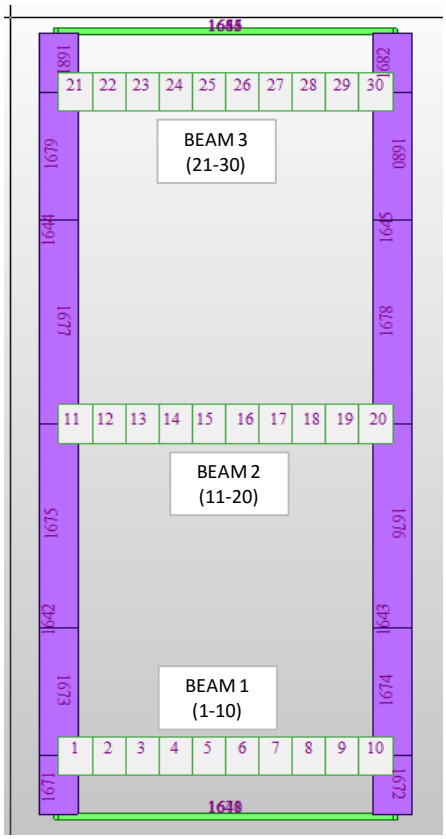
$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

$f_{DL+SDL}=1.25*DL+1.5*DW$

$f_{LL+I}=Y_{LL}*LL$

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	H-20	33	31.35	-3.440	1.290	21.636
1	H-20	33	31.35	-0.460	-0.210	147.095
2	H-20	33	31.35	-6.440	2.540	9.807
2	H-20	33	31.35	-3.440	1.290	21.636
3	H-20	33	31.35	-9.520	3.780	5.775
3	H-20	33	31.35	-6.440	2.540	9.807
4	H-20	33	31.35	-12.810	5.060	3.664
4	H-20	33	31.35	-9.520	3.780	5.775
5	H-20	33	31.35	-16.090	6.340	2.407
5	H-20	33	31.35	-12.810	5.060	3.664
6	H-20	33	31.35	11.950	5.060	3.834
6	H-20	33	31.35	15.020	6.340	2.576
7	H-20	33	31.35	9.220	3.780	5.854
7	H-20	33	31.35	11.950	5.060	3.834
8	H-20	33	31.35	6.470	2.520	9.873
8	H-20	33	31.35	9.220	3.780	5.854
9	H-20	33	31.35	3.710	1.280	21.594
9	H-20	33	31.35	6.470	2.520	9.873
10	H-20	33	31.35	0.960	0.210	144.714
10	H-20	33	31.35	3.710	1.280	21.594
11	H-20	33	31.35	-2.800	-0.730	39.110
11	H-20	33	31.35	-8.630	-1.830	12.415
12	H-20	33	31.35	-3.670	-1.350	20.504
12	H-20	33	31.35	-2.800	-0.730	39.110
13	H-20	33	31.35	-9.430	-2.780	7.885
13	H-20	33	31.35	-3.670	-1.350	20.504
14	H-20	33	31.35	-15.210	-4.220	3.825
14	H-20	33	31.35	-9.430	-2.780	7.885
15	H-20	33	31.35	-20.990	-5.650	1.834
15	H-20	33	31.35	-15.210	-4.220	3.825
16	H-20	33	31.35	-15.000	-4.460	3.666
16	H-20	33	31.35	-20.280	-5.990	1.848
17	H-20	33	31.35	-9.710	-2.940	7.361
17	H-20	33	31.35	-15.000	-4.460	3.666
18	H-20	33	31.35	-4.460	-1.420	18.937
18	H-20	33	31.35	-9.710	-2.940	7.361
19	H-20	33	31.35	-1.320	-0.730	41.137
19	H-20	33	31.35	-4.460	-1.420	18.937
20	H-20	33	31.35	-6.640	-1.870	13.214
20	H-20	33	31.35	-1.320	-0.730	41.137
21	H-20	33	31.35	-3.930	1.310	20.931
21	H-20	33	31.35	-0.980	-0.220	138.045
22	H-20	33	31.35	-6.900	2.550	9.588
22	H-20	33	31.35	-3.930	1.310	20.931
23	H-20	33	31.35	-9.870	3.790	5.668
23	H-20	33	31.35	-6.900	2.550	9.588
24	H-20	33	31.35	-12.980	5.060	3.630
24	H-20	33	31.35	-9.870	3.790	5.668
25	H-20	33	31.35	-16.410	6.340	2.356
25	H-20	33	31.35	-12.980	5.060	3.630
26	H-20	33	31.35	12.270	5.070	3.763
26	H-20	33	31.35	15.410	6.360	2.506
27	H-20	33	31.35	9.200	3.790	5.844
27	H-20	33	31.35	12.270	5.070	3.763
28	H-20	33	31.35	6.300	2.530	9.901
28	H-20	33	31.35	9.200	3.790	5.844
29	H-20	33	31.35	3.380	1.290	21.682
29	H-20	33	31.35	6.300	2.530	9.901
30	H-20	33	31.35	0.480	-0.210	147.000
30	H-20	33	31.35	3.380	1.290	21.682

Minimum Rating factor 1.834



LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH 10% SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	HS-20	33	31.35	-3.440	2.060	13.549
1	HS-20	33	31.35	-0.460	-0.360	85.806
2	HS-20	33	31.35	-6.440	4.020	6.197
2	HS-20	33	31.35	-3.440	2.060	13.549
3	HS-20	33	31.35	-9.520	6.020	3.626
3	HS-20	33	31.35	-6.440	4.020	6.197
4	HS-20	33	31.35	-12.810	8.060	2.300
4	HS-20	33	31.35	-9.520	6.020	3.626
5	HS-20	33	31.35	-16.090	10.100	1.511
5	HS-20	33	31.35	-12.810	8.060	2.300
6	HS-20	33	31.35	11.950	8.070	2.404
6	HS-20	33	31.35	15.020	10.110	1.615
7	HS-20	33	31.35	9.220	6.020	3.676
7	HS-20	33	31.35	11.950	8.070	2.404
8	HS-20	33	31.35	6.470	3.990	6.236
8	HS-20	33	31.35	9.220	6.020	3.676
9	HS-20	33	31.35	3.710	2.050	13.483
9	HS-20	33	31.35	6.470	3.990	6.236
10	HS-20	33	31.35	0.960	0.360	84.417
10	HS-20	33	31.35	3.710	2.050	13.483
11	HS-20	33	31.35	-2.800	-1.170	24.402
11	HS-20	33	31.35	-8.630	-2.910	7.808
12	HS-20	33	31.35	-3.670	-2.140	12.935
12	HS-20	33	31.35	-2.800	-1.170	24.402
13	HS-20	33	31.35	-9.430	-4.410	4.971
13	HS-20	33	31.35	-3.670	-2.140	12.935
14	HS-20	33	31.35	-15.210	-6.680	2.416
14	HS-20	33	31.35	-9.430	-4.410	4.971
15	HS-20	33	31.35	-20.990	-8.950	1.158
15	HS-20	33	31.35	-15.210	-6.680	2.416
16	HS-20	33	31.35	-15.000	-7.080	2.309
16	HS-20	33	31.35	-20.280	-9.500	1.165
17	HS-20	33	31.35	-9.710	-4.660	4.644
17	HS-20	33	31.35	-15.000	-7.080	2.309
18	HS-20	33	31.35	-4.460	-2.240	12.004
18	HS-20	33	31.35	-9.710	-4.660	4.644
19	HS-20	33	31.35	-1.320	-1.150	26.113
19	HS-20	33	31.35	-4.460	-2.240	12.004
20	HS-20	33	31.35	-6.640	-2.990	8.264
20	HS-20	33	31.35	-1.320	-1.150	26.113
21	HS-20	33	31.35	-3.930	2.090	13.120
21	HS-20	33	31.35	-0.980	-0.380	79.921
22	HS-20	33	31.35	-6.900	4.040	6.052
22	HS-20	33	31.35	-3.930	2.090	13.120
23	HS-20	33	31.35	-9.870	6.010	3.574
23	HS-20	33	31.35	-6.900	4.040	6.052
24	HS-20	33	31.35	-12.980	8.060	2.279
24	HS-20	33	31.35	-9.870	6.010	3.574
25	HS-20	33	31.35	-16.410	10.110	1.478
25	HS-20	33	31.35	-12.980	8.060	2.279
26	HS-20	33	31.35	12.270	8.080	2.361
26	HS-20	33	31.35	15.410	10.130	1.574
27	HS-20	33	31.35	9.200	6.030	3.673
27	HS-20	33	31.35	12.270	8.080	2.361
28	HS-20	33	31.35	6.300	4.010	6.247
28	HS-20	33	31.35	9.200	6.030	3.673
29	HS-20	33	31.35	3.380	2.060	13.578
29	HS-20	33	31.35	6.300	4.010	6.247
30	HS-20	33	31.35	0.480	-0.360	85.750
30	HS-20	33	31.35	3.380	2.060	13.578

Minimum Rating factor 1.158

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH 10% SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	.95F_Y (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	HL-93 Inventory	33	31.35	-3.440	2.770	10.076
1	HL-93 Inventory	33	31.35	-0.460	-0.530	58.283
2	HL-93 Inventory	33	31.35	-6.440	5.350	4.656
2	HL-93 Inventory	33	31.35	-3.440	2.770	10.076
3	HL-93 Inventory	33	31.35	-9.520	8.020	2.722
3	HL-93 Inventory	33	31.35	-6.440	5.350	4.656
4	HL-93 Inventory	33	31.35	-12.810	10.760	1.723
4	HL-93 Inventory	33	31.35	-9.520	8.020	2.722
5	HL-93 Inventory	33	31.35	-16.090	13.500	1.130
5	HL-93 Inventory	33	31.35	-12.810	10.760	1.723
6	HL-93 Inventory	33	31.35	11.950	10.770	1.801
6	HL-93 Inventory	33	31.35	15.020	13.510	1.209
7	HL-93 Inventory	33	31.35	9.220	8.020	2.759
7	HL-93 Inventory	33	31.35	11.950	10.770	1.801
8	HL-93 Inventory	33	31.35	6.470	5.300	4.694
8	HL-93 Inventory	33	31.35	9.220	8.020	2.759
9	HL-93 Inventory	33	31.35	3.710	2.740	10.088
9	HL-93 Inventory	33	31.35	6.470	5.300	4.694
10	HL-93 Inventory	33	31.35	0.960	0.520	58.442
10	HL-93 Inventory	33	31.35	3.710	2.740	10.088
11	HL-93 Inventory	33	31.35	-2.800	-1.560	18.301
11	HL-93 Inventory	33	31.35	-8.630	-3.880	5.856
12	HL-93 Inventory	33	31.35	-3.670	-2.840	9.746
12	HL-93 Inventory	33	31.35	-2.800	-1.560	18.301
13	HL-93 Inventory	33	31.35	-9.430	-5.860	3.741
13	HL-93 Inventory	33	31.35	-3.670	-2.840	9.746
14	HL-93 Inventory	33	31.35	-15.210	-8.880	1.818
14	HL-93 Inventory	33	31.35	-9.430	-5.860	3.741
15	HL-93 Inventory	33	31.35	-20.990	-11.890	0.871
15	HL-93 Inventory	33	31.35	-15.210	-8.880	1.818
16	HL-93 Inventory	33	31.35	-15.000	-9.420	1.736
16	HL-93 Inventory	33	31.35	-20.280	-12.640	0.876
17	HL-93 Inventory	33	31.35	-9.710	-6.190	3.496
17	HL-93 Inventory	33	31.35	-15.000	-9.420	1.736
18	HL-93 Inventory	33	31.35	-4.460	-2.970	9.054
18	HL-93 Inventory	33	31.35	-9.710	-6.190	3.496
19	HL-93 Inventory	33	31.35	-1.320	-1.530	19.627
19	HL-93 Inventory	33	31.35	-4.460	-2.970	9.054
20	HL-93 Inventory	33	31.35	-6.640	-4.020	6.147
20	HL-93 Inventory	33	31.35	-1.320	-1.530	19.627
21	HL-93 Inventory	33	31.35	-3.930	2.810	9.758
21	HL-93 Inventory	33	31.35	-0.980	-0.560	54.232
22	HL-93 Inventory	33	31.35	-6.900	5.370	4.553
22	HL-93 Inventory	33	31.35	-3.930	2.810	9.758
23	HL-93 Inventory	33	31.35	-9.870	8.010	2.682
23	HL-93 Inventory	33	31.35	-6.900	5.370	4.553
24	HL-93 Inventory	33	31.35	-12.980	10.760	1.707
24	HL-93 Inventory	33	31.35	-9.870	8.010	2.682
25	HL-93 Inventory	33	31.35	-16.410	13.510	1.106
25	HL-93 Inventory	33	31.35	-12.980	10.760	1.707
26	HL-93 Inventory	33	31.35	12.270	10.790	1.768
26	HL-93 Inventory	33	31.35	15.410	13.540	1.177
27	HL-93 Inventory	33	31.35	9.200	8.040	2.755
27	HL-93 Inventory	33	31.35	12.270	10.790	1.768
28	HL-93 Inventory	33	31.35	6.300	5.330	4.700
28	HL-93 Inventory	33	31.35	9.200	8.040	2.755
29	HL-93 Inventory	33	31.35	3.380	2.770	10.097
29	HL-93 Inventory	33	31.35	6.300	5.330	4.700
30	HL-93 Inventory	33	31.35	0.480	-0.530	58.245
30	HL-93 Inventory	33	31.35	3.380	2.770	10.097

Minimum Rating factor 0.871

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH 10% SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

$f_{LL+I}=\gamma_{LL}$*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	HL-93 Operating	33	31.35	-3.440	2.130	13.103
1	HL-93 Operating	33	31.35	-0.460	-0.410	75.341
2	HL-93 Operating	33	31.35	-6.440	4.120	6.046
2	HL-93 Operating	33	31.35	-3.440	2.130	13.103
3	HL-93 Operating	33	31.35	-9.520	6.190	3.527
3	HL-93 Operating	33	31.35	-6.440	4.120	6.046
4	HL-93 Operating	33	31.35	-12.810	8.300	2.234
4	HL-93 Operating	33	31.35	-9.520	6.190	3.527
5	HL-93 Operating	33	31.35	-16.090	10.420	1.464
5	HL-93 Operating	33	31.35	-12.810	8.300	2.234
6	HL-93 Operating	33	31.35	11.950	8.310	2.335
6	HL-93 Operating	33	31.35	15.020	10.420	1.567
7	HL-93 Operating	33	31.35	9.220	6.190	3.575
7	HL-93 Operating	33	31.35	11.950	8.310	2.335
8	HL-93 Operating	33	31.35	6.470	4.090	6.083
8	HL-93 Operating	33	31.35	9.220	6.190	3.575
9	HL-93 Operating	33	31.35	3.710	2.120	13.038
9	HL-93 Operating	33	31.35	6.470	4.090	6.083
10	HL-93 Operating	33	31.35	0.960	0.400	75.975
10	HL-93 Operating	33	31.35	3.710	2.120	13.038
11	HL-93 Operating	33	31.35	-2.800	-1.200	23.792
11	HL-93 Operating	33	31.35	-8.630	-3.000	7.573
12	HL-93 Operating	33	31.35	-3.670	-2.190	12.639
12	HL-93 Operating	33	31.35	-2.800	-1.200	23.792
13	HL-93 Operating	33	31.35	-9.430	-4.520	4.850
13	HL-93 Operating	33	31.35	-3.670	-2.190	12.639
14	HL-93 Operating	33	31.35	-15.210	-6.850	2.356
14	HL-93 Operating	33	31.35	-9.430	-4.520	4.850
15	HL-93 Operating	33	31.35	-20.990	-9.180	1.129
15	HL-93 Operating	33	31.35	-15.210	-6.850	2.356
16	HL-93 Operating	33	31.35	-15.000	-7.260	2.252
16	HL-93 Operating	33	31.35	-20.280	-9.750	1.135
17	HL-93 Operating	33	31.35	-9.710	-4.780	4.527
17	HL-93 Operating	33	31.35	-15.000	-7.260	2.252
18	HL-93 Operating	33	31.35	-4.460	-2.290	11.742
18	HL-93 Operating	33	31.35	-9.710	-4.780	4.527
19	HL-93 Operating	33	31.35	-1.320	-1.180	25.449
19	HL-93 Operating	33	31.35	-4.460	-2.290	11.742
20	HL-93 Operating	33	31.35	-6.640	-3.100	7.971
20	HL-93 Operating	33	31.35	-1.320	-1.180	25.449
21	HL-93 Operating	33	31.35	-3.930	2.160	12.694
21	HL-93 Operating	33	31.35	-0.980	-0.440	69.023
22	HL-93 Operating	33	31.35	-6.900	4.140	5.906
22	HL-93 Operating	33	31.35	-3.930	2.160	12.694
23	HL-93 Operating	33	31.35	-9.870	6.180	3.476
23	HL-93 Operating	33	31.35	-6.900	4.140	5.906
24	HL-93 Operating	33	31.35	-12.980	8.300	2.213
24	HL-93 Operating	33	31.35	-9.870	6.180	3.476
25	HL-93 Operating	33	31.35	-16.410	10.420	1.434
25	HL-93 Operating	33	31.35	-12.980	8.300	2.213
26	HL-93 Operating	33	31.35	12.270	8.330	2.291
26	HL-93 Operating	33	31.35	15.410	10.450	1.525
27	HL-93 Operating	33	31.35	9.200	6.200	3.573
27	HL-93 Operating	33	31.35	12.270	8.330	2.291
28	HL-93 Operating	33	31.35	6.300	4.110	6.095
28	HL-93 Operating	33	31.35	9.200	6.200	3.573
29	HL-93 Operating	33	31.35	3.380	2.130	13.131
29	HL-93 Operating	33	31.35	6.300	4.110	6.095
30	HL-93 Operating	33	31.35	0.480	-0.410	75.293
30	HL-93 Operating	33	31.35	3.380	2.130	13.131

Minimum Rating factor 1.129

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH 10% SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	.95F_Y (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	CT-L3S2	33	31.35	-3.440	1.210	23.066
1	CT-L3S2	33	31.35	-0.460	-0.240	128.708
2	CT-L3S2	33	31.35	-6.440	2.320	10.737
2	CT-L3S2	33	31.35	-3.440	1.210	23.066
3	CT-L3S2	33	31.35	-9.520	3.490	6.255
3	CT-L3S2	33	31.35	-6.440	2.320	10.737
4	CT-L3S2	33	31.35	-12.810	4.700	3.945
4	CT-L3S2	33	31.35	-9.520	3.490	6.255
5	CT-L3S2	33	31.35	-16.090	5.900	2.586
5	CT-L3S2	33	31.35	-12.810	4.700	3.945
6	CT-L3S2	33	31.35	11.950	4.700	4.128
6	CT-L3S2	33	31.35	15.020	5.900	2.768
7	CT-L3S2	33	31.35	9.220	3.490	6.341
7	CT-L3S2	33	31.35	11.950	4.700	4.128
8	CT-L3S2	33	31.35	6.470	2.290	10.865
8	CT-L3S2	33	31.35	9.220	3.490	6.341
9	CT-L3S2	33	31.35	3.710	1.200	23.033
9	CT-L3S2	33	31.35	6.470	2.290	10.865
10	CT-L3S2	33	31.35	0.960	0.230	132.130
10	CT-L3S2	33	31.35	3.710	1.200	23.033
11	CT-L3S2	33	31.35	-2.800	-0.680	41.985
11	CT-L3S2	33	31.35	-8.630	-1.700	13.365
12	CT-L3S2	33	31.35	-3.670	-1.230	22.504
12	CT-L3S2	33	31.35	-2.800	-0.680	41.985
13	CT-L3S2	33	31.35	-9.430	-2.540	8.630
13	CT-L3S2	33	31.35	-3.670	-1.230	22.504
14	CT-L3S2	33	31.35	-15.210	-3.850	4.192
14	CT-L3S2	33	31.35	-9.430	-2.540	8.630
15	CT-L3S2	33	31.35	-20.990	-5.160	2.008
15	CT-L3S2	33	31.35	-15.210	-3.850	4.192
16	CT-L3S2	33	31.35	-15.000	-4.090	3.998
16	CT-L3S2	33	31.35	-20.280	-5.500	2.013
17	CT-L3S2	33	31.35	-9.710	-2.690	8.045
17	CT-L3S2	33	31.35	-15.000	-4.090	3.998
18	CT-L3S2	33	31.35	-4.460	-1.290	20.845
18	CT-L3S2	33	31.35	-9.710	-2.690	8.045
19	CT-L3S2	33	31.35	-1.320	-0.660	45.500
19	CT-L3S2	33	31.35	-4.460	-1.290	20.845
20	CT-L3S2	33	31.35	-6.640	-1.770	13.960
20	CT-L3S2	33	31.35	-1.320	-0.660	45.500
21	CT-L3S2	33	31.35	-3.930	1.230	22.293
21	CT-L3S2	33	31.35	-0.980	-0.260	116.808
22	CT-L3S2	33	31.35	-6.900	2.330	10.494
22	CT-L3S2	33	31.35	-3.930	1.230	22.293
23	CT-L3S2	33	31.35	-9.870	3.490	6.155
23	CT-L3S2	33	31.35	-6.900	2.330	10.494
24	CT-L3S2	33	31.35	-12.980	4.700	3.909
24	CT-L3S2	33	31.35	-9.870	3.490	6.155
25	CT-L3S2	33	31.35	-16.410	5.900	2.532
25	CT-L3S2	33	31.35	-12.980	4.700	3.909
26	CT-L3S2	33	31.35	12.270	4.710	4.051
26	CT-L3S2	33	31.35	15.410	5.920	2.693
27	CT-L3S2	33	31.35	9.200	3.500	6.329
27	CT-L3S2	33	31.35	12.270	4.710	4.051
28	CT-L3S2	33	31.35	6.300	2.310	10.844
28	CT-L3S2	33	31.35	9.200	3.500	6.329
29	CT-L3S2	33	31.35	3.380	1.210	23.116
29	CT-L3S2	33	31.35	6.300	2.310	10.844
30	CT-L3S2	33	31.35	0.480	-0.240	128.625
30	CT-L3S2	33	31.35	3.380	1.210	23.116

Minimum Rating factor 2.008

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH 10% SECTION LOSS

RF= RATING FACTOR

$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	CT-L73.0	33	31.35	-3.440	1.600	17.444
1	CT-L73.0	33	31.35	-0.460	-0.280	110.321
2	CT-L73.0	33	31.35	-6.440	3.120	7.984
2	CT-L73.0	33	31.35	-3.440	1.600	17.444
3	CT-L73.0	33	31.35	-9.520	4.660	4.685
3	CT-L73.0	33	31.35	-6.440	3.120	7.984
4	CT-L73.0	33	31.35	-12.810	6.240	2.971
4	CT-L73.0	33	31.35	-9.520	4.660	4.685
5	CT-L73.0	33	31.35	-16.090	7.820	1.951
5	CT-L73.0	33	31.35	-12.810	6.240	2.971
6	CT-L73.0	33	31.35	11.950	6.240	3.109
6	CT-L73.0	33	31.35	15.020	7.830	2.086
7	CT-L73.0	33	31.35	9.220	4.660	4.749
7	CT-L73.0	33	31.35	11.950	6.240	3.109
8	CT-L73.0	33	31.35	6.470	3.090	8.052
8	CT-L73.0	33	31.35	9.220	4.660	4.749
9	CT-L73.0	33	31.35	3.710	1.580	17.494
9	CT-L73.0	33	31.35	6.470	3.090	8.052
10	CT-L73.0	33	31.35	0.960	0.280	108.536
10	CT-L73.0	33	31.35	3.710	1.580	17.494
11	CT-L73.0	33	31.35	-2.800	-0.900	31.722
11	CT-L73.0	33	31.35	-8.630	-2.250	10.098
12	CT-L73.0	33	31.35	-3.670	-1.660	16.675
12	CT-L73.0	33	31.35	-2.800	-0.900	31.722
13	CT-L73.0	33	31.35	-9.430	-3.420	6.409
13	CT-L73.0	33	31.35	-3.670	-1.660	16.675
14	CT-L73.0	33	31.35	-15.210	-5.180	3.116
14	CT-L73.0	33	31.35	-9.430	-3.420	6.409
15	CT-L73.0	33	31.35	-20.990	-6.940	1.493
15	CT-L73.0	33	31.35	-15.210	-5.180	3.116
16	CT-L73.0	33	31.35	-15.000	-5.490	2.978
16	CT-L73.0	33	31.35	-20.280	-7.360	1.504
17	CT-L73.0	33	31.35	-9.710	-3.610	5.994
17	CT-L73.0	33	31.35	-15.000	-5.490	2.978
18	CT-L73.0	33	31.35	-4.460	-1.740	15.454
18	CT-L73.0	33	31.35	-9.710	-3.610	5.994
19	CT-L73.0	33	31.35	-1.320	-0.890	33.742
19	CT-L73.0	33	31.35	-4.460	-1.740	15.454
20	CT-L73.0	33	31.35	-6.640	-2.310	10.697
20	CT-L73.0	33	31.35	-1.320	-0.890	33.742
21	CT-L73.0	33	31.35	-3.930	1.620	16.926
21	CT-L73.0	33	31.35	-0.980	-0.300	101.233
22	CT-L73.0	33	31.35	-6.900	3.130	7.812
22	CT-L73.0	33	31.35	-3.930	1.620	16.926
23	CT-L73.0	33	31.35	-9.870	4.650	4.619
23	CT-L73.0	33	31.35	-6.900	3.130	7.812
24	CT-L73.0	33	31.35	-12.980	6.240	2.944
24	CT-L73.0	33	31.35	-9.870	4.650	4.619
25	CT-L73.0	33	31.35	-16.410	7.830	1.908
25	CT-L73.0	33	31.35	-12.980	6.240	2.944
26	CT-L73.0	33	31.35	12.270	6.260	3.048
26	CT-L73.0	33	31.35	15.410	7.850	2.031
27	CT-L73.0	33	31.35	9.200	4.670	4.743
27	CT-L73.0	33	31.35	12.270	6.260	3.048
28	CT-L73.0	33	31.35	6.300	3.110	8.055
28	CT-L73.0	33	31.35	9.200	4.670	4.743
29	CT-L73.0	33	31.35	3.380	1.600	17.481
29	CT-L73.0	33	31.35	6.300	3.110	8.055
30	CT-L73.0	33	31.35	0.480	-0.280	110.250
30	CT-L73.0	33	31.35	3.380	1.600	17.481

Minimum Rating factor 1.493

LOAD RATING CARRYING BEAMS

WF 14 x 219 WITH 10% SECTION LOSS

RF= RATING FACTOR

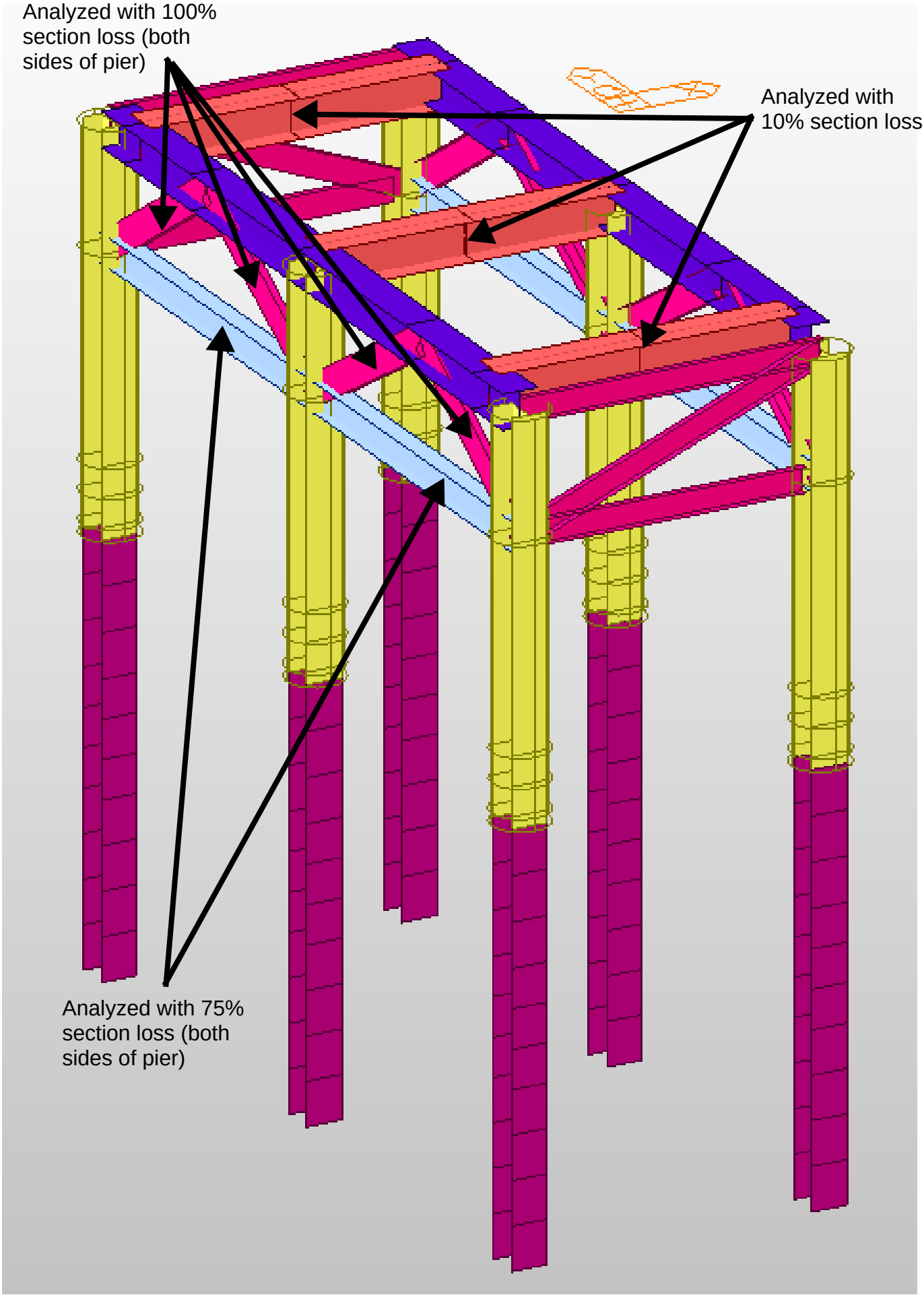
$RF = (.95\ F_Y - f_{DL+SDL}) / (f_{LL+I})$ MBE A1A.1.8.1

f_{DL+SDL}=1.25*DL+1.5*DW

f_{LL+I}=Y_{LL}*LL

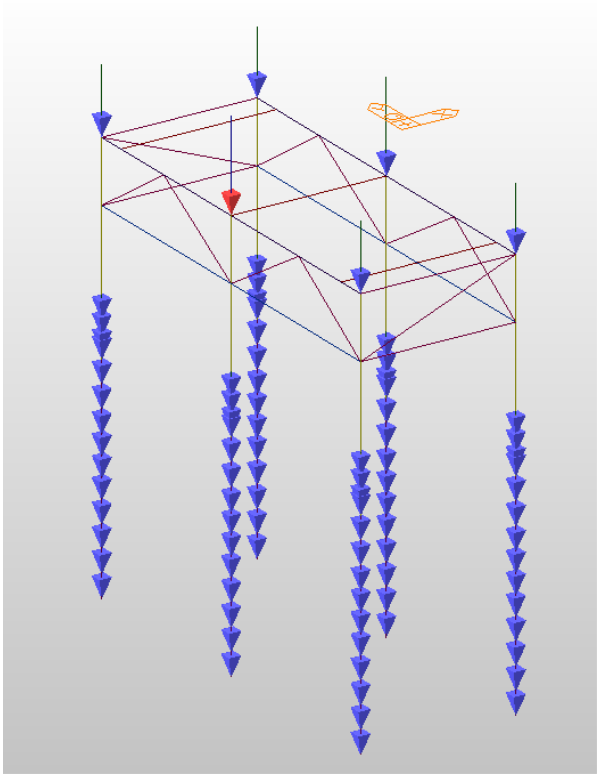
ELEMENT	LOADING	F_Y (ksi)	$.95F_Y$ (ksi)	f_{DL+SDL} (ksi)	f_{LL+I} (ksi)	RF
1	CT-L3S2 + Lane Load	33	31.35	-3.440	1.210	23.066
1	CT-L3S2 + Lane Load	33	31.35	-0.460	-0.240	128.708
2	CT-L3S2 + Lane Load	33	31.35	-6.440	2.320	10.737
2	CT-L3S2 + Lane Load	33	31.35	-3.440	1.210	23.066
3	CT-L3S2 + Lane Load	33	31.35	-9.520	3.490	6.255
3	CT-L3S2 + Lane Load	33	31.35	-6.440	2.320	10.737
4	CT-L3S2 + Lane Load	33	31.35	-12.810	4.700	3.945
4	CT-L3S2 + Lane Load	33	31.35	-9.520	3.490	6.255
5	CT-L3S2 + Lane Load	33	31.35	-16.090	5.900	2.586
5	CT-L3S2 + Lane Load	33	31.35	-12.810	4.700	3.945
6	CT-L3S2 + Lane Load	33	31.35	11.950	4.700	4.128
6	CT-L3S2 + Lane Load	33	31.35	15.020	5.900	2.768
7	CT-L3S2 + Lane Load	33	31.35	9.220	3.490	6.341
7	CT-L3S2 + Lane Load	33	31.35	11.950	4.700	4.128
8	CT-L3S2 + Lane Load	33	31.35	6.470	2.290	10.865
8	CT-L3S2 + Lane Load	33	31.35	9.220	3.490	6.341
9	CT-L3S2 + Lane Load	33	31.35	3.710	1.200	23.033
9	CT-L3S2 + Lane Load	33	31.35	6.470	2.290	10.865
10	CT-L3S2 + Lane Load	33	31.35	0.960	0.230	132.130
10	CT-L3S2 + Lane Load	33	31.35	3.710	1.200	23.033
11	CT-L3S2 + Lane Load	33	31.35	-2.800	-0.680	41.985
11	CT-L3S2 + Lane Load	33	31.35	-8.630	-1.700	13.365
12	CT-L3S2 + Lane Load	33	31.35	-3.670	-1.230	22.504
12	CT-L3S2 + Lane Load	33	31.35	-2.800	-0.680	41.985
13	CT-L3S2 + Lane Load	33	31.35	-9.430	-2.540	8.630
13	CT-L3S2 + Lane Load	33	31.35	-3.670	-1.230	22.504
14	CT-L3S2 + Lane Load	33	31.35	-15.210	-3.850	4.192
14	CT-L3S2 + Lane Load	33	31.35	-9.430	-2.540	8.630
15	CT-L3S2 + Lane Load	33	31.35	-20.990	-5.160	2.008
15	CT-L3S2 + Lane Load	33	31.35	-15.210	-3.850	4.192
16	CT-L3S2 + Lane Load	33	31.35	-15.000	-4.090	3.998
16	CT-L3S2 + Lane Load	33	31.35	-20.280	-5.500	2.013
17	CT-L3S2 + Lane Load	33	31.35	-9.710	-2.690	8.045
17	CT-L3S2 + Lane Load	33	31.35	-15.000	-4.090	3.998
18	CT-L3S2 + Lane Load	33	31.35	-4.460	-1.290	20.845
18	CT-L3S2 + Lane Load	33	31.35	-9.710	-2.690	8.045
19	CT-L3S2 + Lane Load	33	31.35	-1.320	-0.660	45.500
19	CT-L3S2 + Lane Load	33	31.35	-4.460	-1.290	20.845
20	CT-L3S2 + Lane Load	33	31.35	-6.640	-1.770	13.960
20	CT-L3S2 + Lane Load	33	31.35	-1.320	-0.660	45.500
21	CT-L3S2 + Lane Load	33	31.35	-3.930	1.230	22.293
21	CT-L3S2 + Lane Load	33	31.35	-0.980	-0.260	116.808
22	CT-L3S2 + Lane Load	33	31.35	-6.900	2.330	10.494
22	CT-L3S2 + Lane Load	33	31.35	-3.930	1.230	22.293
23	CT-L3S2 + Lane Load	33	31.35	-9.870	3.490	6.155
23	CT-L3S2 + Lane Load	33	31.35	-6.900	2.330	10.494
24	CT-L3S2 + Lane Load	33	31.35	-12.980	4.700	3.909
24	CT-L3S2 + Lane Load	33	31.35	-9.870	3.490	6.155
25	CT-L3S2 + Lane Load	33	31.35	-16.410	5.900	2.532
25	CT-L3S2 + Lane Load	33	31.35	-12.980	4.700	3.909
26	CT-L3S2 + Lane Load	33	31.35	12.270	4.710	4.051
26	CT-L3S2 + Lane Load	33	31.35	15.410	5.920	2.693
27	CT-L3S2 + Lane Load	33	31.35	9.200	3.500	6.329
27	CT-L3S2 + Lane Load	33	31.35	12.270	4.710	4.051
28	CT-L3S2 + Lane Load	33	31.35	6.300	2.310	10.844
28	CT-L3S2 + Lane Load	33	31.35	9.200	3.500	6.329
29	CT-L3S2 + Lane Load	33	31.35	3.380	1.210	23.116
29	CT-L3S2 + Lane Load	33	31.35	6.300	2.310	10.844
30	CT-L3S2 + Lane Load	33	31.35	0.480	-0.240	128.625
30	CT-L3S2 + Lane Load	33	31.35	3.380	1.210	23.116

Minimum Rating factor 2.008

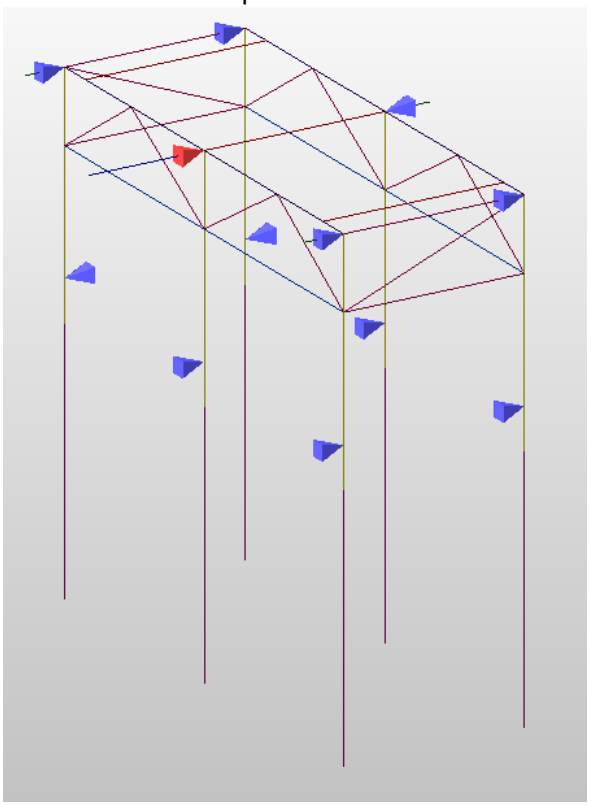

Analyzed with 100% section loss (both sides of pier)
Analyzed with 10% section loss
Analyzed with 75% section loss (both sides of pier)

L-Pile loads – HL-93 Inventory

Axial Load = 379.8 kips



Shear Load = 10.5 kips



LPile for Windows, Version 2015-08.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
© 1985-2015 by Ensoft, Inc.
All Rights Reserved

This copy of LPile is being used by:

CJM
Wethersfield

Serial Number of Security Device: 227885239

This copy of LPile is licensed for exclusive use by:

Close, Jensen and Miller, P.C.,

Use of this program by any entity other than Close, Jensen and Miller, P.C.,
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Liaison\State Bridge Program\Project Files\01349, SPN 158-212, List 28\1-Pre-Design\Calculations\01349 L-Pile\REVISED\

Name of input data file:
HL-93 Inventory 01349 pier 2.lp8d

Name of output report file:
HL-93 Inventory 01349 pier 2.lp8o

Name of plot output file:
HL-93 Inventory 01349 pier 2.lp8p

Name of runtime message file:
HL-93 Inventory 01349 pier 2.lp8r

Date and Time of Analysis

Date: June 1, 2016 Time: 14:48:53

Problem Title

Project Name: Rehabilitation of Bridge 01349, ROute 136 Over Saugatuck

Job Number: 158-212

Client: CT DOT

Engineer: Danielle Coutu

Description: Pier 2 Analysis Under Existing Condition

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis includes loading by one distributed lateral load acting on pile
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 29.000 ft
Depth of ground surface below top of pile = 11.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over
the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	13.8300
2	29.000	13.8300

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is an elastic pile
Cross-sectional Shape = Weak H-Pile
Length of section = 29.000000 ft
Flange Width = 14.695000 in
Section Depth = 13.830000 in
Flange Thickness = 0.615000 in
Web Thickness = 0.615000 in
Section Area = 25.823850 sq. in
Moment of Inertia = 325.505721 in^4
Elastic Modulus = 29000000. psi

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is cemented silt with cohesion and friction

Distance from top of pile to top of layer = 11.000000 ft
Distance from top of pile to bottom of layer = 13.000000 ft
Effective unit weight at top of layer = 120.000000 pcf
Effective unit weight at bottom of layer = 120.000000 pcf
Undrained cohesion at top of layer = 500.000000 psf
Undrained cohesion at bottom of layer = 500.000000 psf
Friction angle at top of layer = 10.000000 deg.
Friction angle at bottom of layer = 10.000000 deg.
Epsilon-50 at top of layer = 0.010000
Epsilon-50 at bottom of layer = 0.010000
Subgrade k at top of layer = 18.000000 pci
Subgrade k at bottom of layer = 18.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 13.000000 ft
Distance from top of pile to bottom of layer = 22.000000 ft
Effective unit weight at top of layer = 125.000000 pcf
Effective unit weight at bottom of layer = 125.000000 pcf
Friction angle at top of layer = 38.000000 deg.
Friction angle at bottom of layer = 38.000000 deg.
Subgrade k at top of layer = 25.000000 pci
Subgrade k at bottom of layer = 25.000000 pci

Layer 3 is weak rock, p-y criteria by Reese, 1997

Distance from top of pile to top of layer = 22.000000 ft

```
   Distance from top of pile to bottom of layer        =    29.000000 ft
   Effective unit weight at top of layer               =   125.000000 pcf
   Effective unit weight at bottom of layer            =   125.000000 pcf
   Uniaxial compressive strength at top of layer       =   500.000000 psi
   Uniaxial compressive strength at bottom of layer    =   500.000000 psi
   Initial modulus of rock at top of layer             =     1050000. psi
   Initial modulus of rock at bottom of layer          =     1050000. psi
   RQD of rock at top of layer                         =       0.0000 %
   RQD of rock at bottom of layer                      =       0.0000 %
   k rm of rock at top of layer                        =    0.0005000
   k rm of rock at bottom of layer                     =    0.0005000


Layer 4 is massive rock, p-y criteria by Liang et al., 2009

   Distance from top of pile to top of layer           =    29.000000 ft
   Distance from top of pile to bottom of layer        =    30.000000 ft
   Effective unit weight at top of layer               =   139.000000 pcf
   Effective unit weight at bottom of layer            =   139.000000 pcf
   Uniaxial compressive strength at top of layer       =       11600. psi
   Uniaxial compressive strength at bottom of layer    =       11600. psi
   Poisson's ratio at top of layer                     =     0.250000
   Poisson's ratio at bottom of layer                  =     0.250000
   Option 1: Intact rock modulus at top of layer       =     1500000. psi
             Intact rock modulus at bottom of layer    =     1500000. psi
   Option 1: Geologic Strength Index for layer         =    50.000000
   Option 2: Rock mass modulus at top of layer         =       0.0000 psi
             Rock mass modulus at bottom of layer      =       0.0000 psi
   Option 1 will be used to compute values of rock mass modulus for the p-y curve
            in massive rock.
   The rock type is (metamorphic) gneiss, Hoek-Brown Material Constant mi = 28


 (Depth of the lowest soil layer extends 1.000 ft below the pile tip)


--------------------------------------------------------------------------------
                        Summary of Input Soil Properties
--------------------------------------------------------------------------------

Layer         Soil Type          Layer      Effective    Undrained    Angle of     Uniaxial                    E50
Rock Mass    Geologic     Int. Rock   Hoek-Brown
Layer           Name             Depth       Unit Wt.    Cohesion     Friction        qu          RQD %         or           kpy
Modulus     Strength      Modulus     Material     Poisson's
 Num.     (p-y Curve Type)        ft          pcf          psf          deg.         psi                       krm          pci
 psi         Index         psi       Index, mi      Ratio
-----   -------------------   ----------   ----------   ----------   ----------   ----------   ----------   ----------   ----------
----------   ----------   ----------   ----------   ----------
  1          Cemented           11.0000     120.0000     500.0000      10.0000       --           --          0.01000      18.0000
 --           --             0.00         0.00         0.00
               Silt             13.0000     120.0000     500.0000      10.0000       --           --          0.01000      18.0000
 --           --             0.00         0.00         0.00
  2            Sand            13.0000     125.0000       --          38.0000       --           --           --          25.0000
 --           --             0.00         0.00         0.00
          (Reese, et al.)        22.0000     125.0000       --          38.0000       --           --           --          25.0000
 --           --             0.00         0.00         0.00
  3            Weak            22.0000     125.0000       --           --         500.0000         0.00     5.00E-04       --
1050000.       --             0.00         0.00         0.00
               Rock            29.0000     125.0000       --           --         500.0000         0.00     5.00E-04       --
1050000.       --             0.00         0.00         0.00
  4          Massive           29.0000     139.0000       --           --          11600.       --           --           --
Internally      50.0000     1500000.      28.0000       0.2500
               Rock            30.0000     139.0000       --           --          11600.       --           --           --
Computed       50.0000     1500000.      28.0000       0.2500


--------------------------------------------------------------------------------
                              Static Loading Type
--------------------------------------------------------------------------------

Static loading criteria were used when computing p-y curves for all analyses.


--------------------------------------------------------------------------------
               Distributed Lateral Loading Used For All Load Cases
--------------------------------------------------------------------------------

Distributed lateral load intensity defined using 2 points

Point           Depth X            Dist. Load
 No.               in               lb/in
-----          ----------          ----------
  1               0.000               0.000
  2               0.000               0.000



--------------------------------------------------------------------------------
               Pile-head Loading and Pile-head Fixity Conditions
--------------------------------------------------------------------------------

Number of loads specified = 1

Load     Load         Condition              Condition           Axial Thrust      Compute Top y
 No.     Type             1                      2                Force, lbs      vs. Pile Length
```

1	2	V = 10500. lbs	S = 0.0000 in/in	379800.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic section properties

---

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	11.0000	0.00	N.A.	No	0.00	549.7454
2	13.0000	0.7518	No	No	549.7454	193067.
3	22.0000	11.0000	No	Yes	N.A.	N.A.
4	29.0000	18.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 10500.0 lbs
Rotation of pile head = 0.000E+00 radians
Axial load at pile head = 379800.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	1.5026	-1471520.	10500.	0.00	45968.	9.44E+09	0.00	0.00	0.00
0.2900	1.5016	-1434622.	10500.	-5.36E-04	45184.	9.44E+09	0.00	0.00	0.00
0.5800	1.4989	-1397024.	10500.	-0.00106	44386.	9.44E+09	0.00	0.00	0.00
0.8700	1.4943	-1358746.	10500.	-0.00157	43572.	9.44E+09	0.00	0.00	0.00
1.1600	1.4880	-1319806.	10500.	-0.00206	42745.	9.44E+09	0.00	0.00	0.00
1.4500	1.4799	-1280222.	10500.	-0.00254	41904.	9.44E+09	0.00	0.00	0.00
1.7400	1.4703	-1240015.	10500.	-0.00300	41050.	9.44E+09	0.00	0.00	0.00
2.0300	1.4590	-1199204.	10500.	-0.00345	40183.	9.44E+09	0.00	0.00	0.00
2.3200	1.4463	-1157808.	10500.	-0.00389	39304.	9.44E+09	0.00	0.00	0.00
2.6100	1.4320	-1115848.	10500.	-0.00431	38412.	9.44E+09	0.00	0.00	0.00
2.9000	1.4163	-1073345.	10500.	-0.00471	37509.	9.44E+09	0.00	0.00	0.00
3.1900	1.3992	-1030318.	10500.	-0.00510	36595.	9.44E+09	0.00	0.00	0.00
3.4800	1.3808	-986790.	10500.	-0.00547	35671.	9.44E+09	0.00	0.00	0.00
3.7700	1.3611	-942780.	10500.	-0.00583	34736.	9.44E+09	0.00	0.00	0.00
4.0600	1.3403	-898311.	10500.	-0.00616	33791.	9.44E+09	0.00	0.00	0.00
4.3500	1.3182	-853405.	10500.	-0.00649	32837.	9.44E+09	0.00	0.00	0.00
4.6400	1.2951	-808083.	10500.	-0.00679	31874.	9.44E+09	0.00	0.00	0.00
4.9300	1.2710	-762367.	10500.	-0.00708	30903.	9.44E+09	0.00	0.00	0.00
5.2200	1.2458	-716279.	10500.	-0.00736	29924.	9.44E+09	0.00	0.00	0.00
5.5100	1.2198	-669843.	10500.	-0.00761	28937.	9.44E+09	0.00	0.00	0.00
5.8000	1.1928	-623080.	10500.	-0.00785	27944.	9.44E+09	0.00	0.00	0.00
6.0900	1.1651	-576013.	10500.	-0.00807	26944.	9.44E+09	0.00	0.00	0.00
6.3800	1.1367	-528666.	10500.	-0.00827	25938.	9.44E+09	0.00	0.00	0.00
6.6700	1.1075	-481061.	10500.	-0.00846	24927.	9.44E+09	0.00	0.00	0.00
6.9600	1.0778	-433222.	10500.	-0.00863	23911.	9.44E+09	0.00	0.00	0.00
7.2500	1.0475	-385172.	10500.	-0.00878	22890.	9.44E+09	0.00	0.00	0.00
7.5400	1.0167	-336934.	10500.	-0.00891	21865.	9.44E+09	0.00	0.00	0.00
7.8300	0.9854	-288532.	10500.	-0.00903	20837.	9.44E+09	0.00	0.00	0.00
8.1200	0.9538	-239989.	10500.	-0.00913	19806.	9.44E+09	0.00	0.00	0.00

8.4100	0.9219	-191329.	10500.	-0.00920	18772.	9.44E+09	0.00	0.00	0.00
8.7000	0.8898	-142577.	10500.	-0.00927	17736.	9.44E+09	0.00	0.00	0.00
8.9900	0.8574	-93754.	10500.	-0.00931	16699.	9.44E+09	0.00	0.00	0.00
9.2800	0.8250	-44886.	10500.	-0.00934	15661.	9.44E+09	0.00	0.00	0.00
9.5700	0.7925	4004.	10500.	-0.00934	14792.	9.44E+09	0.00	0.00	0.00
9.8600	0.7599	52892.	10500.	-0.00933	15831.	9.44E+09	0.00	0.00	0.00
10.1500	0.7275	101754.	10500.	-0.00930	16869.	9.44E+09	0.00	0.00	0.00
10.4400	0.6952	150566.	10500.	-0.00926	17906.	9.44E+09	0.00	0.00	0.00
10.7300	0.6631	199305.	10500.	-0.00919	18941.	9.44E+09	0.00	0.00	0.00
11.0200	0.6312	247948.	10499.	-0.00911	19975.	9.44E+09	-0.4678	2.5793	0.00
11.3100	0.5997	296463.	10486.	-0.00901	21005.	9.44E+09	-7.3572	42.6959	0.00
11.6000	0.5685	344745.	10448.	-0.00889	22031.	9.44E+09	-14.2955	87.5085	0.00
11.8900	0.5378	392686.	10387.	-0.00876	23050.	9.44E+09	-20.9874	135.8125	0.00
12.1800	0.5076	440182.	10291.	-0.00860	24058.	9.44E+09	-33.9607	232.8493	0.00
12.4700	0.4779	487051.	10129.	-0.00843	25054.	9.44E+09	-59.0910	430.2948	0.00
12.7600	0.4489	532968.	9877.	-0.00824	26030.	9.44E+09	-85.4495	662.4781	0.00
13.0500	0.4205	577590.	9279.	-0.00804	26978.	9.44E+09	-258.6199	2140.	0.00
13.3400	0.3929	618799.	8349.	-0.00782	27853.	9.44E+09	-275.8261	2443.	0.00
13.6300	0.3661	656366.	7366.	-0.00758	28651.	9.44E+09	-288.8553	2746.	0.00
13.9200	0.3401	690115.	6345.	-0.00734	29368.	9.44E+09	-297.9569	3048.	0.00
14.2100	0.3150	719919.	5299.	-0.00708	30001.	9.44E+09	-303.3923	3351.	0.00
14.5000	0.2909	745699.	4240.	-0.00681	30549.	9.44E+09	-305.4329	3654.	0.00
14.7900	0.2677	767416.	3179.	-0.00653	31010.	9.44E+09	-304.3573	3957.	0.00
15.0800	0.2455	785073.	2126.	-0.00624	31385.	9.44E+09	-300.4493	4260.	0.00
15.3700	0.2243	798709.	1092.	-0.00595	31675.	9.44E+09	-293.9956	4562.	0.00
15.6600	0.2041	808396.	83.8849	-0.00565	31881.	9.44E+09	-285.2834	4865.	0.00
15.9500	0.1849	814234.	-890.3099	-0.00535	32005.	9.44E+09	-274.5987	5168.	0.00
16.2400	0.1668	816349.	-1824.	-0.00505	32050.	9.44E+09	-262.2239	5471.	0.00
16.5300	0.1498	814891.	-2713.	-0.00475	32019.	9.44E+09	-248.4362	5773.	0.00
16.8200	0.1337	810028.	-3552.	-0.00445	31915.	9.44E+09	-233.5057	6076.	0.00
17.1100	0.1188	801942.	-4337.	-0.00416	31744.	9.44E+09	-217.6938	6379.	0.00
17.4000	0.1048	790829.	-5066.	-0.00386	31508.	9.44E+09	-201.2518	6682.	0.00
17.6900	0.09189	776893.	-5737.	-0.00357	31212.	9.44E+09	-184.4196	6984.	0.00
17.9800	0.07995	760345.	-6349.	-0.00329	30860.	9.44E+09	-167.4246	7287.	0.00
18.2700	0.06900	741399.	-6902.	-0.00301	30458.	9.44E+09	-150.4806	7590.	0.00
18.5600	0.05899	720270.	-7397.	-0.00274	30009.	9.44E+09	-133.7871	7893.	0.00
18.8500	0.04991	697169.	-7834.	-0.00248	29518.	9.44E+09	-117.5285	8195.	0.00
19.1400	0.04172	672306.	-8216.	-0.00223	28990.	9.44E+09	-101.8736	8498.	0.00
19.4300	0.03439	645881.	-8544.	-0.00199	28428.	9.44E+09	-86.9752	8801.	0.00
19.7200	0.02789	618088.	-8823.	-0.00175	27838.	9.44E+09	-72.9697	9104.	0.00
20.0100	0.02219	589110.	-9054.	-0.00153	27222.	9.44E+09	-59.9770	9406.	0.00
20.3000	0.01724	559119.	-9242.	-0.00132	26585.	9.44E+09	-48.1004	9709.	0.00
20.5900	0.01301	528273.	-9391.	-0.00112	25930.	9.44E+09	-37.4264	10012.	0.00
20.8800	0.00946	496716.	-9505.	-9.30E-04	25260.	9.44E+09	-28.0249	10315.	0.00
21.1700	0.00654	464578.	-9588.	-7.52E-04	24577.	9.44E+09	-19.9493	10617.	0.00
21.4600	0.00422	431972.	-9646.	-5.87E-04	23884.	9.44E+09	-13.2365	10920.	0.00
21.7500	0.00245	398995.	-9683.	-4.34E-04	23184.	9.44E+09	-7.9073	11223.	0.00
22.0400	0.00120	365727.	-13768.	-2.93E-04	22477.	9.44E+09	-2340.	6800166.	0.00
22.3300	4.12E-04	303944.	-22007.	-1.70E-04	21164.	9.44E+09	-2395.	2.02E+07	0.00
22.6200	1.70E-05	213004.	-28532.	-7.43E-05	19232.	9.44E+09	-1354.	2.77E+08	0.00
22.9100	-1.05E-04	105558.	-26434.	-1.56E-05	16950.	9.44E+09	2560.	8.49E+07	0.00
23.2000	-9.15E-05	29066.	-16945.	9.22E-06	15325.	9.44E+09	2893.	1.10E+08	0.00
23.4900	-4.08E-05	-12406.	-7194.	1.23E-05	14971.	9.44E+09	2711.	2.31E+08	0.00
23.7800	-5.97E-06	-21038.	833.1535	6.13E-06	15154.	9.44E+09	1902.	1.11E+09	0.00
24.0700	1.86E-06	-6623.	2991.	1.03E-06	14848.	9.44E+09	-662.2781	1.24E+09	0.00
24.3600	1.18E-06	-225.8555	1031.	-2.35E-07	14712.	9.44E+09	-463.7280	1.36E+09	0.00
24.6500	2.20E-07	555.7109	60.9404	-1.75E-07	14719.	9.44E+09	-93.9899	1.49E+09	0.00
24.9400	-3.07E-08	198.7514	-77.9327	-3.54E-08	14712.	9.44E+09	14.1777	1.61E+09	0.00
25.2300	-2.65E-08	13.3931	-30.2972	3.66E-09	14708.	9.44E+09	13.1989	1.73E+09	0.00
25.5200	-5.21E-09	-12.1271	-2.5677	3.89E-09	14708.	9.44E+09	2.7376	1.83E+09	0.00
25.8100	5.51E-10	-4.4884	1.6926	8.29E-10	14707.	9.44E+09	-0.2891	1.83E+09	0.00
26.1000	5.58E-10	-0.3490	0.6801	-6.23E-11	14707.	9.44E+09	-0.2928	1.83E+09	0.00
26.3900	1.17E-10	0.2452	0.06401	-8.15E-11	14707.	9.44E+09	-0.06131	1.83E+09	0.00
26.6800	-9.51E-12	0.09675	-0.03397	-1.85E-11	14707.	9.44E+09	0.00500	1.83E+09	0.00
26.9700	-1.17E-11	0.00877	-0.01461	0.00	14707.	9.44E+09	0.00613	1.83E+09	0.00
27.2600	-2.60E-12	-0.00493	-0.00156	1.70E-12	14707.	9.44E+09	0.00137	1.83E+09	0.00
27.5500	0.00	-0.00208	6.78E-04	0.00	14707.	9.44E+09	-8.14E-05	1.83E+09	0.00
27.8400	0.00	-2.15E-04	3.13E-04	0.00	14707.	9.44E+09	-1.28E-04	1.83E+09	0.00
28.1300	0.00	9.85E-05	3.72E-05	0.00	14707.	9.44E+09	-3.03E-05	1.83E+09	0.00
28.4200	0.00	4.45E-05	-1.34E-05	0.00	14707.	9.44E+09	1.22E-06	1.83E+09	0.00
28.7100	0.00	5.24E-06	-6.39E-06	0.00	14707.	9.44E+09	2.81E-06	1.83E+09	0.00
29.0000	0.00	0.00	0.00	0.00	14707.	9.44E+09	8.65E-07	9.14E+08	0.00

* The above values of total stress are combined axial and bending stresses.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     1.50258198 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =      -1471520. inch-lbs
Maximum shear force              =        -28532. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =    22.62000000 feet below pile head
Number of iterations             =             10
Number of zero deflection points =              8
```

Pile-head Deflection vs. Pile Length for Load Case 1

Boundary Condition Type 2, Shear and Slope

```
Shear      =          10500. lbs
Slope      =         0.00000
Axial Load =         379800. lbs
```

Pile Length feet	Pile Head Deflection inches	Maximum Moment ln-lbs	Maximum Shear lbs
29.00000	1.50258198	-1471520.	-28532.
27.55000	1.51964871	-1479191.	-28990.
26.10000	1.50504512	-1472236.	-28329.
24.65000	1.50715026	-1473171.	-28214.
23.20000	1.53462337	-1482546.	-31136.
21.75000	2.13921593	-1771869.	-16098.
20.30000	3.03172707	-2244490.	-18555.
18.85000	4.67077243	-3190274.	-17419.
17.40000	5.48386017	-3855662.	10500.
15.95000	4.74602858	-3630189.	10500.

Summary of Pile-head Responses for Conventional Analyses

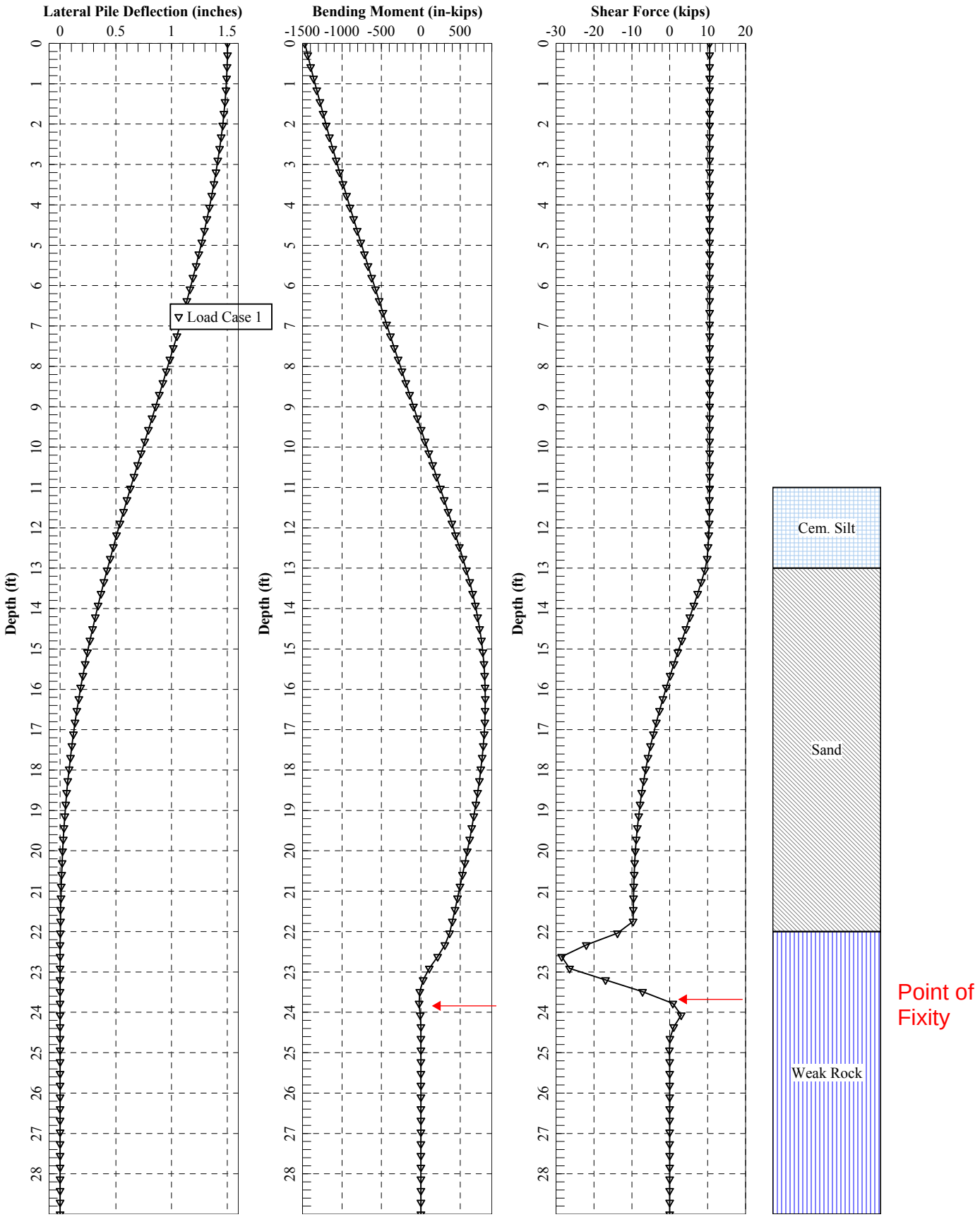
Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	10500.	S, rad	0.00	379800.	1.5026	0.00	-28532.	-1471520.

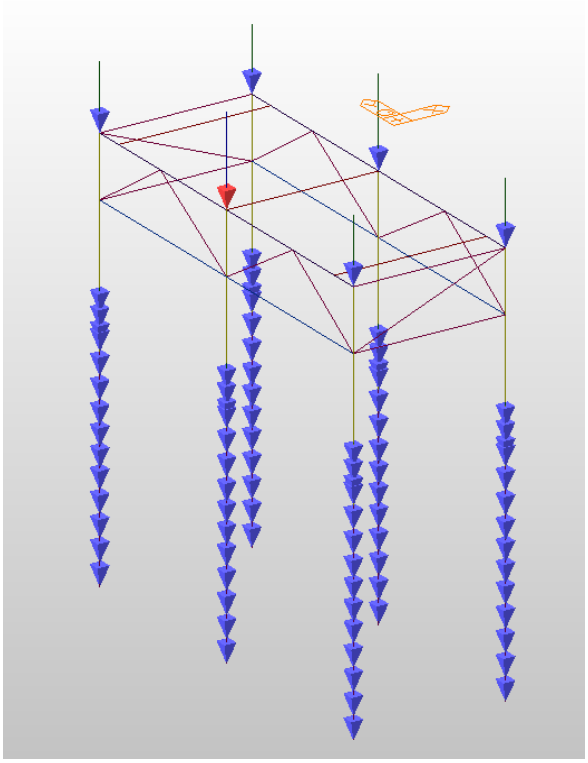
Maximum pile-head deflection = 1.5025819846 inches
Maximum pile-head rotation = -0.0000000000 radians = -0.000000 deg.

This analysis ended normally

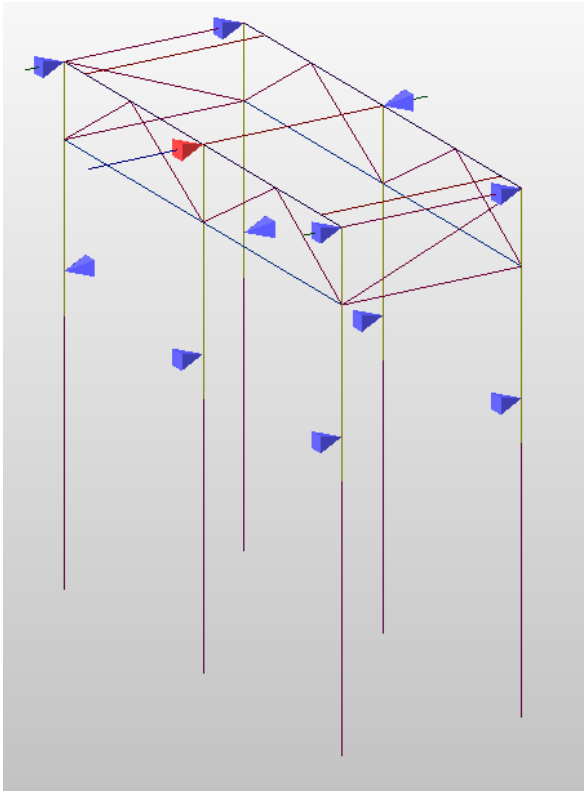

Lateral Pile Deflection (inches)
0
0.5
1
1.5
Load Case 1
Bending Moment (in-kips)
-1500
-1000
-500
0
500
Shear Force (kips)
-30
-20
-10
0
10
20
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
Cem. Silt
Sand
Weak Rock
Point of Fixity

L-Pile loads – HL-93 Operating

Axial = 350.8 kips



Shear = 8.4 kips



LPile for Windows, Version 2015-08.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
© 1985-2015 by Ensoft, Inc.
All Rights Reserved

This copy of LPile is being used by:

CJM
Wethersfield

Serial Number of Security Device: 227885239

This copy of LPile is licensed for exclusive use by:

Close, Jensen and Miller, P.C.,

Use of this program by any entity other than Close, Jensen and Miller, P.C.,
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Liaison\State Bridge Program\Project Files\01349, SPN 158-212, List 28\1-Pre-Design\Calculations\01349 L-Pile\REVISED\

Name of input data file:
HL-93 Operating 01349 pier 2.lp8d

Name of output report file:
HL-93 Operating 01349 pier 2.lp8o

Name of plot output file:
HL-93 Operating 01349 pier 2.lp8p

Name of runtime message file:
HL-93 Operating 01349 pier 2.lp8r

Date and Time of Analysis

Date: June 1, 2016 Time: 14:50:08

Problem Title

Project Name: Rehabilitation of Bridge 01349, ROute 136 Over Saugatuck

Job Number: 158-212

Client: CT DOT

Engineer: Danielle Coutu

Description: Pier 2 Analysis Under Existing Condition

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis includes loading by one distributed lateral load acting on pile
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 29.000 ft
Depth of ground surface below top of pile = 11.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over
the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	13.8300
2	29.000	13.8300

Input Structural Properties for Pile Sections:

Pile Section No. 1:

   Section 1 is an elastic pile
   Cross-sectional Shape = Weak H-Pile
   Length of section = 29.000000 ft
   Flange Width = 14.695000 in
   Section Depth = 13.830000 in
   Flange Thickness = 0.615000 in
   Web Thickness = 0.615000 in
   Section Area = 25.823850 sq. in
   Moment of Inertia = 325.505721 in^4
   Elastic Modulus = 29000000. psi

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is cemented silt with cohesion and friction

   Distance from top of pile to top of layer = 11.000000 ft
   Distance from top of pile to bottom of layer = 13.000000 ft
   Effective unit weight at top of layer = 120.000000 pcf
   Effective unit weight at bottom of layer = 120.000000 pcf
   Undrained cohesion at top of layer = 500.000000 psf
   Undrained cohesion at bottom of layer = 500.000000 psf
   Friction angle at top of layer = 10.000000 deg.
   Friction angle at bottom of layer = 10.000000 deg.
   Epsilon-50 at top of layer = 0.010000
   Epsilon-50 at bottom of layer = 0.010000
   Subgrade k at top of layer = 18.000000 pci
   Subgrade k at bottom of layer = 18.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

   Distance from top of pile to top of layer = 13.000000 ft
   Distance from top of pile to bottom of layer = 22.000000 ft
   Effective unit weight at top of layer = 125.000000 pcf
   Effective unit weight at bottom of layer = 125.000000 pcf
   Friction angle at top of layer = 38.000000 deg.
   Friction angle at bottom of layer = 38.000000 deg.
   Subgrade k at top of layer = 25.000000 pci
   Subgrade k at bottom of layer = 25.000000 pci

Layer 3 is weak rock, p-y criteria by Reese, 1997

   Distance from top of pile to top of layer = 22.000000 ft

```
   Distance from top of pile to bottom of layer        =    29.000000 ft
   Effective unit weight at top of layer               =   125.000000 pcf
   Effective unit weight at bottom of layer            =   125.000000 pcf
   Uniaxial compressive strength at top of layer       =   500.000000 psi
   Uniaxial compressive strength at bottom of layer    =   500.000000 psi
   Initial modulus of rock at top of layer             =     1050000. psi
   Initial modulus of rock at bottom of layer          =     1050000. psi
   RQD of rock at top of layer                         =       0.0000 %
   RQD of rock at bottom of layer                      =       0.0000 %
   k rm of rock at top of layer                        =    0.0005000
   k rm of rock at bottom of layer                     =    0.0005000


Layer 4 is massive rock, p-y criteria by Liang et al., 2009

   Distance from top of pile to top of layer           =    29.000000 ft
   Distance from top of pile to bottom of layer        =    30.000000 ft
   Effective unit weight at top of layer               =   139.000000 pcf
   Effective unit weight at bottom of layer            =   139.000000 pcf
   Uniaxial compressive strength at top of layer       =       11600. psi
   Uniaxial compressive strength at bottom of layer    =       11600. psi
   Poisson's ratio at top of layer                     =     0.250000
   Poisson's ratio at bottom of layer                  =     0.250000
   Option 1: Intact rock modulus at top of layer       =     1500000. psi
             Intact rock modulus at bottom of layer    =     1500000. psi
   Option 1: Geologic Strength Index for layer         =    50.000000
   Option 2: Rock mass modulus at top of layer         =       0.0000 psi
             Rock mass modulus at bottom of layer      =       0.0000 psi
   Option 1 will be used to compute values of rock mass modulus for the p-y curve
            in massive rock.
   The rock type is (metamorphic) gneiss, Hoek-Brown Material Constant mi = 28


 (Depth of the lowest soil layer extends 1.000 ft below the pile tip)


--------------------------------------------------------------------------------
                        Summary of Input Soil Properties
--------------------------------------------------------------------------------

Layer         Soil Type          Layer      Effective    Undrained    Angle of     Uniaxial                    E50
Rock Mass    Geologic     Int. Rock   Hoek-Brown
Layer           Name            Depth       Unit Wt.    Cohesion     Friction        qu          RQD %         or           kpy
Modulus     Strength      Modulus     Material     Poisson's
 Num.     (p-y Curve Type)        ft          pcf          psf          deg.         psi                       krm          pci
 psi         Index         psi       Index, mi      Ratio
-----   -------------------   ----------   ----------   ----------   ----------   ----------   ----------   ----------   ----------
----------   ----------   ----------   ----------   ----------
  1          Cemented           11.0000     120.0000     500.0000      10.0000       --           --          0.01000      18.0000
 --           --             0.00         0.00         0.00
               Silt             13.0000     120.0000     500.0000      10.0000       --           --          0.01000      18.0000
 --           --             0.00         0.00         0.00
  2            Sand            13.0000     125.0000       --          38.0000       --           --           --          25.0000
 --           --             0.00         0.00         0.00
          (Reese, et al.)        22.0000     125.0000       --          38.0000       --           --           --          25.0000
 --           --             0.00         0.00         0.00
  3            Weak            22.0000     125.0000       --           --          500.0000         0.00     5.00E-04       --
1050000.       --             0.00         0.00         0.00
               Rock            29.0000     125.0000       --           --          500.0000         0.00     5.00E-04       --
1050000.       --             0.00         0.00         0.00
  4          Massive           29.0000     139.0000       --           --            11600.       --           --           --
Internally      50.0000     1500000.      28.0000       0.2500
               Rock            30.0000     139.0000       --           --            11600.       --           --           --
Computed       50.0000     1500000.      28.0000       0.2500


--------------------------------------------------------------------------------
                              Static Loading Type
--------------------------------------------------------------------------------

Static loading criteria were used when computing p-y curves for all analyses.


--------------------------------------------------------------------------------
               Distributed Lateral Loading Used For All Load Cases
--------------------------------------------------------------------------------

Distributed lateral load intensity defined using 2 points

Point           Depth X            Dist. Load
 No.               in               lb/in
-----          ----------          ----------
  1              0.000               0.000
  2              0.000               0.000



--------------------------------------------------------------------------------
               Pile-head Loading and Pile-head Fixity Conditions
--------------------------------------------------------------------------------

Number of loads specified = 1

Load     Load         Condition              Condition           Axial Thrust      Compute Top y
 No.     Type             1                      2                Force, lbs      vs. Pile Length
```

1	2	V = 8500. lbs	S = 0.0000 in/in	350800.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with
specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic section properties

---

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	11.0000	0.00	N.A.	No	0.00	549.7454
2	13.0000	0.7518	No	No	549.7454	193067.
3	22.0000	11.0000	No	Yes	N.A.	N.A.
4	29.0000	18.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals
for Layer n. Layering correction equivalent depths are computed only
for soil types with both shallow-depth and deep-depth expressions for
peak lateral load transfer. These soil types are soft and stiff clays,
non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 8500.0 lbs
Rotation of pile head = 0.000E+00 radians
Axial load at pile head = 350800.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	1.1369	-1144859.	8500.	0.00	37906.	9.44E+09	0.00	0.00	0.00
0.2900	1.1361	-1115021.	8500.	-4.17E-04	37272.	9.44E+09	0.00	0.00	0.00
0.5800	1.1340	-1084682.	8500.	-8.22E-04	36627.	9.44E+09	0.00	0.00	0.00
0.8700	1.1304	-1053854.	8500.	-0.00122	35972.	9.44E+09	0.00	0.00	0.00
1.1600	1.1255	-1022553.	8500.	-0.00160	35307.	9.44E+09	0.00	0.00	0.00
1.4500	1.1193	-990790.	8500.	-0.00197	34633.	9.44E+09	0.00	0.00	0.00
1.7400	1.1118	-958582.	8500.	-0.00233	33948.	9.44E+09	0.00	0.00	0.00
2.0300	1.1031	-925943.	8500.	-0.00268	33255.	9.44E+09	0.00	0.00	0.00
2.3200	1.0931	-892887.	8500.	-0.00301	32553.	9.44E+09	0.00	0.00	0.00
2.6100	1.0821	-859429.	8500.	-0.00334	31842.	9.44E+09	0.00	0.00	0.00
2.9000	1.0699	-825584.	8500.	-0.00365	31123.	9.44E+09	0.00	0.00	0.00
3.1900	1.0567	-791368.	8500.	-0.00394	30396.	9.44E+09	0.00	0.00	0.00
3.4800	1.0425	-756795.	8500.	-0.00423	29662.	9.44E+09	0.00	0.00	0.00
3.7700	1.0273	-721882.	8500.	-0.00450	28920.	9.44E+09	0.00	0.00	0.00
4.0600	1.0112	-686644.	8500.	-0.00476	28171.	9.44E+09	0.00	0.00	0.00
4.3500	0.9941	-651097.	8500.	-0.00501	27416.	9.44E+09	0.00	0.00	0.00
4.6400	0.9763	-615257.	8500.	-0.00524	26655.	9.44E+09	0.00	0.00	0.00
4.9300	0.9577	-579140.	8500.	-0.00546	25888.	9.44E+09	0.00	0.00	0.00
5.2200	0.9383	-542763.	8500.	-0.00567	25115.	9.44E+09	0.00	0.00	0.00
5.5100	0.9182	-506141.	8500.	-0.00586	24337.	9.44E+09	0.00	0.00	0.00
5.8000	0.8975	-469292.	8500.	-0.00604	23554.	9.44E+09	0.00	0.00	0.00
6.0900	0.8762	-432231.	8500.	-0.00621	22767.	9.44E+09	0.00	0.00	0.00
6.3800	0.8543	-394975.	8500.	-0.00636	21975.	9.44E+09	0.00	0.00	0.00
6.6700	0.8319	-357542.	8500.	-0.00650	21180.	9.44E+09	0.00	0.00	0.00
6.9600	0.8091	-319948.	8500.	-0.00662	20381.	9.44E+09	0.00	0.00	0.00
7.2500	0.7858	-282210.	8500.	-0.00673	19580.	9.44E+09	0.00	0.00	0.00
7.5400	0.7622	-244345.	8500.	-0.00683	18775.	9.44E+09	0.00	0.00	0.00
7.8300	0.7383	-206370.	8500.	-0.00691	17968.	9.44E+09	0.00	0.00	0.00
8.1200	0.7141	-168303.	8500.	-0.00698	17160.	9.44E+09	0.00	0.00	0.00

8.4100	0.6896	-130159.	8500.	-0.00704	16349.	9.44E+09	0.00	0.00	0.00
8.7000	0.6651	-91957.	8500.	-0.00708	15538.	9.44E+09	0.00	0.00	0.00
8.9900	0.6404	-53713.	8500.	-0.00711	14725.	9.44E+09	0.00	0.00	0.00
9.2800	0.6156	-15445.	8500.	-0.00712	13912.	9.44E+09	0.00	0.00	0.00
9.5700	0.5908	22829.	8500.	-0.00712	14069.	9.44E+09	0.00	0.00	0.00
9.8600	0.5661	61094.	8500.	-0.00710	14882.	9.44E+09	0.00	0.00	0.00
10.1500	0.5414	99331.	8500.	-0.00707	15695.	9.44E+09	0.00	0.00	0.00
10.4400	0.5168	137523.	8500.	-0.00703	16506.	9.44E+09	0.00	0.00	0.00
10.7300	0.4925	175653.	8500.	-0.00697	17316.	9.44E+09	0.00	0.00	0.00
11.0200	0.4683	213704.	8496.	-0.00690	18124.	9.44E+09	-2.0231	15.0336	0.00
11.3100	0.4444	251635.	8441.	-0.00681	18930.	9.44E+09	-29.7599	233.0208	0.00
11.6000	0.4209	289092.	8294.	-0.00671	19726.	9.44E+09	-54.5475	451.0080	0.00
11.8900	0.3977	325758.	8067.	-0.00660	20505.	9.44E+09	-76.4559	668.9952	0.00
12.1800	0.3749	361352.	7767.	-0.00647	21261.	9.44E+09	-95.5668	886.9824	0.00
12.4700	0.3526	395626.	7406.	-0.00633	21989.	9.44E+09	-111.9731	1105.	0.00
12.7600	0.3309	428365.	6992.	-0.00618	22684.	9.44E+09	-125.7788	1323.	0.00
13.0500	0.3096	459389.	6442.	-0.00602	23344.	9.44E+09	-190.4137	2140.	0.00
13.3400	0.2890	487900.	5758.	-0.00584	23949.	9.44E+09	-202.8522	2443.	0.00
13.6300	0.2689	513734.	5036.	-0.00566	24498.	9.44E+09	-212.1910	2746.	0.00
13.9200	0.2496	536768.	4286.	-0.00547	24987.	9.44E+09	-218.6225	3048.	0.00
14.2100	0.2309	556913.	3519.	-0.00526	25415.	9.44E+09	-222.3473	3351.	0.00
14.5000	0.2129	574114.	2743.	-0.00506	25781.	9.44E+09	-223.5721	3654.	0.00
14.7900	0.1957	588349.	1967.	-0.00484	26083.	9.44E+09	-222.5086	3957.	0.00
15.0800	0.1792	599625.	1198.	-0.00462	26323.	9.44E+09	-219.3713	4260.	0.00
15.3700	0.1635	607974.	443.2019	-0.00440	26500.	9.44E+09	-214.3762	4562.	0.00
15.6600	0.1486	613454.	-291.2787	-0.00418	26616.	9.44E+09	-207.7391	4865.	0.00
15.9500	0.1345	616142.	-1000.	-0.00395	26674.	9.44E+09	-199.6740	5168.	0.00
16.2400	0.1211	616134.	-1679.	-0.00372	26673.	9.44E+09	-190.3916	5471.	0.00
16.5300	0.1086	613543.	-2324.	-0.00349	26618.	9.44E+09	-180.0984	5773.	0.00
16.8200	0.09679	608495.	-2931.	-0.00327	26511.	9.44E+09	-168.9948	6076.	0.00
17.1100	0.08580	601127.	-3499.	-0.00305	26355.	9.44E+09	-157.2744	6379.	0.00
17.4000	0.07558	591583.	-4025.	-0.00283	26152.	9.44E+09	-145.1228	6682.	0.00
17.6900	0.06613	580016.	-4508.	-0.00261	25906.	9.44E+09	-132.7166	6984.	0.00
17.9800	0.05741	566580.	-4948.	-0.00240	25621.	9.44E+09	-120.2230	7287.	0.00
18.2700	0.04943	551433.	-5345.	-0.00219	25299.	9.44E+09	-107.7985	7590.	0.00
18.5600	0.04215	534733.	-5699.	-0.00199	24944.	9.44E+09	-95.5888	7893.	0.00
18.8500	0.03555	516634.	-6011.	-0.00180	24560.	9.44E+09	-83.7280	8195.	0.00
19.1400	0.02962	497289.	-6283.	-0.00161	24149.	9.44E+09	-72.3385	8498.	0.00
19.4300	0.02433	476845.	-6516.	-0.00143	23714.	9.44E+09	-61.5306	8801.	0.00
19.7200	0.01965	455440.	-6712.	-0.00126	23260.	9.44E+09	-51.4021	9104.	0.00
20.0100	0.01555	433208.	-6875.	-0.00110	22787.	9.44E+09	-42.0385	9406.	0.00
20.3000	0.01201	410272.	-7006.	-9.42E-04	22300.	9.44E+09	-33.5127	9709.	0.00
20.5900	0.00900	386745.	-7109.	-7.95E-04	21800.	9.44E+09	-25.8850	10012.	0.00
20.8800	0.00648	362731.	-7188.	-6.57E-04	21290.	9.44E+09	-19.2035	10315.	0.00
21.1700	0.00443	338321.	-7245.	-5.28E-04	20772.	9.44E+09	-13.5037	10617.	0.00
21.4600	0.00281	313595.	-7284.	-4.07E-04	20246.	9.44E+09	-8.8086	10920.	0.00
21.7500	0.00159	288621.	-7308.	-2.96E-04	19716.	9.44E+09	-5.1293	11223.	0.00
22.0400	7.44E-04	263456.	-10937.	-1.95E-04	19181.	9.44E+09	-2081.	9730711.	0.00
22.3300	2.36E-04	212972.	-18192.	-1.07E-04	18109.	9.44E+09	-2088.	3.08E+07	0.00
22.6200	7.69E-07	137100.	-22067.	-4.23E-05	16497.	9.44E+09	-138.7502	6.27E+08	0.00
22.9100	-5.84E-05	59487.	-18430.	-6.05E-06	14848.	9.44E+09	2229.	1.33E+08	0.00
23.2000	-4.13E-05	8840.	-10357.	6.55E-06	13772.	9.44E+09	2411.	2.03E+08	0.00
23.4900	-1.28E-05	-12614.	-2461.	5.85E-06	13852.	9.44E+09	2127.	5.76E+08	0.00
23.7800	-5.71E-07	-8303.	1559.	2.00E-06	13761.	9.44E+09	183.3187	1.12E+09	0.00
24.0700	1.06E-06	-1769.	1224.	1.41E-07	13622.	9.44E+09	-376.0649	1.24E+09	0.00
24.3600	4.12E-07	212.3195	288.6185	-1.46E-07	13589.	9.44E+09	-161.2426	1.36E+09	0.00
24.6500	4.07E-08	240.4860	-22.1820	-6.23E-08	13589.	9.44E+09	-17.3784	1.49E+09	0.00
24.9400	-2.17E-08	58.0845	-34.9497	-7.23E-09	13586.	9.44E+09	10.0407	1.61E+09	0.00
25.2300	-9.64E-09	-2.7460	-9.1336	2.97E-09	13584.	9.44E+09	4.7961	1.73E+09	0.00
25.5200	-1.08E-09	-5.4926	0.2002	1.45E-09	13584.	9.44E+09	0.5682	1.83E+09	0.00
25.8100	4.32E-10	-1.3561	0.7943	1.85E-10	13584.	9.44E+09	-0.2268	1.83E+09	0.00
26.1000	2.06E-10	0.03502	0.2112	-5.84E-11	13584.	9.44E+09	-0.1083	1.83E+09	0.00
26.3900	2.57E-11	0.1141	-7.50E-04	-3.09E-11	13584.	9.44E+09	-0.01349	1.83E+09	0.00
26.6800	-8.52E-12	0.02987	-0.01644	-4.32E-12	13584.	9.44E+09	0.00447	1.83E+09	0.00
26.9700	-4.40E-12	-2.45E-04	-0.00463	1.14E-12	13584.	9.44E+09	0.00231	1.83E+09	0.00
27.2600	0.00	-0.00236	-5.89E-05	0.00	13584.	9.44E+09	3.16E-04	1.83E+09	0.00
27.5500	0.00	-6.56E-04	3.39E-04	0.00	13584.	9.44E+09	-8.74E-05	1.83E+09	0.00
27.8400	0.00	-5.47E-06	1.01E-04	0.00	13584.	9.44E+09	-4.92E-05	1.83E+09	0.00
28.1300	0.00	4.88E-05	2.84E-06	0.00	13584.	9.44E+09	-7.32E-06	1.83E+09	0.00
28.4200	0.00	1.43E-05	-6.93E-06	0.00	13584.	9.44E+09	1.71E-06	1.83E+09	0.00
28.7100	0.00	5.63E-07	-2.06E-06	0.00	13584.	9.44E+09	1.09E-06	1.83E+09	0.00
29.0000	0.00	0.00	0.00	0.00	13584.	9.44E+09	9.28E-08	9.14E+08	0.00

* The above values of total stress are combined axial and bending stresses.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     1.13685563 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =      -1144859. inch-lbs
Maximum shear force              =        -22067. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =    22.62000000 feet below pile head
Number of iterations             =              8
Number of zero deflection points =              8
```

Pile-head Deflection vs. Pile Length for Load Case 1

Boundary Condition Type 2, Shear and Slope

```
Shear      =          8500. lbs
Slope      =       0.00000
Axial Load =        350800. lbs
```

Pile Length feet	Pile Head Deflection inches	Maximum Moment ln-lbs	Maximum Shear lbs
29.00000	1.13685563	-1144859.	-22067.
27.55000	1.14103635	-1146716.	-22491.
26.10000	1.13752443	-1144855.	-21904.
24.65000	1.13774363	-1144951.	-22131.
23.20000	1.14362543	-1146692.	-24051.
21.75000	1.65684054	-1387562.	-12280.
20.30000	2.18078978	-1671462.	-13398.
18.85000	2.95107736	-2144307.	-12184.
17.40000	3.63353975	-2653834.	8500.
15.95000	3.41173624	-2653983.	8500.
14.50000	2.99760144	-2315755.	8500.

Summary of Pile-head Responses for Conventional Analyses

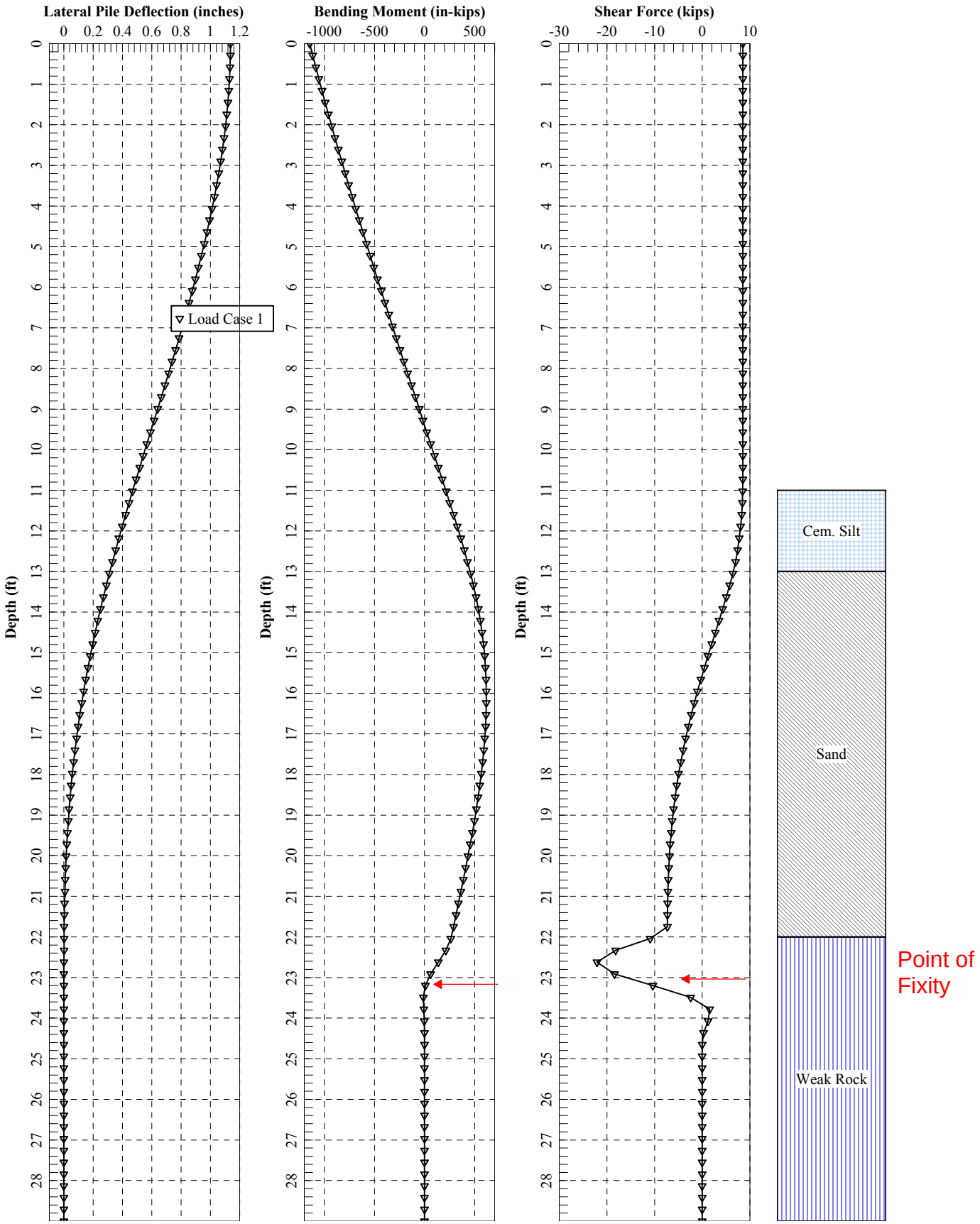
Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	8500.	S, rad	0.00	350800.	1.1369	0.00	-22067.	-1144859.

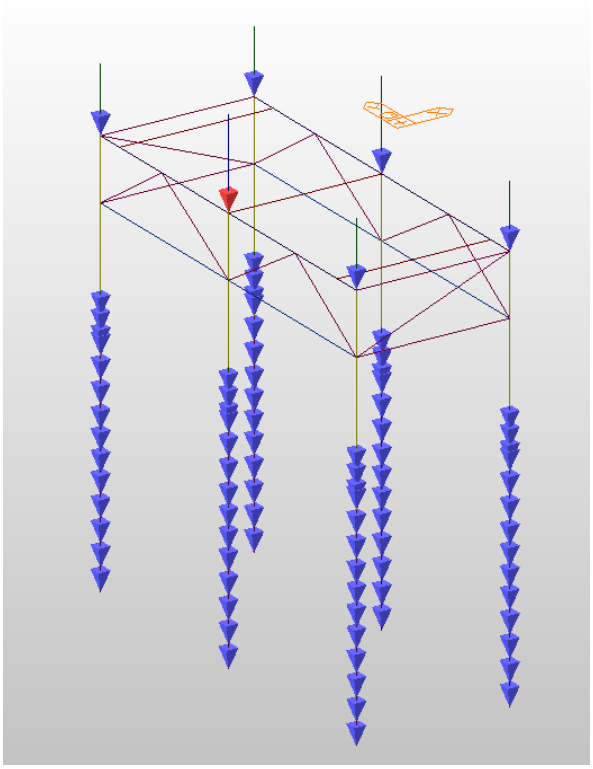
Maximum pile-head deflection = 1.1368556272 inches
Maximum pile-head rotation = -0.0000000000 radians = -0.000000 deg.

This analysis ended normally

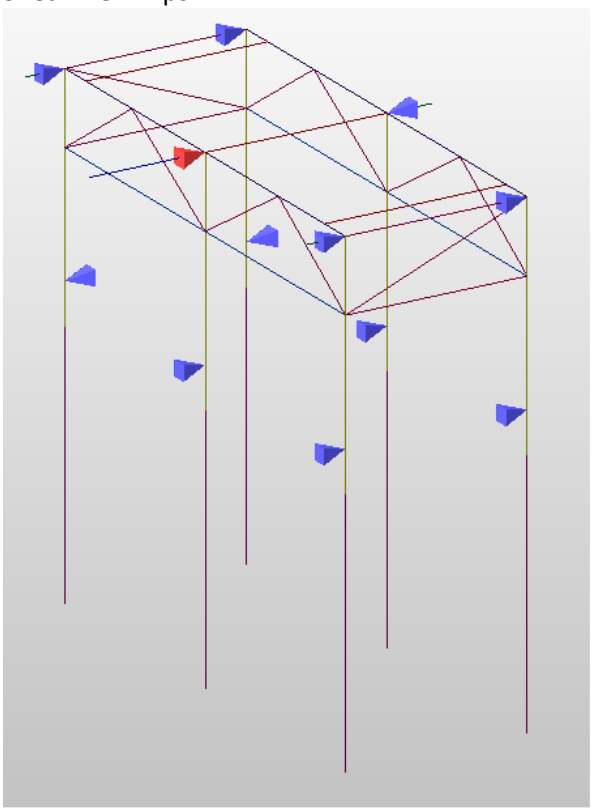

Lateral Pile Deflection (inches)
0 0.2 0.4 0.6 0.8 1 1.2
Load Case 1
Depth (ft)
Bending Moment (in-kips)
-1000 -500 0 500
Depth (ft)
Shear Force (kips)
-30 -20 -10 0 10
Depth (ft)
Cem. Silt
Sand
Weak Rock
Point of Fixity

L-Pile loads – HS-20

Axial Load = 350.4 kips



Shear = 8.4 kips



LPile for Windows, Version 2015-08.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
© 1985-2015 by Ensoft, Inc.
All Rights Reserved

This copy of LPile is being used by:

CJM
Wethersfield

Serial Number of Security Device: 227885239

This copy of LPile is licensed for exclusive use by:

Close, Jensen and Miller, P.C.,

Use of this program by any entity other than Close, Jensen and Miller, P.C.,
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Liaison\State Bridge Program\Project Files\01349, SPN 158-212, List 28\1-Pre-Design\Calculations\01349 L-Pile\REVISED\

Name of input data file:
HS-2O 01349 pier 2.lp8d

Name of output report file:
HS-2O 01349 pier 2.lp8o

Name of plot output file:
HS-2O 01349 pier 2.lp8p

Name of runtime message file:
HS-2O 01349 pier 2.lp8r

Date and Time of Analysis

Date: June 1, 2016 Time: 14:37:40

Problem Title

Project Name: Rehabilitation of Bridge 01349, ROute 136 Over Saugatuck

Job Number: 158-212

Client: CT DOT

Engineer: Danielle Coutu

Description: Pier 2 Analysis Under Existing Condition

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis includes loading by one distributed lateral load acting on pile
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

- Output files use decimal points to denote decimal symbols.
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 29.000 ft
Depth of ground surface below top of pile = 11.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	13.8300
2	29.000	13.8300

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is an elastic pile
Cross-sectional Shape = Weak H-Pile
Length of section = 29.000000 ft
Flange Width = 14.695000 in
Section Depth = 13.830000 in
Flange Thickness = 0.615000 in
Web Thickness = 0.615000 in
Section Area = 25.823850 sq. in
Moment of Inertia = 325.505721 in^4
Elastic Modulus = 29000000. psi

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is cemented silt with cohesion and friction

Distance from top of pile to top of layer = 11.000000 ft
Distance from top of pile to bottom of layer = 13.000000 ft
Effective unit weight at top of layer = 120.000000 pcf
Effective unit weight at bottom of layer = 120.000000 pcf
Undrained cohesion at top of layer = 500.000000 psf
Undrained cohesion at bottom of layer = 500.000000 psf
Friction angle at top of layer = 10.000000 deg.
Friction angle at bottom of layer = 10.000000 deg.
Epsilon-50 at top of layer = 0.010000
Epsilon-50 at bottom of layer = 0.010000
Subgrade k at top of layer = 18.000000 pci
Subgrade k at bottom of layer = 18.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 13.000000 ft
Distance from top of pile to bottom of layer = 22.000000 ft
Effective unit weight at top of layer = 125.000000 pcf
Effective unit weight at bottom of layer = 125.000000 pcf
Friction angle at top of layer = 38.000000 deg.
Friction angle at bottom of layer = 38.000000 deg.
Subgrade k at top of layer = 25.000000 pci
Subgrade k at bottom of layer = 25.000000 pci

Layer 3 is weak rock, p-y criteria by Reese, 1997

Distance from top of pile to top of layer = 22.000000 ft

```
   Distance from top of pile to bottom of layer        =    29.000000 ft
   Effective unit weight at top of layer               =   125.000000 pcf
   Effective unit weight at bottom of layer            =   125.000000 pcf
   Uniaxial compressive strength at top of layer       =   500.000000 psi
   Uniaxial compressive strength at bottom of layer    =   500.000000 psi
   Initial modulus of rock at top of layer             =     1050000. psi
   Initial modulus of rock at bottom of layer          =     1050000. psi
   RQD of rock at top of layer                         =       0.0000 %
   RQD of rock at bottom of layer                      =       0.0000 %
   k rm of rock at top of layer                        =    0.0005000
   k rm of rock at bottom of layer                     =    0.0005000


Layer 4 is massive rock, p-y criteria by Liang et al., 2009

   Distance from top of pile to top of layer           =    29.000000 ft
   Distance from top of pile to bottom of layer        =    30.000000 ft
   Effective unit weight at top of layer               =   139.000000 pcf
   Effective unit weight at bottom of layer            =   139.000000 pcf
   Uniaxial compressive strength at top of layer       =       11600. psi
   Uniaxial compressive strength at bottom of layer    =       11600. psi
   Poisson's ratio at top of layer                     =     0.250000
   Poisson's ratio at bottom of layer                  =     0.250000
   Option 1: Intact rock modulus at top of layer       =     1500000. psi
             Intact rock modulus at bottom of layer    =     1500000. psi
   Option 1: Geologic Strength Index for layer         =    50.000000
   Option 2: Rock mass modulus at top of layer         =       0.0000 psi
             Rock mass modulus at bottom of layer      =       0.0000 psi
   Option 1 will be used to compute values of rock mass modulus for the p-y curve
            in massive rock.
   The rock type is (metamorphic) gneiss, Hoek-Brown Material Constant mi = 28


 (Depth of the lowest soil layer extends 1.000 ft below the pile tip)


--------------------------------------------------------------------------------
                        Summary of Input Soil Properties
--------------------------------------------------------------------------------

Layer         Soil Type          Layer      Effective    Undrained    Angle of     Uniaxial                    E50
Rock Mass    Geologic     Int. Rock   Hoek-Brown
Layer           Name             Depth       Unit Wt.    Cohesion     Friction        qu          RQD %         or           kpy
Modulus     Strength      Modulus     Material     Poisson's
 Num.     (p-y Curve Type)        ft          pcf          psf          deg.         psi                        krm          pci
 psi         Index         psi       Index, mi      Ratio
-----   -------------------   ----------   ----------   ----------   ----------   ----------   ----------   ----------   ----------
----------   ----------   ----------   ----------   ----------
  1          Cemented           11.0000     120.0000     500.0000      10.0000       --           --          0.01000      18.0000
 --           --             0.00         0.00         0.00
               Silt             13.0000     120.0000     500.0000      10.0000       --           --          0.01000      18.0000
 --           --             0.00         0.00         0.00
  2            Sand            13.0000     125.0000       --          38.0000       --           --           --          25.0000
 --           --             0.00         0.00         0.00
          (Reese, et al.)        22.0000     125.0000       --          38.0000       --           --           --          25.0000
 --           --             0.00         0.00         0.00
  3            Weak            22.0000     125.0000       --           --         500.0000         0.00     5.00E-04       --
1050000.       --             0.00         0.00         0.00
               Rock            29.0000     125.0000       --           --         500.0000         0.00     5.00E-04       --
1050000.       --             0.00         0.00         0.00
  4          Massive           29.0000     139.0000       --           --          11600.       --           --           --
Internally      50.0000     1500000.      28.0000       0.2500
               Rock            30.0000     139.0000       --           --          11600.       --           --           --
Computed       50.0000     1500000.      28.0000       0.2500

--------------------------------------------------------------------------------
                              Static Loading Type
--------------------------------------------------------------------------------

Static loading criteria were used when computing p-y curves for all analyses.


--------------------------------------------------------------------------------
               Distributed Lateral Loading Used For All Load Cases
--------------------------------------------------------------------------------

Distributed lateral load intensity defined using 2 points

Point           Depth X            Dist. Load
 No.               in               lb/in
-----          ----------          ----------
  1              0.000               0.000
  2              0.000               0.000



--------------------------------------------------------------------------------
               Pile-head Loading and Pile-head Fixity Conditions
--------------------------------------------------------------------------------

Number of loads specified = 1

Load     Load         Condition              Condition           Axial Thrust      Compute Top y
 No.     Type             1                      2                Force, lbs      vs. Pile Length
```

1	2	V = 8400. lbs	S = 0.0000 in/in	350400.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic section properties

---

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	11.0000	0.00	N.A.	No	0.00	549.7454
2	13.0000	0.7518	No	No	549.7454	193067.
3	22.0000	11.0000	No	Yes	N.A.	N.A.
4	29.0000	18.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 8400.0 lbs
Rotation of pile head = 0.000E+00 radians
Axial load at pile head = 350400.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	1.1232	-1131133.	8400.	0.00	37598.	9.44E+09	0.00	0.00	0.00
0.2900	1.1225	-1101647.	8400.	-4.12E-04	36972.	9.44E+09	0.00	0.00	0.00
0.5800	1.1203	-1071665.	8400.	-8.12E-04	36335.	9.44E+09	0.00	0.00	0.00
0.8700	1.1168	-1041202.	8400.	-0.00120	35688.	9.44E+09	0.00	0.00	0.00
1.1600	1.1120	-1010271.	8400.	-0.00158	35031.	9.44E+09	0.00	0.00	0.00
1.4500	1.1058	-978885.	8400.	-0.00195	34364.	9.44E+09	0.00	0.00	0.00
1.7400	1.0984	-947060.	8400.	-0.00230	33688.	9.44E+09	0.00	0.00	0.00
2.0300	1.0898	-914809.	8400.	-0.00264	33003.	9.44E+09	0.00	0.00	0.00
2.3200	1.0800	-882146.	8400.	-0.00298	32309.	9.44E+09	0.00	0.00	0.00
2.6100	1.0691	-849087.	8400.	-0.00329	31607.	9.44E+09	0.00	0.00	0.00
2.9000	1.0571	-815647.	8400.	-0.00360	30896.	9.44E+09	0.00	0.00	0.00
3.1900	1.0440	-781839.	8400.	-0.00390	30178.	9.44E+09	0.00	0.00	0.00
3.4800	1.0299	-747680.	8400.	-0.00418	29452.	9.44E+09	0.00	0.00	0.00
3.7700	1.0149	-713185.	8400.	-0.00445	28720.	9.44E+09	0.00	0.00	0.00
4.0600	0.9990	-678370.	8400.	-0.00470	27980.	9.44E+09	0.00	0.00	0.00
4.3500	0.9822	-643249.	8400.	-0.00495	27234.	9.44E+09	0.00	0.00	0.00
4.6400	0.9646	-607840.	8400.	-0.00518	26482.	9.44E+09	0.00	0.00	0.00
4.9300	0.9461	-572157.	8400.	-0.00540	25724.	9.44E+09	0.00	0.00	0.00
5.2200	0.9270	-536216.	8400.	-0.00560	24960.	9.44E+09	0.00	0.00	0.00
5.5100	0.9072	-500035.	8400.	-0.00579	24192.	9.44E+09	0.00	0.00	0.00
5.8000	0.8867	-463629.	8400.	-0.00597	23418.	9.44E+09	0.00	0.00	0.00
6.0900	0.8656	-427015.	8400.	-0.00613	22640.	9.44E+09	0.00	0.00	0.00
6.3800	0.8440	-390209.	8400.	-0.00628	21858.	9.44E+09	0.00	0.00	0.00
6.6700	0.8219	-353227.	8400.	-0.00642	21073.	9.44E+09	0.00	0.00	0.00
6.9600	0.7993	-316086.	8400.	-0.00654	20284.	9.44E+09	0.00	0.00	0.00
7.2500	0.7763	-278804.	8400.	-0.00665	19492.	9.44E+09	0.00	0.00	0.00
7.5400	0.7530	-241396.	8400.	-0.00675	18697.	9.44E+09	0.00	0.00	0.00
7.8300	0.7294	-203879.	8400.	-0.00683	17900.	9.44E+09	0.00	0.00	0.00
8.1200	0.7055	-166271.	8400.	-0.00690	17101.	9.44E+09	0.00	0.00	0.00

8.4100	0.6813	-128588.	8400.	-0.00695	16301.	9.44E+09	0.00	0.00	0.00
8.7000	0.6571	-90847.	8400.	-0.00699	15499.	9.44E+09	0.00	0.00	0.00
8.9900	0.6327	-53066.	8400.	-0.00702	14696.	9.44E+09	0.00	0.00	0.00
9.2800	0.6082	-15261.	8400.	-0.00703	13893.	9.44E+09	0.00	0.00	0.00
9.5700	0.5837	22552.	8400.	-0.00703	14048.	9.44E+09	0.00	0.00	0.00
9.8600	0.5593	60354.	8400.	-0.00702	14851.	9.44E+09	0.00	0.00	0.00
10.1500	0.5349	98129.	8400.	-0.00699	15653.	9.44E+09	0.00	0.00	0.00
10.4400	0.5106	135860.	8400.	-0.00694	16455.	9.44E+09	0.00	0.00	0.00
10.7300	0.4865	173529.	8400.	-0.00689	17255.	9.44E+09	0.00	0.00	0.00
11.0200	0.4627	211121.	8397.	-0.00682	18054.	9.44E+09	-1.9988	15.0336	0.00
11.3100	0.4391	248594.	8342.	-0.00673	18850.	9.44E+09	-29.4017	233.0208	0.00
11.6000	0.4158	285599.	8197.	-0.00663	19636.	9.44E+09	-53.8909	451.0080	0.00
11.8900	0.3929	321823.	7972.	-0.00652	20406.	9.44E+09	-75.5356	668.9952	0.00
12.1800	0.3704	356987.	7676.	-0.00640	21153.	9.44E+09	-94.4164	886.9824	0.00
12.4700	0.3484	390847.	7319.	-0.00626	21872.	9.44E+09	-110.6252	1105.	0.00
12.7600	0.3269	423193.	6911.	-0.00611	22559.	9.44E+09	-124.2646	1323.	0.00
13.0500	0.3059	453843.	6367.	-0.00595	23210.	9.44E+09	-188.1212	2140.	0.00
13.3400	0.2855	482010.	5691.	-0.00577	23809.	9.44E+09	-200.4098	2443.	0.00
13.6300	0.2657	507534.	4977.	-0.00559	24351.	9.44E+09	-209.6359	2746.	0.00
13.9200	0.2466	530291.	4237.	-0.00540	24834.	9.44E+09	-215.9896	3048.	0.00
14.2100	0.2281	550194.	3479.	-0.00520	25257.	9.44E+09	-219.6691	3351.	0.00
14.5000	0.2104	567189.	2712.	-0.00500	25618.	9.44E+09	-220.8787	3654.	0.00
14.7900	0.1933	581255.	1945.	-0.00478	25917.	9.44E+09	-219.8274	3957.	0.00
15.0800	0.1771	592397.	1186.	-0.00457	26154.	9.44E+09	-216.7272	4260.	0.00
15.3700	0.1615	600648.	440.2380	-0.00435	26329.	9.44E+09	-211.7915	4562.	0.00
15.6600	0.1468	606064.	-285.3855	-0.00413	26444.	9.44E+09	-205.2335	4865.	0.00
15.9500	0.1328	608722.	-985.7320	-0.00390	26500.	9.44E+09	-197.2645	5168.	0.00
16.2400	0.1197	608718.	-1656.	-0.00368	26500.	9.44E+09	-188.0930	5471.	0.00
16.5300	0.1072	606162.	-2293.	-0.00345	26446.	9.44E+09	-177.9226	5773.	0.00
16.8200	0.09562	601178.	-2893.	-0.00323	26340.	9.44E+09	-166.9516	6076.	0.00
17.1100	0.08476	593903.	-3454.	-0.00301	26186.	9.44E+09	-155.3711	6379.	0.00
17.4000	0.07467	584479.	-3974.	-0.00279	25985.	9.44E+09	-143.3645	6682.	0.00
17.6900	0.06532	573057.	-4451.	-0.00258	25743.	9.44E+09	-131.1065	6984.	0.00
17.9800	0.05672	559788.	-4886.	-0.00237	25461.	9.44E+09	-118.7620	7287.	0.00
18.2700	0.04882	544830.	-5278.	-0.00217	25143.	9.44E+09	-106.4859	7590.	0.00
18.5600	0.04163	528338.	-5628.	-0.00197	24793.	9.44E+09	-94.4220	7893.	0.00
18.8500	0.03512	510464.	-5936.	-0.00178	24413.	9.44E+09	-82.7030	8195.	0.00
19.1400	0.02926	491360.	-6204.	-0.00159	24007.	9.44E+09	-71.4497	8498.	0.00
19.4300	0.02403	471169.	-6434.	-0.00142	23578.	9.44E+09	-60.7711	8801.	0.00
19.7200	0.01941	450030.	-6628.	-0.00125	23129.	9.44E+09	-50.7639	9104.	0.00
20.0100	0.01536	428075.	-6789.	-0.00108	22663.	9.44E+09	-41.5127	9406.	0.00
20.3000	0.01186	405424.	-6919.	-9.30E-04	22182.	9.44E+09	-33.0896	9709.	0.00
20.5900	0.00888	382190.	-7021.	-7.85E-04	21688.	9.44E+09	-25.5542	10012.	0.00
20.8800	0.00639	358475.	-7098.	-6.49E-04	21184.	9.44E+09	-18.9539	10315.	0.00
21.1700	0.00437	334369.	-7154.	-5.21E-04	20672.	9.44E+09	-13.3240	10617.	0.00
21.4600	0.00277	309952.	-7193.	-4.02E-04	20153.	9.44E+09	-8.6874	10920.	0.00
21.7500	0.00157	285290.	-7216.	-2.93E-04	19630.	9.44E+09	-5.0550	11223.	0.00
22.0400	7.32E-04	260439.	-10832.	-1.92E-04	19102.	9.44E+09	-2073.	9847576.	0.00
22.3300	2.32E-04	210369.	-18056.	-1.05E-04	18038.	9.44E+09	-2079.	3.12E+07	0.00
22.6200	6.01E-07	135027.	-21862.	-4.15E-05	16437.	9.44E+09	-108.3196	6.27E+08	0.00
22.9100	-5.72E-05	58313.	-18194.	-5.85E-06	14808.	9.44E+09	2216.	1.35E+08	0.00
23.2000	-4.01E-05	8410.	-10176.	6.45E-06	13748.	9.44E+09	2392.	2.08E+08	0.00
23.4900	-1.22E-05	-12528.	-2357.	5.69E-06	13835.	9.44E+09	2102.	5.97E+08	0.00
23.7800	-4.68E-07	-8009.	1561.	1.91E-06	13739.	9.44E+09	150.2255	1.12E+09	0.00
24.0700	1.03E-06	-1667.	1182.	1.24E-07	13604.	9.44E+09	-368.0708	1.24E+09	0.00
24.3600	3.95E-07	218.7963	272.8980	-1.43E-07	13574.	9.44E+09	-154.5209	1.36E+09	0.00
24.6500	3.71E-08	232.9516	-23.5431	-5.98E-08	13574.	9.44E+09	-15.8475	1.49E+09	0.00
24.9400	-2.14E-08	55.0822	-33.9065	-6.66E-09	13570.	9.44E+09	9.8915	1.61E+09	0.00
25.2300	-9.26E-09	-3.0217	-8.6790	2.93E-09	13569.	9.44E+09	4.6071	1.73E+09	0.00
25.5200	-9.99E-10	-5.3309	0.2495	1.39E-09	13569.	9.44E+09	0.5243	1.83E+09	0.00
25.8100	4.27E-10	-1.2887	0.7720	1.72E-10	13569.	9.44E+09	-0.2240	1.83E+09	0.00
26.1000	1.98E-10	0.04180	0.2011	-5.79E-11	13569.	9.44E+09	-0.1042	1.83E+09	0.00
26.3900	2.38E-11	0.1109	-0.00193	-2.97E-11	13569.	9.44E+09	-0.01251	1.83E+09	0.00
26.6800	-8.44E-12	0.02843	-0.01600	-4.03E-12	13569.	9.44E+09	0.00443	1.83E+09	0.00
26.9700	-4.24E-12	-4.08E-04	-0.00441	1.13E-12	13569.	9.44E+09	0.00223	1.83E+09	0.00
27.2600	0.00	-0.00230	-3.09E-05	0.00	13569.	9.44E+09	2.94E-04	1.83E+09	0.00
27.5500	0.00	-6.25E-04	3.30E-04	0.00	13569.	9.44E+09	-8.69E-05	1.83E+09	0.00
27.8400	0.00	-1.60E-06	9.66E-05	0.00	13569.	9.44E+09	-4.74E-05	1.83E+09	0.00
28.1300	0.00	4.75E-05	2.19E-06	0.00	13569.	9.44E+09	-6.85E-06	1.83E+09	0.00
28.4200	0.00	1.37E-05	-6.76E-06	0.00	13569.	9.44E+09	1.71E-06	1.83E+09	0.00
28.7100	0.00	4.73E-07	-1.96E-06	0.00	13569.	9.44E+09	1.05E-06	1.83E+09	0.00
29.0000	0.00	0.00	0.00	0.00	13569.	9.44E+09	7.80E-08	9.14E+08	0.00

* The above values of total stress are combined axial and bending stresses.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     1.12317797 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =      -1131133. inch-lbs
Maximum shear force              =        -21862. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =    22.62000000 feet below pile head
Number of iterations             =              8
Number of zero deflection points =              8
```

Pile-head Deflection vs. Pile Length for Load Case 1

Boundary Condition Type 2, Shear and Slope

```
Shear      =          8400. lbs
Slope      =        0.00000
Axial Load =        350400. lbs
```

Pile Length feet	Pile Head Deflection inches	Maximum Moment ln-lbs	Maximum Shear lbs
29.00000	1.12317797	-1131133.	-21862.
27.55000	1.12730790	-1132967.	-22285.
26.10000	1.12384136	-1131129.	-21704.
24.65000	1.12405867	-1131224.	-21929.
23.20000	1.12979979	-1132944.	-23835.
21.75000	1.63616903	-1370531.	-12124.
20.30000	2.15050572	-1649407.	-13214.
18.85000	2.90112438	-2111205.	-12010.
17.40000	3.57460001	-2613671.	8400.
15.95000	3.36388832	-2618118.	8400.
14.50000	2.95632444	-2285881.	8400.

Summary of Pile-head Responses for Conventional Analyses

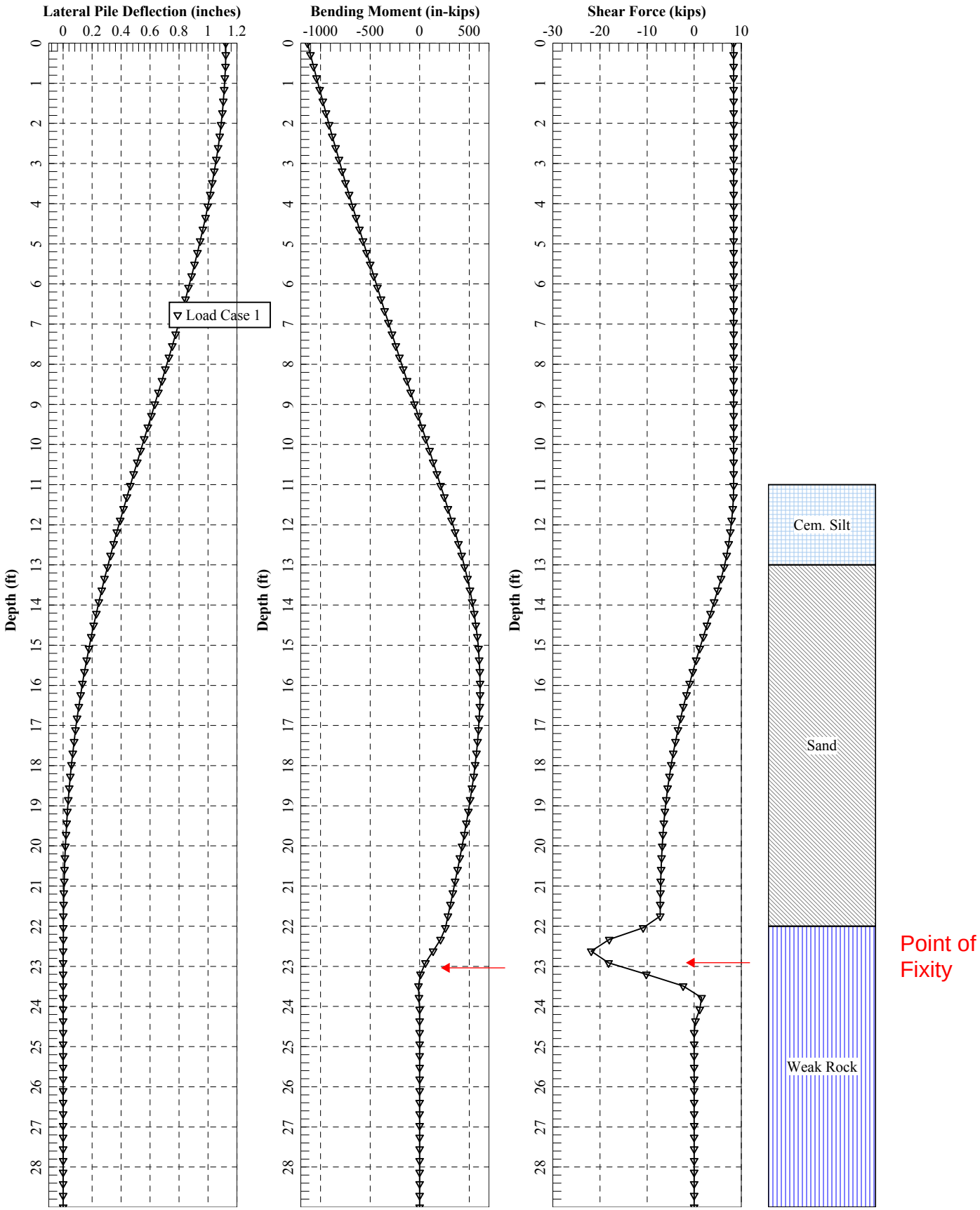
Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	8400.	S, rad	0.00	350400.	1.1232	0.00	-21862.	-1131133.

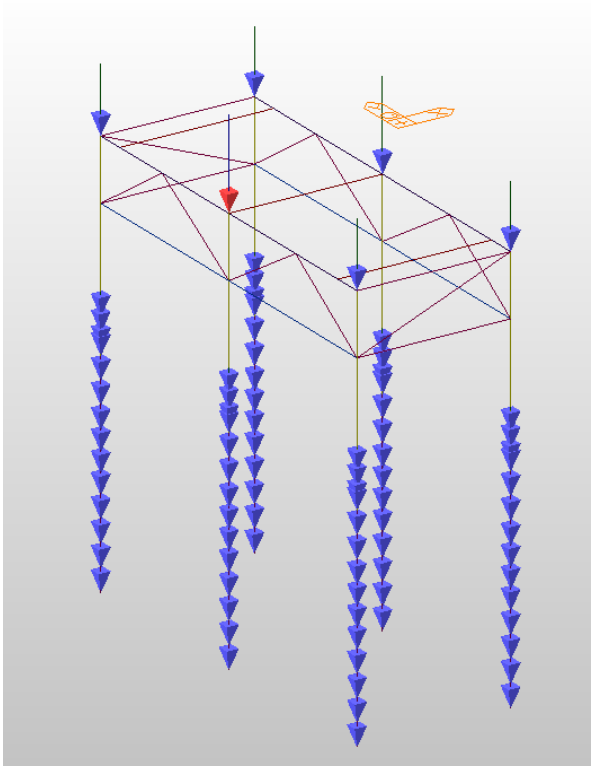
Maximum pile-head deflection = 1.1231779708 inches
Maximum pile-head rotation = 0.0000000000 radians = 0.000000 deg.

This analysis ended normally

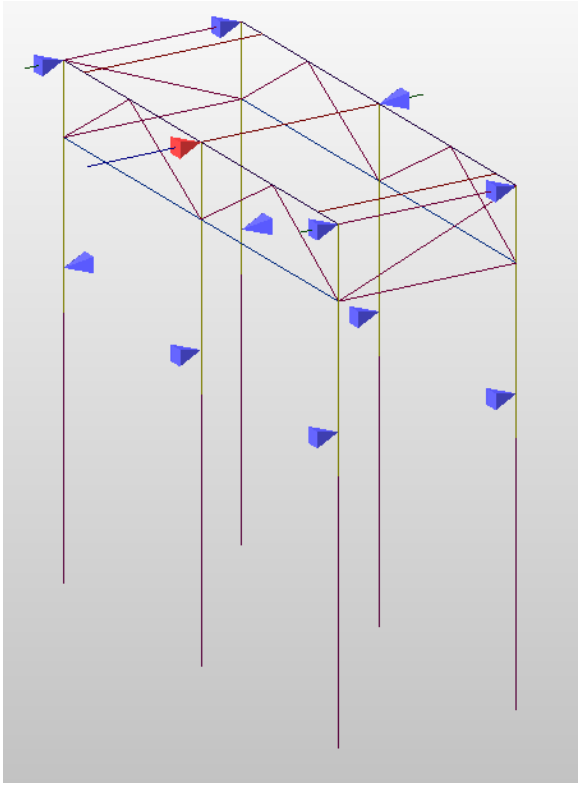

Lateral Pile Deflection (inches)
0 0.2 0.4 0.6 0.8 1 1.2
Load Case 1
Bending Moment (in-kips)
-1000 -500 0 500
Shear Force (kips)
-30 -20 -10 0 10
Depth (ft)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Cem. Silt
Sand
Weak Rock
Point of Fixity

L-Pile loads – H-20

Axial Load = 314.2 kips



Shear = 6.0 kips



LPile for Windows, Version 2015-08.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
© 1985-2015 by Ensoft, Inc.
All Rights Reserved

This copy of LPile is being used by:

CJM
Wethersfield

Serial Number of Security Device: 227885239

This copy of LPile is licensed for exclusive use by:

Close, Jensen and Miller, P.C.,

Use of this program by any entity other than Close, Jensen and Miller, P.C.,
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Liaison\State Bridge Program\Project Files\01349, SPN 158-212, List 28\1-Pre-Design\Calculations\01349 L-Pile\REVISED\

Name of input data file:
H-2O 01349 pier 2.lp8d

Name of output report file:
H-2O 01349 pier 2.lp8o

Name of plot output file:
H-2O 01349 pier 2.lp8p

Name of runtime message file:
H-2O 01349 pier 2.lp8r

Date and Time of Analysis

Date: June 1, 2016 Time: 14:38:34

Problem Title

Project Name: Rehabilitation of Bridge 01349, ROute 136 Over Saugatuck

Job Number: 158-212

Client: CT DOT

Engineer: Danielle Coutu

Description: Pier 2 Analysis Under Existing Condition

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis includes loading by one distributed lateral load acting on pile
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

- Output files use decimal points to denote decimal symbols.
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 29.000 ft
Depth of ground surface below top of pile = 11.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	13.8300
2	29.000	13.8300

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is an elastic pile
Cross-sectional Shape = Weak H-Pile
Length of section = 29.000000 ft
Flange Width = 14.695000 in
Section Depth = 13.830000 in
Flange Thickness = 0.615000 in
Web Thickness = 0.615000 in
Section Area = 25.823850 sq. in
Moment of Inertia = 325.505721 in^4
Elastic Modulus = 29000000. psi

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is cemented silt with cohesion and friction

Distance from top of pile to top of layer = 11.000000 ft
Distance from top of pile to bottom of layer = 13.000000 ft
Effective unit weight at top of layer = 120.000000 pcf
Effective unit weight at bottom of layer = 120.000000 pcf
Undrained cohesion at top of layer = 500.000000 psf
Undrained cohesion at bottom of layer = 500.000000 psf
Friction angle at top of layer = 10.000000 deg.
Friction angle at bottom of layer = 10.000000 deg.
Epsilon-50 at top of layer = 0.010000
Epsilon-50 at bottom of layer = 0.010000
Subgrade k at top of layer = 18.000000 pci
Subgrade k at bottom of layer = 18.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 13.000000 ft
Distance from top of pile to bottom of layer = 22.000000 ft
Effective unit weight at top of layer = 125.000000 pcf
Effective unit weight at bottom of layer = 125.000000 pcf
Friction angle at top of layer = 38.000000 deg.
Friction angle at bottom of layer = 38.000000 deg.
Subgrade k at top of layer = 25.000000 pci
Subgrade k at bottom of layer = 25.000000 pci

Layer 3 is weak rock, p-y criteria by Reese, 1997

Distance from top of pile to top of layer = 22.000000 ft

Distance from top of pile to bottom of layer	=	29.000000 ft
Effective unit weight at top of layer	=	125.000000 pcf
Effective unit weight at bottom of layer	=	125.000000 pcf
Uniaxial compressive strength at top of layer	=	500.000000 psi
Uniaxial compressive strength at bottom of layer	=	500.000000 psi
Initial modulus of rock at top of layer	=	1050000. psi
Initial modulus of rock at bottom of layer	=	1050000. psi
RQD of rock at top of layer	=	0.0000 %
RQD of rock at bottom of layer	=	0.0000 %
k rm of rock at top of layer	=	0.0005000
k rm of rock at bottom of layer	=	0.0005000

Layer 4 is massive rock, p-y criteria by Liang et al., 2009

Distance from top of pile to top of layer	=	29.000000 ft
Distance from top of pile to bottom of layer	=	30.000000 ft
Effective unit weight at top of layer	=	139.000000 pcf
Effective unit weight at bottom of layer	=	139.000000 pcf
Uniaxial compressive strength at top of layer	=	11600. psi
Uniaxial compressive strength at bottom of layer	=	11600. psi
Poisson's ratio at top of layer	=	0.250000
Poisson's ratio at bottom of layer	=	0.250000
Option 1: Intact rock modulus at top of layer	=	1500000. psi
Intact rock modulus at bottom of layer	=	1500000. psi
Option 1: Geologic Strength Index for layer	=	50.000000
Option 2: Rock mass modulus at top of layer	=	0.0000 psi
Rock mass modulus at bottom of layer	=	0.0000 psi

Option 1 will be used to compute values of rock mass modulus for the p-y curve in massive rock.
The rock type is (metamorphic) gneiss, Hoek-Brown Material Constant mi = 28

(Depth of the lowest soil layer extends 1.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Num.	Soil Type (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	Uniaxial qu psi	RQD %	E50 or krm	kpy pci
Rock Mass Modulus psi	Geologic Strength Index	Int. Rock Modulus psi	Hoek-Brown Material Index, mi	Poisson's Ratio					
1	Cemented	11.0000	120.0000	500.0000	10.0000	--	--	0.01000	18.0000
--	--	0.00	0.00	0.00					
	Silt	13.0000	120.0000	500.0000	10.0000	--	--	0.01000	18.0000
--	--	0.00	0.00	0.00					
2	Sand	13.0000	125.0000	--	38.0000	--	--	--	25.0000
--	(Reese, et al.)	22.0000	125.0000	--	38.0000	--	--	--	25.0000
--	--	0.00	0.00	0.00					
3	Weak	22.0000	125.0000	--	--	500.0000	0.00	5.00E-04	--
1050000.	--	0.00	0.00	0.00					
	Rock	29.0000	125.0000	--	--	500.0000	0.00	5.00E-04	--
1050000.	--	0.00	0.00	0.00					
4	Massive	29.0000	139.0000	--	--	11600.	--	--	--
Internally	50.0000	1500000.	28.0000	0.2500					
	Rock	30.0000	139.0000	--	--	11600.	--	--	--
Computed	50.0000	1500000.	28.0000	0.2500					

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Distributed Lateral Loading Used For All Load Cases

Distributed lateral load intensity defined using 2 points

Point No.	Depth X in	Dist. Load lb/in
1	0.000	0.000
2	0.000	0.000

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length

1	2	V = 6100. lbs	S = 0.0000 in/in	314200.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic section properties

---

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	11.0000	0.00	N.A.	No	0.00	549.7454
2	13.0000	0.7518	No	No	549.7454	193067.
3	22.0000	11.0000	No	Yes	N.A.	N.A.
4	29.0000	18.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 6100.0 lbs
Rotation of pile head = 0.000E+00 radians
Axial load at pile head = 314200.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.7968	-804911.	6100.	0.00	29266.	9.44E+09	0.00	0.00	0.00
0.2900	0.7962	-783521.	6100.	-2.93E-04	28812.	9.44E+09	0.00	0.00	0.00
0.5800	0.7947	-761815.	6100.	-5.78E-04	28351.	9.44E+09	0.00	0.00	0.00
0.8700	0.7922	-739802.	6100.	-8.54E-04	27883.	9.44E+09	0.00	0.00	0.00
1.1600	0.7888	-717490.	6100.	-0.00112	27409.	9.44E+09	0.00	0.00	0.00
1.4500	0.7844	-694890.	6100.	-0.00138	26929.	9.44E+09	0.00	0.00	0.00
1.7400	0.7791	-672009.	6100.	-0.00164	26443.	9.44E+09	0.00	0.00	0.00
2.0300	0.7730	-648857.	6100.	-0.00188	25951.	9.44E+09	0.00	0.00	0.00
2.3200	0.7661	-625444.	6100.	-0.00211	25454.	9.44E+09	0.00	0.00	0.00
2.6100	0.7583	-601779.	6100.	-0.00234	24951.	9.44E+09	0.00	0.00	0.00
2.9000	0.7498	-577871.	6100.	-0.00256	24443.	9.44E+09	0.00	0.00	0.00
3.1900	0.7405	-553730.	6100.	-0.00277	23930.	9.44E+09	0.00	0.00	0.00
3.4800	0.7305	-529367.	6100.	-0.00297	23413.	9.44E+09	0.00	0.00	0.00
3.7700	0.7199	-504789.	6100.	-0.00316	22891.	9.44E+09	0.00	0.00	0.00
4.0600	0.7086	-480008.	6100.	-0.00334	22364.	9.44E+09	0.00	0.00	0.00
4.3500	0.6966	-455034.	6100.	-0.00351	21834.	9.44E+09	0.00	0.00	0.00
4.6400	0.6841	-429876.	6100.	-0.00367	21299.	9.44E+09	0.00	0.00	0.00
4.9300	0.6711	-404545.	6100.	-0.00383	20761.	9.44E+09	0.00	0.00	0.00
5.2200	0.6575	-379051.	6100.	-0.00397	20220.	9.44E+09	0.00	0.00	0.00
5.5100	0.6434	-353404.	6100.	-0.00411	19675.	9.44E+09	0.00	0.00	0.00
5.8000	0.6289	-327615.	6100.	-0.00423	19127.	9.44E+09	0.00	0.00	0.00
6.0900	0.6140	-301694.	6100.	-0.00435	18576.	9.44E+09	0.00	0.00	0.00
6.3800	0.5987	-275651.	6100.	-0.00445	18023.	9.44E+09	0.00	0.00	0.00
6.6700	0.5830	-249497.	6100.	-0.00455	17467.	9.44E+09	0.00	0.00	0.00
6.9600	0.5670	-223242.	6100.	-0.00464	16910.	9.44E+09	0.00	0.00	0.00
7.2500	0.5507	-196897.	6100.	-0.00472	16350.	9.44E+09	0.00	0.00	0.00
7.5400	0.5342	-170473.	6100.	-0.00478	15789.	9.44E+09	0.00	0.00	0.00
7.8300	0.5174	-143980.	6100.	-0.00484	15226.	9.44E+09	0.00	0.00	0.00
8.1200	0.5005	-117430.	6100.	-0.00489	14662.	9.44E+09	0.00	0.00	0.00

8.4100	0.4834	-90832.	6100.	-0.00493	14097.	9.44E+09	0.00	0.00	0.00
8.7000	0.4662	-64197.	6100.	-0.00496	13531.	9.44E+09	0.00	0.00	0.00
8.9900	0.4489	-37536.	6100.	-0.00498	12964.	9.44E+09	0.00	0.00	0.00
9.2800	0.4315	-10860.	6100.	-0.00498	12398.	9.44E+09	0.00	0.00	0.00
9.5700	0.4142	15820.	6100.	-0.00498	12503.	9.44E+09	0.00	0.00	0.00
9.8600	0.3968	42493.	6100.	-0.00497	13070.	9.44E+09	0.00	0.00	0.00
10.1500	0.3796	69150.	6100.	-0.00495	13636.	9.44E+09	0.00	0.00	0.00
10.4400	0.3624	95779.	6100.	-0.00492	14202.	9.44E+09	0.00	0.00	0.00
10.7300	0.3453	122369.	6100.	-0.00488	14767.	9.44E+09	0.00	0.00	0.00
11.0200	0.3284	148910.	6098.	-0.00483	15330.	9.44E+09	-1.4187	15.0336	0.00
11.3100	0.3117	175373.	6059.	-0.00477	15893.	9.44E+09	-20.8703	233.0208	0.00
11.6000	0.2952	201514.	5956.	-0.00470	16448.	9.44E+09	-38.2566	451.0080	0.00
11.8900	0.2790	227109.	5796.	-0.00462	16992.	9.44E+09	-53.6264	668.9952	0.00
12.1800	0.2630	251964.	5586.	-0.00453	17520.	9.44E+09	-67.0366	886.9824	0.00
12.4700	0.2474	275905.	5333.	-0.00444	18028.	9.44E+09	-78.5521	1105.	0.00
12.7600	0.2321	298784.	5042.	-0.00433	18514.	9.44E+09	-88.2453	1323.	0.00
13.0500	0.2172	320473.	4656.	-0.00422	18975.	9.44E+09	-133.6051	2140.	0.00
13.3400	0.2028	340416.	4176.	-0.00410	19399.	9.44E+09	-142.3464	2443.	0.00
13.6300	0.1887	358497.	3670.	-0.00397	19783.	9.44E+09	-148.9143	2746.	0.00
13.9200	0.1752	374631.	3143.	-0.00383	20126.	9.44E+09	-153.4430	3048.	0.00
14.2100	0.1621	388755.	2605.	-0.00369	20426.	9.44E+09	-156.0725	3351.	0.00
14.5000	0.1495	400832.	2060.	-0.00355	20682.	9.44E+09	-156.9474	3654.	0.00
14.7900	0.1374	410847.	1515.	-0.00340	20895.	9.44E+09	-156.2153	3957.	0.00
15.0800	0.1258	418805.	975.4804	-0.00324	21064.	9.44E+09	-154.0263	4260.	0.00
15.3700	0.1148	424728.	445.5503	-0.00309	21190.	9.44E+09	-150.5313	4562.	0.00
15.6600	0.1043	428657.	-70.2071	-0.00293	21273.	9.44E+09	-145.8811	4865.	0.00
15.9500	0.09443	430647.	-568.0324	-0.00277	21316.	9.44E+09	-140.2254	5168.	0.00
16.2400	0.08506	430765.	-1045.	-0.00261	21318.	9.44E+09	-133.7119	5471.	0.00
16.5300	0.07624	429090.	-1497.	-0.00245	21283.	9.44E+09	-126.4849	5773.	0.00
16.8200	0.06798	425711.	-1924.	-0.00230	21211.	9.44E+09	-118.6849	6076.	0.00
17.1100	0.06026	420722.	-2323.	-0.00214	21105.	9.44E+09	-110.4477	6379.	0.00
17.4000	0.05307	414226.	-2692.	-0.00199	20967.	9.44E+09	-101.9035	6682.	0.00
17.6900	0.04643	406330.	-3032.	-0.00184	20799.	9.44E+09	-93.1765	6984.	0.00
17.9800	0.04030	397141.	-3341.	-0.00169	20604.	9.44E+09	-84.3841	7287.	0.00
18.2700	0.03468	386770.	-3619.	-0.00154	20384.	9.44E+09	-75.6368	7590.	0.00
18.5600	0.02956	375327.	-3867.	-0.00140	20140.	9.44E+09	-67.0372	7893.	0.00
18.8500	0.02492	362921.	-4086.	-0.00127	19877.	9.44E+09	-58.6804	8195.	0.00
19.1400	0.02074	349658.	-4276.	-0.00114	19595.	9.44E+09	-50.6532	8498.	0.00
19.4300	0.01702	335640.	-4439.	-0.00101	19297.	9.44E+09	-43.0340	8801.	0.00
19.7200	0.01372	320967.	-4577.	-8.88E-04	18986.	9.44E+09	-35.8929	9104.	0.00
20.0100	0.01084	305729.	-4690.	-7.72E-04	18662.	9.44E+09	-29.2913	9406.	0.00
20.3000	0.00834	290013.	-4782.	-6.63E-04	18328.	9.44E+09	-23.2823	9709.	0.00
20.5900	0.00623	273898.	-4853.	-5.59E-04	17986.	9.44E+09	-17.9102	10012.	0.00
20.8800	0.00446	257456.	-4907.	-4.61E-04	17636.	9.44E+09	-13.2107	10315.	0.00
21.1700	0.00302	240750.	-4946.	-3.69E-04	17282.	9.44E+09	-9.2114	10617.	0.00
21.4600	0.00189	223836.	-4973.	-2.83E-04	16922.	9.44E+09	-5.9310	10920.	0.00
21.7500	0.00105	206760.	-4989.	-2.04E-04	16559.	9.44E+09	-3.3803	11223.	0.00
22.0400	4.72E-04	189559.	-8226.	-1.31E-04	16194.	9.44E+09	-1857.	1.37E+07	0.00
22.3300	1.38E-04	149792.	-14640.	-6.82E-05	15349.	9.44E+09	-1829.	4.61E+07	0.00
22.6200	-3.22E-06	87814.	-16812.	-2.44E-05	14033.	9.44E+09	580.7131	6.27E+08	0.00
22.9100	-3.18E-05	32834.	-12507.	-2.17E-06	12865.	9.44E+09	1893.	2.07E+08	0.00
23.2000	-1.83E-05	770.3493	-5857.	4.02E-06	12183.	9.44E+09	1929.	3.66E+08	0.00
23.4900	-3.86E-06	-7937.	-581.9015	2.70E-06	12336.	9.44E+09	1103.	9.95E+08	0.00
23.7800	4.49E-07	-3286.	1086.	6.32E-07	12237.	9.44E+09	-144.2760	1.12E+09	0.00
24.0700	5.39E-07	-379.9557	500.5156	-4.41E-08	12175.	9.44E+09	-192.2097	1.24E+09	0.00
24.3600	1.42E-07	198.0950	69.3902	-7.77E-08	12171.	9.44E+09	-55.5635	1.36E+09	0.00
24.6500	-1.37E-09	103.1700	-26.2734	-2.21E-08	12169.	9.44E+09	0.5844	1.49E+09	0.00
24.9400	-1.22E-08	15.2809	-15.4162	-3.06E-10	12167.	9.44E+09	5.6553	1.61E+09	0.00
25.2300	-3.50E-09	-4.1260	-2.5457	1.75E-09	12167.	9.44E+09	1.7415	1.73E+09	0.00
25.5200	-5.90E-11	-2.4408	0.5385	5.39E-10	12167.	9.44E+09	0.03098	1.83E+09	0.00
25.8100	2.52E-10	-0.3794	0.3621	1.95E-11	12167.	9.44E+09	-0.1324	1.83E+09	0.00
26.1000	7.65E-11	0.07923	0.06194	-3.59E-11	12167.	9.44E+09	-0.04014	1.83E+09	0.00
26.3900	2.45E-12	0.05175	-0.01014	-1.17E-11	12167.	9.44E+09	-0.00129	1.83E+09	0.00
26.6800	-5.17E-12	0.00868	-0.00765	0.00	12167.	9.44E+09	0.00272	1.83E+09	0.00
26.9700	-1.66E-12	-0.00150	-0.00140	0.00	12167.	9.44E+09	8.74E-04	1.83E+09	0.00
27.2600	0.00	-0.00109	1.87E-04	0.00	12167.	9.44E+09	4.06E-05	1.83E+09	0.00
27.5500	0.00	-1.97E-04	1.61E-04	0.00	12167.	9.44E+09	-5.55E-05	1.83E+09	0.00
27.8400	0.00	2.78E-05	3.16E-05	0.00	12167.	9.44E+09	-1.90E-05	1.83E+09	0.00
28.1300	0.00	2.31E-05	-3.36E-06	0.00	12167.	9.44E+09	-1.14E-06	1.83E+09	0.00
28.4200	0.00	4.45E-06	-3.36E-06	0.00	12167.	9.44E+09	1.14E-06	1.83E+09	0.00
28.7100	0.00	-3.47E-07	-6.40E-07	0.00	12167.	9.44E+09	4.25E-07	1.83E+09	0.00
29.0000	0.00	0.00	0.00	0.00	12167.	9.44E+09	-5.73E-08	9.14E+08	0.00

* The above values of total stress are combined axial and bending stresses.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     0.79675464 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =       -804911. inch-lbs
Maximum shear force              =        -16812. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =    22.62000000 feet below pile head
Number of iterations             =              9
Number of zero deflection points =              8
```

Pile-head Deflection vs. Pile Length for Load Case 1

Boundary Condition Type 2, Shear and Slope

```
Shear      =          6100. lbs
Slope      =        0.00000
Axial Load =        314200. lbs
```

Pile Length feet	Pile Head Deflection inches	Maximum Moment ln-lbs	Maximum Shear lbs
29.00000	0.79675464	-804911.	-16812.
27.55000	0.79962890	-806166.	-17236.
26.10000	0.79727754	-804913.	-16791.
24.65000	0.79744045	-804977.	-17036.
23.20000	0.80036919	-806165.	-18372.
21.75000	1.03509480	-915525.	-7570.
20.30000	1.44375578	-1128070.	-8684.
18.85000	1.83081532	-1374417.	-7573.
17.40000	2.21343882	-1663216.	6100.
15.95000	2.18316803	-1718416.	6100.
14.50000	1.97481761	-1537869.	6100.

Summary of Pile-head Responses for Conventional Analyses

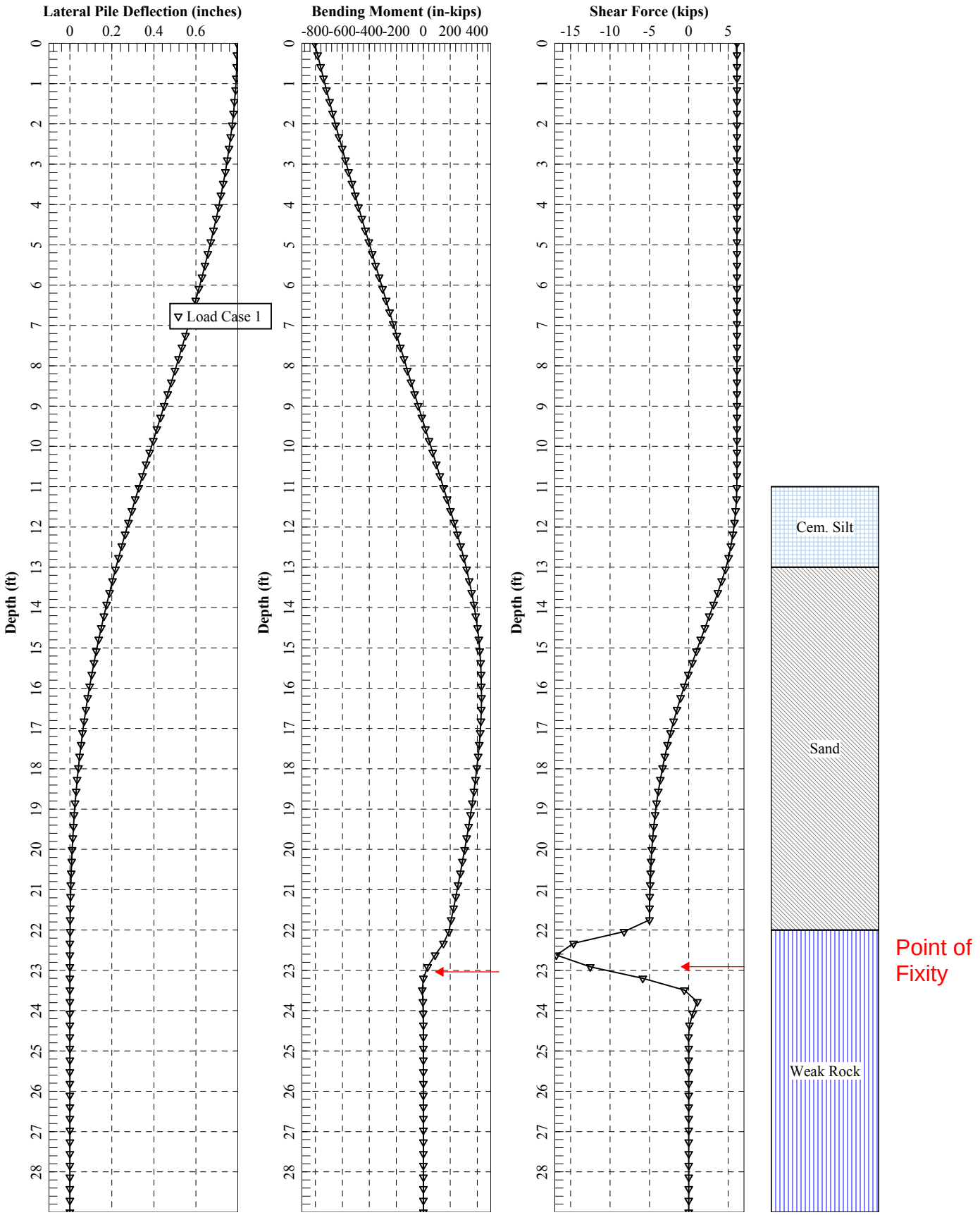
Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	6100.	S, rad	0.00	314200.	0.7968	0.00	-16812.	-804911.

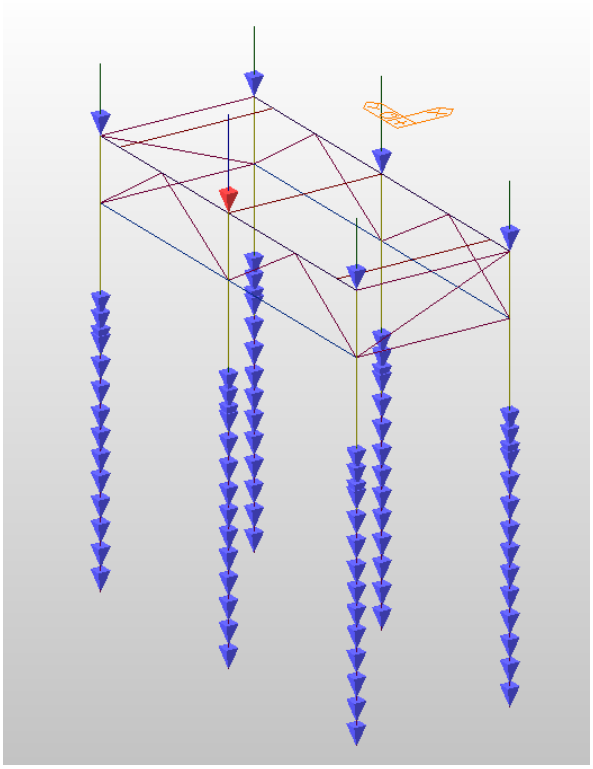
Maximum pile-head deflection = 0.7967546360 inches
Maximum pile-head rotation = -0.0000000000 radians = -0.000000 deg.

This analysis ended normally

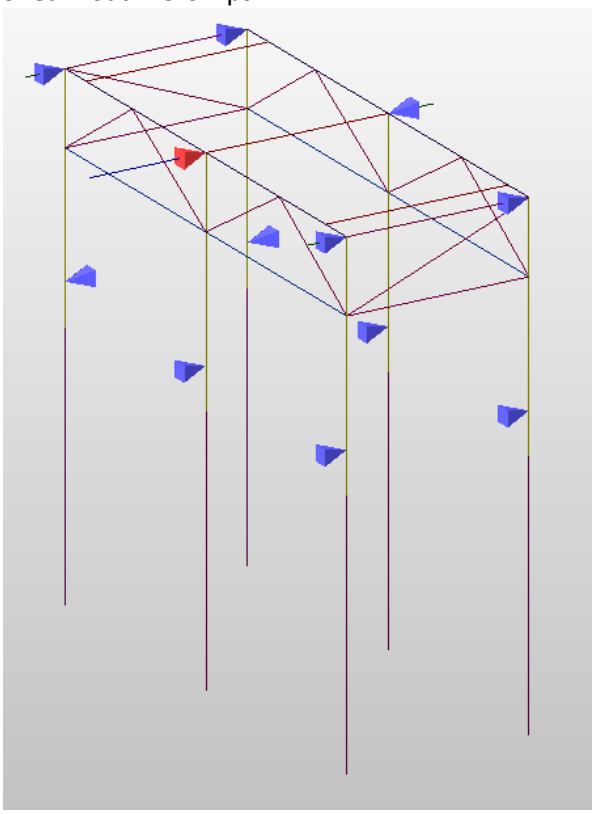

Lateral Pile Deflection (inches)
0 0.2 0.4 0.6
Load Case 1
Depth (ft)
Bending Moment (in-kips)
-800 -600 -400 -200 0 200 400
Depth (ft)
Shear Force (kips)
-15 -10 -5 0 5
Depth (ft)
Cem. Silt
Sand
Weak Rock
Point of Fixity

L-Pile loads – CT-L3S2

Axial Load = 309.2 kips



Shear Load = 5.6 kips



LPile for Windows, Version 2015-08.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
© 1985-2015 by Ensoft, Inc.
All Rights Reserved

This copy of LPile is being used by:

CJM
Wethersfield

Serial Number of Security Device: 227885239

This copy of LPile is licensed for exclusive use by:

Close, Jensen and Miller, P.C.,

Use of this program by any entity other than Close, Jensen and Miller, P.C.,
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Liaison\State Bridge Program\Project Files\01349, SPN 158-212, List 28\1-Pre-Design\Calculations\01349 L-Pile\REVISED\

Name of input data file:
CT-L3S2 01349 pier 2.lp8d

Name of output report file:
CT-L3S2 01349 pier 2.lp8o

Name of plot output file:
CT-L3S2 01349 pier 2.lp8p

Name of runtime message file:
CT-L3S2 01349 pier 2.lp8r

Date and Time of Analysis

Date: June 1, 2016 Time: 14:39:26

Problem Title

Project Name: Rehabilitation of Bridge 01349, ROute 136 Over Saugatuck

Job Number: 158-212

Client: CT DOT

Engineer: Danielle Coutu

Description: Pier 2 Analysis Under Existing Condition

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis includes loading by one distributed lateral load acting on pile
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 29.000 ft
Depth of ground surface below top of pile = 11.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	13.8300
2	29.000	13.8300

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is an elastic pile
Cross-sectional Shape = Weak H-Pile
Length of section = 29.000000 ft
Flange Width = 14.695000 in
Section Depth = 13.830000 in
Flange Thickness = 0.615000 in
Web Thickness = 0.615000 in
Section Area = 25.823850 sq. in
Moment of Inertia = 325.505721 in^4
Elastic Modulus = 29000000. psi

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is cemented silt with cohesion and friction

Distance from top of pile to top of layer = 11.000000 ft
Distance from top of pile to bottom of layer = 13.000000 ft
Effective unit weight at top of layer = 120.000000 pcf
Effective unit weight at bottom of layer = 120.000000 pcf
Undrained cohesion at top of layer = 500.000000 psf
Undrained cohesion at bottom of layer = 500.000000 psf
Friction angle at top of layer = 10.000000 deg.
Friction angle at bottom of layer = 10.000000 deg.
Epsilon-50 at top of layer = 0.010000
Epsilon-50 at bottom of layer = 0.010000
Subgrade k at top of layer = 18.000000 pci
Subgrade k at bottom of layer = 18.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 13.000000 ft
Distance from top of pile to bottom of layer = 22.000000 ft
Effective unit weight at top of layer = 125.000000 pcf
Effective unit weight at bottom of layer = 125.000000 pcf
Friction angle at top of layer = 38.000000 deg.
Friction angle at bottom of layer = 38.000000 deg.
Subgrade k at top of layer = 25.000000 pci
Subgrade k at bottom of layer = 25.000000 pci

Layer 3 is weak rock, p-y criteria by Reese, 1997

Distance from top of pile to top of layer = 22.000000 ft

```
   Distance from top of pile to bottom of layer        =    29.000000 ft
   Effective unit weight at top of layer               =   125.000000 pcf
   Effective unit weight at bottom of layer            =   125.000000 pcf
   Uniaxial compressive strength at top of layer       =   500.000000 psi
   Uniaxial compressive strength at bottom of layer    =   500.000000 psi
   Initial modulus of rock at top of layer             =     1050000. psi
   Initial modulus of rock at bottom of layer          =     1050000. psi
   RQD of rock at top of layer                         =       0.0000 %
   RQD of rock at bottom of layer                      =       0.0000 %
   k rm of rock at top of layer                        =    0.0005000
   k rm of rock at bottom of layer                     =    0.0005000


Layer 4 is massive rock, p-y criteria by Liang et al., 2009

   Distance from top of pile to top of layer           =    29.000000 ft
   Distance from top of pile to bottom of layer        =    30.000000 ft
   Effective unit weight at top of layer               =   139.000000 pcf
   Effective unit weight at bottom of layer            =   139.000000 pcf
   Uniaxial compressive strength at top of layer       =       11600. psi
   Uniaxial compressive strength at bottom of layer    =       11600. psi
   Poisson's ratio at top of layer                     =     0.250000
   Poisson's ratio at bottom of layer                  =     0.250000
   Option 1: Intact rock modulus at top of layer       =     1500000. psi
             Intact rock modulus at bottom of layer    =     1500000. psi
   Option 1: Geologic Strength Index for layer         =    50.000000
   Option 2: Rock mass modulus at top of layer         =       0.0000 psi
             Rock mass modulus at bottom of layer      =       0.0000 psi
   Option 1 will be used to compute values of rock mass modulus for the p-y curve
            in massive rock.
   The rock type is (metamorphic) gneiss, Hoek-Brown Material Constant mi = 28


 (Depth of the lowest soil layer extends 1.000 ft below the pile tip)


--------------------------------------------------------------------------------
                        Summary of Input Soil Properties
--------------------------------------------------------------------------------

Layer         Soil Type          Layer      Effective    Undrained    Angle of     Uniaxial                    E50
Rock Mass    Geologic     Int. Rock   Hoek-Brown
Layer           Name            Depth       Unit Wt.    Cohesion     Friction        qu          RQD %         or           kpy
Modulus     Strength      Modulus     Material     Poisson's
 Num.     (p-y Curve Type)        ft          pcf          psf          deg.         psi                       krm          pci
 psi         Index         psi       Index, mi      Ratio
-----   -------------------   ----------   ----------   ----------   ----------   ----------   ----------   ----------   ----------
----------   ----------   ----------   ----------   ----------
  1          Cemented           11.0000     120.0000     500.0000      10.0000       --           --          0.01000      18.0000
 --           --             0.00         0.00         0.00
               Silt             13.0000     120.0000     500.0000      10.0000       --           --          0.01000      18.0000
 --           --             0.00         0.00         0.00
  2            Sand            13.0000     125.0000       --          38.0000       --           --           --          25.0000
 --           --             0.00         0.00         0.00
          (Reese, et al.)        22.0000     125.0000       --          38.0000       --           --           --          25.0000
 --           --             0.00         0.00         0.00
  3            Weak            22.0000     125.0000       --           --          500.0000         0.00     5.00E-04       --
1050000.       --             0.00         0.00         0.00
               Rock            29.0000     125.0000       --           --          500.0000         0.00     5.00E-04       --
1050000.       --             0.00         0.00         0.00
  4          Massive           29.0000     139.0000       --           --            11600.       --           --           --
Internally      50.0000     1500000.      28.0000       0.2500
               Rock            30.0000     139.0000       --           --            11600.       --           --           --
Computed       50.0000     1500000.      28.0000       0.2500


--------------------------------------------------------------------------------
                              Static Loading Type
--------------------------------------------------------------------------------

Static loading criteria were used when computing p-y curves for all analyses.


--------------------------------------------------------------------------------
               Distributed Lateral Loading Used For All Load Cases
--------------------------------------------------------------------------------

Distributed lateral load intensity defined using 2 points

Point           Depth X            Dist. Load
 No.               in               lb/in
-----          ----------          ----------
  1               0.000               0.000
  2               0.000               0.000



--------------------------------------------------------------------------------
               Pile-head Loading and Pile-head Fixity Conditions
--------------------------------------------------------------------------------

Number of loads specified = 1

Load     Load         Condition              Condition           Axial Thrust      Compute Top y
 No.     Type             1                      2                Force, lbs      vs. Pile Length
```

1	2	V = 6300. lbs	S = 0.0000 in/in	319300.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic section properties

---

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	11.0000	0.00	N.A.	No	0.00	549.7454
2	13.0000	0.7518	No	No	549.7454	193067.
3	22.0000	11.0000	No	Yes	N.A.	N.A.
4	29.0000	18.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 6300.0 lbs
Rotation of pile head = 0.000E+00 radians
Axial load at pile head = 319300.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.8256	-833655.	6300.	0.00	30075.	9.44E+09	0.00	0.00	0.00
0.2900	0.8250	-811561.	6300.	-3.03E-04	29605.	9.44E+09	0.00	0.00	0.00
0.5800	0.8235	-789133.	6300.	-5.98E-04	29129.	9.44E+09	0.00	0.00	0.00
0.8700	0.8209	-766383.	6300.	-8.85E-04	28645.	9.44E+09	0.00	0.00	0.00
1.1600	0.8173	-743318.	6300.	-0.00116	28155.	9.44E+09	0.00	0.00	0.00
1.4500	0.8128	-719950.	6300.	-0.00143	27659.	9.44E+09	0.00	0.00	0.00
1.7400	0.8073	-696286.	6300.	-0.00169	27156.	9.44E+09	0.00	0.00	0.00
2.0300	0.8010	-672337.	6300.	-0.00195	26648.	9.44E+09	0.00	0.00	0.00
2.3200	0.7938	-648112.	6300.	-0.00219	26133.	9.44E+09	0.00	0.00	0.00
2.6100	0.7857	-623622.	6300.	-0.00242	25613.	9.44E+09	0.00	0.00	0.00
2.9000	0.7769	-598877.	6300.	-0.00265	25087.	9.44E+09	0.00	0.00	0.00
3.1900	0.7673	-573886.	6300.	-0.00287	24556.	9.44E+09	0.00	0.00	0.00
3.4800	0.7570	-548660.	6300.	-0.00307	24020.	9.44E+09	0.00	0.00	0.00
3.7700	0.7459	-523210.	6300.	-0.00327	23480.	9.44E+09	0.00	0.00	0.00
4.0600	0.7342	-497545.	6300.	-0.00346	22934.	9.44E+09	0.00	0.00	0.00
4.3500	0.7218	-471676.	6300.	-0.00364	22385.	9.44E+09	0.00	0.00	0.00
4.6400	0.7089	-445614.	6300.	-0.00381	21831.	9.44E+09	0.00	0.00	0.00
4.9300	0.6953	-419370.	6300.	-0.00397	21274.	9.44E+09	0.00	0.00	0.00
5.2200	0.6813	-392954.	6300.	-0.00412	20712.	9.44E+09	0.00	0.00	0.00
5.5100	0.6667	-366376.	6300.	-0.00426	20148.	9.44E+09	0.00	0.00	0.00
5.8000	0.6517	-339649.	6300.	-0.00439	19580.	9.44E+09	0.00	0.00	0.00
6.0900	0.6362	-312783.	6300.	-0.00451	19009.	9.44E+09	0.00	0.00	0.00
6.3800	0.6203	-285788.	6300.	-0.00462	18436.	9.44E+09	0.00	0.00	0.00
6.6700	0.6041	-258677.	6300.	-0.00472	17860.	9.44E+09	0.00	0.00	0.00
6.9600	0.5875	-231459.	6300.	-0.00481	17282.	9.44E+09	0.00	0.00	0.00
7.2500	0.5706	-204147.	6300.	-0.00489	16701.	9.44E+09	0.00	0.00	0.00
7.5400	0.5535	-176751.	6300.	-0.00496	16119.	9.44E+09	0.00	0.00	0.00
7.8300	0.5361	-149282.	6300.	-0.00502	15536.	9.44E+09	0.00	0.00	0.00
8.1200	0.5185	-121752.	6300.	-0.00507	14951.	9.44E+09	0.00	0.00	0.00

8.4100	0.5008	-94173.	6300.	-0.00511	14365.	9.44E+09	0.00	0.00	0.00
8.7000	0.4830	-66555.	6300.	-0.00514	13778.	9.44E+09	0.00	0.00	0.00
8.9900	0.4651	-38910.	6300.	-0.00516	13191.	9.44E+09	0.00	0.00	0.00
9.2800	0.4471	-11248.	6300.	-0.00517	12603.	9.44E+09	0.00	0.00	0.00
9.5700	0.4291	16417.	6300.	-0.00516	12713.	9.44E+09	0.00	0.00	0.00
9.8600	0.4112	44077.	6300.	-0.00515	13301.	9.44E+09	0.00	0.00	0.00
10.1500	0.3933	71718.	6300.	-0.00513	13888.	9.44E+09	0.00	0.00	0.00
10.4400	0.3755	99329.	6300.	-0.00510	14475.	9.44E+09	0.00	0.00	0.00
10.7300	0.3578	126900.	6300.	-0.00506	15060.	9.44E+09	0.00	0.00	0.00
11.0200	0.3402	154419.	6297.	-0.00501	15645.	9.44E+09	-1.4698	15.0336	0.00
11.3100	0.3229	181857.	6257.	-0.00494	16228.	9.44E+09	-21.6226	233.0208	0.00
11.6000	0.3058	208959.	6151.	-0.00487	16804.	9.44E+09	-39.6351	451.0080	0.00
11.8900	0.2890	235495.	5985.	-0.00479	17367.	9.44E+09	-55.5579	668.9952	0.00
12.1800	0.2725	261262.	5768.	-0.00470	17915.	9.44E+09	-69.4502	886.9824	0.00
12.4700	0.2563	286080.	5505.	-0.00460	18442.	9.44E+09	-81.3791	1105.	0.00
12.7600	0.2405	309796.	5204.	-0.00449	18946.	9.44E+09	-91.4197	1323.	0.00
13.0500	0.2251	332278.	4805.	-0.00437	19423.	9.44E+09	-138.4091	2140.	0.00
13.3400	0.2101	352948.	4307.	-0.00424	19863.	9.44E+09	-147.4623	2443.	0.00
13.6300	0.1955	371687.	3782.	-0.00411	20261.	9.44E+09	-154.2636	2746.	0.00
13.9200	0.1815	388405.	3237.	-0.00397	20616.	9.44E+09	-158.9522	3048.	0.00
14.2100	0.1679	403040.	2679.	-0.00382	20927.	9.44E+09	-161.6733	3351.	0.00
14.5000	0.1548	415552.	2115.	-0.00367	21192.	9.44E+09	-162.5766	3654.	0.00
14.7900	0.1423	425924.	1551.	-0.00352	21413.	9.44E+09	-161.8153	3957.	0.00
15.0800	0.1303	434163.	991.4012	-0.00336	21588.	9.44E+09	-159.5449	4260.	0.00
15.3700	0.1189	440291.	442.4891	-0.00320	21718.	9.44E+09	-155.9218	4562.	0.00
15.6600	0.1081	444351.	-91.7331	-0.00304	21804.	9.44E+09	-151.1024	4865.	0.00
15.9500	0.09781	446398.	-607.3723	-0.00287	21848.	9.44E+09	-145.2419	5168.	0.00
16.2400	0.08810	446504.	-1101.	-0.00271	21850.	9.44E+09	-138.4932	5471.	0.00
16.5300	0.07897	444750.	-1570.	-0.00254	21813.	9.44E+09	-131.0059	5773.	0.00
16.8200	0.07040	441228.	-2012.	-0.00238	21738.	9.44E+09	-122.9257	6076.	0.00
17.1100	0.06241	436035.	-2425.	-0.00222	21628.	9.44E+09	-114.3932	6379.	0.00
17.4000	0.05497	429279.	-2807.	-0.00206	21484.	9.44E+09	-105.5434	6682.	0.00
17.6900	0.04808	421069.	-3159.	-0.00190	21310.	9.44E+09	-96.5048	6984.	0.00
17.9800	0.04174	411517.	-3479.	-0.00175	21107.	9.44E+09	-87.3992	7287.	0.00
18.2700	0.03592	400739.	-3767.	-0.00160	20878.	9.44E+09	-78.3408	7590.	0.00
18.5600	0.03062	388848.	-4025.	-0.00145	20625.	9.44E+09	-69.4360	7893.	0.00
18.8500	0.02581	375956.	-4251.	-0.00131	20351.	9.44E+09	-60.7831	8195.	0.00
19.1400	0.02149	362174.	-4448.	-0.00118	20059.	9.44E+09	-52.4720	8498.	0.00
19.4300	0.01763	347609.	-4617.	-0.00104	19749.	9.44E+09	-44.5837	8801.	0.00
19.7200	0.01422	332361.	-4759.	-9.19E-04	19425.	9.44E+09	-37.1907	9104.	0.00
20.0100	0.01123	316527.	-4877.	-8.00E-04	19089.	9.44E+09	-30.3565	9406.	0.00
20.3000	0.00865	300195.	-4972.	-6.86E-04	18742.	9.44E+09	-24.1357	9709.	0.00
20.5900	0.00646	283448.	-5046.	-5.78E-04	18386.	9.44E+09	-18.5741	10012.	0.00
20.8800	0.00462	266360.	-5102.	-4.77E-04	18023.	9.44E+09	-13.7083	10315.	0.00
21.1700	0.00314	248997.	-5143.	-3.82E-04	17654.	9.44E+09	-9.5666	10617.	0.00
21.4600	0.00197	231416.	-5170.	-2.94E-04	17281.	9.44E+09	-6.1681	10920.	0.00
21.7500	0.00109	213666.	-5187.	-2.11E-04	16904.	9.44E+09	-3.5236	11223.	0.00
22.0400	4.94E-04	195785.	-8460.	-1.36E-04	16524.	9.44E+09	-1878.	1.32E+07	0.00
22.3300	1.46E-04	155086.	-14951.	-7.13E-05	15659.	9.44E+09	-1853.	4.42E+07	0.00
22.6200	-2.89E-06	91886.	-17269.	-2.58E-05	14317.	9.44E+09	520.4853	6.27E+08	0.00
22.9100	-3.38E-05	34951.	-13016.	-2.44E-06	13107.	9.44E+09	1924.	1.98E+08	0.00
23.2000	-1.99E-05	1303.	-6241.	4.24E-06	12392.	9.44E+09	1969.	3.45E+08	0.00
23.4900	-4.25E-06	-8496.	-699.5417	2.92E-06	12545.	9.44E+09	1215.	9.95E+08	0.00
23.7800	4.57E-07	-3573.	1159.	6.94E-07	12440.	9.44E+09	-146.9493	1.12E+09	0.00
24.0700	5.81E-07	-427.8185	543.5052	-4.34E-08	12374.	9.44E+09	-207.0181	1.24E+09	0.00
24.3600	1.55E-07	210.1792	77.5074	-8.35E-08	12369.	9.44E+09	-60.7967	1.36E+09	0.00
24.6500	-6.88E-10	111.8190	-27.7678	-2.42E-08	12367.	9.44E+09	0.2937	1.49E+09	0.00
24.9400	-1.31E-08	16.9692	-16.6907	-4.50E-10	12365.	9.44E+09	6.0725	1.61E+09	0.00
25.2300	-3.82E-09	-4.3473	-2.8171	1.88E-09	12365.	9.44E+09	1.9009	1.73E+09	0.00
25.5200	-8.11E-11	-2.6419	0.5645	5.88E-10	12365.	9.44E+09	0.04257	1.83E+09	0.00
25.8100	2.70E-10	-0.4198	0.3915	2.36E-11	12365.	9.44E+09	-0.1420	1.83E+09	0.00
26.1000	8.34E-11	0.08316	0.06834	-3.84E-11	12365.	9.44E+09	-0.04377	1.83E+09	0.00
26.3900	3.02E-12	0.05597	-0.01058	-1.28E-11	12365.	9.44E+09	-0.00158	1.83E+09	0.00
26.6800	-5.54E-12	0.00958	-0.00827	0.00	12365.	9.44E+09	0.00291	1.83E+09	0.00
26.9700	-1.81E-12	-0.00157	-0.00155	0.00	12365.	9.44E+09	9.52E-04	1.83E+09	0.00
27.2600	0.00	-0.00118	1.94E-04	0.00	12365.	9.44E+09	4.80E-05	1.83E+09	0.00
27.5500	0.00	-2.17E-04	1.74E-04	0.00	12365.	9.44E+09	-5.94E-05	1.83E+09	0.00
27.8400	0.00	2.89E-05	3.48E-05	0.00	12365.	9.44E+09	-2.06E-05	1.83E+09	0.00
28.1300	0.00	2.49E-05	-3.45E-06	0.00	12365.	9.44E+09	-1.32E-06	1.83E+09	0.00
28.4200	0.00	4.90E-06	-3.63E-06	0.00	12365.	9.44E+09	1.22E-06	1.83E+09	0.00
28.7100	0.00	-3.51E-07	-7.03E-07	0.00	12365.	9.44E+09	4.62E-07	1.83E+09	0.00
29.0000	0.00	0.00	0.00	0.00	12365.	9.44E+09	-5.80E-08	9.14E+08	0.00

* The above values of total stress are combined axial and bending stresses.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     0.82556209 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =       -833655. inch-lbs
Maximum shear force              =        -17269. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =    22.62000000 feet below pile head
Number of iterations             =              9
Number of zero deflection points =              8
```

Pile-head Deflection vs. Pile Length for Load Case 1

Boundary Condition Type 2, Shear and Slope

```
Shear      =          6300. lbs
Slope      =        0.00000
Axial Load =        319300. lbs
```

Pile Length feet	Pile Head Deflection inches	Maximum Moment ln-lbs	Maximum Shear lbs
29.00000	0.82556209	-833655.	-17269.
27.55000	0.82854771	-834962.	-17699.
26.10000	0.82609701	-833657.	-17242.
24.65000	0.82626564	-833723.	-17482.
23.20000	0.82939723	-834960.	-18884.
21.75000	1.07571509	-949996.	-7889.
20.30000	1.51095367	-1176313.	-9109.
18.85000	1.91363689	-1433758.	-7956.
17.40000	2.32337238	-1741976.	6300.
15.95000	2.28649160	-1797719.	6300.
14.50000	2.05982540	-1604216.	6300.

Summary of Pile-head Responses for Conventional Analyses

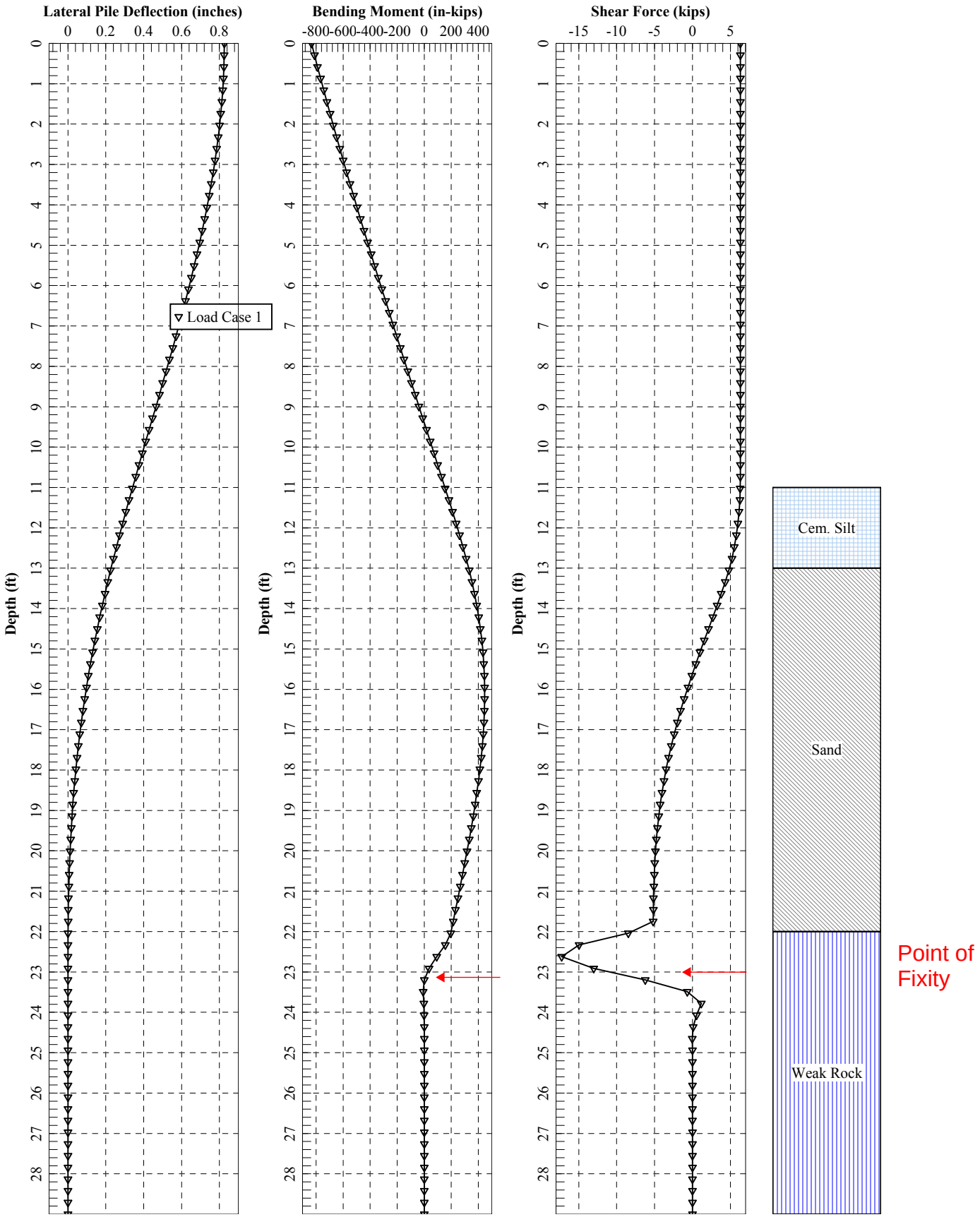
Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	6300.	S, rad	0.00	319300.	0.8256	0.00	-17269.	-833655.

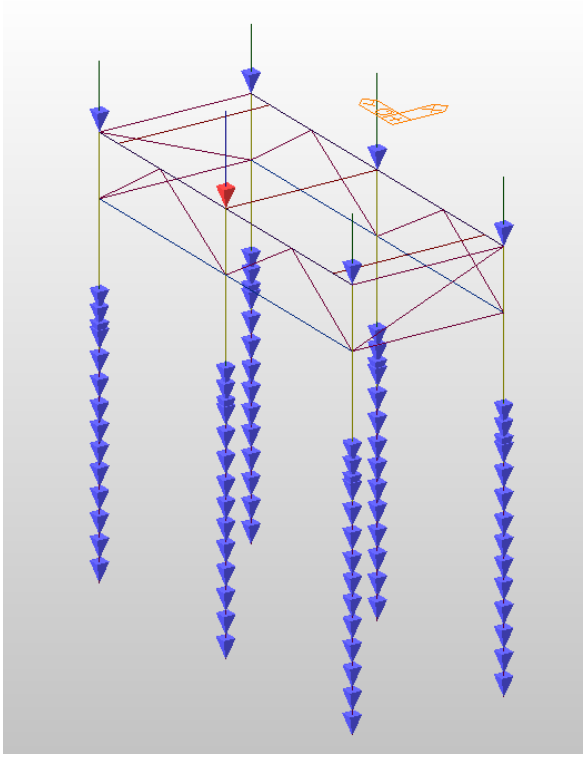
Maximum pile-head deflection = 0.8255620926 inches
Maximum pile-head rotation = -0.0000000000 radians = -0.000000 deg.

This analysis ended normally

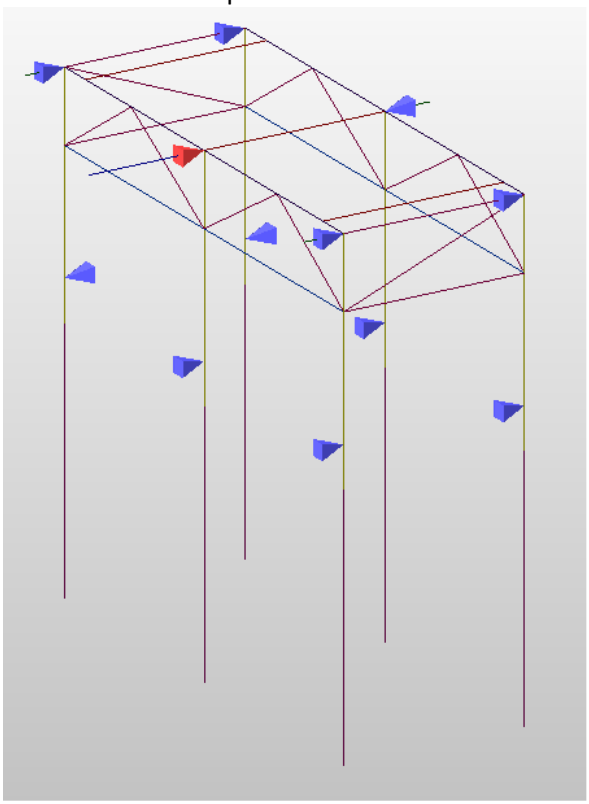

Lateral Pile Deflection (inches)
0 0.2 0.4 0.6 0.8
Load Case 1
Bending Moment (in-kips)
-800 -600 -400 -200 0 200 400
Shear Force (kips)
-15 -10 -5 0 5
Depth (ft)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Cem. Silt
Sand
Weak Rock
Point of Fixity

L-Pile loads – CT-L73.0

Axial Load = 328.3 kips



Shear Load = 7.1 kips



LPile for Windows, Version 2015-08.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
© 1985-2015 by Ensoft, Inc.
All Rights Reserved

This copy of LPile is being used by:

CJM
Wethersfield

Serial Number of Security Device: 227885239

This copy of LPile is licensed for exclusive use by:

Close, Jensen and Miller, P.C.,

Use of this program by any entity other than Close, Jensen and Miller, P.C.,
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Liaison\State Bridge Program\Project Files\01349, SPN 158-212, List 28\1-Pre-Design\Calculations\01349 L-Pile\REVISED\

Name of input data file:
CT-L73.0 01349 pier 2.lp8d

Name of output report file:
CT-L73.0 01349 pier 2.lp8o

Name of plot output file:
CT-L73.0 01349 pier 2.lp8p

Name of runtime message file:
CT-L73.0 01349 pier 2.lp8r

Date and Time of Analysis

Date: June 1, 2016 Time: 14:41:09

Problem Title

Project Name: Rehabilitation of Bridge 01349, ROute 136 Over Saugatuck

Job Number: 158-212

Client: CT DOT

Engineer: Danielle Coutu

Description: Pier 2 Analysis Under Existing Condition

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis includes loading by one distributed lateral load acting on pile
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 29.000 ft
Depth of ground surface below top of pile = 11.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	13.8300
2	29.000	13.8300

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is an elastic pile
Cross-sectional Shape = Weak H-Pile
Length of section = 29.000000 ft
Flange Width = 14.695000 in
Section Depth = 13.830000 in
Flange Thickness = 0.615000 in
Web Thickness = 0.615000 in
Section Area = 25.823850 sq. in
Moment of Inertia = 325.505721 in^4
Elastic Modulus = 29000000. psi

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is cemented silt with cohesion and friction

Distance from top of pile to top of layer = 11.000000 ft
Distance from top of pile to bottom of layer = 13.000000 ft
Effective unit weight at top of layer = 120.000000 pcf
Effective unit weight at bottom of layer = 120.000000 pcf
Undrained cohesion at top of layer = 500.000000 psf
Undrained cohesion at bottom of layer = 500.000000 psf
Friction angle at top of layer = 10.000000 deg.
Friction angle at bottom of layer = 10.000000 deg.
Epsilon-50 at top of layer = 0.010000
Epsilon-50 at bottom of layer = 0.010000
Subgrade k at top of layer = 18.000000 pci
Subgrade k at bottom of layer = 18.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 13.000000 ft
Distance from top of pile to bottom of layer = 22.000000 ft
Effective unit weight at top of layer = 125.000000 pcf
Effective unit weight at bottom of layer = 125.000000 pcf
Friction angle at top of layer = 38.000000 deg.
Friction angle at bottom of layer = 38.000000 deg.
Subgrade k at top of layer = 25.000000 pci
Subgrade k at bottom of layer = 25.000000 pci

Layer 3 is weak rock, p-y criteria by Reese, 1997

Distance from top of pile to top of layer = 22.000000 ft

Distance from top of pile to bottom of layer	=	29.000000 ft
Effective unit weight at top of layer	=	125.000000 pcf
Effective unit weight at bottom of layer	=	125.000000 pcf
Uniaxial compressive strength at top of layer	=	500.000000 psi
Uniaxial compressive strength at bottom of layer	=	500.000000 psi
Initial modulus of rock at top of layer	=	1050000. psi
Initial modulus of rock at bottom of layer	=	1050000. psi
RQD of rock at top of layer	=	0.0000 %
RQD of rock at bottom of layer	=	0.0000 %
k rm of rock at top of layer	=	0.0005000
k rm of rock at bottom of layer	=	0.0005000

Layer 4 is massive rock, p-y criteria by Liang et al., 2009

Distance from top of pile to top of layer	=	29.000000 ft
Distance from top of pile to bottom of layer	=	30.000000 ft
Effective unit weight at top of layer	=	139.000000 pcf
Effective unit weight at bottom of layer	=	139.000000 pcf
Uniaxial compressive strength at top of layer	=	11600. psi
Uniaxial compressive strength at bottom of layer	=	11600. psi
Poisson's ratio at top of layer	=	0.250000
Poisson's ratio at bottom of layer	=	0.250000
Option 1: Intact rock modulus at top of layer	=	1500000. psi
Intact rock modulus at bottom of layer	=	1500000. psi
Option 1: Geologic Strength Index for layer	=	50.000000
Option 2: Rock mass modulus at top of layer	=	0.0000 psi
Rock mass modulus at bottom of layer	=	0.0000 psi

Option 1 will be used to compute values of rock mass modulus for the p-y curve in massive rock.
The rock type is (metamorphic) gneiss, Hoek-Brown Material Constant mi = 28

(Depth of the lowest soil layer extends 1.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Num.	Soil Type (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	Uniaxial qu psi	RQD %	E50 or krm	kpy pci
Rock Mass Modulus psi	Geologic Strength Index	Int. Rock Modulus psi	Hoek-Brown Material Index, mi	Poisson's Ratio					
1	Cemented	11.0000	120.0000	500.0000	10.0000	--	--	0.01000	18.0000
--	--	0.00	0.00	0.00					
	Silt	13.0000	120.0000	500.0000	10.0000	--	--	0.01000	18.0000
--	--	0.00	0.00	0.00					
2	Sand	13.0000	125.0000	--	38.0000	--	--	--	25.0000
--	(Reese, et al.)	22.0000	125.0000	--	38.0000	--	--	--	25.0000
--	--	0.00	0.00	0.00					
3	Weak	22.0000	125.0000	--	--	500.0000	0.00	5.00E-04	--
1050000.	--	0.00	0.00	0.00					
	Rock	29.0000	125.0000	--	--	500.0000	0.00	5.00E-04	--
1050000.	--	0.00	0.00	0.00					
4	Massive	29.0000	139.0000	--	--	11600.	--	--	--
Internally	50.0000	1500000.	28.0000	0.2500					
	Rock	30.0000	139.0000	--	--	11600.	--	--	--
Computed	50.0000	1500000.	28.0000	0.2500					

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Distributed Lateral Loading Used For All Load Cases

Distributed lateral load intensity defined using 2 points

Point No.	Depth X in	Dist. Load lb/in
1	0.000	0.000
2	0.000	0.000

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length

1	2	V = 8100. lbs	S = 0.0000 in/in	341900.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic section properties

---

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	11.0000	0.00	N.A.	No	0.00	549.7454
2	13.0000	0.7518	No	No	549.7454	193067.
3	22.0000	11.0000	No	Yes	N.A.	N.A.
4	29.0000	18.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 8100.0 lbs
Rotation of pile head = 0.000E+00 radians
Axial load at pile head = 341900.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	1.0771	-1085494.	8100.	0.00	36300.	9.44E+09	0.00	0.00	0.00
0.2900	1.0764	-1057068.	8100.	-3.95E-04	35696.	9.44E+09	0.00	0.00	0.00
0.5800	1.0744	-1028178.	8100.	-7.79E-04	35082.	9.44E+09	0.00	0.00	0.00
0.8700	1.0710	-998837.	8100.	-0.00115	34459.	9.44E+09	0.00	0.00	0.00
1.1600	1.0663	-969058.	8100.	-0.00152	33826.	9.44E+09	0.00	0.00	0.00
1.4500	1.0604	-938854.	8100.	-0.00187	33185.	9.44E+09	0.00	0.00	0.00
1.7400	1.0533	-908239.	8100.	-0.00221	32534.	9.44E+09	0.00	0.00	0.00
2.0300	1.0451	-877225.	8100.	-0.00254	31875.	9.44E+09	0.00	0.00	0.00
2.3200	1.0357	-845826.	8100.	-0.00285	31208.	9.44E+09	0.00	0.00	0.00
2.6100	1.0252	-814056.	8100.	-0.00316	30533.	9.44E+09	0.00	0.00	0.00
2.9000	1.0137	-781929.	8100.	-0.00345	29851.	9.44E+09	0.00	0.00	0.00
3.1900	1.0012	-749459.	8100.	-0.00374	29161.	9.44E+09	0.00	0.00	0.00
3.4800	0.9877	-716660.	8100.	-0.00401	28464.	9.44E+09	0.00	0.00	0.00
3.7700	0.9733	-683547.	8100.	-0.00427	27761.	9.44E+09	0.00	0.00	0.00
4.0600	0.9580	-650134.	8100.	-0.00451	27051.	9.44E+09	0.00	0.00	0.00
4.3500	0.9419	-616436.	8100.	-0.00474	26335.	9.44E+09	0.00	0.00	0.00
4.6400	0.9250	-582468.	8100.	-0.00497	25614.	9.44E+09	0.00	0.00	0.00
4.9300	0.9073	-548244.	8100.	-0.00517	24887.	9.44E+09	0.00	0.00	0.00
5.2200	0.8890	-513780.	8100.	-0.00537	24154.	9.44E+09	0.00	0.00	0.00
5.5100	0.8699	-479090.	8100.	-0.00555	23417.	9.44E+09	0.00	0.00	0.00
5.8000	0.8503	-444190.	8100.	-0.00572	22676.	9.44E+09	0.00	0.00	0.00
6.0900	0.8301	-409095.	8100.	-0.00588	21930.	9.44E+09	0.00	0.00	0.00
6.3800	0.8094	-373821.	8100.	-0.00602	21181.	9.44E+09	0.00	0.00	0.00
6.6700	0.7882	-338383.	8100.	-0.00616	20428.	9.44E+09	0.00	0.00	0.00
6.9600	0.7665	-302797.	8100.	-0.00627	19672.	9.44E+09	0.00	0.00	0.00
7.2500	0.7445	-267077.	8100.	-0.00638	18913.	9.44E+09	0.00	0.00	0.00
7.5400	0.7221	-231241.	8100.	-0.00647	18152.	9.44E+09	0.00	0.00	0.00
7.8300	0.6995	-195303.	8100.	-0.00655	17389.	9.44E+09	0.00	0.00	0.00
8.1200	0.6766	-159279.	8100.	-0.00661	16623.	9.44E+09	0.00	0.00	0.00

8.4100	0.6534	-123186.	8100.	-0.00667	15857.	9.44E+09	0.00	0.00	0.00
8.7000	0.6301	-87038.	8100.	-0.00671	15089.	9.44E+09	0.00	0.00	0.00
8.9900	0.6068	-50852.	8100.	-0.00673	14320.	9.44E+09	0.00	0.00	0.00
9.2800	0.5833	-14644.	8100.	-0.00674	13551.	9.44E+09	0.00	0.00	0.00
9.5700	0.5598	21570.	8100.	-0.00674	13698.	9.44E+09	0.00	0.00	0.00
9.8600	0.5364	57775.	8100.	-0.00673	14467.	9.44E+09	0.00	0.00	0.00
10.1500	0.5130	93955.	8100.	-0.00670	15236.	9.44E+09	0.00	0.00	0.00
10.4400	0.4897	130093.	8100.	-0.00666	16003.	9.44E+09	0.00	0.00	0.00
10.7300	0.4667	166174.	8100.	-0.00660	16770.	9.44E+09	0.00	0.00	0.00
11.0200	0.4438	202183.	8097.	-0.00654	17535.	9.44E+09	-1.9172	15.0336	0.00
11.3100	0.4212	238079.	8044.	-0.00645	18297.	9.44E+09	-28.2018	233.0208	0.00
11.6000	0.3989	273530.	7905.	-0.00636	19051.	9.44E+09	-51.6929	451.0080	0.00
11.8900	0.3769	308235.	7689.	-0.00625	19788.	9.44E+09	-72.4566	668.9952	0.00
12.1800	0.3553	341927.	7406.	-0.00613	20504.	9.44E+09	-90.5703	886.9824	0.00
12.4700	0.3342	374372.	7063.	-0.00600	21193.	9.44E+09	-106.1219	1105.	0.00
12.7600	0.3136	405367.	6671.	-0.00586	21851.	9.44E+09	-119.2097	1323.	0.00
13.0500	0.2935	434742.	6150.	-0.00570	22475.	9.44E+09	-180.4745	2140.	0.00
13.3400	0.2739	461739.	5501.	-0.00554	23049.	9.44E+09	-192.2699	2443.	0.00
13.6300	0.2549	486206.	4817.	-0.00536	23569.	9.44E+09	-201.1284	2746.	0.00
13.9200	0.2366	508024.	4106.	-0.00518	24032.	9.44E+09	-207.2320	3048.	0.00
14.2100	0.2189	527110.	3379.	-0.00499	24438.	9.44E+09	-210.7704	3351.	0.00
14.5000	0.2018	543411.	2643.	-0.00479	24784.	9.44E+09	-211.9394	3654.	0.00
14.7900	0.1855	556908.	1907.	-0.00459	25071.	9.44E+09	-210.9394	3957.	0.00
15.0800	0.1699	567606.	1179.	-0.00438	25298.	9.44E+09	-207.9735	4260.	0.00
15.3700	0.1550	575536.	463.0676	-0.00417	25466.	9.44E+09	-203.2461	4562.	0.00
15.6600	0.1409	580752.	-233.2938	-0.00396	25577.	9.44E+09	-196.9616	4865.	0.00
15.9500	0.1275	583329.	-905.4282	-0.00374	25632.	9.44E+09	-189.3226	5168.	0.00
16.2400	0.1148	583356.	-1549.	-0.00353	25632.	9.44E+09	-180.5287	5471.	0.00
16.5300	0.1029	580942.	-2160.	-0.00331	25581.	9.44E+09	-170.7753	5773.	0.00
16.8200	0.09178	576204.	-2736.	-0.00310	25481.	9.44E+09	-160.2524	6076.	0.00
17.1100	0.08137	569274.	-3275.	-0.00289	25333.	9.44E+09	-149.1434	6379.	0.00
17.4000	0.07168	560287.	-3774.	-0.00268	25142.	9.44E+09	-137.6241	6682.	0.00
17.6900	0.06271	549388.	-4232.	-0.00248	24911.	9.44E+09	-125.8619	6984.	0.00
17.9800	0.05445	536723.	-4649.	-0.00228	24642.	9.44E+09	-114.0153	7287.	0.00
18.2700	0.04687	522442.	-5026.	-0.00208	24338.	9.44E+09	-102.2327	7590.	0.00
18.5600	0.03997	506695.	-5361.	-0.00189	24004.	9.44E+09	-90.6523	7893.	0.00
18.8500	0.03372	489627.	-5657.	-0.00171	23641.	9.44E+09	-79.4015	8195.	0.00
19.1400	0.02809	471382.	-5915.	-0.00153	23254.	9.44E+09	-68.5964	8498.	0.00
19.4300	0.02307	452100.	-6136.	-0.00136	22844.	9.44E+09	-58.3419	8801.	0.00
19.7200	0.01863	431914.	-6322.	-0.00120	22415.	9.44E+09	-48.7310	9104.	0.00
20.0100	0.01474	410948.	-6476.	-0.00104	21970.	9.44E+09	-39.8451	9406.	0.00
20.3000	0.01138	389318.	-6601.	-8.94E-04	21510.	9.44E+09	-31.7538	9709.	0.00
20.5900	0.00852	367134.	-6698.	-7.54E-04	21039.	9.44E+09	-24.5148	10012.	0.00
20.8800	0.00613	344492.	-6773.	-6.23E-04	20558.	9.44E+09	-18.1743	10315.	0.00
21.1700	0.00418	321478.	-6827.	-5.00E-04	20069.	9.44E+09	-12.7664	10617.	0.00
21.4600	0.00265	298169.	-6863.	-3.86E-04	19574.	9.44E+09	-8.3138	10920.	0.00
21.7500	0.00150	274629.	-6886.	-2.81E-04	19074.	9.44E+09	-4.8279	11223.	0.00
22.0400	6.97E-04	250909.	-10457.	-1.84E-04	18570.	9.44E+09	-2047.	1.02E+07	0.00
22.3300	2.19E-04	202286.	-17587.	-1.00E-04	17537.	9.44E+09	-2050.	3.26E+07	0.00
22.6200	1.65E-07	128745.	-21206.	-3.91E-05	15975.	9.44E+09	-29.7018	6.27E+08	0.00
22.9100	-5.33E-05	54788.	-17472.	-5.27E-06	14404.	9.44E+09	2176.	1.42E+08	0.00
23.2000	-3.65E-05	7155.	-9627.	6.15E-06	13392.	9.44E+09	2333.	2.23E+08	0.00
23.4900	-1.05E-05	-12228.	-2053.	5.22E-06	13499.	9.44E+09	2020.	6.70E+08	0.00
23.7800	-1.77E-07	-7147.	1560.	1.65E-06	13392.	9.44E+09	56.9201	1.12E+09	0.00
24.0700	9.65E-07	-1374.	1061.	7.50E-08	13269.	9.44E+09	-343.8866	1.24E+09	0.00
24.3600	3.45E-07	235.8267	227.5760	-1.35E-07	13245.	9.44E+09	-134.9546	1.36E+09	0.00
24.6500	2.69E-08	210.7228	-27.2327	-5.24E-08	13244.	9.44E+09	-11.4872	1.49E+09	0.00
24.9400	-2.04E-08	46.4119	-30.8208	-5.04E-09	13241.	9.44E+09	9.4251	1.61E+09	0.00
25.2300	-8.15E-09	-3.7777	-7.3646	2.82E-09	13240.	9.44E+09	4.0555	1.73E+09	0.00
25.5200	-7.60E-10	-4.8521	0.3860	1.23E-09	13240.	9.44E+09	0.3989	1.83E+09	0.00
25.8100	4.10E-10	-1.0941	0.7059	1.34E-10	13240.	9.44E+09	-0.2150	1.83E+09	0.00
26.1000	1.75E-10	0.06055	0.1717	-5.62E-11	13240.	9.44E+09	-0.09198	1.83E+09	0.00
26.3900	1.85E-11	0.1013	-0.00522	-2.63E-11	13240.	9.44E+09	-0.00972	1.83E+09	0.00
26.6800	-8.17E-12	0.02425	-0.01468	-3.20E-12	13240.	9.44E+09	0.00429	1.83E+09	0.00
26.9700	-3.75E-12	-8.63E-04	-0.00379	1.11E-12	13240.	9.44E+09	0.00197	1.83E+09	0.00
27.2600	0.00	-0.00211	4.72E-05	0.00	13240.	9.44E+09	2.33E-04	1.83E+09	0.00
27.5500	0.00	-5.35E-04	3.04E-04	0.00	13240.	9.44E+09	-8.50E-05	1.83E+09	0.00
27.8400	0.00	9.24E-06	8.32E-05	0.00	13240.	9.44E+09	-4.21E-05	1.83E+09	0.00
28.1300	0.00	4.37E-05	3.58E-07	0.00	13240.	9.44E+09	-5.49E-06	1.83E+09	0.00
28.4200	0.00	1.18E-05	-6.25E-06	0.00	13240.	9.44E+09	1.69E-06	1.83E+09	0.00
28.7100	0.00	2.19E-07	-1.69E-06	0.00	13240.	9.44E+09	9.35E-07	1.83E+09	0.00
29.0000	0.00	0.00	0.00	0.00	13240.	9.44E+09	3.61E-08	9.14E+08	0.00

* The above values of total stress are combined axial and bending stresses.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     1.07710935 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =      -1085494. inch-lbs
Maximum shear force              =        -21206. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =    22.62000000 feet below pile head
Number of iterations             =              8
Number of zero deflection points =              8
```

Pile-head Deflection vs. Pile Length for Load Case 1

Boundary Condition Type 2, Shear and Slope

```
Shear      =          8100. lbs
Slope      =        0.00000
Axial Load =        341900. lbs
```

Pile Length feet	Pile Head Deflection inches	Maximum Moment ln-lbs	Maximum Shear lbs
29.00000	1.07710935	-1085494.	-21206.
27.55000	1.08105285	-1087238.	-21627.
26.10000	1.07775592	-1085491.	-21066.
24.65000	1.07796549	-1085581.	-21288.
23.20000	1.08325656	-1087217.	-23134.
21.75000	1.56174462	-1310876.	-11517.
20.30000	2.03674951	-1568466.	-12452.
18.85000	2.69742852	-1978855.	-11191.
17.40000	3.31388487	-2438875.	8100.
15.95000	3.15592568	-2462871.	8100.
14.50000	2.79318256	-2164064.	8100.

Summary of Pile-head Responses for Conventional Analyses

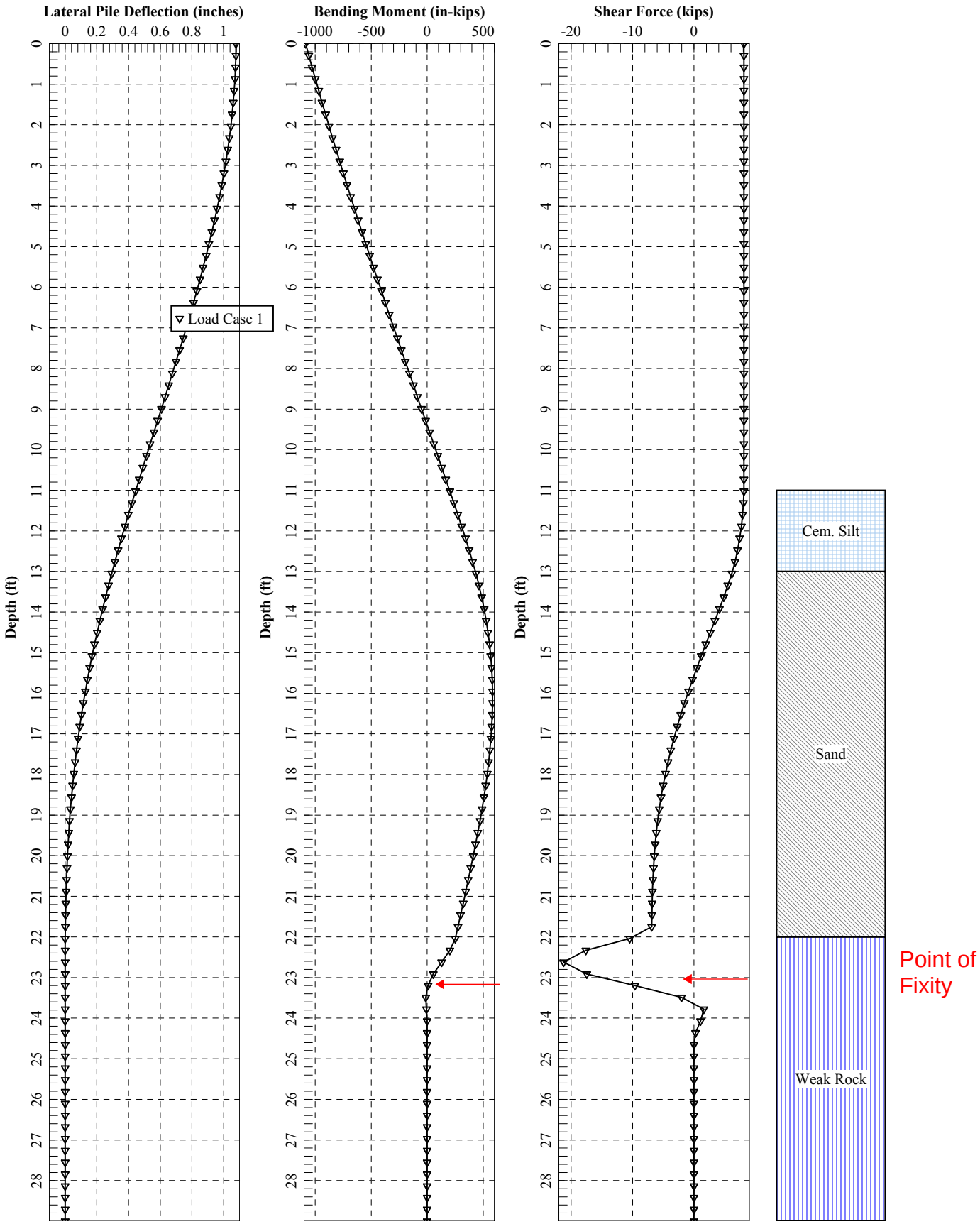
Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	8100.	S, rad	0.00	341900.	1.0771	0.00	-21206.	-1085494.

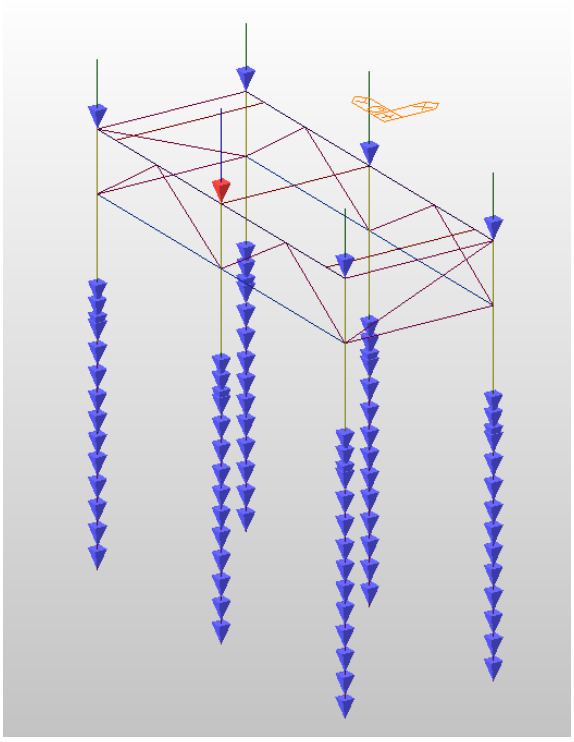
Maximum pile-head deflection = 1.0771093467 inches
Maximum pile-head rotation = 0.0000000000 radians = 0.000000 deg.

This analysis ended normally

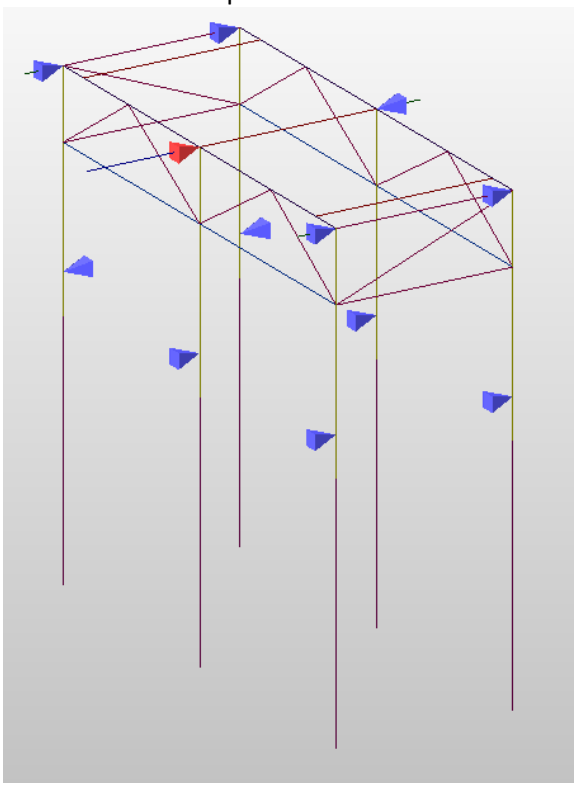

Lateral Pile Deflection (inches)
0 0.2 0.4 0.6 0.8 1
Load Case 1
Bending Moment (in-kips)
-1000 -500 0 500
Shear Force (kips)
-20 -10 0
Depth (ft)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Cem. Silt
Sand
Weak Rock
Point of Fixity

L-Pile loads – CT-L3S2 + Lane Load

Axial Load = 314.4 kips



Shear Load = 5.9 kips



LPile for Windows, Version 2015-08.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
© 1985-2015 by Ensoft, Inc.
All Rights Reserved

This copy of LPile is being used by:

CJM
Wethersfield

Serial Number of Security Device: 227885239

This copy of LPile is licensed for exclusive use by:

Close, Jensen and Miller, P.C.,

Use of this program by any entity other than Close, Jensen and Miller, P.C.,
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Liaison\State Bridge Program\Project Files\01349, SPN 158-212, List 28\1-Pre-Design\Calculations\01349 L-Pile\REVISED\

Name of input data file:
CT-L3S2 plus Lane Load 01349 pier 2.lp8d

Name of output report file:
CT-L3S2 plus Lane Load 01349 pier 2.lp8o

Name of plot output file:
CT-L3S2 plus Lane Load 01349 pier 2.lp8p

Name of runtime message file:
CT-L3S2 plus Lane Load 01349 pier 2.lp8r

Date and Time of Analysis

Date: June 1, 2016 Time: 14:40:17

Problem Title

Project Name: Rehabilitation of Bridge 01349, ROute 136 Over Saugatuck

Job Number: 158-212

Client: CT DOT

Engineer: Danielle Coutu

Description: Pier 2 Analysis Under Existing Condition

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis includes loading by one distributed lateral load acting on pile
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 29.000 ft
Depth of ground surface below top of pile = 11.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over
the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	13.8300
2	29.000	13.8300

Input Structural Properties for Pile Sections:

Pile Section No. 1:

   Section 1 is an elastic pile
   Cross-sectional Shape = Weak H-Pile
   Length of section = 29.000000 ft
   Flange Width = 14.695000 in
   Section Depth = 13.830000 in
   Flange Thickness = 0.615000 in
   Web Thickness = 0.615000 in
   Section Area = 25.823850 sq. in
   Moment of Inertia = 325.505721 in^4
   Elastic Modulus = 29000000. psi

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is cemented silt with cohesion and friction

   Distance from top of pile to top of layer = 11.000000 ft
   Distance from top of pile to bottom of layer = 13.000000 ft
   Effective unit weight at top of layer = 120.000000 pcf
   Effective unit weight at bottom of layer = 120.000000 pcf
   Undrained cohesion at top of layer = 500.000000 psf
   Undrained cohesion at bottom of layer = 500.000000 psf
   Friction angle at top of layer = 10.000000 deg.
   Friction angle at bottom of layer = 10.000000 deg.
   Epsilon-50 at top of layer = 0.010000
   Epsilon-50 at bottom of layer = 0.010000
   Subgrade k at top of layer = 18.000000 pci
   Subgrade k at bottom of layer = 18.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

   Distance from top of pile to top of layer = 13.000000 ft
   Distance from top of pile to bottom of layer = 22.000000 ft
   Effective unit weight at top of layer = 125.000000 pcf
   Effective unit weight at bottom of layer = 125.000000 pcf
   Friction angle at top of layer = 38.000000 deg.
   Friction angle at bottom of layer = 38.000000 deg.
   Subgrade k at top of layer = 25.000000 pci
   Subgrade k at bottom of layer = 25.000000 pci

Layer 3 is weak rock, p-y criteria by Reese, 1997

   Distance from top of pile to top of layer = 22.000000 ft

```
   Distance from top of pile to bottom of layer        =    29.000000 ft
   Effective unit weight at top of layer               =   125.000000 pcf
   Effective unit weight at bottom of layer            =   125.000000 pcf
   Uniaxial compressive strength at top of layer       =   500.000000 psi
   Uniaxial compressive strength at bottom of layer    =   500.000000 psi
   Initial modulus of rock at top of layer             =     1050000. psi
   Initial modulus of rock at bottom of layer          =     1050000. psi
   RQD of rock at top of layer                         =       0.0000 %
   RQD of rock at bottom of layer                      =       0.0000 %
   k rm of rock at top of layer                        =    0.0005000
   k rm of rock at bottom of layer                     =    0.0005000


Layer 4 is massive rock, p-y criteria by Liang et al., 2009

   Distance from top of pile to top of layer           =    29.000000 ft
   Distance from top of pile to bottom of layer        =    30.000000 ft
   Effective unit weight at top of layer               =   139.000000 pcf
   Effective unit weight at bottom of layer            =   139.000000 pcf
   Uniaxial compressive strength at top of layer       =       11600. psi
   Uniaxial compressive strength at bottom of layer    =       11600. psi
   Poisson's ratio at top of layer                     =     0.250000
   Poisson's ratio at bottom of layer                  =     0.250000
   Option 1: Intact rock modulus at top of layer       =     1500000. psi
             Intact rock modulus at bottom of layer    =     1500000. psi
   Option 1: Geologic Strength Index for layer         =    50.000000
   Option 2: Rock mass modulus at top of layer         =       0.0000 psi
             Rock mass modulus at bottom of layer      =       0.0000 psi
   Option 1 will be used to compute values of rock mass modulus for the p-y curve
            in massive rock.
   The rock type is (metamorphic) gneiss, Hoek-Brown Material Constant mi = 28


 (Depth of the lowest soil layer extends 1.000 ft below the pile tip)


--------------------------------------------------------------------------------
                        Summary of Input Soil Properties
--------------------------------------------------------------------------------

Layer         Soil Type          Layer      Effective    Undrained    Angle of     Uniaxial                    E50
Rock Mass    Geologic     Int. Rock   Hoek-Brown
Layer           Name            Depth       Unit Wt.    Cohesion     Friction        qu          RQD %         or           kpy
Modulus     Strength      Modulus     Material     Poisson's
 Num.     (p-y Curve Type)        ft          pcf          psf          deg.         psi                       krm          pci
 psi         Index         psi       Index, mi      Ratio
-----   -------------------   ----------   ----------   ----------   ----------   ----------   ----------   ----------   ----------
----------   ----------   ----------   ----------   ----------
  1          Cemented           11.0000     120.0000     500.0000      10.0000       --           --          0.01000      18.0000
 --           --             0.00         0.00         0.00
               Silt             13.0000     120.0000     500.0000      10.0000       --           --          0.01000      18.0000
 --           --             0.00         0.00         0.00
  2            Sand            13.0000     125.0000       --          38.0000       --           --           --          25.0000
 --           --             0.00         0.00         0.00
          (Reese, et al.)        22.0000     125.0000       --          38.0000       --           --           --          25.0000
 --           --             0.00         0.00         0.00
  3            Weak            22.0000     125.0000       --           --         500.0000         0.00     5.00E-04       --
1050000.       --             0.00         0.00         0.00
               Rock            29.0000     125.0000       --           --         500.0000         0.00     5.00E-04       --
1050000.       --             0.00         0.00         0.00
  4          Massive           29.0000     139.0000       --           --          11600.       --           --           --
Internally      50.0000     1500000.      28.0000       0.2500
               Rock            30.0000     139.0000       --           --          11600.       --           --           --
Computed       50.0000     1500000.      28.0000       0.2500


--------------------------------------------------------------------------------
                              Static Loading Type
--------------------------------------------------------------------------------

Static loading criteria were used when computing p-y curves for all analyses.


--------------------------------------------------------------------------------
               Distributed Lateral Loading Used For All Load Cases
--------------------------------------------------------------------------------

Distributed lateral load intensity defined using 2 points

Point           Depth X            Dist. Load
 No.               in               lb/in
-----          ----------          ----------
  1               0.000               0.000
  2               0.000               0.000



--------------------------------------------------------------------------------
               Pile-head Loading and Pile-head Fixity Conditions
--------------------------------------------------------------------------------

Number of loads specified = 1

Load     Load         Condition              Condition           Axial Thrust      Compute Top y
 No.     Type             1                      2                Force, lbs      vs. Pile Length
```

1	2	V = 6700. lbs	S = 0.0000 in/in	324600.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with
specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic section properties

---

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	11.0000	0.00	N.A.	No	0.00	549.7454
2	13.0000	0.7518	No	No	549.7454	193067.
3	22.0000	11.0000	No	Yes	N.A.	N.A.
4	29.0000	18.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals
for Layer n. Layering correction equivalent depths are computed only
for soil types with both shallow-depth and deep-depth expressions for
peak lateral load transfer. These soil types are soft and stiff clays,
non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 6700.0 lbs
Rotation of pile head = 0.000E+00 radians
Axial load at pile head = 324600.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.8810	-889204.	6700.	0.00	31460.	9.44E+09	0.00	0.00	0.00
0.2900	0.8804	-865703.	6700.	-3.23E-04	30961.	9.44E+09	0.00	0.00	0.00
0.5800	0.8787	-841841.	6700.	-6.38E-04	30454.	9.44E+09	0.00	0.00	0.00
0.8700	0.8760	-817629.	6700.	-9.44E-04	29939.	9.44E+09	0.00	0.00	0.00
1.1600	0.8722	-793076.	6700.	-0.00124	29418.	9.44E+09	0.00	0.00	0.00
1.4500	0.8673	-768193.	6700.	-0.00153	28889.	9.44E+09	0.00	0.00	0.00
1.7400	0.8615	-742990.	6700.	-0.00181	28354.	9.44E+09	0.00	0.00	0.00
2.0300	0.8548	-717478.	6700.	-0.00208	27812.	9.44E+09	0.00	0.00	0.00
2.3200	0.8471	-691667.	6700.	-0.00234	27263.	9.44E+09	0.00	0.00	0.00
2.6100	0.8385	-665568.	6700.	-0.00259	26709.	9.44E+09	0.00	0.00	0.00
2.9000	0.8291	-639191.	6700.	-0.00283	26149.	9.44E+09	0.00	0.00	0.00
3.1900	0.8188	-612549.	6700.	-0.00306	25583.	9.44E+09	0.00	0.00	0.00
3.4800	0.8078	-585651.	6700.	-0.00328	25011.	9.44E+09	0.00	0.00	0.00
3.7700	0.7960	-558510.	6700.	-0.00349	24435.	9.44E+09	0.00	0.00	0.00
4.0600	0.7835	-531136.	6700.	-0.00369	23853.	9.44E+09	0.00	0.00	0.00
4.3500	0.7703	-503541.	6700.	-0.00388	23267.	9.44E+09	0.00	0.00	0.00
4.6400	0.7565	-475736.	6700.	-0.00406	22676.	9.44E+09	0.00	0.00	0.00
4.9300	0.7421	-447733.	6700.	-0.00423	22081.	9.44E+09	0.00	0.00	0.00
5.2200	0.7270	-419543.	6700.	-0.00439	21482.	9.44E+09	0.00	0.00	0.00
5.5100	0.7115	-391179.	6700.	-0.00454	20880.	9.44E+09	0.00	0.00	0.00
5.8000	0.6954	-362652.	6700.	-0.00468	20274.	9.44E+09	0.00	0.00	0.00
6.0900	0.6789	-333974.	6700.	-0.00481	19665.	9.44E+09	0.00	0.00	0.00
6.3800	0.6620	-305157.	6700.	-0.00493	19052.	9.44E+09	0.00	0.00	0.00
6.6700	0.6446	-276212.	6700.	-0.00503	18438.	9.44E+09	0.00	0.00	0.00
6.9600	0.6269	-247153.	6700.	-0.00513	17820.	9.44E+09	0.00	0.00	0.00
7.2500	0.6089	-217991.	6700.	-0.00522	17201.	9.44E+09	0.00	0.00	0.00
7.5400	0.5906	-188738.	6700.	-0.00529	16579.	9.44E+09	0.00	0.00	0.00
7.8300	0.5721	-159406.	6700.	-0.00535	15956.	9.44E+09	0.00	0.00	0.00
8.1200	0.5534	-130008.	6700.	-0.00541	15332.	9.44E+09	0.00	0.00	0.00

8.4100	0.5345	-100556.	6700.	-0.00545	14706.	9.44E+09	0.00	0.00	0.00
8.7000	0.5154	-71062.	6700.	-0.00548	14079.	9.44E+09	0.00	0.00	0.00
8.9900	0.4963	-41538.	6700.	-0.00550	13452.	9.44E+09	0.00	0.00	0.00
9.2800	0.4771	-11998.	6700.	-0.00551	12825.	9.44E+09	0.00	0.00	0.00
9.5700	0.4579	17548.	6700.	-0.00551	12943.	9.44E+09	0.00	0.00	0.00
9.8600	0.4388	47087.	6700.	-0.00550	13570.	9.44E+09	0.00	0.00	0.00
10.1500	0.4197	76606.	6700.	-0.00548	14197.	9.44E+09	0.00	0.00	0.00
10.4400	0.4006	106093.	6700.	-0.00544	14824.	9.44E+09	0.00	0.00	0.00
10.7300	0.3818	135536.	6700.	-0.00540	15449.	9.44E+09	0.00	0.00	0.00
11.0200	0.3631	164922.	6697.	-0.00534	16073.	9.44E+09	-1.5684	15.0336	0.00
11.3100	0.3446	194221.	6654.	-0.00528	16696.	9.44E+09	-23.0727	233.0208	0.00
11.6000	0.3263	223160.	6541.	-0.00520	17311.	9.44E+09	-42.2929	451.0080	0.00
11.8900	0.3084	251493.	6364.	-0.00511	17912.	9.44E+09	-59.2829	668.9952	0.00
12.1800	0.2907	279004.	6132.	-0.00502	18497.	9.44E+09	-74.1058	886.9824	0.00
12.4700	0.2735	305501.	5852.	-0.00491	19060.	9.44E+09	-86.8336	1105.	0.00
12.7600	0.2566	330819.	5531.	-0.00479	19598.	9.44E+09	-97.5462	1323.	0.00
13.0500	0.2401	354818.	5104.	-0.00466	20107.	9.44E+09	-147.6831	2140.	0.00
13.3400	0.2241	376881.	4574.	-0.00453	20576.	9.44E+09	-157.3414	2443.	0.00
13.6300	0.2086	396882.	4013.	-0.00439	21001.	9.44E+09	-164.5968	2746.	0.00
13.9200	0.1936	414723.	3432.	-0.00424	21380.	9.44E+09	-169.5979	3048.	0.00
14.2100	0.1791	430339.	2837.	-0.00408	21712.	9.44E+09	-172.4998	3351.	0.00
14.5000	0.1652	443686.	2235.	-0.00392	21995.	9.44E+09	-173.4624	3654.	0.00
14.7900	0.1518	454747.	1632.	-0.00375	22230.	9.44E+09	-172.6491	3957.	0.00
15.0800	0.1391	463529.	1036.	-0.00358	22417.	9.44E+09	-170.2259	4260.	0.00
15.3700	0.1269	470055.	450.1323	-0.00341	22556.	9.44E+09	-166.3600	4562.	0.00
15.6600	0.1153	474372.	-119.8534	-0.00324	22647.	9.44E+09	-161.2181	4865.	0.00
15.9500	0.1044	476538.	-670.0135	-0.00306	22693.	9.44E+09	-154.9659	5168.	0.00
16.2400	0.09400	476629.	-1197.	-0.00289	22695.	9.44E+09	-147.7666	5471.	0.00
16.5300	0.08426	474733.	-1697.	-0.00271	22655.	9.44E+09	-139.7800	5773.	0.00
16.8200	0.07512	470945.	-2169.	-0.00254	22574.	9.44E+09	-131.1614	6076.	0.00
17.1100	0.06659	465374.	-2609.	-0.00237	22456.	9.44E+09	-122.0609	6379.	0.00
17.4000	0.05866	458130.	-3017.	-0.00220	22302.	9.44E+09	-112.6224	6682.	0.00
17.6900	0.05131	449331.	-3393.	-0.00203	22115.	9.44E+09	-102.9832	6984.	0.00
17.9800	0.04454	439098.	-3734.	-0.00186	21898.	9.44E+09	-93.2729	7287.	0.00
18.2700	0.03834	427553.	-4042.	-0.00170	21653.	9.44E+09	-83.6135	7590.	0.00
18.5600	0.03268	414817.	-4316.	-0.00155	21382.	9.44E+09	-74.1183	7893.	0.00
18.8500	0.02755	401011.	-4558.	-0.00140	21089.	9.44E+09	-64.8920	8195.	0.00
19.1400	0.02294	386252.	-4769.	-0.00125	20775.	9.44E+09	-56.0303	8498.	0.00
19.4300	0.01883	370654.	-4949.	-0.00111	20444.	9.44E+09	-47.6196	8801.	0.00
19.7200	0.01519	354324.	-5101.	-9.81E-04	20097.	9.44E+09	-39.7368	9104.	0.00
20.0100	0.01200	337366.	-5227.	-8.53E-04	19737.	9.44E+09	-32.4495	9406.	0.00
20.3000	0.00925	319874.	-5328.	-7.32E-04	19365.	9.44E+09	-25.8155	9709.	0.00
20.5900	0.00691	301937.	-5408.	-6.17E-04	18984.	9.44E+09	-19.8834	10012.	0.00
20.8800	0.00496	283633.	-5468.	-5.09E-04	18595.	9.44E+09	-14.6919	10315.	0.00
21.1700	0.00337	265032.	-5511.	-4.08E-04	18200.	9.44E+09	-10.2705	10617.	0.00
21.4600	0.00212	246198.	-5541.	-3.14E-04	17800.	9.44E+09	-6.6394	10920.	0.00
21.7500	0.00118	227180.	-5559.	-2.27E-04	17396.	9.44E+09	-3.8093	11223.	0.00
22.0400	5.38E-04	208021.	-8901.	-1.46E-04	16989.	9.44E+09	-1917.	1.24E+07	0.00
22.3300	1.62E-04	165558.	-15541.	-7.76E-05	16087.	9.44E+09	-1898.	4.09E+07	0.00
22.6200	-2.19E-06	100035.	-18158.	-2.87E-05	14695.	9.44E+09	394.1174	6.27E+08	0.00
22.9100	-3.77E-05	39243.	-14026.	-2.98E-06	13403.	9.44E+09	1981.	1.83E+08	0.00
23.2000	-2.30E-05	2422.	-7021.	4.70E-06	12621.	9.44E+09	2045.	3.10E+08	0.00
23.4900	-5.06E-06	-9636.	-944.9734	3.37E-06	12774.	9.44E+09	1447.	9.95E+08	0.00
23.7800	4.73E-07	-4163.	1309.	8.23E-07	12658.	9.44E+09	-151.8803	1.12E+09	0.00
24.0700	6.66E-07	-526.9680	631.7750	-4.17E-08	12581.	9.44E+09	-237.3262	1.24E+09	0.00
24.3600	1.83E-07	234.7082	94.2985	-9.56E-08	12575.	9.44E+09	-71.5683	1.36E+09	0.00
24.6500	7.57E-10	129.5655	-30.7924	-2.84E-08	12573.	9.44E+09	-0.3230	1.49E+09	0.00
24.9400	-1.50E-08	20.4574	-19.3048	-7.53E-10	12570.	9.44E+09	6.9250	1.61E+09	0.00
25.2300	-4.48E-09	-4.7941	-3.3774	2.13E-09	12570.	9.44E+09	2.2286	1.73E+09	0.00
25.5200	-1.27E-10	-3.0542	0.6167	6.88E-10	12570.	9.44E+09	0.06687	1.83E+09	0.00
25.8100	3.08E-10	-0.5031	0.4519	3.23E-11	12570.	9.44E+09	-0.1616	1.83E+09	0.00
26.1000	9.76E-11	0.09106	0.08155	-4.36E-11	12570.	9.44E+09	-0.05124	1.83E+09	0.00
26.3900	4.20E-12	0.06462	-0.01144	-1.49E-11	12570.	9.44E+09	-0.00221	1.83E+09	0.00
26.6800	-6.30E-12	0.01144	-0.00953	0.00	12570.	9.44E+09	0.00331	1.83E+09	0.00
26.9700	-2.12E-12	-0.00170	-0.00184	0.00	12570.	9.44E+09	0.00111	1.83E+09	0.00
27.2600	0.00	-0.00136	2.07E-04	0.00	12570.	9.44E+09	6.35E-05	1.83E+09	0.00
27.5500	0.00	-2.58E-04	2.00E-04	0.00	12570.	9.44E+09	-6.74E-05	1.83E+09	0.00
27.8400	0.00	3.10E-05	4.13E-05	0.00	12570.	9.44E+09	-2.41E-05	1.83E+09	0.00
28.1300	0.00	2.87E-05	-3.62E-06	0.00	12570.	9.44E+09	-1.70E-06	1.83E+09	0.00
28.4200	0.00	5.81E-06	-4.17E-06	0.00	12570.	9.44E+09	1.38E-06	1.83E+09	0.00
28.7100	0.00	-3.58E-07	-8.35E-07	0.00	12570.	9.44E+09	5.39E-07	1.83E+09	0.00
29.0000	0.00	0.00	0.00	0.00	12570.	9.44E+09	-5.92E-08	9.14E+08	0.00

* The above values of total stress are combined axial and bending stresses.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     0.88098891 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =       -889204. inch-lbs
Maximum shear force              =        -18158. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =    22.62000000 feet below pile head
Number of iterations             =              9
Number of zero deflection points =              8
```

Pile-head Deflection vs. Pile Length for Load Case 1

Boundary Condition Type 2, Shear and Slope

```
Shear      =          6700. lbs
Slope      =        0.00000
Axial Load =        324600. lbs
```

Pile Length feet	Pile Head Deflection inches	Maximum Moment ln-lbs	Maximum Shear lbs
29.00000	0.88098891	-889204.	-18158.
27.55000	0.88418357	-890606.	-18595.
26.10000	0.88154887	-889205.	-18116.
24.65000	0.88172697	-889276.	-18346.
23.20000	0.88528244	-890600.	-19864.
21.75000	1.21092281	-1042330.	-8879.
20.30000	1.62629156	-1262331.	-9833.
18.85000	2.06887438	-1544879.	-8627.
17.40000	2.52069802	-1883940.	6700.
15.95000	2.46944795	-1938842.	6700.
14.50000	2.21510784	-1724570.	6700.

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	6700.	S, rad	0.00	324600.	0.8810	0.00	-18158.	-889204.

Maximum pile-head deflection = 0.8809889120 inches
Maximum pile-head rotation = 0.0000000000 radians = 0.000000 deg.

This analysis ended normally

PROJECT TITLE : Load Rating and Structural Anlaysis

MIDAS	Company	Close, Jensen and Miller PC	Client	CT DOT
	Author	Danielle Coutu	File Name	Pier 2 Analysis-Carrying Beams

```
**********************************************************************************************
**           MIDAS/Civil V.8.5.1    Modeling, Integrated Design & Analysis Software              **
**                             CIVIL STRUCTURE DESIGN SYSTEM                                    **
**********************************************************************************************

                    XXX   XXX     XX    XXXXXXXX      XXXXXXX    XXXXXXXX
                    XXXX XXXX     XX    XX     XX     XX   XX    XX    XX
                    XX XXX XX     XX    XX     XX     XX   XX    XX
                    XX  X  XX     XX    XX     XX     XXXXXXX    XXXXXXXX
                    XXX    XX    XXX    XXX    XX     XX   XX         XXX
                    XXX    XX    XXX    XXX    XX    XXX   XX    XX   XXX
                    XXX    XX    XXX    XXX    XX    XXX   XX    XX   XXX
                    XXX    XX    XXX    XXXXXXXX    XXX   XX    XXXXXXXX  /Civil

                                    VERSION 8.5.1

                  COPYRIGHT (C) SINCE 1989. MIDAS Information Technology Co.,Ltd.
                                    ALL RIGHTS RESERVED.             MIDAS TEAM

**********************************************************************************************
```

ANALYSIS RESULT OUTPUT

LOAD SET FOR DISPLACMENT OUTPUT - Strength I HL-93 Inv.

<< LOAD COMB/CASE/ENVEL ABBREVIATION TABLE >>

ABBREVIATION	FULL NAME	TYPE	DESCRIPTION
Self W~1	Self Weight	Static	
Guide ~1	Guide Rail	Static	
Wearin~1	Wearing Surface	Static	
S1 HL-~1	S1 HL-93 INV	Gen.Comb	

<< SELECTED LOAD CASE/COMBINATION DETAIL LIST >>

[Selected Load Combinations]

L. COMB	TYPE	COMBINATION DETAIL
S1 HL-~1	Gen.Comb	1.250 x Self W~1 + 1.250 x Guide ~1 + 1.250 x Sidewalk + 1.500 x Wearin~1 + 1.750 x HL-93

LOAD SET FOR REACTION OUTPUT - Strength I HL-93 Inv.

<< LOAD COMB/CASE/ENVEL ABBREVIATION TABLE >>

ABBREVIATION	FULL NAME	TYPE	DESCRIPTION
No Abbreviation was defined in this Load Set. All names are less than 8 char.'s			

<< SELECTED LOAD CASE/COMBINATION DETAIL LIST >>

[Selected Load Combinations]

L. COMB	TYPE	COMBINATION DETAIL
S1 HL-~1	Gen.Comb	1.250 x Self W~1 + 1.250 x Guide ~1 + 1.250 x Sidewalk + 1.500 x Wearin~1 + 1.750 x HL-93

LOAD SET FOR ELEMENT OUTPUT - Strength I HL-93 Inv.

<< LOAD COMB/CASE/ENVEL ABBREVIATION TABLE >>

ABBREVIATION	FULL NAME	TYPE	DESCRIPTION
No Abbreviation was defined in this Load Set. All names are less than 8 char.'s			

<< SELECTED LOAD CASE/COMBINATION DETAIL LIST >>

[Selected Load Combinations]

L. COMB	TYPE	COMBINATION DETAIL
S1 HL-~1	Gen.Comb	1.250 x Self W~1 + 1.250 x Guide ~1 + 1.250 x Sidewalk + 1.500 x Wearin~1 + 1.750 x HL-93

NODE DISPLACEMENT AND ROTATIONS DEFAULT PRINTOUT Unit System : kips , in

NODE	LC		UX	UY	UZ	RX	RY	RZ
1	S1 HL-~1	Max	-0.058	0.023	-0.088	-0.0	0.0	0.0
		Min	-0.064	-0.022	-0.166	-0.0	0.0	-0.0
2	S1 HL-~1	Max	-0.059	0.023	-0.114	-0.0	0.0	0.0
		Min	-0.064	-0.023	-0.220	-0.0	0.0	-0.0
3	S1 HL-~1	Max	-0.059	0.024	-0.139	-0.0	0.0	0.0
		Min	-0.065	-0.025	-0.271	-0.0	0.0	-0.0
4	S1 HL-~1	Max	-0.059	0.025	-0.160	0.0	0.0	0.0
		Min	-0.065	-0.026	-0.314	-0.0	0.0	-0.0
5	S1 HL-~1	Max	-0.059	0.025	-0.176	0.0	0.0	0.0
		Min	-0.065	-0.027	-0.347	-0.0	0.0	-0.0
6	S1 HL-~1	Max	-0.059	0.025	-0.185	0.0	0.0	0.0
		Min	-0.065	-0.028	-0.366	-0.0	-0.0	-0.0
7	S1 HL-~1	Max	-0.059	0.025	-0.173	0.0	-0.0	0.0
		Min	-0.065	-0.028	-0.344	-0.0	-0.0	-0.0
8	S1 HL-~1	Max	-0.059	0.024	-0.155	0.0	-0.0	0.0
		Min	-0.065	-0.027	-0.307	-0.0	-0.0	-0.0
9	S1 HL-~1	Max	-0.059	0.024	-0.132	-0.0	-0.0	0.0
		Min	-0.065	-0.026	-0.261	-0.0	-0.0	-0.0
10	S1 HL-~1	Max	-0.059	0.023	-0.105	-0.0	-0.0	0.0
		Min	-0.065	-0.025	-0.208	-0.0	-0.0	-0.0
11	S1 HL-~1	Max	-0.059	0.023	-0.077	-0.0	-0.0	0.0
		Min	-0.065	-0.024	-0.152	-0.0	-0.0	0.0
12	S1 HL-~1	Max	-0.059	0.022	-0.055	0.0	0.0	0.0
		Min	-0.063	-0.023	-0.088	-0.0	0.0	-0.0
13	S1 HL-~1	Max	-0.060	0.022	-0.085	0.0	0.0	0.0
		Min	-0.063	-0.025	-0.136	-0.0	0.0	-0.0
14	S1 HL-~1	Max	-0.060	0.023	-0.116	0.0	0.0	0.0
		Min	-0.063	-0.026	-0.185	-0.0	0.0	-0.0
15	S1 HL-~1	Max	-0.060	0.024	-0.145	0.0	0.0	0.0
		Min	-0.063	-0.027	-0.230	-0.0	0.0	-0.0
16	S1 HL-~1	Max	-0.060	0.024	-0.169	0.0	0.0	0.0
		Min	-0.063	-0.028	-0.266	-0.0	0.0	-0.0
17	S1 HL-~1	Max	-0.060	0.025	-0.184	0.0	0.0	0.0
		Min	-0.064	-0.028	-0.291	-0.0	-0.0	-0.0
18	S1 HL-~1	Max	-0.060	0.025	-0.167	0.0	-0.0	0.0
		Min	-0.064	-0.028	-0.266	-0.0	-0.0	-0.0

19	S1 HL-~1	Max	-0.060	0.024	-0.141	0.0	-0.0	0.0
		Min	-0.064	-0.028	-0.226	-0.0	-0.0	-0.0
20	S1 HL-~1	Max	-0.061	0.023	-0.110	0.0	-0.0	0.0
		Min	-0.064	-0.027	-0.178	-0.0	-0.0	-0.0
21	S1 HL-~1	Max	-0.061	0.023	-0.076	0.0	-0.0	0.0
		Min	-0.064	-0.026	-0.124	-0.0	-0.0	-0.0
22	S1 HL-~1	Max	-0.061	0.022	-0.043	0.0	-0.0	0.0
		Min	-0.065	-0.025	-0.071	-0.0	-0.0	-0.0
23	S1 HL-~1	Max	-0.058	0.021	-0.089	0.0	0.0	-0.0
		Min	-0.062	-0.025	-0.166	0.0	0.0	-0.0
24	S1 HL-~1	Max	-0.058	0.021	-0.115	0.0	0.0	0.0
		Min	-0.062	-0.026	-0.220	0.0	0.0	-0.0
25	S1 HL-~1	Max	-0.058	0.022	-0.141	0.0	0.0	0.0
		Min	-0.062	-0.027	-0.271	0.0	0.0	-0.0
26	S1 HL-~1	Max	-0.059	0.023	-0.162	0.0	0.0	0.0
		Min	-0.063	-0.028	-0.315	-0.0	0.0	-0.0
27	S1 HL-~1	Max	-0.059	0.023	-0.178	0.0	0.0	0.0
		Min	-0.063	-0.029	-0.349	-0.0	0.0	-0.0
28	S1 HL-~1	Max	-0.059	0.024	-0.187	0.0	0.0	0.0
		Min	-0.063	-0.029	-0.368	-0.0	-0.0	-0.0
29	S1 HL-~1	Max	-0.059	0.024	-0.176	0.0	-0.0	0.0
		Min	-0.063	-0.029	-0.345	-0.0	-0.0	-0.0
30	S1 HL-~1	Max	-0.059	0.023	-0.157	0.0	-0.0	0.0
		Min	-0.063	-0.028	-0.308	-0.0	-0.0	-0.0
31	S1 HL-~1	Max	-0.059	0.023	-0.133	0.0	-0.0	0.0
		Min	-0.063	-0.028	-0.261	0.0	-0.0	-0.0
32	S1 HL-~1	Max	-0.059	0.022	-0.106	0.0	-0.0	0.0
		Min	-0.063	-0.027	-0.208	0.0	-0.0	-0.0
33	S1 HL-~1	Max	-0.059	0.021	-0.077	0.0	-0.0	0.0
		Min	-0.063	-0.026	-0.150	0.0	-0.0	-0.0

BEAM ELEMENT FORCES & MOMENTS DEFAULT PRINTOUT Unit System : kips , in

ELEM	MAT	SEC	LC	PT	AXIAL	SHEAR-y	SHEAR-z	TORSION	MOMENT-y	MOMENT-z
1	4	11	S1 HL-~1 Max	I	-0.4	1.1	189.5	9.7	2360.8	59.8
				J	-0.4	1.1	189.9	9.7	-5.6	115.4
			Min	I	-2.5	-4.4	94.7	0.4	1180.5	1.6
				J	-2.5	-4.4	95.1	0.4	-10.8	-11.5
2	4	11	S1 HL-~1 Max	I	-0.4	1.1	189.1	9.7	4726.8	15.0
				J	-0.4	1.1	189.5	9.7	2360.8	59.8
			Min	I	-2.5	-4.4	94.2	0.4	2361.0	4.1
				J	-2.5	-4.4	94.7	0.4	1180.5	1.6
3	4	11	S1 HL-~1 Max	I	-0.4	1.1	188.6	9.7	7087.4	28.0
				J	-0.4	1.1	189.1	9.7	4726.8	15.0
			Min	I	-2.5	-4.4	93.8	0.4	3536.1	-51.4
				J	-2.5	-4.4	94.2	0.4	2361.0	4.1
4	4	11	S1 HL-~1 Max	I	-0.4	1.1	188.2	9.7	9442.4	41.1
				J	-0.4	1.1	188.6	9.7	7087.4	28.0
			Min	I	-2.5	-4.4	93.3	0.4	4705.6	-107.0
				J	-2.5	-4.4	93.8	0.4	3536.1	-51.4
5	4	11	S1 HL-~1 Max	I	-0.4	1.1	187.7	9.7	11791.9	54.3
				J	-0.4	1.1	188.2	9.7	9442.4	41.1
			Min	I	-2.5	-4.4	92.9	0.4	5869.5	-162.6
				J	-2.5	-4.4	93.3	0.4	4705.6	-107.0
6	4	11	S1 HL-~1 Max	I	7.8	1.0	-88.2	0.1	9122.1	68.9
				J	7.8	1.0	-87.7	0.1	11391.2	127.3
			Min	I	6.1	-4.7	-181.7	-9.2	4448.5	-91.0
				J	6.1	-4.7	-181.3	-9.2	5547.8	-103.8
7	4	11	S1 HL-~1 Max	I	7.8	1.0	-88.6	0.1	6847.5	10.6
				J	7.8	1.0	-88.2	0.1	9122.1	68.9
			Min	I	6.1	-4.7	-182.2	-9.2	3343.6	-78.2
				J	6.1	-4.7	-181.7	-9.2	4448.5	-91.0
8	4	11	S1 HL-~1 Max	I	7.8	1.0	-89.1	0.1	4567.3	-47.6
				J	7.8	1.0	-88.6	0.1	6847.5	10.6
			Min	I	6.1	-4.7	-182.6	-9.2	2233.2	-65.7
				J	6.1	-4.7	-182.2	-9.2	3343.6	-78.2
9	4	11	S1 HL-~1 Max	I	7.8	1.0	-89.5	0.1	2281.6	-52.5
				J	7.8	1.0	-89.1	0.1	4567.3	-47.6
			Min	I	6.1	-4.7	-183.1	-9.2	1117.3	-106.2
				J	6.1	-4.7	-182.6	-9.2	2233.2	-65.7
10	4	11	S1 HL-~1 Max	I	7.8	1.0	-89.9	0.1	-4.2	-39.7
				J	7.8	1.0	-89.5	0.1	2281.6	-52.5
			Min	I	6.1	-4.7	-183.5	-9.2	-9.6	-164.5
				J	6.1	-4.7	-183.1	-9.2	1117.3	-106.2
11	4	11	S1 HL-~1 Max	I	-22.9	2.1	274.7	3.5	-717.4	35.7
				J	-22.9	2.1	275.1	3.5	-2876.8	78.9
			Min	I	-34.3	-3.5	168.7	-3.6	-1222.5	-16.3
				J	-34.3	-3.5	169.1	-3.6	-4375.8	-42.7
12	4	11	S1 HL-~1 Max	I	-22.9	2.1	274.2	3.5	2647.3	10.1
				J	-22.9	2.1	274.7	3.5	-717.4	35.7
			Min	I	-34.3	-3.5	168.3	-3.6	1338.1	-7.5
				J	-34.3	-3.5	168.7	-3.6	-1222.5	-16.3
13	4	11	S1 HL-~1 Max	I	-22.9	2.1	273.8	3.5	6072.6	36.5
				J	-22.9	2.1	274.2	3.5	2647.3	10.1
			Min	I	-34.3	-3.5	167.8	-3.6	3438.5	-50.7
				J	-34.3	-3.5	168.3	-3.6	1338.1	-7.5
14	4	11	S1 HL-~1 Max	I	-22.9	2.1	273.4	3.5	9492.4	63.0
				J	-22.9	2.1	273.8	3.5	6072.6	36.5
			Min	I	-34.3	-3.5	167.4	-3.6	5533.4	-93.9
				J	-34.3	-3.5	167.8	-3.6	3438.5	-50.7
15	4	11	S1 HL-~1 Max	I	-22.9	2.1	272.9	3.5	12906.7	89.4

					J	-22.9	2.1	273.4	3.5	9492.4	63.0
				Min	I	-34.3	-3.5	166.9	-3.6	7622.8	-137.1
					J	-34.3	-3.5	167.4	-3.6	5533.4	-93.9
16	4	11	S1 HL-~1	Max	I	-14.2	3.7	-151.5	3.7	9663.4	70.6
					J	-14.2	3.7	-151.1	3.7	12947.0	100.5
				Min	I	-25.3	-2.4	-262.9	-3.5	5521.1	-100.6
					J	-25.3	-2.4	-262.5	-3.5	7412.6	-146.9
17	4	11	S1 HL-~1	Max	I	-14.2	3.7	-152.0	3.7	6374.2	40.7
					J	-14.2	3.7	-151.5	3.7	9663.4	70.6
				Min	I	-25.3	-2.4	-263.4	-3.5	3624.0	-54.3
					J	-25.3	-2.4	-262.9	-3.5	5521.1	-100.6
18	4	11	S1 HL-~1	Max	I	-14.2	3.7	-152.4	3.7	3079.6	10.8
					J	-14.2	3.7	-152.0	3.7	6374.2	40.7
				Min	I	-25.3	-2.4	-263.8	-3.5	1721.5	-8.0
					J	-25.3	-2.4	-263.4	-3.5	3624.0	-54.3
19	4	11	S1 HL-~1	Max	I	-14.2	3.7	-152.9	3.7	-132.0	38.3
					J	-14.2	3.7	-152.4	3.7	3079.6	10.8
				Min	I	-25.3	-2.4	-264.2	-3.5	-639.2	-19.1
					J	-25.3	-2.4	-263.8	-3.5	1721.5	-8.0
20	4	11	S1 HL-~1	Max	I	-14.2	3.7	-153.3	3.7	-2076.0	84.6
					J	-14.2	3.7	-152.9	3.7	-132.0	38.3
				Min	I	-25.3	-2.4	-264.7	-3.5	-3571.8	-49.0
					J	-25.3	-2.4	-264.2	-3.5	-639.2	-19.1
21	4	11	S1 HL-~1	Max	I	-4.2	5.4	191.4	-0.6	2384.5	-49.9
					J	-4.2	5.4	191.8	-0.6	-5.6	-46.4
				Min	I	-7.0	-0.3	96.6	-9.9	1204.4	-114.1
					J	-7.0	-0.3	97.0	-9.9	-10.7	-181.5
22	4	11	S1 HL-~1	Max	I	-4.2	5.4	191.0	-0.6	4774.2	-42.0
					J	-4.2	5.4	191.4	-0.6	2384.5	-49.9
				Min	I	-7.0	-0.3	96.1	-9.9	2408.9	-53.7
					J	-7.0	-0.3	96.6	-9.9	1204.4	-114.1
23	4	11	S1 HL-~1	Max	I	-4.2	5.4	190.5	-0.6	7158.4	21.0
					J	-4.2	5.4	191.0	-0.6	4774.2	-42.0
				Min	I	-7.0	-0.3	95.7	-9.9	3607.9	-56.8
					J	-7.0	-0.3	96.1	-9.9	2408.9	-53.7
24	4	11	S1 HL-~1	Max	I	-4.2	5.4	190.1	-0.6	9537.0	88.5
					J	-4.2	5.4	190.5	-0.6	7158.4	21.0
				Min	I	-7.0	-0.3	95.3	-9.9	4801.3	-60.2
					J	-7.0	-0.3	95.7	-9.9	3607.9	-56.8
25	4	11	S1 HL-~1	Max	I	-4.2	5.4	189.6	-0.6	11910.1	156.0
					J	-4.2	5.4	190.1	-0.6	9537.0	88.5
				Min	I	-7.0	-0.3	94.8	-9.9	5989.2	-63.7
					J	-7.0	-0.3	95.3	-9.9	4801.3	-60.2
26	4	11	S1 HL-~1	Max	I	3.8	3.9	-90.7	9.6	9264.7	72.4
					J	3.8	3.9	-90.2	9.6	11569.5	95.6
				Min	I	2.0	-1.9	-184.6	0.2	4572.8	-87.6
					J	2.0	-1.9	-184.2	0.2	5703.3	-136.4
27	4	11	S1 HL-~1	Max	I	3.8	3.9	-91.1	9.6	6954.4	49.3
					J	3.8	3.9	-90.7	9.6	9264.7	72.4
				Min	I	2.0	-1.9	-185.0	0.2	3436.8	-38.7
					J	2.0	-1.9	-184.6	0.2	4572.8	-87.6
28	4	11	S1 HL-~1	Max	I	3.8	3.9	-91.5	9.6	4638.6	26.2
					J	3.8	3.9	-91.1	9.6	6954.4	49.3
				Min	I	2.0	-1.9	-185.5	0.2	2295.3	10.0
					J	2.0	-1.9	-185.0	0.2	3436.8	-38.7
29	4	11	S1 HL-~1	Max	I	3.8	3.9	-92.0	9.6	2317.2	59.0
					J	3.8	3.9	-91.5	9.6	4638.6	26.2
				Min	I	2.0	-1.9	-185.9	0.2	1148.3	2.9
					J	2.0	-1.9	-185.5	0.2	2295.3	10.0
30	4	11	S1 HL-~1	Max	I	3.8	3.9	-92.4	9.6	-4.3	107.8
					J	3.8	3.9	-92.0	9.6	2317.2	59.0
				Min	I	2.0	-1.9	-186.4	0.2	-9.7	-20.2
					J	2.0	-1.9	-185.9	0.2	1148.3	2.9

BEAM ELEMENT FORCES & MOMENTS MIN/MAX SUMMARY BY PROPERTY PRINTOUT

Unit System : kips , in

* LENGTH : the length between two nodes

[SECTION NAME : W14X219 , SECTION ID : 11 , SECTION SHAPE : H]
[SECTION SIZE] H:15.875 B1:15.875 tw:1 tf1:1.5625 B2:15.875 tf2:1.5625

** MAX

ELEM	COM	LC	PT	AXIAL	SHEAR-y	SHEAR-z	TORSION	MOMENT-y	MOMENT-z	LENGTH
10	AXL	S1 HL-~1	1 I	7.8	1.0	-89.9	0.1	-4.2	-39.7	12.50
21	SHY	S1 HL-~1	1 I	-4.2	5.4	191.4	-0.6	2384.5	-49.9	12.50
11	SHZ	S1 HL-~1	1 J	-22.9	2.1	275.1	3.5	-2876.8	78.9	12.50
1	TOR	S1 HL-~1	1 J	-0.4	1.1	189.9	9.7	-5.6	115.4	12.50
16	MTY	S1 HL-~1	1 J	-14.2	3.7	-151.1	3.7	12947.0	100.5	12.50
25	MTZ	S1 HL-~1	1 I	-4.2	5.4	189.6	-0.6	11910.1	156.0	12.50

** MIN

ELEM	COM	LC	PT	AXIAL	SHEAR-y	SHEAR-z	TORSION	MOMENT-y	MOMENT-z	LENGTH
15	AXL	S1 HL-~1	1 I	-34.3	-3.5	166.9	-3.6	7622.8	-137.1	12.50
9	SHY	S1 HL-~1	1 I	6.1	-4.7	-183.1	-9.2	1117.3	-106.2	12.50
20	SHZ	S1 HL-~1	1 I	-25.3	-2.4	-264.7	-3.5	-3571.8	-49.0	12.50
21	TOR	S1 HL-~1	1 J	-7.0	-0.3	97.0	-9.9	-10.7	-181.5	12.50
11	MTY	S1 HL-~1	1 J	-34.3	-3.5	169.1	-3.6	-4375.8	-42.7	12.50
21	MTZ	S1 HL-~1	1 J	-7.0	-0.3	97.0	-9.9	-10.7	-181.5	12.50

BEAM ELEMENT STRESSES DEFAULT PRINTOUT

Unit System : kips , in

ELEM	MAT	SEC	LC	PT	AXIAL	SHEAR-y	SHEAR-z	(+y)-BENDING-(-y)		(+z)-BENDING-(-z)	
1	4	11	S1 HL-~1 Max	I	-0.0	0.0	10.2	-0.0	0.4	-2.5	5.1
				J	-0.0	0.0	10.2	0.1	0.7	0.0	-0.0
			Min	I	-0.0	-0.1	5.1	-0.4	0.0	-5.1	2.5
				J	-0.0	-0.1	5.1	-0.7	-0.1	0.0	-0.0
2	4	11	S1 HL-~1 Max	I	-0.0	0.0	10.2	-0.0	0.1	-5.1	10.2
				J	-0.0	0.0	10.2	-0.0	0.4	-2.5	5.1
			Min	I	-0.0	-0.1	5.1	-0.1	0.0	-10.2	5.1
				J	-0.0	-0.1	5.1	-0.4	0.0	-5.1	2.5
3	4	11	S1 HL-~1 Max	I	-0.0	0.0	10.1	0.3	0.2	-7.6	15.3
				J	-0.0	0.0	10.2	-0.0	0.1	-5.1	10.2
			Min	I	-0.0	-0.1	5.0	-0.2	-0.3	-15.3	7.6
				J	-0.0	-0.1	5.1	-0.1	0.0	-10.2	5.1
4	4	11	S1 HL-~1 Max	I	-0.0	0.0	10.1	0.7	0.3	-10.2	20.4
				J	-0.0	0.0	10.1	0.3	0.2	-7.6	15.3
			Min	I	-0.0	-0.1	5.0	-0.3	-0.7	-20.4	10.2
				J	-0.0	-0.1	5.0	-0.2	-0.3	-15.3	7.6
5	4	11	S1 HL-~1 Max	I	-0.0	0.0	10.1	1.0	0.3	-12.7	25.5
				J	-0.0	0.0	10.1	0.7	0.3	-10.2	20.4
			Min	I	-0.0	-0.1	5.0	-0.3	-1.0	-25.5	12.7
				J	-0.0	-0.1	5.0	-0.3	-0.7	-20.4	10.2
6	4	11	S1 HL-~1 Max	I	0.1	0.0	-4.7	0.6	0.4	-9.6	19.7
				J	0.1	0.0	-4.7	0.7	0.8	-12.0	24.6
			Min	I	0.1	-0.1	-9.8	-0.4	-0.6	-19.7	9.6
				J	0.1	-0.1	-9.8	-0.8	-0.7	-24.6	12.0
7	4	11	S1 HL-~1 Max	I	0.1	0.0	-4.8	0.5	0.1	-7.2	14.8
				J	0.1	0.0	-4.7	0.6	0.4	-9.6	19.7
			Min	I	0.1	-0.1	-9.8	-0.1	-0.5	-14.8	7.2
				J	0.1	-0.1	-9.8	-0.4	-0.6	-19.7	9.6
8	4	11	S1 HL-~1 Max	I	0.1	0.0	-4.8	0.4	-0.3	-4.8	9.9
				J	0.1	0.0	-4.8	0.5	0.1	-7.2	14.8
			Min	I	0.1	-0.1	-9.8	0.3	-0.4	-9.9	4.8
				J	0.1	-0.1	-9.8	-0.1	-0.5	-14.8	7.2

9	4	11 S1 HL-~1	Max	I	0.1	0.0	-4.8	0.7	-0.3	-2.4	4.9
				J	0.1	0.0	-4.8	0.4	-0.3	-4.8	9.9
			Min	I	0.1	-0.1	-9.9	0.3	-0.7	-4.9	2.4
				J	0.1	-0.1	-9.8	0.3	-0.4	-9.9	4.8
10	4	11 S1 HL-~1	Max	I	0.1	0.0	-4.8	1.0	-0.3	0.0	-0.0
				J	0.1	0.0	-4.8	0.7	-0.3	-2.4	4.9
			Min	I	0.1	-0.1	-9.9	0.3	-1.0	0.0	-0.0
				J	0.1	-0.1	-9.9	0.3	-0.7	-4.9	2.4
11	4	11 S1 HL-~1	Max	I	-0.2	0.1	14.8	0.1	0.2	2.6	-1.5
				J	-0.2	0.1	14.8	0.3	0.5	9.4	-6.2
			Min	I	-0.3	-0.1	9.1	-0.2	-0.1	1.5	-2.6
				J	-0.3	-0.1	9.1	-0.5	-0.3	6.2	-9.4
12	4	11 S1 HL-~1	Max	I	-0.2	0.1	14.8	0.0	0.1	-2.9	5.7
				J	-0.2	0.1	14.8	0.1	0.2	2.6	-1.5
			Min	I	-0.3	-0.1	9.1	-0.1	-0.0	-5.7	2.9
				J	-0.3	-0.1	9.1	-0.2	-0.1	1.5	-2.6
13	4	11 S1 HL-~1	Max	I	-0.2	0.1	14.7	0.3	0.2	-7.4	13.1
				J	-0.2	0.1	14.8	0.0	0.1	-2.9	5.7
			Min	I	-0.3	-0.1	9.0	-0.2	-0.3	-13.1	7.4
				J	-0.3	-0.1	9.1	-0.1	-0.0	-5.7	2.9
14	4	11 S1 HL-~1	Max	I	-0.2	0.1	14.7	0.6	0.4	-11.9	20.5
				J	-0.2	0.1	14.7	0.3	0.2	-7.4	13.1
			Min	I	-0.3	-0.1	9.0	-0.4	-0.6	-20.5	11.9
				J	-0.3	-0.1	9.0	-0.2	-0.3	-13.1	7.4
15	4	11 S1 HL-~1	Max	I	-0.2	0.1	14.7	0.9	0.6	-16.5	27.9
				J	-0.2	0.1	14.7	0.6	0.4	-11.9	20.5
			Min	I	-0.3	-0.1	9.0	-0.6	-0.9	-27.9	16.5
				J	-0.3	-0.1	9.0	-0.4	-0.6	-20.5	11.9
16	4	11 S1 HL-~1	Max	I	-0.1	0.1	-8.2	0.6	0.4	-11.9	20.9
				J	-0.1	0.1	-8.1	0.9	0.6	-16.0	28.0
			Min	I	-0.3	-0.1	-14.1	-0.4	-0.6	-20.9	11.9
				J	-0.3	-0.1	-14.1	-0.6	-0.9	-28.0	16.0
17	4	11 S1 HL-~1	Max	I	-0.1	0.1	-8.2	0.3	0.3	-7.8	13.8
				J	-0.1	0.1	-8.2	0.6	0.4	-11.9	20.9
			Min	I	-0.3	-0.1	-14.2	-0.3	-0.3	-13.8	7.8
				J	-0.3	-0.1	-14.1	-0.4	-0.6	-20.9	11.9
18	4	11 S1 HL-~1	Max	I	-0.1	0.1	-8.2	0.1	0.1	-3.7	6.6
				J	-0.1	0.1	-8.2	0.3	0.3	-7.8	13.8
			Min	I	-0.3	-0.1	-14.2	-0.1	-0.1	-6.6	3.7
				J	-0.3	-0.1	-14.2	-0.3	-0.3	-13.8	7.8
19	4	11 S1 HL-~1	Max	I	-0.1	0.1	-8.2	0.1	0.2	1.4	-0.3
				J	-0.1	0.1	-8.2	0.1	0.1	-3.7	6.6
			Min	I	-0.3	-0.1	-14.2	-0.2	-0.1	0.3	-1.4
				J	-0.3	-0.1	-14.2	-0.1	-0.1	-6.6	3.7
20	4	11 S1 HL-~1	Max	I	-0.1	0.1	-8.2	0.3	0.5	7.7	-4.5
				J	-0.1	0.1	-8.2	0.1	0.2	1.4	-0.3
			Min	I	-0.3	-0.1	-14.2	-0.5	-0.3	4.5	-7.7
				J	-0.3	-0.1	-14.2	-0.2	-0.1	0.3	-1.4
21	4	11 S1 HL-~1	Max	I	-0.0	0.1	10.3	0.7	-0.3	-2.6	5.1
				J	-0.0	0.1	10.3	1.2	-0.3	0.0	-0.0
			Min	I	-0.1	-0.0	5.2	0.3	-0.7	-5.1	2.6
				J	-0.1	-0.0	5.2	0.3	-1.2	0.0	-0.0
22	4	11 S1 HL-~1	Max	I	-0.0	0.1	10.3	0.3	-0.3	-5.2	10.3
				J	-0.0	0.1	10.3	0.7	-0.3	-2.6	5.1
			Min	I	-0.1	-0.0	5.2	0.3	-0.3	-10.3	5.2
				J	-0.1	-0.0	5.2	0.3	-0.7	-5.1	2.6
23	4	11 S1 HL-~1	Max	I	-0.0	0.1	10.3	0.4	0.1	-7.8	15.5
				J	-0.0	0.1	10.3	0.3	-0.3	-5.2	10.3
			Min	I	-0.1	-0.0	5.1	-0.1	-0.4	-15.5	7.8
				J	-0.1	-0.0	5.2	0.3	-0.3	-10.3	5.2
24	4	11 S1 HL-~1	Max	I	-0.0	0.1	10.2	0.4	0.6	-10.4	20.6
				J	-0.0	0.1	10.3	0.4	0.1	-7.8	15.5

			Min	I	-0.1	-0.0	5.1	-0.6	-0.4	-20.6	10.4
				J	-0.1	-0.0	5.1	-0.1	-0.4	-15.5	7.8
25	4	11 S1 HL-~1	Max	I	-0.0	0.1	10.2	0.4	1.0	-12.9	25.7
				J	-0.0	0.1	10.2	0.4	0.6	-10.4	20.6
			Min	I	-0.1	-0.0	5.1	-1.0	-0.4	-25.7	12.9
				J	-0.1	-0.0	5.1	-0.6	-0.4	-20.6	10.4
26	4	11 S1 HL-~1	Max	I	0.0	0.1	-4.9	0.6	0.5	-9.9	20.0
				J	0.0	0.1	-4.9	0.9	0.6	-12.3	25.0
			Min	I	0.0	-0.0	-9.9	-0.5	-0.6	-20.0	9.9
				J	0.0	-0.0	-9.9	-0.6	-0.9	-25.0	12.3
27	4	11 S1 HL-~1	Max	I	0.0	0.1	-4.9	0.2	0.3	-7.4	15.0
				J	0.0	0.1	-4.9	0.6	0.5	-9.9	20.0
			Min	I	0.0	-0.0	-10.0	-0.3	-0.2	-15.0	7.4
				J	0.0	-0.0	-9.9	-0.5	-0.6	-20.0	9.9
28	4	11 S1 HL-~1	Max	I	0.0	0.1	-4.9	-0.1	0.2	-5.0	10.0
				J	0.0	0.1	-4.9	0.2	0.3	-7.4	15.0
			Min	I	0.0	-0.0	-10.0	-0.2	0.1	-10.0	5.0
				J	0.0	-0.0	-10.0	-0.3	-0.2	-15.0	7.4
29	4	11 S1 HL-~1	Max	I	0.0	0.1	-4.9	-0.0	0.4	-2.5	5.0
				J	0.0	0.1	-4.9	-0.1	0.2	-5.0	10.0
			Min	I	0.0	-0.0	-10.0	-0.4	0.0	-5.0	2.5
				J	0.0	-0.0	-10.0	-0.2	0.1	-10.0	5.0
30	4	11 S1 HL-~1	Max	I	0.0	0.1	-5.0	0.1	0.7	0.0	-0.0
				J	0.0	0.1	-4.9	-0.0	0.4	-2.5	5.0
			Min	I	0.0	-0.0	-10.0	-0.7	-0.1	0.0	-0.0
				J	0.0	-0.0	-10.0	-0.4	0.0	-5.0	2.5

BEAM ELEMENT STRESSES MIN/MAX SUMMARY BY PROPERTY PRINTOUT Unit System : kips , in

[SECTION NAME : W14X219 , SECTION ID : 11 , SECTION SHAPE : H]
[SECTION SIZE] H:15.875 B1:15.875 tw:1 tf1:1.5625 B2:15.875 tf2:1.5625

** MAX

ELEM	COM	LC	PT	AXIAL	SHEAR-y	SHEAR-Z	(+y)-BENDING	-(-y)	(+z)-BENDING	-(-z)
10	AXL	S1 HL-~1	1 I	0.1	0.0	-4.8	1.0	-0.3	0.0	-0.0
21	SHY	S1 HL-~1	1 I	-0.0	0.1	10.3	0.7	-0.3	-2.6	5.1
11	SHZ	S1 HL-~1	1 J	-0.2	0.1	14.8	0.3	0.5	9.4	-6.2
21	BY+	S1 HL-~1	1 J	-0.0	0.1	10.3	1.2	-0.3	0.0	-0.0
25	BY-	S1 HL-~1	1 I	-0.0	0.1	10.2	0.4	1.0	-12.9	25.7
11	BZ+	S1 HL-~1	1 J	-0.2	0.1	14.8	0.3	0.5	9.4	-6.2
16	BZ-	S1 HL-~1	1 J	-0.1	0.1	-8.1	0.9	0.6	-16.0	28.0

** MIN

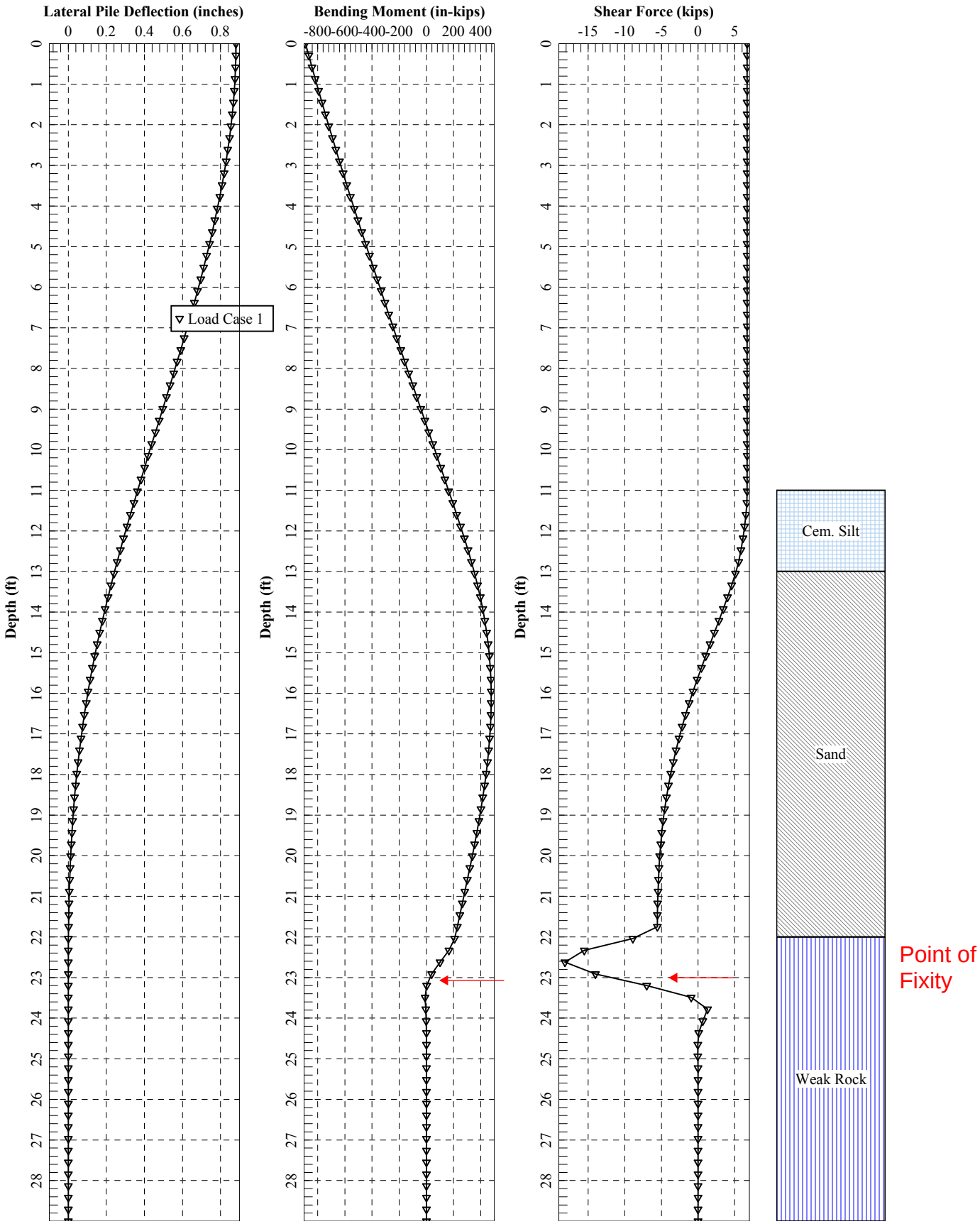
ELEM	COM	LC	PT	AXIAL	SHEAR-y	SHEAR-Z	(+y)-BENDING	-(-y)	(+z)-BENDING	-(-z)
15	AXL	S1 HL-~1	1 I	-0.3	-0.1	9.0	-0.6	-0.9	-27.9	16.5
6	SHY	S1 HL-~1	1 I	0.1	-0.1	-9.8	-0.4	-0.6	-19.7	9.6
20	SHZ	S1 HL-~1	1 I	-0.3	-0.1	-14.2	-0.5	-0.3	4.5	-7.7
25	BY+	S1 HL-~1	1 I	-0.1	-0.0	5.1	-1.0	-0.4	-25.7	12.9
21	BY-	S1 HL-~1	1 J	-0.1	-0.0	5.2	0.3	-1.2	0.0	-0.0
16	BZ+	S1 HL-~1	1 J	-0.3	-0.1	-14.1	-0.6	-0.9	-28.0	16.0
11	BZ-	S1 HL-~1	1 J	-0.3	-0.1	9.1	-0.5	-0.3	6.2	-9.4

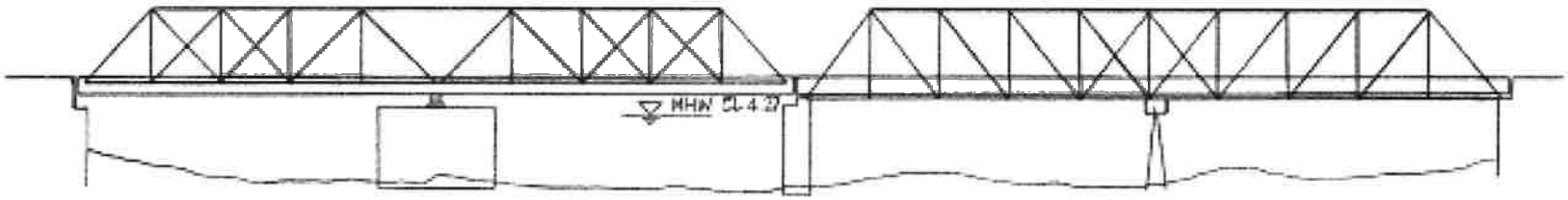
REACTION FORCES & MOMENTS DEFAULT PRINTOUT Unit System : kips , in

Node	LC	FX	FY	FZ	MX	MY	MZ

SUMMATION OF REACTION FORCES

LC	SUM-FX	SUM-FY	SUM-FZ


Lateral Pile Deflection (inches)
0 0.2 0.4 0.6 0.8
Load Case 1
Bending Moment (in-kips)
-800 -600 -400 -200 0 200 400
Shear Force (kips)
-15 -10 -5 0 5
Depth (ft)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Cem. Silt
Sand
Weak Rock
Point of Fixity



ELEVATION

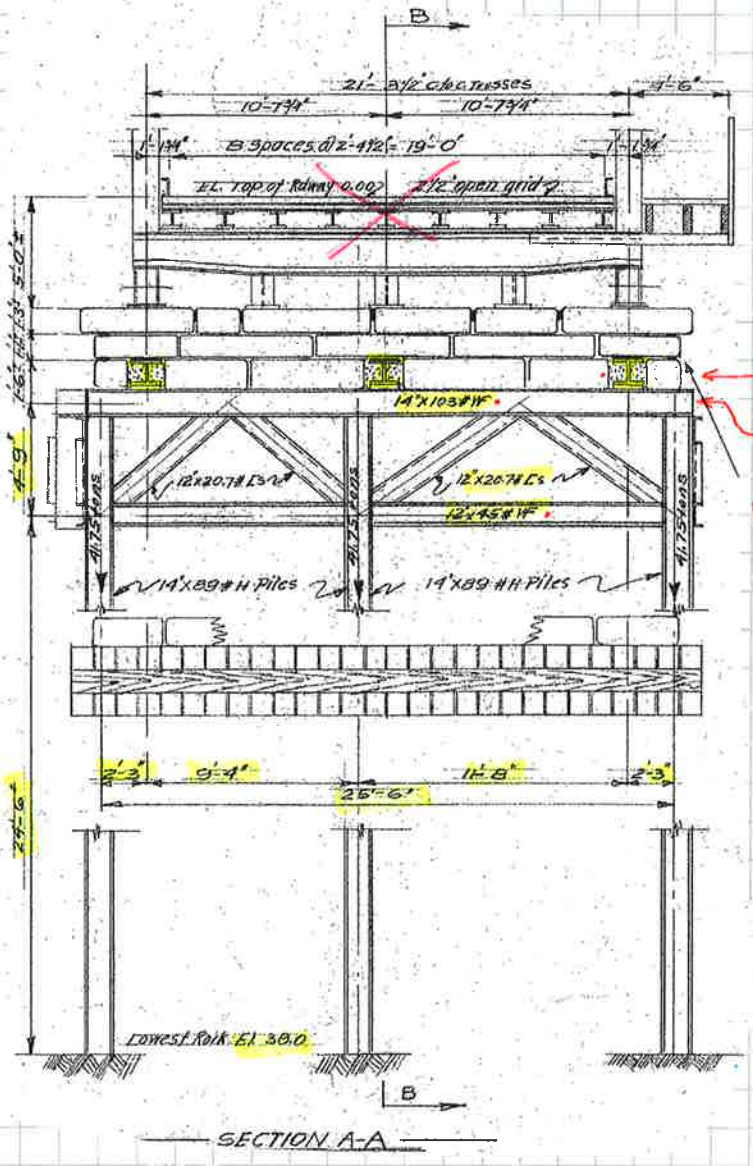
SCALE: 1" = 30'

Close, Jensen and Miller, P.C.

BY BA DATE 11/11/2015 SUBJECT BR. 1349 SHEET NO. 2 OF .....

CHKD. BY ..... DATE ..... US RTE 136 O/ SAUGATUCK RIVER JOB NO. EXIST. 158-150

..... PIER 2 ANALYSIS WESTPORT



W14x219

W14x103

W12x45

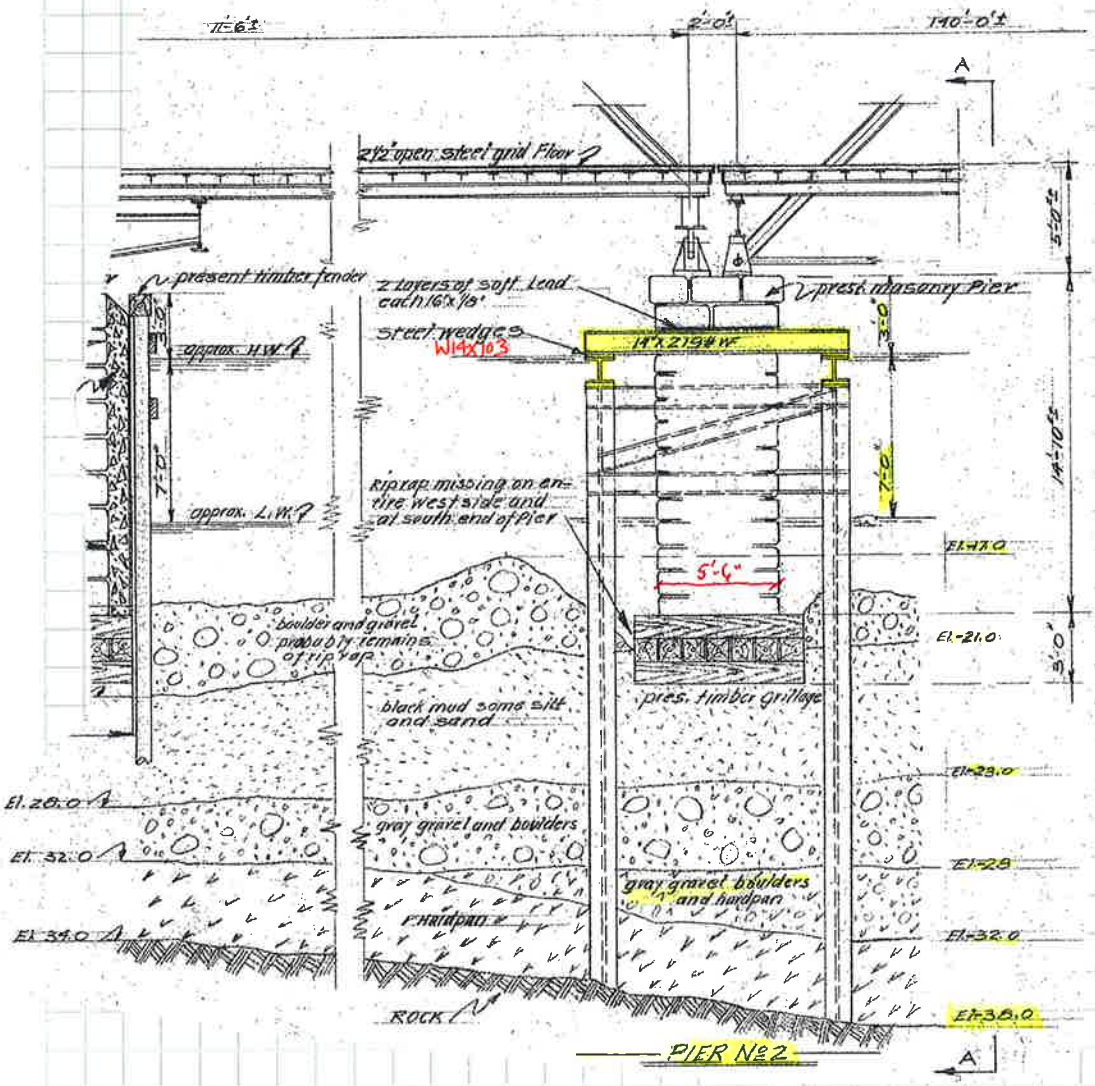
EXIST. PIER 2

Close, Jensen and Miller, P.C.

BY BA DATE 11/11/15 SUBJECT BR. 1349 SHEET NO. 3 OF .....

CHKD. BY ..... DATE ..... US RTE 136 O/ SAUGATUCK RIVER JOB NO. EXIST. 158-150

PIER 2 ANALYSIS WESTPORT

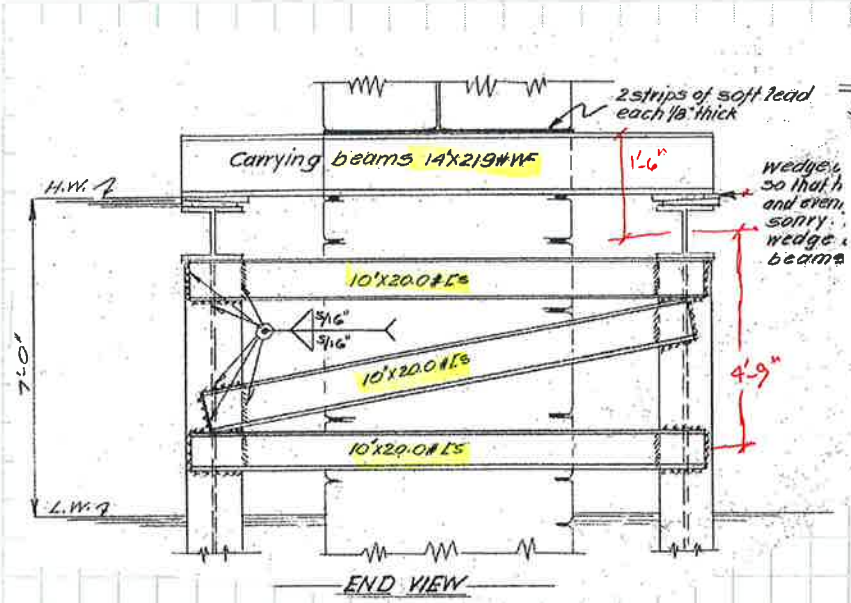


Close, Jensen and Miller, P.C.

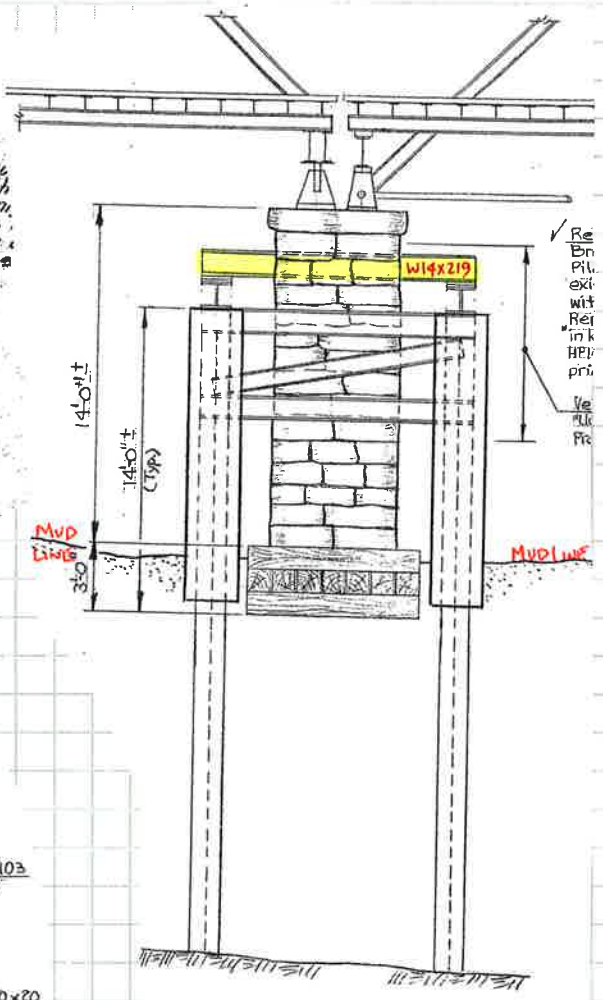
BY BA DATE 11/4/15 SUBJECT BR. 1349 SHEET NO. 4 OF

CHKD. BY DATE V.S. Pier 136 of Saugatuck River JOB NO. Exist. 158-150

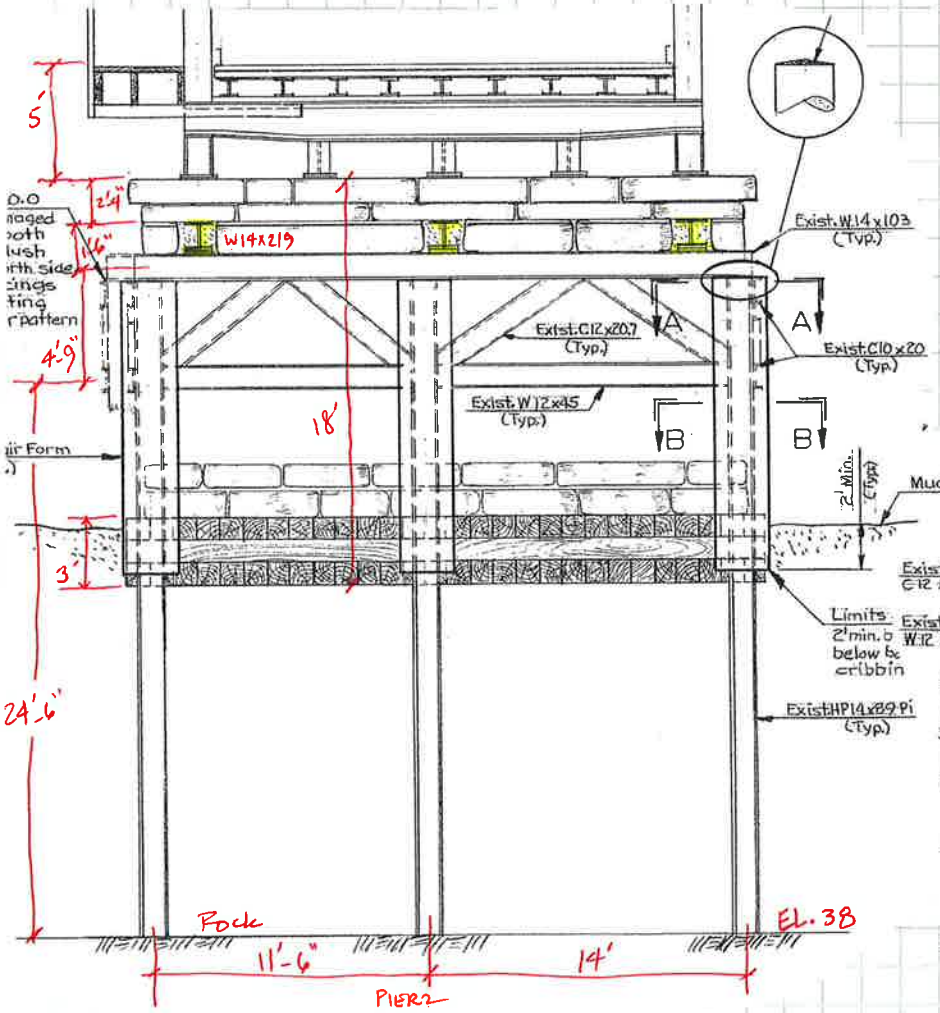
Pier 2 Analysis Westport



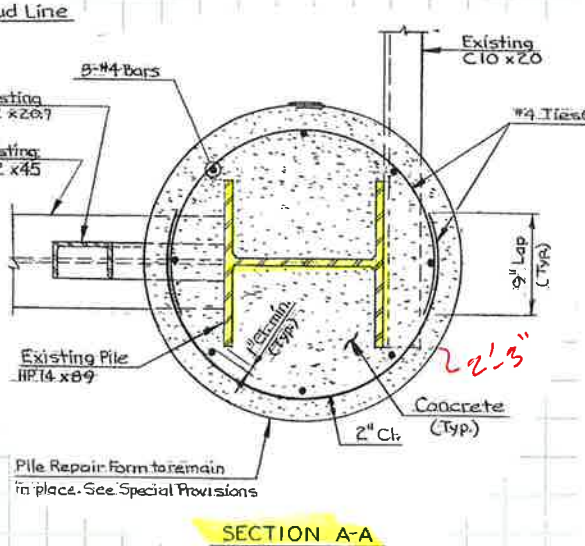
END VIEW



PIER 2
SOUTH END VIEW
Scale 1/4"=1'-0"



PIER 2
WEST ELEVATION



SECTION A-A

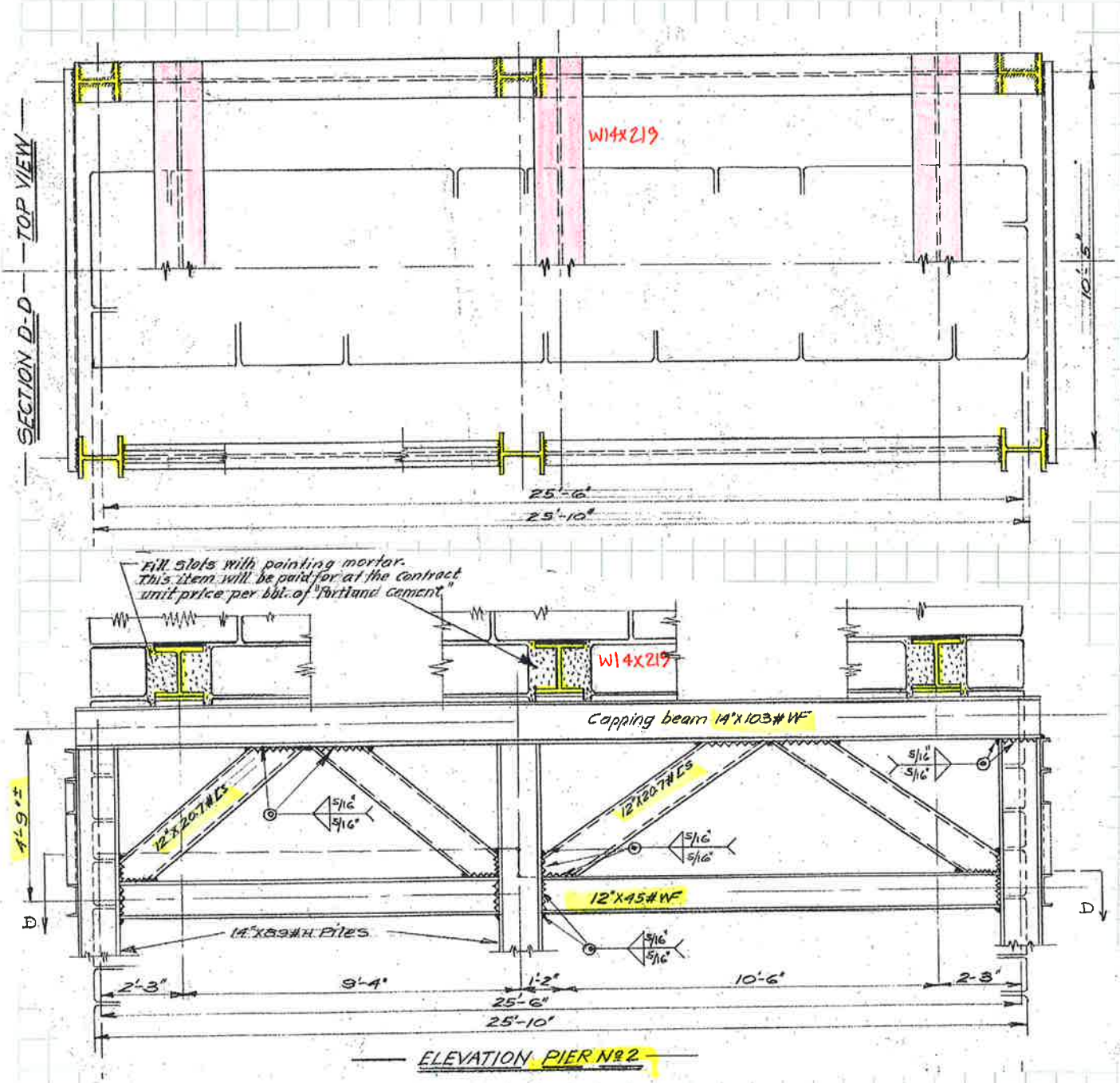
Exist. Pier 2

Close, Jensen and Miller, P.C.

BY BA DATE 11/11/15 SUBJECT Br. 1349 SHEET NO. 5 OF .....

CHKD. BY ..... DATE ..... US Rte 136 o/ SAUGATUCK RIVER JOB NO. EXIST. 158-150

..... PIER 2 ANALYSIS WEST PORT



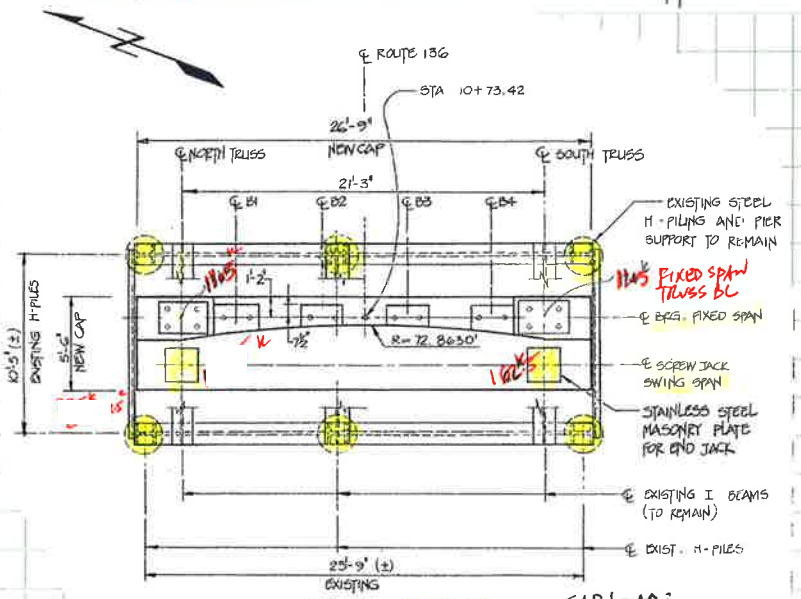
ELEVATION PIER №2

Close, Jensen and Miller, P.C.

BY BA DATE 11/11/15 SUBJECT BR. 1349 SHEET NO. 6 OF

CHKD. BY DATE US. RTE 136 O/SAUGATUCK RIVER JOB NO. EXIST. 158-150

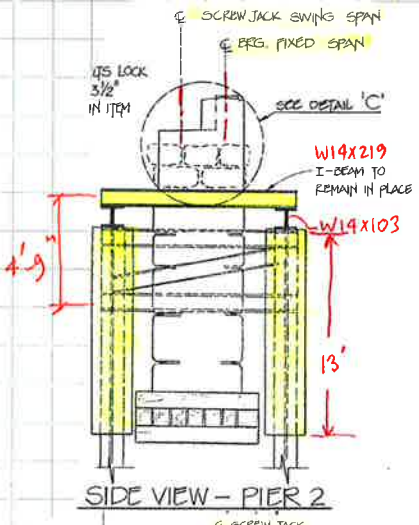
PIER 2 ANALYSIS WESTPORT



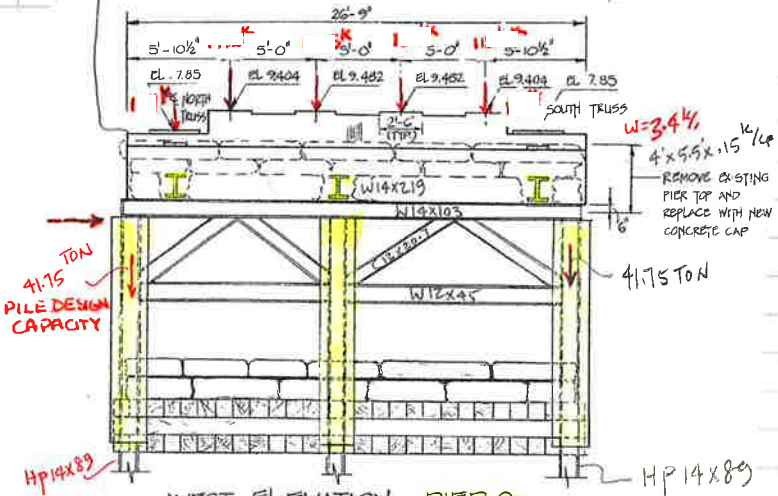
PLAN – PIER 2
SCALE 3/16" = 1'-0"

CAP LOAD:
136+136+108+94+100+136
= 710K + (66+66) = 842K
842K/3 = 280K
710K/3 = 237K

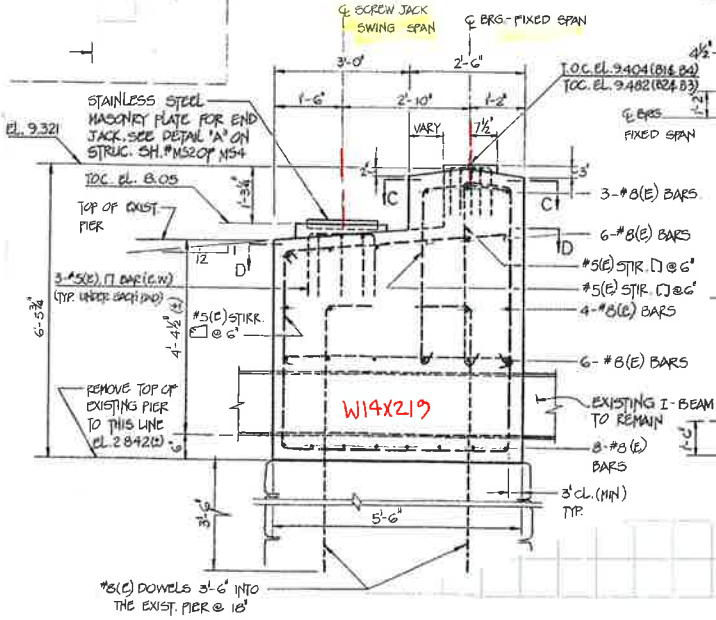
CAP 4'x5.5'x15'
= 3.4 K/L'x 26.75' = 91K/3 = 30K/5.5' = 5.5 K/L'



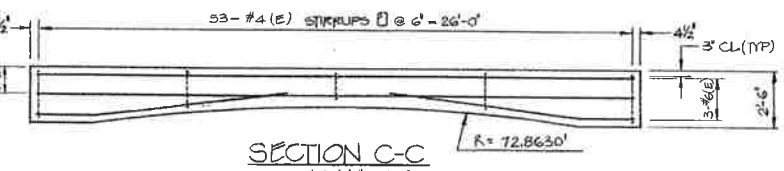
SIDE VIEW – PIER 2



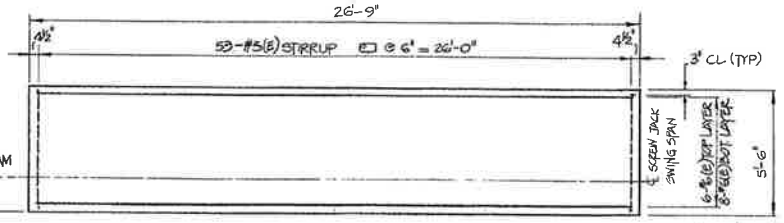
WEST ELEVATION – PIER 2



SECTION D-D
SCALE: 1/4" = 1'-0"



SECTION C-C
SCALE 1/4" = 1'-0"



SECTION D-D
SCALE: 1/4" = 1'-0"

FIXED SPAN - SPANS 3 AND 4

SIDE TRUSSES

NO.	MEMBER	AREA (in^2)	AREA (ft^2)	LENGTH (ft)	UNIT WEIGHT (pcf)		WEIGHT (lbs)	SIDES		WEIGHT (kips)
1	L0L1	7.109	0.049	14.000	490	=	338.665	2	=	0.677
2	L1L2	10.359	0.072	14.000	490	=	493.491	2	=	0.987
3	L2L3	10.359	0.072	14.000	490	=	493.491	2	=	0.987
4	L3L4	10.359	0.072	14.000	490	=	493.491	2	=	0.987
5	L4L5	7.109	0.049	14.000	490	=	338.665	2	=	0.677
6	L5L6	7.109	0.049	14.000	490	=	338.665	2	=	0.677
7	L6L7	10.359	0.072	14.000	490	=	493.491	2	=	0.987
8	L7L8	10.359	0.072	14.000	490	=	493.491	2	=	0.987
9	L8L9	10.359	0.072	14.000	490	=	493.491	2	=	0.987
10	L9L10	7.109	0.049	14.000	490	=	338.665	2	=	0.677
11	U1U2	7.109	0.049	14.000	490	=	338.665	2	=	0.677
12	U2U3	7.109	0.049	14.000	490	=	338.665	2	=	0.677
13	U3U4	7.109	0.049	14.000	490	=	338.665	2	=	0.677
14	U4U5	7.109	0.049	14.000	490	=	338.665	2	=	0.677
15	U5U6	7.109	0.049	14.000	490	=	338.665	2	=	0.677
16	U6U7	7.109	0.049	14.000	490	=	338.665	2	=	0.677
17	U7U8	7.109	0.049	14.000	490	=	338.665	2	=	0.677
18	U8U9	7.109	0.049	14.000	490	=	338.665	2	=	0.677
19	L0U1	7.109	0.049	22.492	490	=	544.098	2	=	1.088
20	L1U1	4.760	0.033	17.604	490	=	285.139	2	=	0.570
21	L2U1	10.453	0.073	22.492	490	=	800.036	2	=	1.600
22	L2U2	4.760	0.033	17.604	490	=	285.139	2	=	0.570
23	L3U2	10.453	0.073	22.492	490	=	800.036	2	=	1.600
24	L3U3	4.760	0.033	17.604	490	=	285.139	2	=	0.570
25	L4U3	10.453	0.073	22.492	490	=	800.036	2	=	1.600
26	L4U4	4.760	0.033	17.604	490	=	285.139	2	=	0.570
27	L4U5	3.125	0.022	22.492	490	=	239.177	2	=	0.478
28	L5U4	1.530	0.011	22.492	490	=	117.101	2	=	0.234
29	L5U5	4.760	0.033	17.604	490	=	285.139	2	=	0.570
30	L5U6	3.125	0.022	22.492	490	=	239.177	2	=	0.478
31	L6U5	1.530	0.011	22.492	490	=	117.101	2	=	0.234
32	L6U6	4.760	0.033	17.604	490	=	285.139	2	=	0.570
33	L6U7	10.453	0.073	22.492	490	=	800.036	2	=	1.600
34	L7U7	4.760	0.033	17.604	490	=	285.139	2	=	0.570
35	L7U8	10.453	0.073	22.492	490	=	800.036	2	=	1.600
36	L8U8	4.760	0.033	17.604	490	=	285.139	2	=	0.570
37	L8U9	10.453	0.073	22.492	490	=	800.036	2	=	1.600
38	L9U9	4.760	0.033	17.604	490	=	285.139	2	=	0.570
39	L10U9	7.109	0.049	22.492	490	=	544.098	2	=	1.088
								TOTAL	=	**32.384**

kips

TOP AND BOTTOM CROSS FRAMES

NO.	MEMBER	AREA (in^2)	AREA (ft^2)	LENGTH (ft)	UNIT WEIGHT (pcf)		WEIGHT (lbs)	SIDES		WEIGHT (kips)
1	U1	4.760	0.033	21.250	490	=	344.191	1	=	0.344
2	U2	4.760	0.033	21.250	490	=	344.191	1	=	0.344
3	U3	4.760	0.033	21.250	490	=	344.191	1	=	0.344
4	U4	4.760	0.033	21.250	490	=	344.191	1	=	0.344
5	U5	4.760	0.033	21.250	490	=	344.191	1	=	0.344
6	U6	4.760	0.033	21.250	490	=	344.191	1	=	0.344
7	U7	4.760	0.033	21.250	490	=	344.191	1	=	0.344
8	U8	4.760	0.033	21.250	490	=	344.191	1	=	0.344
9	U9	4.760	0.033	21.250	490	=	344.191	1	=	0.344
10	U1U2	1.000	0.007	25.447	490	=	86.591	2	=	0.173
11	U2U1	1.000	0.007	25.447	490	=	86.591	2	=	0.173
12	U2U3	1.000	0.007	25.447	490	=	86.591	2	=	0.173
13	U3U2	1.000	0.007	25.447	490	=	86.591	2	=	0.173
14	U3U4	1.000	0.007	25.447	490	=	86.591	2	=	0.173
15	U4U3	1.000	0.007	25.447	490	=	86.591	2	=	0.173
16	U4U5	1.000	0.007	25.447	490	=	86.591	2	=	0.173
17	U5U4	1.000	0.007	25.447	490	=	86.591	2	=	0.173
18	U5U6	1.000	0.007	25.447	490	=	86.591	2	=	0.173
19	U6U5	1.000	0.007	25.447	490	=	86.591	2	=	0.173
20	U6U7	1.000	0.007	25.447	490	=	86.591	2	=	0.173
21	U7U6	1.000	0.007	25.447	490	=	86.591	2	=	0.173
22	U7U8	1.000	0.007	25.447	490	=	86.591	2	=	0.173
23	U8U7	1.000	0.007	25.447	490	=	86.591	2	=	0.173
24	U8U9	1.000	0.007	25.447	490	=	86.591	2	=	0.173
25	U9U8	1.000	0.007	25.447	490	=	86.591	4	=	0.346
								TOTAL	=	**6.042**

kips

TOAL WEIGHT OF TRUSS		38.426	kips
ADD 15% FOR CROSS BARS		5.764	kips
		44.190	kips
	Say:	**45**	**kips**
WEIGHT PER BEARING (4 EA)		11.250	kips
	Say:	**11.5**	**kips**

@ FIXED SPAN TRUSS DL

Close, Jensen and Miller, P.C.

BY DC/BM DATE 11/30/15 SUBJECT Br. 1349 SHEET NO. ..... OF .....

CHKD. BY ..... DATE ..... US RTE 136 o/ Saugatuck River JOB NO. .....

..... Pier 2 Analysis ..... Wesport .....

Assuming based on borings and As-builts

embedment depth = 18ft

Layer 1: Silt (2ft deep)

γ = 120 pcf Navg = 2
c = 500 psf
ϕ = 10°
K = 18 pci

Layer 2: Sand (9ft deep)

γ = 125 pcf Navg = 27
ϕ = 38°
K = 25 pci

Layer 3: Gravel/sand (7ft deep)

γ = 125 pcf Navg = 23
ϕ = 40°

Layer 4: Bed rock

γ = 160 pcf
υ = .25 (AASHTO Table C10.4.6.3-1)
E = 4130 ksi (AASHTO Table C10.4.6.5-1)
δ_c = 16070 ksf (AASHTO Figure 10.4.6.2.4-1)

Maximum load occur at Limit State Strength I

Axial load = 173.71 kips

horizontal load = 17.15 kips

PIER 2 ANALYSIS: (PILES HP 14 X 89)

MAXIMUM AXIAL LOAD = 350.4 K

MAXIMUM MOMENT = 1131.13 K-in

L-PILE ANALYSIS FOR HS-20

DETERMINE NOMINAL AXIAL STRUCTURE PILE RESISTANCE

DETERMINE POINT OF FIXITY

$$1.8\left[E_p I_w / n_h\right]^{.2}$$ (AASHTO C10.7.3.13.4-2)

$E_p = 29000$ ksi

$I_w = (326\ in^4)\left(1/12_{in}\right)^4 = .0157\ ft^4$

$n_h = .556$ (AASHTO TABLE CD.4.6.3-2)

$$1.8\left[(29000 \times .0157)/.556\right]^{.2} = 6.9\ ft$$

UNBRACED LENGTH ESTIMATED

$$\ell = D_{cp} + D_{FIXITY} = (18'-3.8'-3') + 6.9 \cong 18.1\ ft$$

DETERMINE SLENDERNESS

$$b/2t < .56\sqrt{E/F_y}$$ (AISC TABLE B4.1a)

$$b/2t = 14.75/2(5/8) = 11.8$$

$$.56\sqrt{29000/36} = 15.9$$

(Q=1) NOT SLENDER

ELASTIC FLEXURAL BUCKLING RESISTANCE:

$$P_e = \pi^2 E A_g / (k\ell/r_s)^2 \qquad \text{(AASHTO 6.9.4.1.2-1)}$$

$K = 2$ (AASHTO 4.6.2.5)

$$P_e = \frac{\pi^2 (29000)(26.1)}{\left(2 \times 18.1 \times 12 / 3.53\right)^2} = 493.3^{k}$$

$$P_e/P_o \longrightarrow P_o = F_y A_g Q \qquad \text{(AASHTO 6.9.4.1.1)}$$

$$P_o = 36 \times 26.1 \times 1 = 939.6^{k}$$

$$P_e/P_o = 493.3/939.6 = .525 \qquad P_e/P_o \geq .44$$

$$P_n = .658^{(P_o/P_e)} P_o \qquad \text{(AASHTO 6.9.4.1.1-1)}$$

$$P_n = .658^{(1.905)} (939.6) = 423.3^{kips}$$

TORSIONAL BUCKLING:

$$P_e = \left[\frac{\pi^2 E C_w}{(k_z \ell_z)^2} + GJ\right] \frac{A_g}{I_x + I_y} \qquad \text{(AASHTO 6.9.4.1.3-1)}$$

$G = .385E = .385(29000) = 11165$ ksi $\qquad C_w = I_y h^2/4$

$$P_e = \left[\frac{\pi^2 (29000^{ksi})(14232)}{(1 \times 18.1 \times 12)^2} + (11165)(3.59)\right] \frac{26.1}{904+326} = 2683 \text{ kips}$$

$$P_e/P_o = 2683/939.6 = 2.86 \qquad P_e/P_o \geq .44 \qquad \text{(AASHTO 6.9.4.1.1)}$$

$$P_n = .658^{(939.6/2683)} (939.6) = 811.5^{kips}$$

P_n = LESSER OF TWO

$P_n = 423.3^{kips}$

L PILE POINT OF FIXITY @ 24' FROM TOP OF PILE:

$$P_e = \frac{\pi^2(29000)(26.1)}{(1.2 \times 24 \times 12/3.53)^2} = 779.4^{k} \qquad k = 1.2 \quad \text{AASHTO } 4.6.2.5$$

$$P_e/P_o = 779.4^{k}/939.6 = .83 \qquad P_e/P_o \text{ IF } < .44 \quad P_n = .877 P_e$$

$$P_n = .658^{(939.6/779.4)}(939.6) = 567.3^{k}$$

NOMINAL AXIAL GEOTECHNICAL RESISTANCE:

$q_p = 3 q_u k_{sp} d$ (NOMINAL UNIT BEARING RESISTANCE ON ROCK)

$$k_{sp} = \frac{3 + S_d/D}{10(1 + 300 t_d/D)^{.5}} = \frac{3 + 1/1.22}{10(1 + 300(0/1))^{.5}} = .382$$

$S_d = 1'$
$t_d = 0'$
$D = 14.75/12_{in} = 1.22'$
$H_s = 0$
$D_s = 1'$
$d = 1 + .4 H_s/D_s = 1 + .4(0/1) = 1$

$q_u = 11600$ psi (AVERAGE COMPRESSION STRENGTH FOR ROCK TABLE 3-11)

$$q_p = 3(.382)\left(\frac{11600 \times 144}{1000}\right)(1) = 1914.3 \text{ ksf} \simeq 1920^{k/ft^2}$$

$Q_p = q_p A_p$ (AASHTO 10.7.3.8.6 a-3)

$A_p = (13.83'')(14.695'') = 203.23 in^2$

$$Q_p = (1914.3 \text{ ksf})(203.23 in^2)\left(1ft^2/144 in^2\right) = 2701.7^{k}$$

NOMINAL AXIAL RESISTANCE

$Q_{nom} = 2700^{kips}$

FACTORED AXIAL STRUCTURAL RESISTANCE FOR A SINGLE PILE:

$P_r = \phi_c P_n$ (AASHTO 6.9.2.1-1)

$\phi_c = .6$ (AASHTO 6.5.4.2)

$P_n = 567.3^k$ $P_n = 423.3^k$

$P_r = .6(567.3^k) = 340.4^k$ $P_r = .6(423.3^k) = 254^k$

$P_n/P_r \geq .2$ $P_n < P_r = \phi P_n$ USE FROM CALCULATED UNBRACED LENGTH

FACTORED AXIAL GEOTECHNICAL RESISTANCE FOR SINGLE PILE:

$Q_R = \phi_b Q_p$ (AASHTO 10.7.3.8.6a-1)

$\phi_b = .5$ (AASHTO 10.5.5.2.3-1) END BEARING ON ROCK

$Q_p = 2700^k$

$Q_R = .5(2700^k) = 1350^k$

FROM A-PILE

$Q_R = 520^k$ MAX. FACTORED GEOTECHNICAL AXIAL RESISTANCE

FROM MIDAS

$F_{VERT_{MAX.}} = 350^k$ MAX. FACTORED AXIAL PILE LOAD $C/D = 254^k/350^k = .73$

$F_y = 350.4^k$ $F_x = 8.4^k$ $M_y = 1131.1$ K-IN
MAX. FACTORED MOMENT LOAD @ PT. OF FIXITY

FROM L-PILE

$M_y = 1131.13$ K-IN

EVALUATE PILE HEAD FIXITY:

~~BE~~ BEARING LOCATION = 4.75' = 57"

ASSUME PILE HEAD FIXITY FOR PILE STRESS & NO PILE HEAD FIXITY FOR DEFLECTION.

PILE SOIL INTERACTION ANALYSIS:

$Q_{MAX} = 2700$ kips

$\rho_{BASE} = \Sigma P_i I_p / D_s E_r$



$P_1 = Q_{MAX} \times .5 = 1350$ TON

$I_p = 1.1$ (INFLUENCE COEFFICIENT)

$D_s = 14.695$ (DIAMETER)

$E_r = K_c E_i$ (MODULUS OF ELASTICITY OF ROCK)

$K_c = .74$

$E_i = 108000$ TSF (BASED ON SOIL PROPERTIES)

$E_r = .74(108000) = 79920$ TSF

$$\rho_{BASE} = \frac{(1350^{TONS})(1.1)}{(14.695)(79920)(1^{ft^2}/144_{in^2})} = .182^{in}$$

GEOTECHNICAL AXIAL CAPACITY

P_{max} = MAX. FACTORED AXIAL PILE LOAD = 350.4^{k} HS-20

M_{max} = MAX. FACTORED MOMENT LOAD = 1131.13 K-IN

OCCURED WHEN PILE HEAD WAS ASSUMED TO BE FIXED IN L-PILE

MAX. FACTORED GEOTECHNICAL AXIAL RESISTANCE $Q_r = 520^{k}$

MAX. FACTORED STRUCTURAL AXIAL RESISTANCE $P_r = 340.4^{k}$

Close, Jensen and Miller, P.C.

BY BA DATE 6/1/2016 SUBJECT REHABILITATION STUDY SHEET NO. ..... OF .....

CHKD. BY ..... DATE ..... BR. 1349 JOB NO. 158-212

RTE 136 O/SAUGATUCK RIVER WESTPORT

PILE PROPERTIES HP14X89 (36 ksi)

$I_x = 904\ in^4$ $I_y = 326\ in^4$ $S_x = 131\ in^3$ $S_y = 44.3\ in^3$

MAXIMUM SERVICE LOAD PER PILE FOR AN ASSUMED 1" DEFLECTION IS

ALLOW. MOM. $= 44.3^{in^3} \times 36^{ksi} \times .9 = 1435\ k\text{-}in = 119.6\ k\text{-}ft$

NOMINAL FLEXURAL RESISTANCE:

if $\lambda_f < \lambda_{pf}$ ---

$M_{ny} = M_p$ (AASHTO 6.12.2.2.1-1)

$\lambda_f = b_f / 2t_f$ (AASHTO 6.12.2.2.1-3)

$\lambda_f = 14.75 / 2(5/8) = 11.8$

$\lambda_{pf} = .38\sqrt{E/F_y} = .38\sqrt{29000/36} = 10.8$ (AASHTO 6.12.2.2.1-4)

$\lambda_{pf} < \lambda_f$ NOT SATISFIED

if $\lambda_{pf} < \lambda_f < \lambda_{rf}$ ---

$$M_{ny} = \left[1 - \left(1 - \frac{S_y}{Z_y}\right)\left[\frac{\lambda_f - \lambda_{pf}}{.45\sqrt{\frac{E}{F_y}}}\right]\right] F_y Z_y$$ (AASHTO 6.12.2.2.1-2)

$\lambda_{rf} = .83\sqrt{E/F_y} = .83\sqrt{29000/36} = 23.6$ (AASHTO 6.12.2.2.1-5)

$$M_{ny} = \left[1 - \left(1 - \frac{44.3}{67.7}\right)\left(\frac{11.8 - 10.8}{.45\sqrt{\frac{29000}{36}}}\right)\right](36 \times 67.7) = 2371\ k\text{-}in$$

$M_{nx} = F_y Z_x = 36 \times 146 = 5256\ k\text{-}in$

$\phi_f = 1$ (AASHTO 6.5.4.2)

$M_{ry} = \phi_f M_{ny} = (1)(2371) = 2371\ k\text{-}in$ (AASHTO 6.12.1.2.1-1)

$M_{rx} = \phi_f M_{nx} = (1)(5256) = 5256\ k\text{-}in$ (AASHTO 6.12.1.2.1-1)

→ FACTORED MOMENT RESISTANCE ABOUT THE WEAK AXIS

COMBINED AXIAL COMPRESSION & FLEXURE:

$P_u = 350.4^k$ APPLIED FACTORED AXIAL LOAD

$P_r = 340.4^k$ FACTORED COMPRESSIVE STRUCTURAL PILE RESISTANCE

$P_u = 254^k$

$P_u/P_r = 350.4^k / 340.4^k = 1.03 \geq .2$ ✓ $\quad P_u < P_r = \phi P_n$

$$\frac{P_u}{P_r} + \frac{8}{9}\left(\frac{M_{ux}}{M_{rx}} + \frac{M_{uy}}{M_{ry}}\right) < 1 \qquad \text{(AASHTO 6.9.2.2-2)}$$

WEAK AXIS →

ABOUT WEAK AXIS:

$$1.03 + \frac{8}{9}\left(\frac{0}{5256} + \frac{1131.13}{2371}\right) = 1.45 > 1 \quad \text{N.G.}$$

HS-20 RATING = .688
HP 14x89

PIER 2 PILE ANALYSIS

$C/D_{\text{AXIAL RATIO}} = 340.4^k / 350.4^k = .97$ HS20

AASHTO 6.5.4.2

$$\left(1.03 \times \frac{.6}{.8}\right) + 1 \times \frac{8}{9}\left(\frac{1131.13}{2371}\right) = 1.197 > 1$$

.775 .429

AASHTO 6.9.2.2
6.5.4.2

Close, Jensen and Miller, P.C.

BY BA DATE 6/1/2016 SUBJECT REHABILITATION STUDY SHEET NO. ..... OF .....
CHKD. BY ..... DATE ..... BR. 1349 JOB NO. 158-212
..... BTE 136.0/ SAUGATUCK RIVER WESTPORT

CHECK STRUCTURAL SHEAR CAPACITY :

$V_n = V_{cr} = CV_p$ (AASHTO 6.10.9.2-1)

$V_p = .58 F_{yw} D t_w$ (AASHTO 6.10.9.2-2)

$F_{yw} = 36$ ksi

$D = 13.83$ in

$t_w = 5/8$ in

$V_p = .58(36)(13.83)(.625) = 180.48$ kips

SOLVE FOR C $D/t_w < 1.12\sqrt{Ek/F_y}$ (AASHTO 6.10.9.3.2-4)

$k = 5$

$D/t_w = 13.83/.625 = 22.2$ $C = 1.0$

$1.12\sqrt{29000 \times 5/36} = 71.08$

$V_n = V_{cr} = (1.0)(180.48) = 180.48$ kips

$V_r = \phi_v V_n = (1.0)(180.48) = 180.48^K$ $\phi_v = 1$ (AASHTO 6.5.4.2)
(AASHTO 6.10.9.1-1)

$V_r > V = 8.4^K$ OK

Close, Jensen and Miller, P.C.

BY BA DATE 6/1/2016 SUBJECT REHABILITATION STUDY SHEET NO. ____ OF ____

CHKD. BY ____ DATE ____ BR 1349 JOB NO. 158-212

RTE 136 O/SAUGATUCK RIVER WESTPORT

CHECK DEFLECTION:

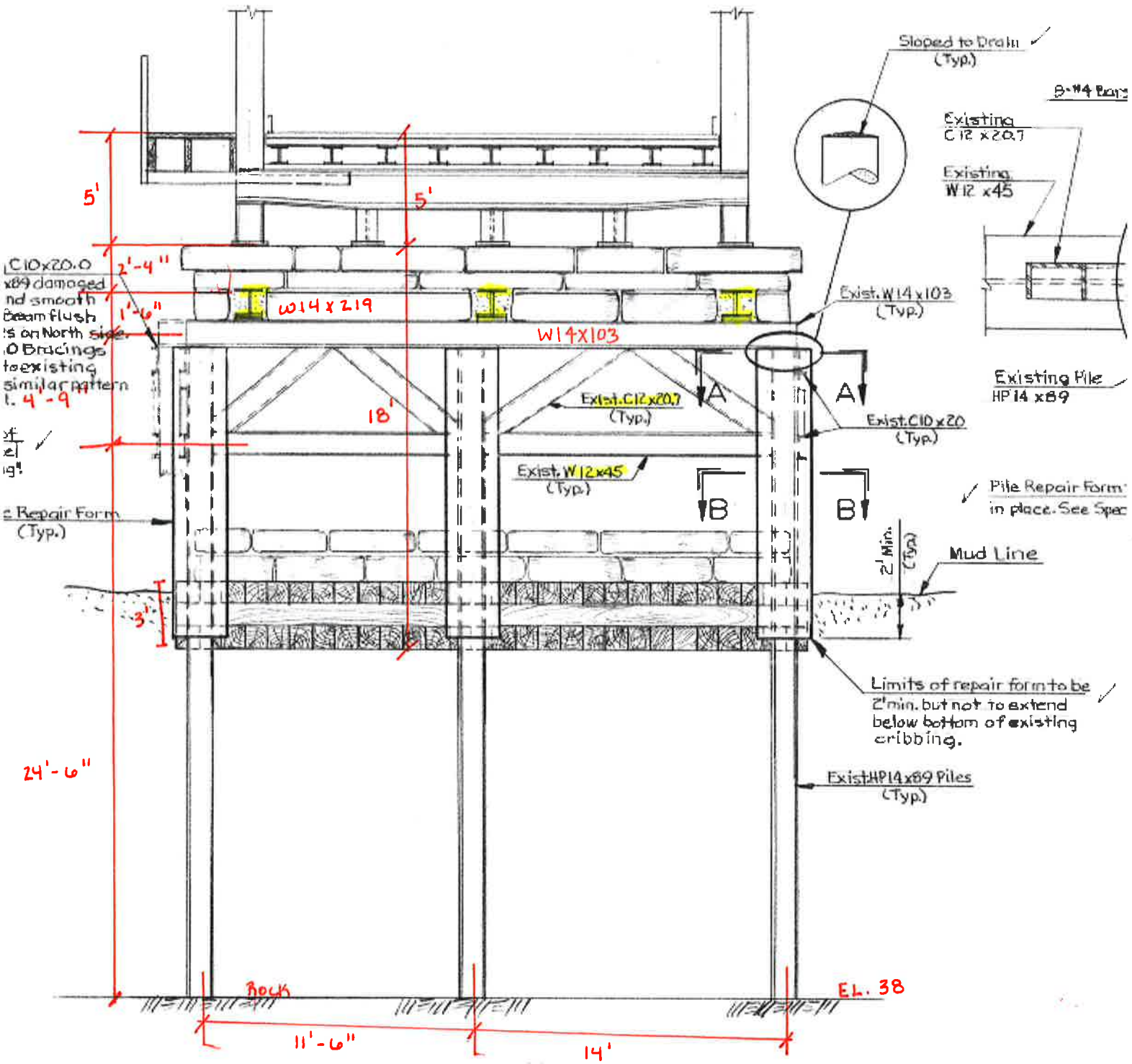
APPROXIMATE DEFLECTION $\Delta_x = (\text{Horizontal load})(N_{PILES})/R_t$

$R_t = K_h A$

$K_h = 18$ pci

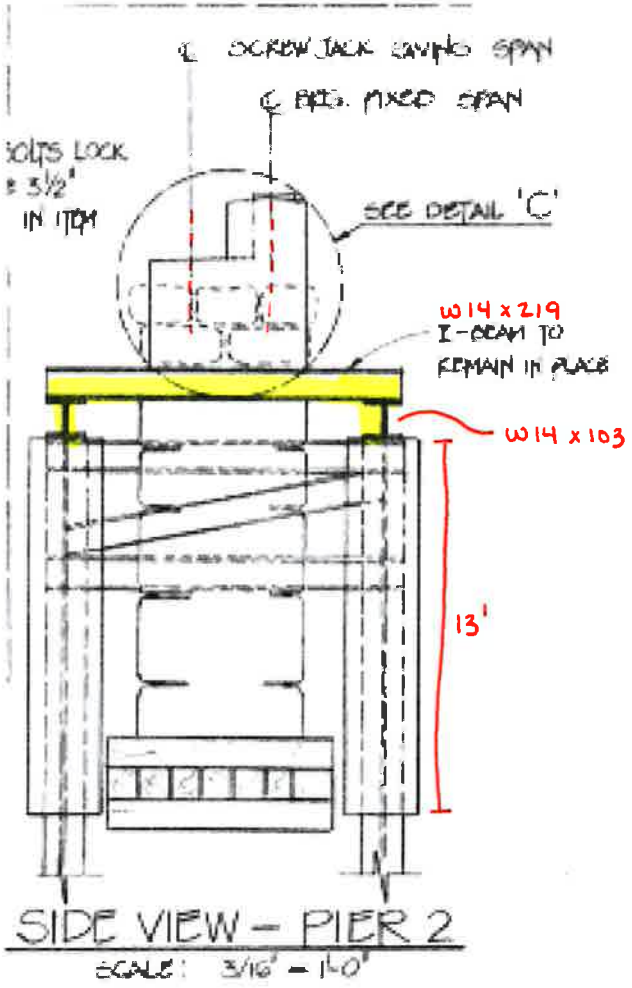
$\Delta_x = \dfrac{8.4^{K} \times 1000 \times 1^{PILE}}{18 \text{ pci} \times (14.7 \times 13.83)} = 2.3''$

ACTUAL DEFLECTION CALCULATED FROM L-PILE 1.5" USE



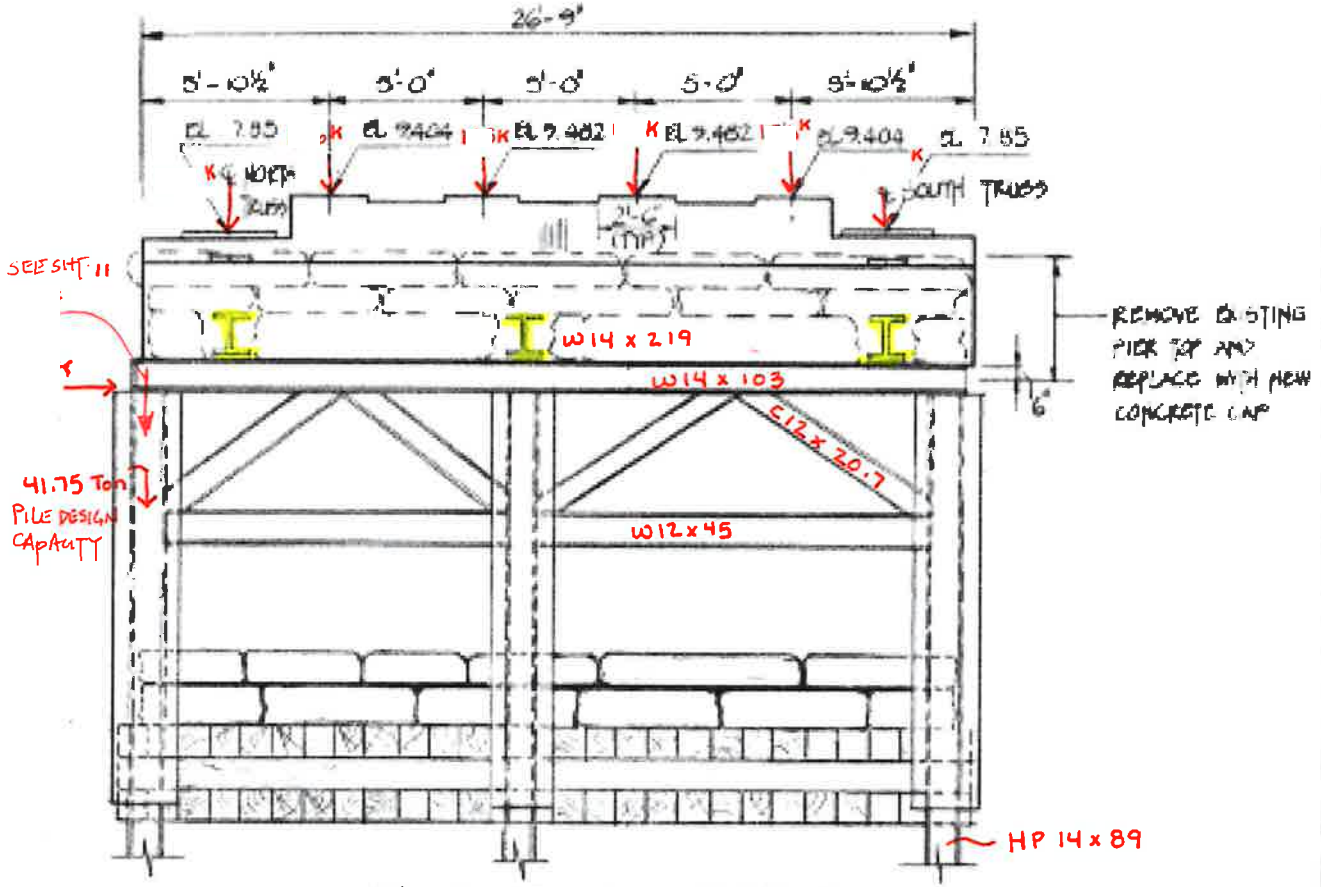
WEST ELEVATION

Scale 1" = 1'-0"



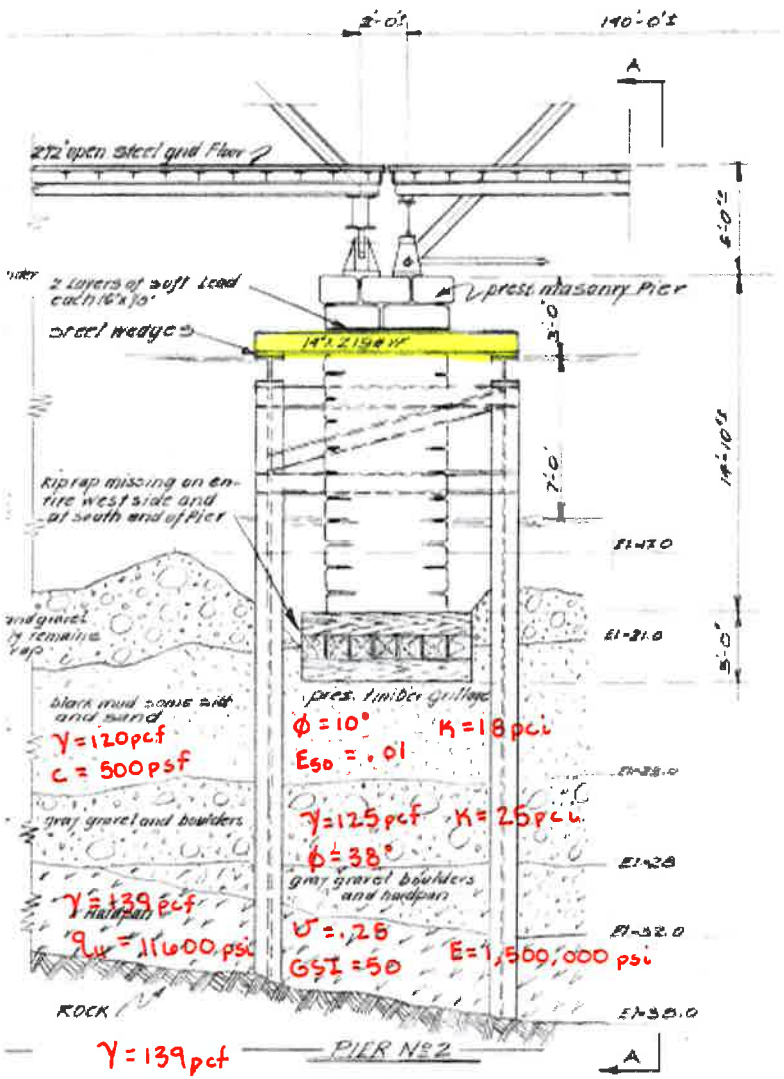
SIDE VIEW – PIER 2

SCALE: 3/16" = 1'-0"



WEST ELEVATION – PIER 2

SCALE 3/16" = 1'-0"



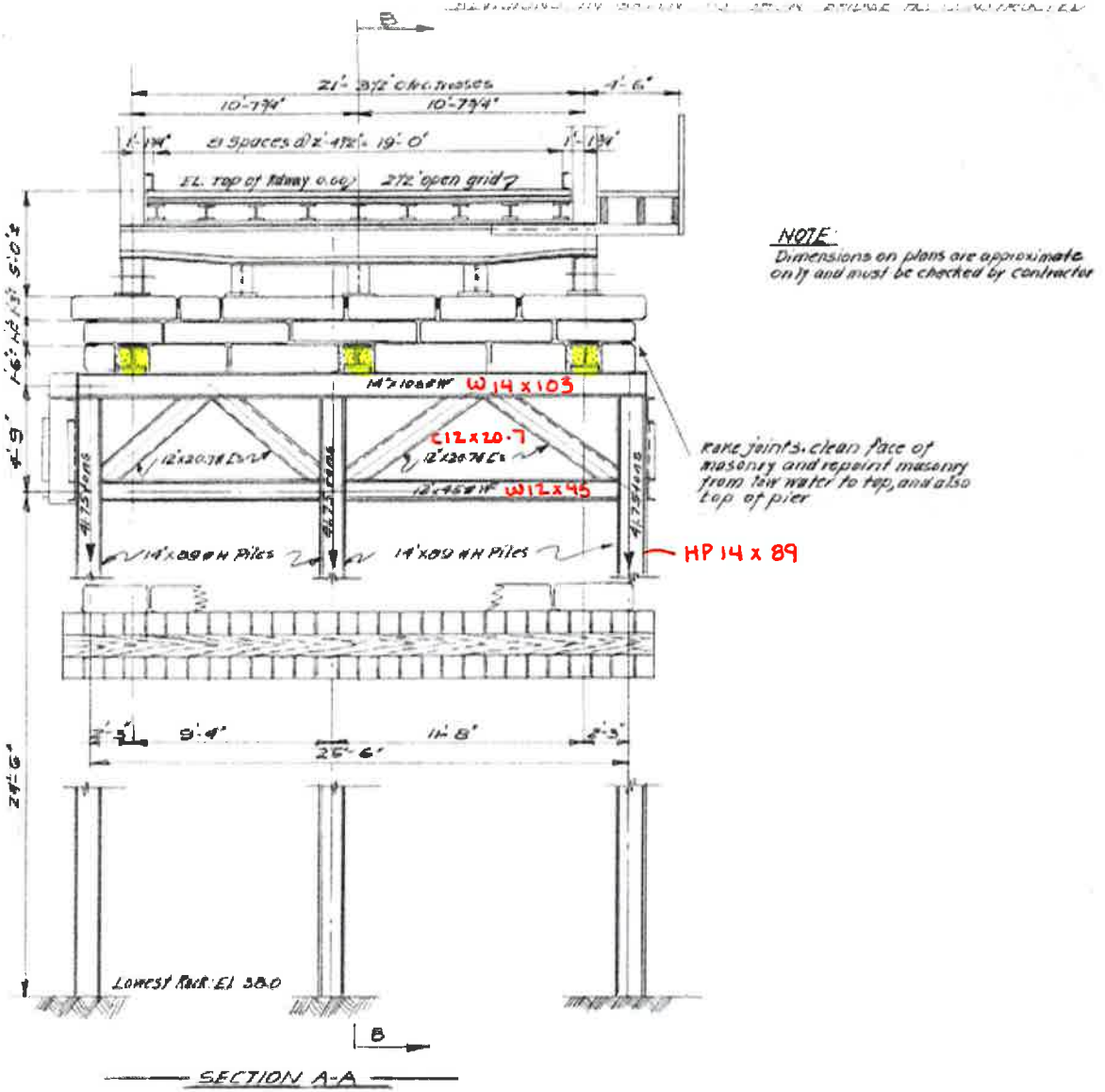
γ = 139 pcf

q = 21750 psi

υ = .2

GSI = 75

E = 3,000,000 psi

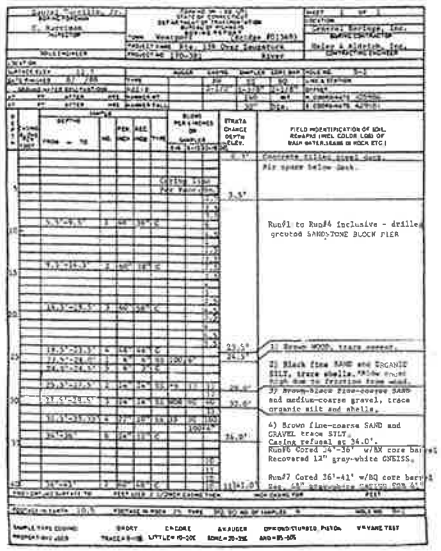


NOTE:
Dimensions on plans are approximate only and must be checked by contractor

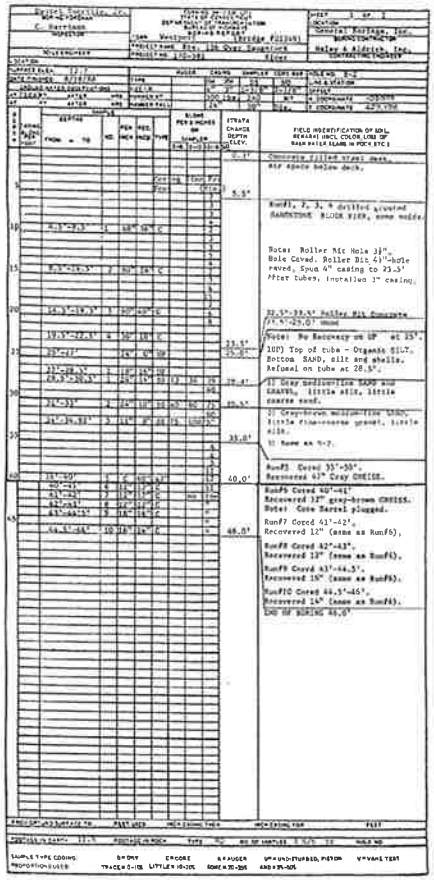
STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION

FORM NO.	SCALE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN	WESTPORT	—	158-150	1989	136	26	72

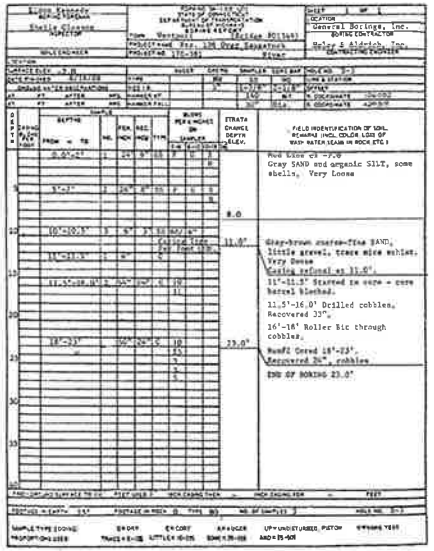
B-1



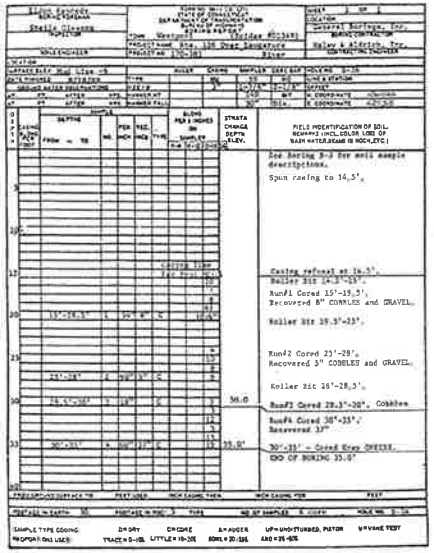
B-2



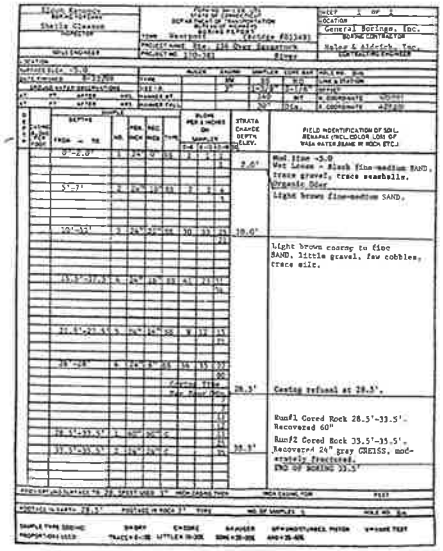
B-3



B-3A



B-4



THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION

REVISIONS

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

BORING LOGS

ENGINEER H.W. LOCHNER, INC. AND HALEY & ALDRICH, INC.
DESIGNER | DRAFTER | CHECKER
APPROVED | DATE 9-6-89
STRUCTURE NO. 158-150-1 | 01349 | 7 of 24

158-150 270-01 26

B-4

Eldon Kennedy — BORING FOREMAN
Sheila Gleason — INSPECTOR
SOILS ENGINEER

FORM NO. SM-1 ED. 1/71
STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS
BORING REPORT
TOWN Westport (Bridge #01349)
PROJECT NAME Rte. 136 Over Saugatuck River
PROJECT NO. 170-381

SHEET 1 OF 1
LOCATION
General Borings, Inc. — BORING CONTRACTOR
Haley & Aldrich, Inc. — CONTRACTING ENGINEER

LOCATION
SURFACE ELEV. -5.0
DATE FINISHED 8/22/88
GROUND WATER OBSERVATIONS
AT FT. AFTER HRS.
AT FT AFTER HRS.

	AUGER	CASING	SAMPLER	CORE BAR
TYPE		NW	SS	NQ
SIZE I.D.		3"	1-3/8"	2-1/8"
HAMMER WT.			140	BIT
HAMMER FALL			30"	Dia.

HOLE NO. B-4
LINE & STATION
OFFSET
N. COORDINATE 105997
E. COORDINATE 429281

DEPTH	CASING BLOWS PER FOOT	SAMPLE DEPTHS FROM – TO	NO.	PEN. INCH	REC. INCH	TYPE	BLOWS PER 6 INCHES ON SAMPLER 0-6	6-12	12-18	24	STRATA CHANGE DEPTH-ELEV.	FIELD IDENTIFICATION OF SOIL. REMARKS (INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.)
		0'-2.0'	1	24"	0"	SS	1	1	2			Mud line -5.0
									1		2.0'	Wet Loose - Black fine-medium SAND, trace gravel, trace seashells. Organic Odor
		5'-7'	2	24"	16"	SS	2	2	4			Light brown fine-medium SAND.
									3			
		10'-12'	3	24"	22"	SS	30	33	25		10.0'	
									21			Light brown coarse to fine SAND, little gravel, few cobbles, trace silt.
		15.5'-17.5'	4	24"	16"	SS	41	23	31			
									34			
		21.5'-23.5'	5	24"	14"	SS	9	12	15			
									21			
		26'-28'	6	24"	6"	SS	36	35	22			
									80			Coring Time Per Foot (Min.)
											28.5'	Casing refusal at 28.5'.
									7			
									7			
									11			Run#1 Cored Rock 28.5'-33.5'.
									12			Recovered 60"
		28.5'-33.5'	1	60"	60"	C			11			Run#2 Cored Rock 33.5'-35.5'.
									25			Recovered 24" gray GNEISS, moderately fractured.
		33.5'-35.5'	2	24"	24"	C			35		35.5'	END OF BORING 35.5'

FROM GROUND SURFACE TO 28.5 FEET USED 3" INCH CASING THEN INCH CASING FOR FEET

FOOTAGE IN EARTH 28.5' FOOTAGE IN ROCK 7' TYPE NO. OF SAMPLES 5 HOLE NO. B-4

SAMPLE TYPE CODING: D=DRY C=CORE A=AUGER UP=UNDISTURBED, PISTON V=VANE TEST
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

Recovered 16" (same as Run#6).

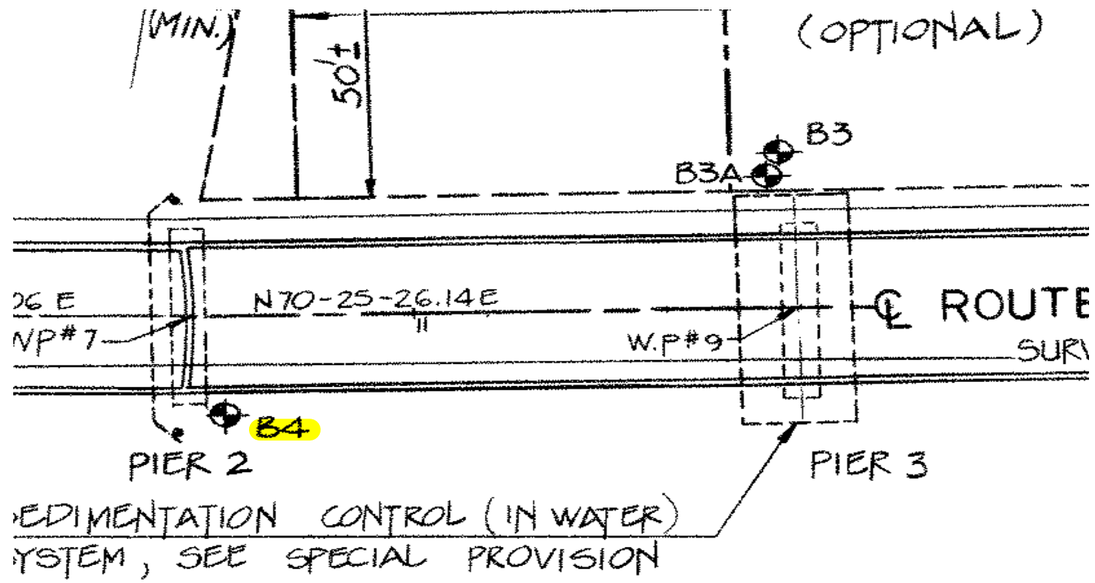
Run#10 Cored 44.5'-46'.
Recovered 14" (same as Run#6).

END OF BORING 46.0'

FROM GROUND SURFACE TO FEET USED INCH CASING THEN INCH CASING FOR FEET

FOOTAGE IN EARTH 11.5 FOOTAGE IN ROCK TYPE NQ NO. OF SAMPLES 3 S/S 1V HOLE NO.

SAMPLE TYPE CODING: D=DRY C=CORE A=AUGER UP=UNDISTURBED, PISTON V=VANE TEST
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%



SCALE: 1" = 30'

25

Table 3-11. Typical Properties for Rock Masses (from Hoek, 2001)

Property	Symbol	Good Quality Hard Rock Mass	Average Rock Mass	Very Poor Quality Rock Mass
Intact Rock Strength	σ_{ci}	150 MPa 21,750 psi	80 MPa 11,600 psi	20 MPa 2,900 psi
Hoek-Brown Constant	m_i	25	12	8
Geological Strength Index	GSI	75	50	30
Friction Angle	ϕ'	46 deg.	33 deg.	24 deg.
Cohesive Strength	c'	13 MPa 1,885 psi	3.5 MPa 500 psi	0.55 MPa 80 psi
Poisson's Ratio	ν	0.2	0.25	0.3

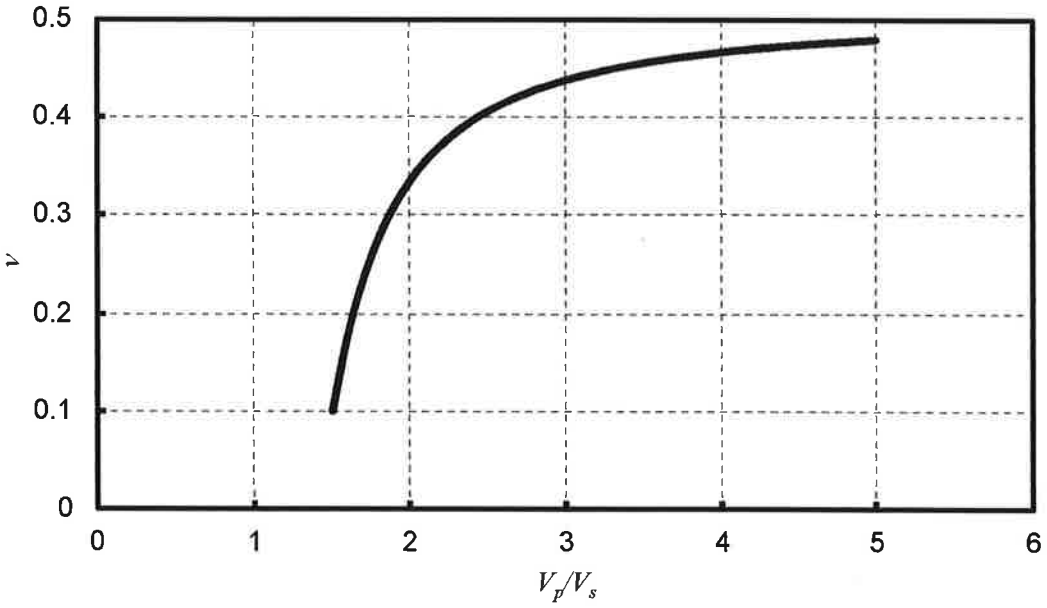


Figure 3-58 Poisson's Ratio as Function of Stress Wave Velocity Ratio

3-9-4 Determination of p_{us} Near the Ground Surface

For a passive wedge type failure near the ground surface, as shown in Figure 3-59, the ultimate lateral resistance per unit length, p_{us} of the drilled shaft at depth H near the ground surface is

$$p_{us} = 2C_1 \cos\theta \sin\beta + C_2 \sin\beta - 2C_4 \sin\theta - C_5 \quad \text{.....(3-128)}$$

where $\beta = 45° + \frac{\phi'}{2}$ and $\theta = \frac{\phi'}{2}$.

Rock Type	Modulus of Elasticity
-	(MPa x 1000) 6.894 Psi
Limestone	3-27
Dolomite	7-15
Limestone (very hard)	70
Sandstone	10-20
Quartz-sandstone	60-120
Greywacke	10-14
Siltstone	3-14
Gneiss - fine	9-13 Avg. = 11/6.894 = 1.5 ≈ 1,500,000 Psi
Gneiss - coarse	13-23
Schist - Micaceous	21
Schist - Biotite	40
Schist - Granitic	10
Schist - Quartz	14
Granite - very altered	2
Granite - slightly altered	10-20
Granite - good	20-50
Quartzite - Micaceous	28
Quartzite - sound	50-80
Dolerite	70-100
Basalt	50
Andesite	20-50
Amphibolite	90

The large ranges emphasize the need for testing at each site.

$$y_A = \left(\frac{p_{ur}}{2(y_{rm})^{0.25} M_{ir}} \right)^{1.333} \quad \text{.....(3-118)}$$

As shown in the case studies that follow, the equations from weak rock predict with reasonable accuracy the behavior of single piles under lateral loading for the two cases that are available. An adequate factor of safety should be employed in all cases.

The equations are based on the assumption that p is a function only of y. This assumption appears to be valid if loading is static and resistance is only due to lateral stresses. However, O'Neill (1996) noted "in large diameter drilled shafts, moment is resisted in the push-pull shear produced by the axial shears caused by the rotation of the pile. In rock, this effect could be significant, especially for small deflections, if the diameter of the pile is large. "

3-8-5 Case Histories for Drilled Shafts in Weak Rock

3-8-5-1 Islamorada

The drilled shaft was 1.22 m (48 in.) diameter and penetrated 13.3 m (43.7 ft) into limestone. A layer of sand over the limestone was retained by a steel casing, and the lateral load was applied at 3.51 m (11.5 ft) above the surface of the rock. A maximum lateral load of 667 kN (150 kips) was applied and the measured curve of load versus deflection was nonlinear.

Values of the strengths of the concrete and steel were unavailable and the bending stiffness of the gross section was used for the initial solutions. The following values were used to compute the p-y curves:

q_{ur} = 3.45 MPa (500 psi),

α_r = 1.0, (RQD = 0%)

E_{ri} = 7,240 MPa (1.05×10^6 psi),

ε_{rm} = 0.0005,

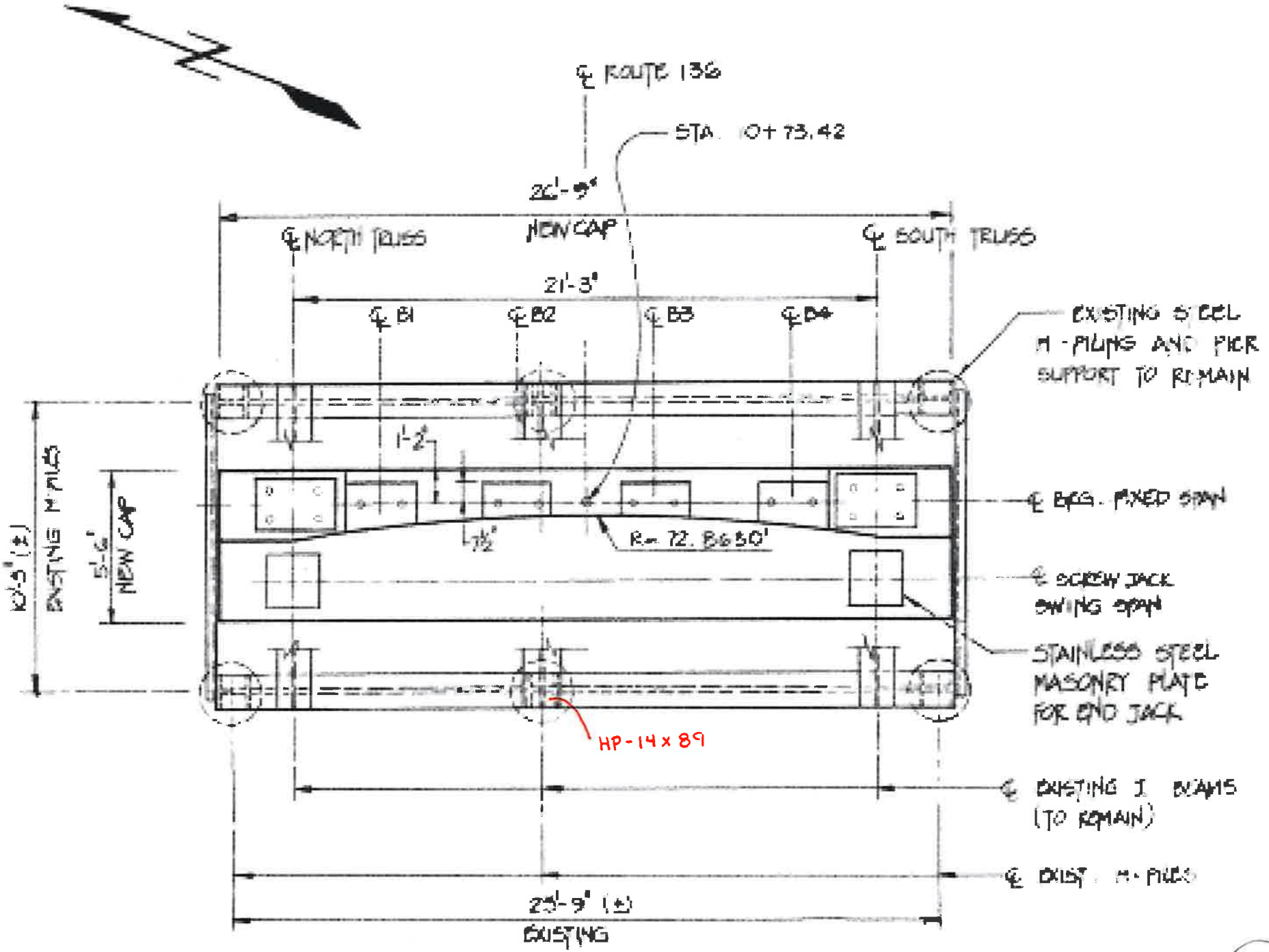
b = 1.22 m (48 in.),

L = 15.2 m (50 ft), and

EI = 3.73×10^6 kN-m^2 (1.3×10^9 ksi).

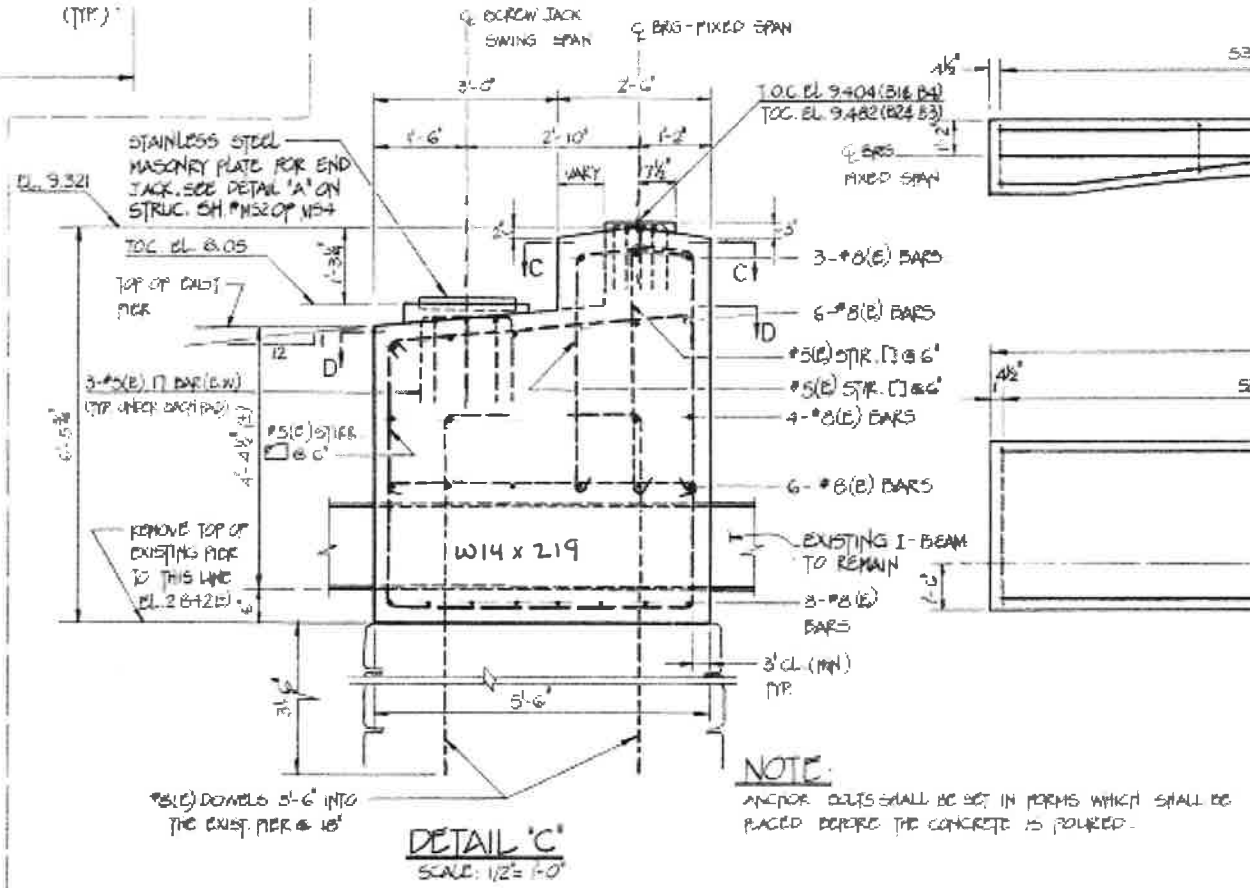
A comparison of pile-head deflection curves from experiment and from analysis is shown in Figure 3-51. Excellent agreement between the elastic EI and experiment and is found for loading levels up to about 350 kN (78.7 kips), where sharp change in the load-deflection curve occurs. Above that level of loading, nonlinear EI is required to match the experimental values reasonably well.

Curves giving deflection and bending moment as a function of depth were computed for a lateral load of 334 kN (75 kips), one-half of the ultimate lateral load, and are shown in Figure 3-52. The plotting is shown for limited depths because the values to the full length are too small to plot. The stiffness of the rock, compared to the stiffness of the pile, is reflected by a total of 13 points of zero deflection over the length of the pile of 15.2 meters (50 ft). However, for the data employed here, the pile will behave as a long pile through the full range of loading.



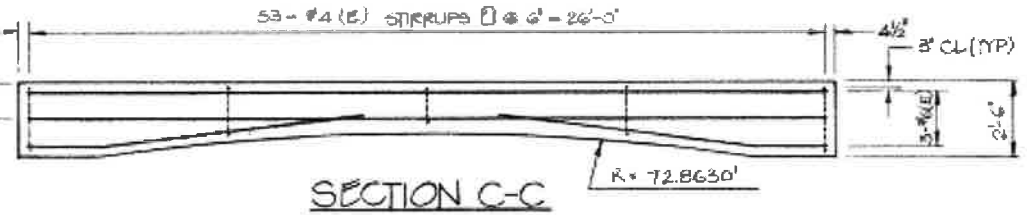
PLAN – PIER 2

SCALE 3/16" = 1'-0"

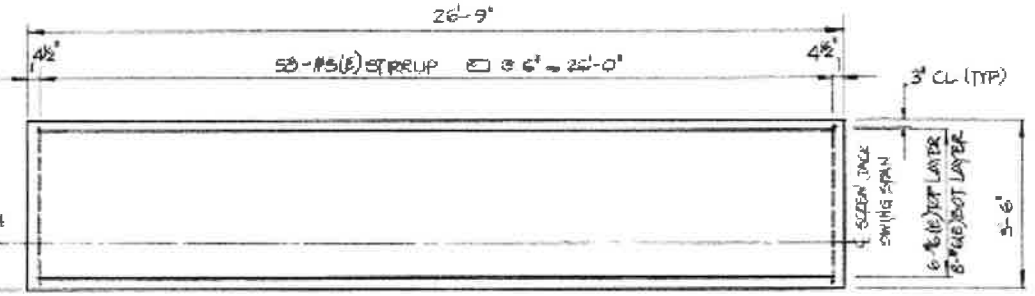


DETAIL 'C'
SCALE: 1/2" = 1'-0"

NOTE:
ANCHOR BOLTS SHALL BE SET IN FORMS WHICH SHALL BE PLACED BEFORE THE CONCRETE IS POURED.



SECTION C-C
SCALE 1/4" = 1'-0"



SECTION D-D
SCALE: 1/4" = 1'-0"

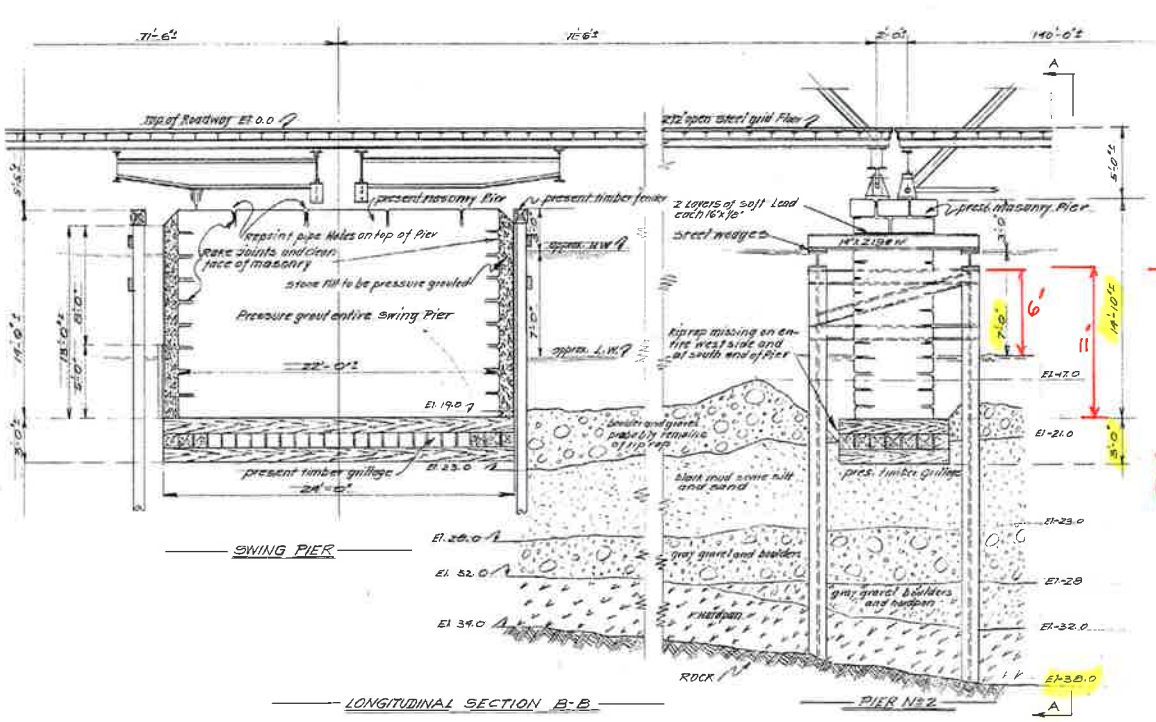
THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	REV CON
3	6/8/90	

RE

FED. ROAD DIV. NO.	STATE	TOWN	FED. AID PROJ. NO.	FISCAL YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	Westport		1957	136	2	8

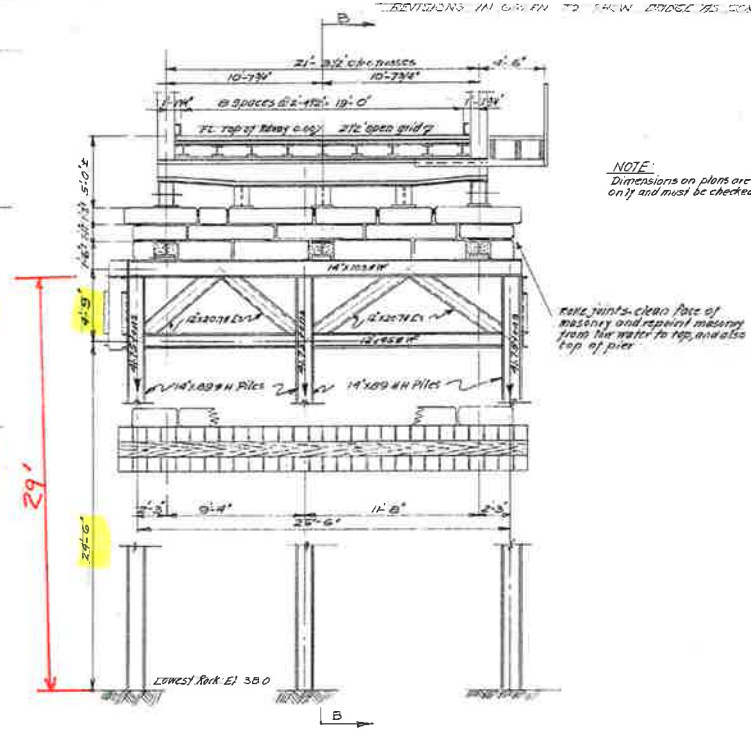
REVISIONS IN GREEN TO SHOW BRIDGE AS CONSTRUCTED



SWING PIER

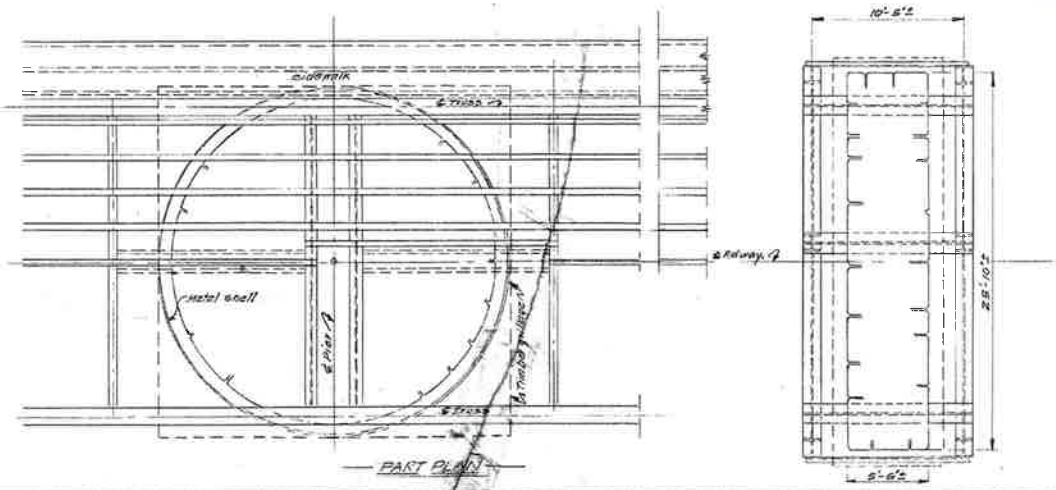
LONGITUDINAL SECTION B-B

PIER No. 2



SECTION A-A

NOTE:
Dimensions on plans are approximate only and must be checked by contractor



PART PLAN

QUANTITIES

ALTERATION TO MASONRY	LS.
FURNISHING STEEL PILES	34592 Lb.
DRIVING STEEL PILES	240 LF.
PORTLAND CEMENT	8 BBL.
RAKING JOINTS & CLEANING FACE OF MASONRY	210 SF.
STRUCTURAL STEEL	5721 Lb.
METAL SHELL AROUND SWING PIER	15600 Lb.
STONE FILL	26 tons
LIQUID ACCELERATING AND WATER RESISTING AGENT	62 gal.
POWDER ACCELERATING AND WATER RESISTING AGENT	248 Lb.
REPOINTING MASONRY JOINTS	598 LF.
DENSIFYING AND RETARDING AGENT	120 Lb.
PRESSURE GROUTING OF STONE FILL	218 bags
PRESSURE GROUTING SWING PIER	160 bags

GENERAL NOTES

CONN. STATE HWY. DEPT. SPECIFICATIONS FORM 801. ALL NEW STEEL EXCEPT THE METAL SHELL AROUND SWING PIER SHALL BE PAINTED ONE SHOP COAT OF ZINC CHROMATE AND IRON OXIDE AND TWO FIELD COATS OF PAINT OF A COLOR AND SHADE SELECTED BY THE ENGINEER

REVISIONS		
No.	DATE	DESCRIPTION

CONNECTICUT
STATE HIGHWAY DEPARTMENT
BRIDGE No. 136-09 Rt. 136
OVER SAUGATUCK RIVER
IN THE TOWN OF
WESTPORT
PLANS SHOWING
PROPOSED REPAIRS TO PIERS

DESIGNED BY A.E.
SCALE: ¼" = 1'-0"
MADE BY [signature] DATE: 5/14/51
CHECKED BY [signature] DATE: 5/14/51
APPROVED J.O. [signature] DATE: 6/11/51
PROJECT No. MC-18
Bridge Sheet No. 1 of 2

MC-18 FORMERLY 158 58

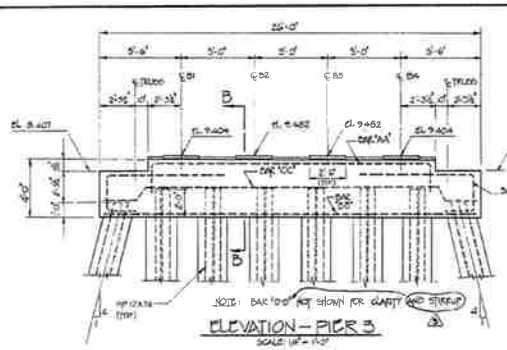
165 05

2

5R

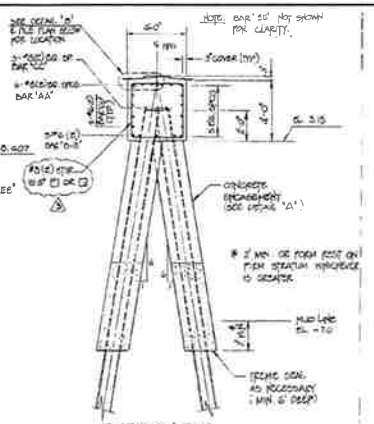
STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION

FORM NO.	STATE	TOWN	PROJ. NO.	FED. NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	158-150	136	23-2	72

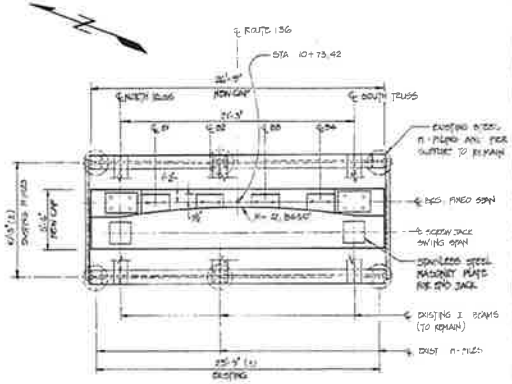


ELEVATION – PIER 3
SCALE: 1/8" = 1'-0"

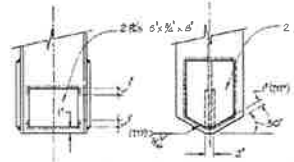
NOTE: FOR ANCHOR BOLT INSTALLATION SEE 'ANCHOR BOLT INSTALLATION NOTES' ON STRUCTURE SHEET No. 8 OF 24.



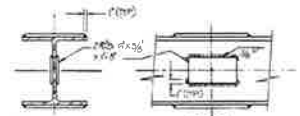
SECTION B-B
SCALE: 1/4" = 1'-0"

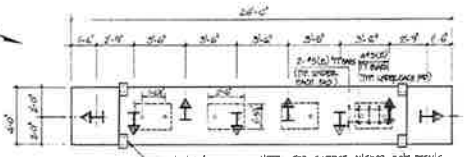


PLAN – PIER 2
SCALE: 3/32" = 1'-0"

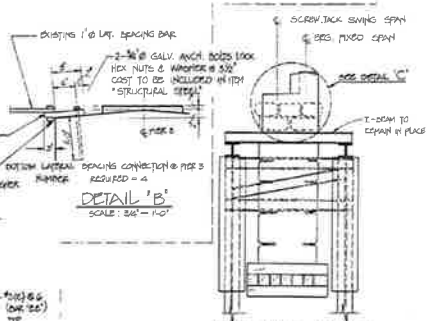


PILE POINT REINFORCING
NOT TO SCALE



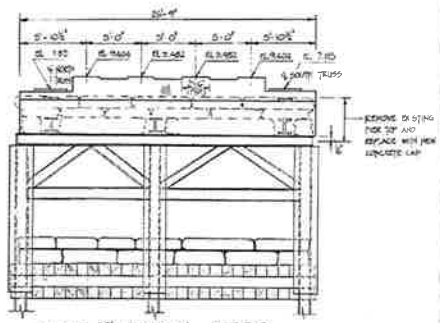


PILE PLAN – PIER 3
SCALE: 1/4" = 1'-0"

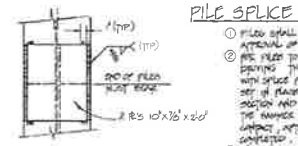


DETAIL 'B'
SCALE: 3/4" = 1'-0"

SIDE VIEW – PIER 2
SCALE: 3/16" = 1'-0"



WEST ELEVATION – PIER 2
SCALE: 3/16" = 1'-0"



FRONT

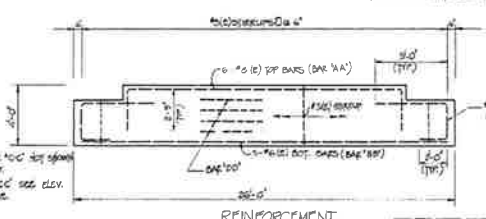
PILE SPLICE DETAIL
NOT TO SCALE

PILE SPLICE NOTES

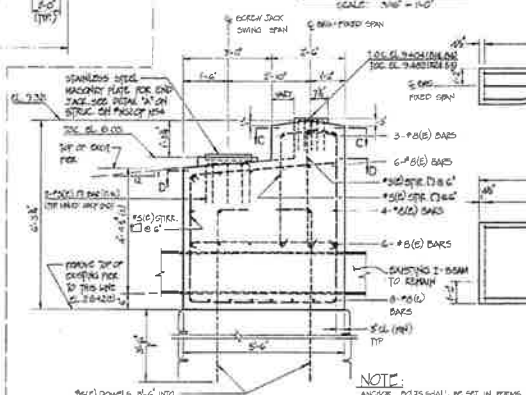
① PILES SHALL NOT BE SPLICED EXCEPT W/ APPROVAL OF THE ENGINEER.
② PILE TIPS TO BE DRIVEN STARTING DRIVING THE UPPER PILE SECTION, WITH SPLICE PLATES ATTACHED SHALL BE SET IN PLACE ON TOP OF THE BENCH SECTION AND TAPPED SEVERAL TIMES WITH THE HAMMER TO INSURE THE BEARING SURFACE. UPPER PILE SECTION SHALL BE COMPLETED.
③ PILES TO BE SPLICED BEFORE DRIVING SHALL BE WELDED BY MEANS A 100% SINGLE BEVEL, BUTT WELD, ALL AGAINST AND PER "STRUCTURAL WELDING CRITERIA" AWWS.
④ PREFABRICATED SPLICING DEVICES MAY BE USED IF APPROVED BY THE ENGINEER.

PILE NOTES

① ALL PILES ARE HP 12 x 74 TO BE COAL-TAR-EPOXY COATED FOR PROTECTION AGAINST CORROSION IN THE ORGANIC DEPOSITS AS PER SPECIAL PROVISION
② ALL EXPOSED PILES SHALL BE ENCASED IN CONCRETE TO 2 FEET BELOW THE MUDLINE
③ H-D DESIGNATES BATTER PILES
④ PILES TO BE DRIVEN TO REFUSAL IN THE GRANULAR DEPOSITS OR ON THE BEDROCK
⑤ ALL PILES TO HAVE A MINIMUM YIELD STRENGTH F_y = 50 KSI
⑥ THE HAMMER USED SHALL BE CAPABLE OF DELIVERING NOT LESS THAN 36,000 FT-LBS OF ENERGY PER BLOW
⑦ ESTIMATED PILE DRIVEN LENGTH = 150 FT
⑧ MAX. PILE LOAD = 90 TONS (GROUP I)

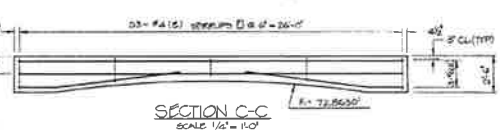


REINFORCEMENT
FRONT VIEW - PIER 3
SCALE: 1/4" = 1'-0"

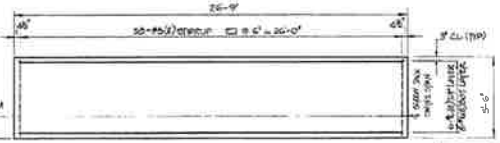


DETAIL 'C'
SCALE: 1/2" = 1'-0"

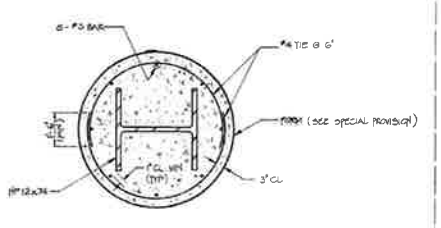
NOTE:
ANCHOR BOLTS SHALL BE SET IN FORMS WHICH SHALL BE PLACED BEFORE THE CONCRETE IS POURED.



SECTION C-C
SCALE: 1/2" = 1'-0"



SECTION D-D
SCALE: 1/4" = 1'-0"



DETAIL 'A'
NTS

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION
1	6/6/86	REVISED PIER, DOT COMMENTS (D.A.M.)

REVISIONS

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

PIER 2 AND PIER 3 REHABILITATION

ENGINEER	H.W. LOCHNER, INC.		
DESIGNER	LM	DRAFTER	CHECKER JD
APPROVED	[signature]	DATE	9-6-85
STRUCTURE NO.	158-150-1	DRAWING NO. 01549	SHEET NO. 10 OF 24

158-150

270-01

23

For uplift, the number of pile load tests required to justify a specific resistance factor are the same as that required for determining compression resistance. Extrapolating the pile load test results to other untested piles as specified in Article 10.7.3.10 does create some uncertainty, since there is not a way to directly verify that the desired uplift resistance has been obtained for each production pile. This uncertainty has not been quantified. Therefore, it is recommended that a resistance factor of not greater than 0.60 be used if an uplift load test is conducted.

Regarding pile drivability analysis, the only source of load is from the pile driving hammer. Therefore, the load factors provided in Section 3 do not apply. In past practice, e.g., AASHTO (2002), no load factors were applied to the stresses imparted to the pile top by the pile hammer. Therefore, a load factor of 1.0 should be used for this type of analysis. Generally, either a wave equation analysis or dynamic testing, or both, are used to determine the stresses in the pile resulting from hammer impact forces. See Article 10.7.8 for the specific calculation of the pile structural resistance available for analysis of pile drivability. The structural resistance available during driving determined as specified in Article 10.7.8 considers the ability of the pile to handle the transient stresses resulting from hammer impact, considering variations in the materials, pile/hammer misalignment, and variations in the pile straightness and uniformity of the pile head impact surface.

Table 10.5.5.2.3-1—Resistance Factors for Driven Piles

Condition/Resistance Determination Method		Resistance Factor
Nominal Bearing Resistance of Single Pile—Dynamic Analysis and Static Load Test Methods, φ_{dyn}	Driving criteria established by successful static load test of at least one pile per site condition and dynamic testing* of at least two piles per site condition, but no less than 2% of the production piles	0.80
	Driving criteria established by successful static load test of at least one pile per site condition without dynamic testing	0.75
	Driving criteria established by dynamic testing* conducted on 100% of production piles	0.75
	Driving criteria established by dynamic testing,* quality control by dynamic testing* of at least two piles per site condition, but no less than 2% of the production piles	0.65
	Wave equation analysis, without pile dynamic measurements or load test but with field confirmation of hammer performance	0.50
	FHWA-modified Gates dynamic pile formula (End of Drive condition only)	0.40
	Engineering News (as defined in Article 10.7.3.8.5) dynamic pile formula (End of Drive condition only)	0.10

* Dynamic testing requires signal matching, and best estimates of nominal resistance are made from a restrike. Dynamic tests are calibrated to the static load test, when available.

Table 10.5.5.2.3-1—Resistance Factors for Driven Piles (continued)

Condition/Resistance Determination Method		Resistance Factor
Nominal Bearing Resistance of Single Pile—Static Analysis Methods, φ_{stat}	Side Resistance and End Bearing: Clay and Mixed Soils	
	α-method (Tomlinson, 1987; Skempton, 1951)	0.35
	β-method (Esrig & Kirby, 1979; Skempton, 1951)	0.25
	λ-method (Vijayvergiya & Focht, 1972; Skempton, 1951)	0.40
	Side Resistance and End Bearing: Sand	
	Nordlund/Thurman Method (Hannigan et al., 2005)	0.45
	SPT-method (Meyerhof)	0.30
	CPT-method (Schmertmann)	0.50
	End bearing in rock (Canadian Geotech. Society, 1985)	0.45
Block Failure, φ_{b1}	Clay	0.60
Uplift Resistance of Single Piles, φ_{up}	Nordlund Method	0.35
	α-method	0.25
	β-method	0.20
	λ-method	0.30
	SPT-method	0.25
	CPT-method	0.40
	Static load test	0.60
	Dynamic test with signal matching	0.50
Group Uplift Resistance, φ_{ug}	All soils	0.50
Lateral Geotechnical Resistance of Single Pile or Pile Group	All soils and rock	1.0
Structural Limit State	Steel piles	See the provisions of Article 6.5.4.2
	Concrete piles	See the provisions of Article 5.5.4.2.1
	Timber piles	See the provisions of Article 8.5.2.2 and 8.5.2.3
Pile Drivability Analysis, φ_{da}	Steel piles	See the provisions of Article 6.5.4.2
	Concrete piles	See the provisions of Article 5.5.4.2.1
	Timber piles	See the provisions of Article 8.5.2.2
	In all three Articles identified above, use φ identified as "resistance during pile driving"	

- For axial resistance of piles in compression and subject to damage due to severe driving conditions where use of a pile tip is necessary:
  - H-piles $\phi_c = 0.50$
  - pipe piles $\phi_c = 0.60$
- For axial resistance of piles in compression under good driving conditions where use of a pile tip is not necessary:
  - H-piles $\phi_c = 0.60$
  - pipe piles $\phi_c = 0.70$
- For combined axial and flexural resistance of undamaged piles:
  - axial resistance for H-piles $\phi_c = 0.70$
  - axial resistance for pipe piles $\phi_c = 0.80$
  - flexural resistance $\phi_f = 1.00$
- For shear connectors in tension $\phi_{st} = 0.75$

The basis for the resistance factors for driven steel piles is described in Article 6.15.2. Further limitations on usable resistance during driving are specified in Article 10.7.8.

Indicated values of ϕ_c and ϕ_f for combined axial and flexural resistance are for use in interaction equations in Article 6.9.2.2.

6.5.5—Extreme Event Limit State

All applicable extreme event load combinations in Table 3.4.1-1 shall be investigated.

All resistance factors for the extreme event limit state, except those specified for bolts and shear connectors, shall be taken to be 1.0.

All resistance factors for ASTM A307 Grade C and ASTM F1554 bolts used as anchor bolts for the extreme event limit state shall be taken to be 1.0.

Bolted slip-critical connections within a seismic load path shall be proportioned according to the requirements of Article 6.13.2.1.1. The connections shall also be proportioned to provide shear, bearing, and tensile resistance in accordance with Articles 6.13.2.7, 6.13.2.9, and 6.13.2.10, as applicable, at the extreme event limit state. Standard holes or short-slotted holes normal to the line of force shall be used in such connections.

C6.5.5

During earthquake motion, there is the potential for full reversal of design load and inelastic deformations of members orconnections, or both. Therefore, slip of bolted joints located within a seismic load path cannot and need not be prevented during a seismic event. A special inspection of joints and connections, particularly in fracture critical members, should be performed as described in AASHTO (2011a) after a seismic event.

To prevent excessive deformations of bolted joints due to slip between the connected plies under earthquake motions, only standard holes or short-slotted holes normal to the line of force are permitted in bolted joints located within a seismic load path. For such holes, the upper limit of $2.4dtF_u$ on the bearing resistance is intended to prevent elongations due to bearing deformations from exceeding approximately 0.25 in. It should be recognized, however, that the actual bearing load in a seismic event may be much larger than that anticipated in design and the actual deformation of the holes may be larger than this theoretical value. Nonetheless, the specified upper limit on the nominal bearing resistance should effectively minimize damage in moderate seismic events.

6.6—FATIGUE AND FRACTURE CONSIDERATIONS

6.6.1—Fatigue

6.6.1.1—General

Fatigue shall be categorized as load- or distortion-induced fatigue.

C6.6.1.1

In the AASHTO *Standard Specifications for Highway Bridges* (2002), the provisions explicitly relating to fatigue deal only with load-induced fatigue.

Modulus of Subgrade Reaction, K

Sandy Soils:

Loose Sand	30-100 kcf
Medium Sand	60-500 kcf
Dense Sand	400-800 kcf
Sand w/Clay (mix)	200-50 kcf
Sand w/Silt (mix)	150-300 kcf

Clayey Soils:

qu < 4 ksf	75-150 kcf
4 ksf < qu < 8 ksf	150-300 kcf
qu > 8 ksf	> 300 kcf

where: qu = unconfined compression strength

Note: if 'K' is known/given in units of kcf, multiply by 1000/1728 = 0.5787 to convert kcf to pci for input.

This program takes 'K' input in pci and multiplies it by 1728/1000 = 1.728 to convert to kcf for use throughout.

Max. Shears and L

+V(max) = 6.27

6.9.2—Compressive Resistance

6.9.2.1—Axial Compression

The factored resistance of components in compression, P_r, shall be taken as:

$$P_r = \phi_c P_n \tag{6.9.2.1-1}$$

where:

P_n = nominal compressive resistance as specified in Articles 6.9.4 or 6.9.5, as applicable (kip)
ϕ_c = resistance factor for compression as specified in Article 6.5.4.2

6.9.2.2—Combined Axial Compression and Flexure

Except as permitted otherwise in Article 6.9.4.4, the axial compressive load, P_u, and concurrent moments, M_{ux} and M_{uy}, calculated for the factored loadings by elastic analytical procedures shall satisfy the following relationship:

- If $\frac{P_u}{P_r} < 0.2$, then

$$\frac{P_u}{2.0P_r} + \left(\frac{M_{ux}}{M_{rx}} + \frac{M_{uy}}{M_{ry}}\right) \le 1.0 \tag{6.9.2.2-1}$$

- If $\frac{P_u}{P_r} \ge 0.2$, then

$$\frac{P_u}{P_r} + \frac{8.0}{9.0}\left(\frac{M_{ux}}{M_{rx}} + \frac{M_{uy}}{M_{ry}}\right) \le 1.0 \tag{6.9.2.2-2}$$

where:

P_r = factored compressive resistance as specified in Article 6.9.2.1 (kip)
M_{rx} = factored flexural resistance about the x-axis taken equal to ϕ_f times the nominal flexural resistance about the x-axis determined as specified in Article 6.10, 6.11 or 6.12, as applicable (kip-in.)
M_{ry} = factored flexural resistance about the y-axis taken equal to ϕ_f times the nominal flexural resistance about the y-axis determined as specified in Article 6.12, as applicable (kip-in.)
M_{ux} = factored flexural moment about the x-axis calculated as specified below (kip-in.)
M_{uy} = factored flexural moment about the y-axis calculated as specified below (kip-in.)
ϕ_f = resistance factor for flexure specified in Article 6.5.4.2

C6.9.2.2

These equations are identical to Eqs. (H1-1a) and (H1-1b) of AISC (2010). They were selected for use in that Specification after being compared with a number of alternative formulations with the results of refined inelastic analyses of 82 frame sidesway cases (Kanchanalai, 1977). P_u, M_{ux}, and M_{uy} are simultaneous axial and flexural forces on cross-sections determined by analysis under factored loads. The maximum calculated moment in the member in each direction including the second-order effects, should be considered. Where maxima occur on different cross-sections, each should be checked.

For further information on computing the factored flexural resistances about the x- and y-axes, refer to Article C6.8.2.3.

For tees and double angles subject to combined axial compression and flexure in which the axial and flexural stresses in the flange of the tee or the connected legs of the angles are additive in compression, e.g., when a tee is used as a bracing member and the connection of this member is made to the flange, a bulge in the interaction curve occurs. As a result, Eqs. 6.9.2.2-1 and 6.9.2.2-2 may significantly underestimate the resistance in such cases. Alternative approaches attempting to capture this bulge have proven to be generally inconclusive or incomplete as of this writing (2009). In the interim, it is recommended that Eqs. 6.9.2.2-1 and 6.9.2.2-2 be conservatively applied to these cases. Should significant additional resistance be required, the use of one or more of these alternative approaches, as described in White (2006), may be considered.

length is larger than the effective lateral unbraced length.

- Applicable buckling modes for singly symmetric members:
  - Flexural buckling shall be applicable.
  - Flexural-torsional buckling shall also be applicable for open-section members.
- Applicable buckling modes for unsymmetric members:
  - Only flexural-torsional buckling shall be applicable for open-section members, except that for single-angle members designed according to the provisions of Article 6.9.4.4, only flexural buckling shall be applicable.
  - Only flexural buckling shall be applicable for closed-section members.

Torsional buckling and flexural-torsional buckling shall not be applicable for bearing stiffeners.

P_n shall be determined as follows:

- If $\frac{P_e}{P_o} \geq 0.44$, then:

$$P_n = \left[0.658^{\left(\frac{P_o}{P_e}\right)}\right] P_o \qquad (6.9.4.1.1\text{-}1)$$

- If $\frac{P_e}{P_o} < 0.44$, then:

$$P_n = 0.877 P_e \qquad (6.9.4.1.1\text{-}2)$$

where:

A_g = gross cross-sectional area of the member (in.^{2})

F_y = specified minimum yield strength (ksi)

P_e = elastic critical buckling resistance determined as specified in Article 6.9.4.1.2 for flexural buckling, and as specified in Article 6.9.4.1.3 for torsional bucking or flexural-torsional buckling, as applicable (kips)

P_o = equivalent nominal yield resistance = QF_yA_g (kips)

Q = slender element reduction factor determined as specified in Article 6.9.4.2. Q shall be taken equal to 1.0 for bearing stiffeners.

is employed to assess the stability of trusses, frames or arches in lieu of utilizing an effective length factor approach (White, 2006). In such cases, P_e in Eqs. 6.9.4.1.1-1 and 6.9.4.1.1-2 would be taken as the axial load in a given member taken from the analysis at incipient elastic buckling of the structure or subassemblage.

Eqs. 6.9.4.1.1-1 and 6.9.4.1.1-2 represent a curve that is essentially the same as column strength curve 2*P* of Galambos (1998). The equations incorporate an out-of-straightness criterion of $L/1500$. The development of the mathematical form of these equations is described in Tide (1985), and the structural reliability they are intended to provide is discussed in Galambos (1998) and Galambos (2006).

For the member under consideration, Table 6.9.4.1.1-1 may be used as a guideline for selecting the appropriate potential buckling mode(s) to be considered in the determination of P_n, and the equations to use for the calculation of the corresponding critical elastic buckling resistance, P_e, and slender element reduction factor, Q, as applicable. For compression members with cross-sections composed of one or more slender elements, or elements not meeting the corresponding width-to-thickness ratio limits specified in Article 6.9.4.2.1, the slender element reduction factor Q accounts for the effect of potential local buckling of those elements on the overall buckling resistance of the member and has a value less than 1.0. The value of Q in this instance is determined according to the provisions of Article 6.9.4.2.2. For compression member cross-sections without any slender elements, that is, composed entirely of nonslender elements, Q is taken equal to 1.0 as specified in Article 6.9.4.2.1. Q is always to be taken equal to 1.0 for bearing stiffeners.

6.9.4.1.2—Elastic Flexural Buckling Resistance

The elastic critical buckling resistance, P_e, based on flexural buckling shall be taken as:

$$P_e = \frac{\pi^2 E}{\left(\frac{K\ell}{r_s}\right)^2} A_g \qquad (6.9.4.1.2\text{-}1)$$

where:

A_g = gross cross-sectional area of the member (in.^{2})
K = effective length factor in the plane of buckling determined as specified in Article 4.6.2.5
ℓ = unbraced length in the plane of buckling (in.)
r_s = radius of gyration about the axis normal to the plane of buckling (in.)

C6.9.4.1.2

Flexural buckling of concentrically loaded compression members refers to a buckling mode in which the member deflects laterally without twist or a change in the cross-sectional shape. Flexural buckling involves lateral displacements of the member cross-sections in the direction of the x- or y-axes that are resisted by the respective flexural rigidities, EI_x or EI_y, of the member.

Eq. 6.9.4.1.2-1 should be used to calculate the critical flexural buckling resistances about the x- and y-axes, with the smaller value taken as P_e for use in Eq. 6.9.4.1.1-1 or 6.9.4.1.1-2, as applicable.

6.9.4.1.3—Elastic Torsional Buckling and Flexural-Torsional Buckling Resistance

For open-section doubly symmetric members, the elastic critical buckling resistance, P_e, based on torsional buckling shall be taken as:

$$P_e = \left[\frac{\pi^2 E C_w}{(K_z \ell_z)^2} + GJ\right]\frac{A_g}{I_x + I_y} \qquad (6.9.4.1.3\text{-}1)$$

where:

A_g = gross cross-sectional area of the member (in.^{2})
C_w = warping torsional constant (in.^{6})
G = shear modulus of elasticity for steel = $0.385E$ (ksi)
I_x, I_y = moments of inertia about the major and minor principal axes of the cross-section, respectively (in.^{4})
J = St. Venant torsional constant (in.^{4})
$K_z\ell_z$ = effective length for torsional buckling (in.)

For open-section singly symmetric members where y is the axis of symmetry of the cross-section, the elastic critical buckling resistance, P_e, based on flexural-torsional buckling shall be taken as:

$$P_e = \left(\frac{P_{ey} + P_{ez}}{2H}\right)\left[1 - \sqrt{1 - \frac{4P_{ey}P_{ez}H}{(P_{ey} + P_{ez})^2}}\right] \qquad (6.9.4.1.3\text{-}2)$$

in which:

C6.9.4.1.3

Torsional buckling of concentrically loaded compression members refers to a buckling mode in which the member twists about its shear center. Torsional buckling applies only for open-section doubly symmetric compression members for which the locations of the centroid and shear center coincide. Torsional buckling will rarely control and need not be considered for doubly symmetric I-section members satisfying the cross-section proportion limits specified in Article 6.10.2, unless the effective length for torsional buckling is significantly larger than the effective length for y-axis flexural buckling. The effective length for torsional buckling, $K_z\ell_z$, is typically taken as the length between locations where the member is prevented from twisting. That is, in many cases, $K_z\ell_z$ can be taken conservatively as $1.0\ell_z$. For a cantilever member fully restrained against twisting and warping at one end with the other end free, $K_z\ell_z$ should be taken as 2ℓ where ℓ is the length of the member (White, 2006). For a member with twisting and warping restrained at both ends, $K_z\ell_z$ may be taken as 0.5ℓ. For a doubly symmetric I-section, C_w may be taken as $I_y h^2/4$, where h is the distance between flange centroids, in lieu of a more precise analysis. For closed sections, C_w may be taken equal to zero and GJ is relatively large. Because of the large GJ, torsional buckling and flexural-torsional buckling need not be considered for closed sections, including built-up members connected by lacing bars, batten plates, perforated plates, or any combination thereof.

Flexural-torsional buckling of concentrically loaded compression members refers to a buckling mode in which the member twists and bends simultaneously without a change in the cross-sectional shape. Compression members composed of open singly symmetric cross-sections, where the y-axis is defined as the axis of symmetry of the cross-

experience damage. Therefore, the specified ϕ_c factors for axial resistance of 0.50 to 0.70 for piles in compression without bending shall be applied only to the axial capacity of the pile. The ϕ_c factors of 0.70 and 0.80 and the ϕ_f factor of 1.00 shall be applied to the combined axial and flexural resistance of the pile in the interaction equation for the compression and flexure terms, respectively.

- Unintended eccentricity of applied load about pile axis,
- Variations in material properties of pile, and
- Pile damage due to driving.

These factors are discussed by Davisson (1983). While the resistance factors specified herein generally conform to the recommendations given by Davisson (1983), they have been modified to reflect current design philosophy.

The factored compressive resistance, P_r, includes reduction factors for unintended load eccentricity and material property variations, as well as a reduction for potential damage to piles due to driving, which is most likely to occur near the tip of the pile. The resistance factors for computation of the factored axial pile capacity near the tip of the pile are 0.50 to 0.60 and 0.60 to 0.70 for severe and good driving conditions, respectively. These factors include a base axial compression resistance factor ϕ_c equal to 0.90, modified by reduction multipliers of 0.78 and 0.87 for eccentric loading of H-piles and pipe piles, respectively, and reduction multipliers of 0.75 and 0.875 for difficult and moderately difficult driving conditions.

For steel piles, flexure occurs primarily toward the head of the pile. This upper zone of the pile is less likely to experience damage due to driving. Therefore, relative to combined axial compression and flexure, the resistance factor for axial resistance range of ϕ_c = 0.70 to 0.80 accounts for both unintended load eccentricity and pile material property variations, whereas the resistance factor for flexural resistance of ϕ_f = 1.00 accounts only for base flexural resistance. This design approach is illustrated on Figure C6.15.2-1 which illustrates the depth to fixity as determined by P-Δ analysis.

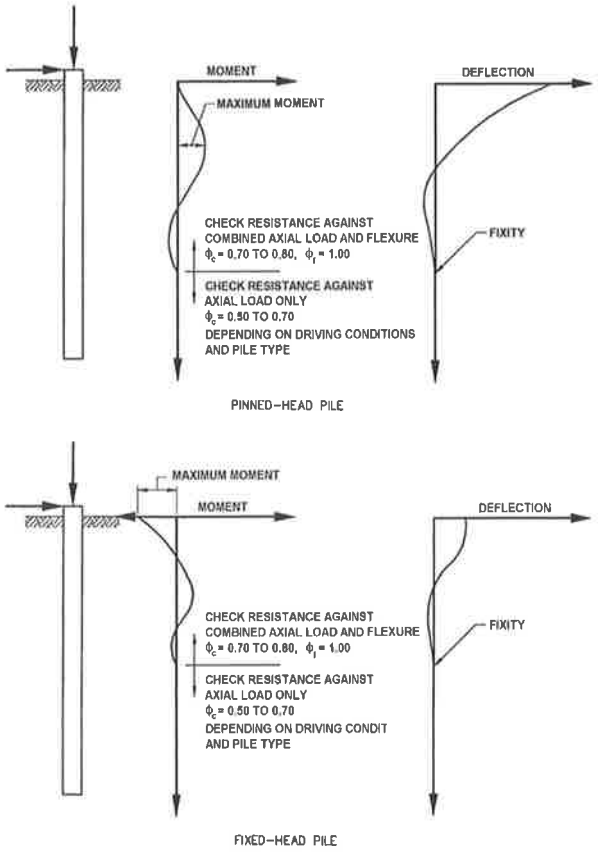


Figure C6.15.2-1—Distribution of Moment and Deflection in Vertical Piles Subjected to Lateral Load

If an unusual situation resulted in significant bending at the pile tip, possible pile damage should be considered in evaluating resistance to combined flexure and axial load.

6.15.3—Compressive Resistance

6.15.3.1—Axial Compression

For piles under axial load, the factored resistance of piles in compression, P_r, shall be taken as specified in Article 6.9.2.1 using the resistance factor, ϕ_c, specified in Article 6.5.4.2.

6.15.3.2—Combined Axial Compression and Flexure

Piles subjected to axial load and flexure shall be designed in accordance with Article 6.9.2.2 using the resistance factors, ϕ_c and ϕ_f, specified in Article 6.5.4.2.

6.15.3.3—Buckling

Instability of piles which extend through water or air shall be accounted for as specified in Article 6.9. Piles which extend through water or air shall be assumed to be fixed at some depth below the ground.

C6.15.3.3

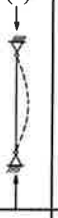
An approximate method acceptable to the Engineer may be used in lieu of a P-Δ analysis.

- For pinned connections at both ends: $K = 0.875$
- For single angles, regardless of end connection: $K = 1.0$

Vierendeel trusses shall be treated as unbraced frames.

Structural Stability Research Council, are given in Table C4.6.2.5-1 for some idealized column end conditions.

Table C4.6.2.5-1—Effective Length Factors, *K*

Buckled shape of column is shown by dashed line	(a) 	(b) 	(c) 	(d) 	(e) 	(f) 
Theoretical K value	0.5	0.7	1.0	1.0	2.0	2.0
Design value of K when ideal conditions are approximated	0.65	0.80	1.0	1.2	2.1	2.0
End condition code		Rotation fixed Rotation free Rotation fixed Rotation free		Translation fixed Translation fixed Translation free Translation free		

Because actual column end conditions seldom comply fully with idealized restraint conditions against rotation and translation, the design values suggested by the Structural Stability Research Council are higher than the idealized values.

Lateral stability of columns in continuous frames, unbraced by attachment to shear walls, diagonal bracing, or adjacent structures, depends on the flexural stiffness of the rigidly connected beams. Therefore, the effective length factor, K, is a function of the total flexural restraint provided by the beams at the ends of the column. If the stiffness of the beams is small in relation to that of the column, the value of K could exceed 2.0.

Single angles are loaded through one leg and are subject to eccentricity and twist, which is often not recognized. K is set equal to 1.0 for these members to more closely match the strength provided in the Guide for Design of Steel Transmission Towers (ASCE Manual No. 52, 1971).

Assuming that only elastic action occurs and that all columns buckle simultaneously, it can be shown that (Chen and Liu, 1991; ASCE Task Committee on Effective Length, 1997):

For braced frames:

$$\frac{G_a G_b}{4}\left(\frac{\pi}{K}\right)^2 + \frac{G_a + G_b}{2}\left(1 - \frac{\frac{\pi}{K}}{\tan\left(\frac{\pi}{K}\right)}\right) + \frac{2\tan\left(\frac{\pi}{2K}\right)}{\frac{\pi}{K}} = 1 \qquad \text{(C4.6.2.5-1)}$$

Table 6B.5.2.1-1—Inventory Rating Allowable Stresses, psi

		DATE BUILT-STEEL UNKNOWN								
		Prior to 1905	1905 to 1936	1936 to 1963	After 1963	Carbon Steel	Silicon Steel Over 2 in. to 4 in. incl.	Nickel Steel	$1^1/_8$ in. and under	Over $1^1/_8$ in. to 2 in. incl.
AASHTO Designation[a]						M 94 (1961)	M 95 (1961)	M 96 (1961)		
ASTM Designation[a]						A7 (1967)	A94 (1966)	A8 (1961)	A94	A94
Minimum Tensile Strength	F_u	52,000	60,000			60,000	70,000	90,000	75,000	72,000
Minimum Yield Point	F_y	26,000	30,000	33,000	36,000	33,000	45,000	55,000	50,000	47,000
Axial tension in members with no holes for high-strength bolts or rivets. Use net section when member has any open holes larger than $1^1/_4$-in. diameter, such as perforations.	$0.55F_y$	14,000	16,000	18,000	20,000	18,000	24,000	30,000	27,000	25,000
	$0.46F_y$	NOT APPLICABLE								
Axial tension in members with holes for high-strength bolts or rivets and tension in extreme fiber of rolled shapes, girders, and built-up sections subject to bending. (use whichever is smaller)	Gross* Section $0.55F_y$	14,000	16,000	18,000	20,000	18,000	24,000	30,000	27,000	25,000
• When the area of holes deducted for high-strength bolts or rivets is more than 15 percent of the gross area, that area in excess of 15 percent shall be deducted from the gross area in determining stress on the gross section. In determining gross section, any open holes larger than $1^1/_4$-in. diameter, such as perforations, shall be deducted.	Net Section $0.50F_u$	26,000	30,000	30,000	30,000	30,000	35,000	45,000	37,000	36,000
	Net Section $0.46F_u$	NOT APPLICABLE								
Axial tension in members without holes. Axial compression, gross section: stiffeners of plate girders. Compression in splice material, gross section.	$0.55F_y$	14,000	16,000	18,000	20,000	18,000	24,000	30,000	27,000	25,000
Compression in extreme fibers of rolled shapes, girders, and built-up sections, subject to bending, gross section, when compression flange is:	$0.55F_y$	14,000	16,000	18,000	20,000	18,000	24,000	30,000	27,000	25,000
(A) Supported laterally its full length by embedment in concrete										
(B) Partially supported or unsupported[b]										

$$F_b = \frac{91\times10^6 C_b}{(F.S.)\,S_{xc}}\left(\frac{\ell_{yc}}{\ell}\right)\sqrt{0.772\frac{J}{\ell_{yc}}+9.87\left(\frac{d}{\ell}\right)^2} \le 0.55F_y$$

C_b = $1.75 + 1.05\,(M_1/M_2) + 0.3\,(M_1/M_2)2 \le 2.3$ where M_1 is the smaller and M_2 is the larger end moment in the unbraced segment of the beams: M_1/M_2 is positive when the moments cause reverse curvature and negative when bent in single curvature.

= 1.0 for unbraced cantilevers and for members where the moment within a significant portion of the unbraced segment is greater than or equal to the larger of the segment end moments.

$F.S.$ = Factor of Safety at Inventory Level = 1.82

APPENDIX B6A—LIMIT STATES AND LOAD FACTORS FOR LOAD RATING

Table B6A-1—Limit States and Load Factors for Load Rating (6A.4.2.2-1)

Bridge Type	Limit State*	Dead Load *DC*	Dead Load *DW*	Design Load Inventory *LL*	Design Load Operating *LL*	Legal Load *LL*	Permit Load *LL*
Steel	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1
	Service II	1.00	1.00	1.30	1.00	1.30	1.00
	Fatigue	0.00	0.00	0.75	—	—	—
Reinforced Concrete	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1
	Service I	1.00	1.00	—	—	—	1.00
Prestressed Concrete	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1
	Service III	1.00	1.00	0.80	—	1.00	—
	Service I	1.00	1.00	—	—	—	1.00
Wood	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	–	Table 6A.4.5.4.2a-1

* Defined in the *AASHTO LRFD Bridge Design Specifications*.

Shaded cells of the table indicate optional checks.

Service I is used to check the $0.9F_y$ stress limit in reinforcing steel.

Load factor for *DW* at the strength limit state may be taken as 1.25 where thickness has been field measured.

Fatigue limit state is checked using the LRFD fatigue truck (see Article 6A.6.4.1).

Table B6A-2—Generalized Live Load Factors for Legal Loads: γ_L (6A.4.4.2.3a-1)

Traffic Volume (one direction)	Load Factor
Unknown	1.80
$ADTT \geq 5000$	1.80
$ADTT = 1000$	1.65
$ADTT \leq 100$	1.40

Note: Linear interpolation is permitted for other *ADTT*.

Table B6A-3—Generalized Live Load Factors, γ_L for Specialized Hauling Vehicles (6A.4.4.2.3b-1)

Traffic Volume (one direction)	Load Factor for NRL, SU4, SU5, SU6, and SU7
Unknown	1.60
$ADTT \geq 5000$	1.60
$ADTT = 1000$	1.40
$ADTT \leq 100$	1.15

Note: Linear interpolation is permitted for other *ADTT*.

A1A.1.8—Design Load Rating (6A.4.3)

A1A.1.8.1—Strength I Limit State (6A.6.4.1)

Capacity $C = (\varphi_c)(\varphi_s)(\varphi)R_n$

$$RF = \frac{(\varphi_c)(\varphi_s)(\varphi)R_n - (\gamma_{DC})(DC) - (\gamma_{DW})(DW)}{(\gamma_L)(LL + IM)}$$

A1A.1.8.1a—Inventory Level

Table 6A.4.2.2-1

Load Factors

γ_{DC}	1.25
γ_{DW}	1.50
γ_{LL}	1.75

The dead load demands established for load cases *DC*1 and *DC*2 are permanent loads and therefore the load factor for these loads will be taken from the load case *DC*.

$$RF = \frac{(1.0)(1.0)(1.0)(2873) - (1.25)(439 + 129) - (1.50)(0)}{(1.75)(952.6)}$$

Flexure: $RF = \dfrac{(1.0)(1.0)(1.0)(2873) - (1.25)(439) - (1.25)(129)}{(1.75)(952.6)}$

$= 1.2975$

Note: The general rule for simple spans carrying moving concentrated loads states: the maximum bending moment produced by moving concentrated loads occurs under one of the loads when that load is as far from one support as the center of gravity of all the moving loads on the beam is from the other support. In a refined analysis with the HL-93 truck located in such a manner, the resulting rating factor for flexure is $RF = 1.2922$ for this stringer. It should be understood that locating the precise critical section and load position for rating depends on the combined influence of dead load, live load, member capacity and load factors that make up the general Rating Factor equation.

Shear: $RF = \dfrac{(1.0)(1.0)(1.0)(360.3) - (1.25)(27 + 8)}{(1.75)(78.9)}$

$= 2.29$

A1A.1.8.1b—Operating Level

Table 6A.4.2.2-1

Load	Load Factor γ
DC	1.25
LL	1.35

For Strength I Operating Level, only the live-load factor changes; therefore, the rating factor can be calculated by direct proportions.

Flexure: $RF = 1.29 \times \dfrac{1.75}{1.35}$

$= 1.67$

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

PIER 3 ANALYSIS

Pier 3 (50 ksi)

	Midas Civil 2016 V2.1		
	Displacement (in)	Stress (ksi)	Limit State
HL-93 Inventory	0.035	6.26	Strength I
HS-20	0.03	5.26	Strength I

	Midas Civil 2016 V2.1/Hand Calcs.			A-Pile		Allowable Compressive Resistance			
Live load	Shear (kip)	Axial (kip)	Moment (in-kip)	Bearing Capacity (kips)	Pile Type	Axial (kips)	Moment (kip-in)	C/D Ratio Axial	C_{Ma}=Combined Compressive and Flexural Resistance Factor* < 1
HL-93 Inv.	42.8	226.0	913.3	520.0	HP14X89	470.3	1677.6	1.249	**1.170**
HL-93 Inv.	97.9	190	1402	520.0	HP14X89	470.3	1677.6	1.485	**1.320**

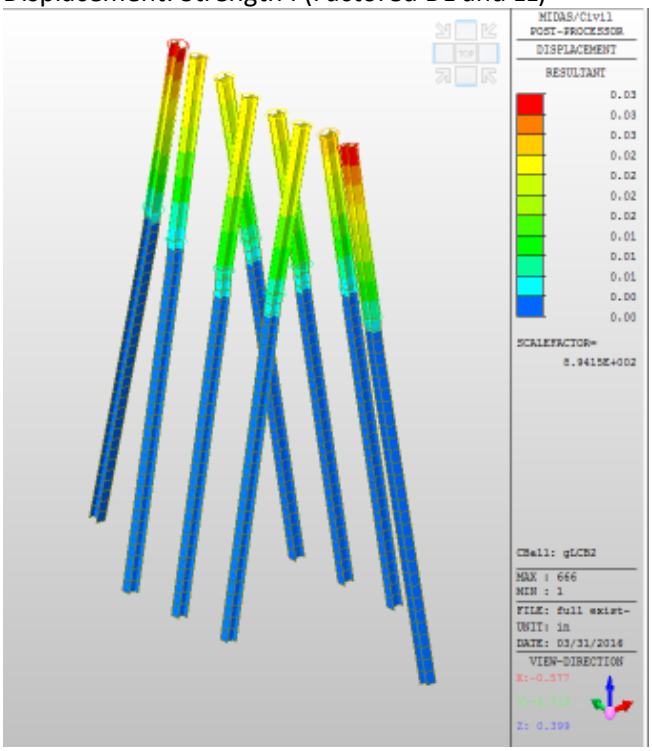
*$C_{Ma}=P_U/P_R+\gamma((M_{Ux}/M_{rx})+(M_{Uy}/M_{ry})) < 1.0$ AASHTO 6.9.2.2-2

*C/D Ratio AASHTO 6.9.4

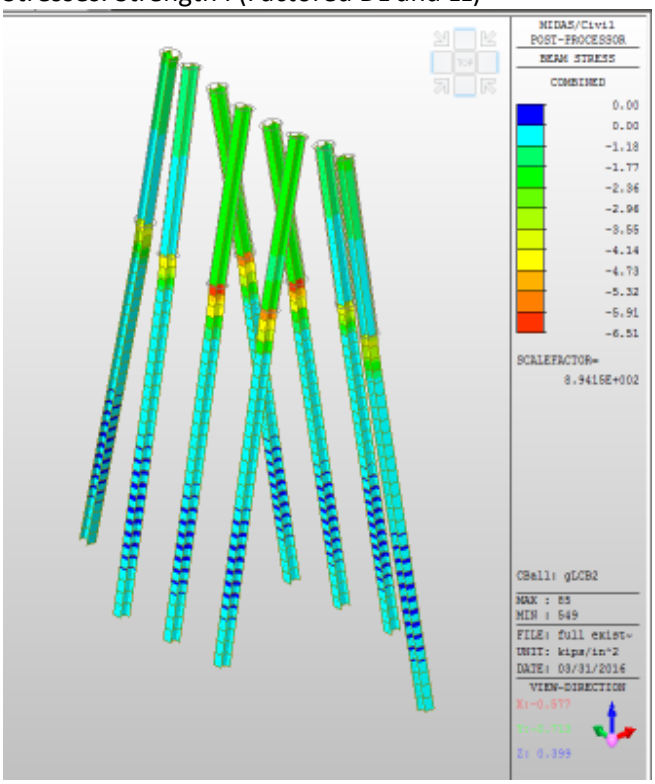
LRFD ANALYSIS

Pier 3

Displacement: Strength I (Factored DL and LL)



Stresses: Strength I (Factored DL and LL)



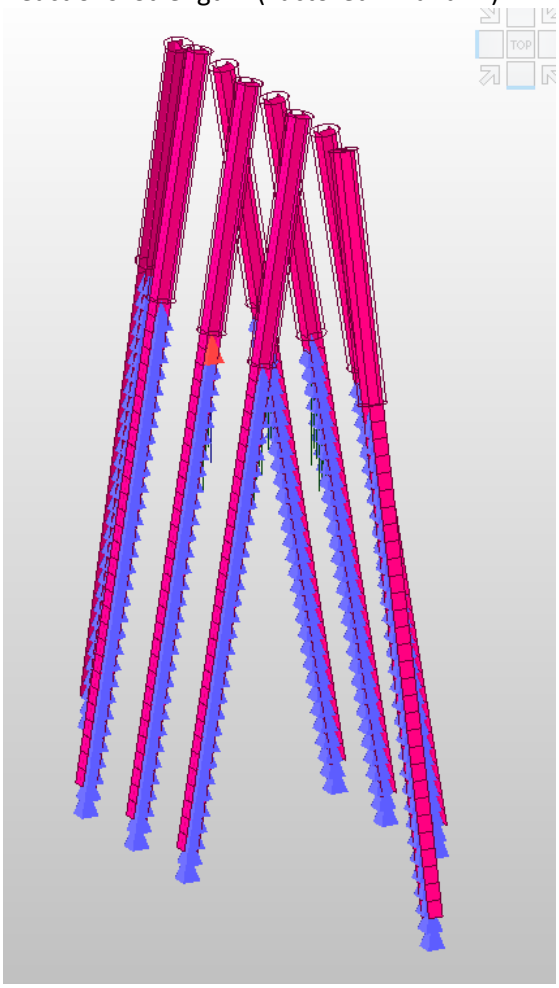
50 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ± Sbz ± Sax (Warping).

LRFD ANALYSIS

Pier 3

Reactions: Strength I (Factored DL and LL)



Maximum Axial Load = 150.032 kips

LPile for Windows, Version 2015-08.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
© 1985-2015 by Ensoft, Inc.
All Rights Reserved

This copy of LPile is being used by:

CJM
Wethersfield

Serial Number of Security Device: 227885239

This copy of LPile is licensed for exclusive use by:

Close, Jensen and Miller, P.C.,

Use of this program by any entity other than Close, Jensen and Miller, P.C.,
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Liaison\State Bridge Program\Project Files\01349, SPN 158-212, List 28\1-Pre-Design\Calculations\01349 L-Pile\REVISED\

Name of input data file:
HL-93 Inv. 01349 pier 3.lp8d

Name of output report file:
HL-93 Inv. 01349 pier 3.lp8o

Name of plot output file:
HL-93 Inv. 01349 pier 3.lp8p

Name of runtime message file:
HL-93 Inv. 01349 pier 3.lp8r

Date and Time of Analysis

Date: June 3, 2016 Time: 11:27:29

Problem Title

Project Name: Rehabilitation of Bridge No. 01349, ROute 136 Over

Job Number: 158-212

Client: CT DOT

Engineer: Danielle Coutu

Description: Pier 3 Pile Analysis Under Existing Condition

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis includes loading by one distributed lateral load acting on pile
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 35.000 ft
Depth of ground surface below top of pile = 14.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over
the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	12.2000
2	35.000	12.2000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is an elastic pile
Cross-sectional Shape = Strong H-Pile
Length of section = 35.000000 ft
Flange Width = 12.200000 in
Section Depth = 12.100000 in
Flange Thickness = 0.610000 in
Web Thickness = 0.605000 in
Section Area = 21.466400 sq. in
Moment of Inertia = 556.640624 in^4
Elastic Modulus = 29000000. psi

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = -9.462 degrees
= -0.165 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is cemented silt with cohesion and friction

Distance from top of pile to top of layer = 14.000000 ft
Distance from top of pile to bottom of layer = 16.000000 ft
Effective unit weight at top of layer = 120.000000 pcf
Effective unit weight at bottom of layer = 120.000000 pcf
Undrained cohesion at top of layer = 500.000000 psf
Undrained cohesion at bottom of layer = 500.000000 psf
Friction angle at top of layer = 10.000000 deg.
Friction angle at bottom of layer = 10.000000 deg.
Epsilon-50 at top of layer = 0.010000
Epsilon-50 at bottom of layer = 0.010000
Subgrade k at top of layer = 18.000000 pci
Subgrade k at bottom of layer = 18.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 16.000000 ft
Distance from top of pile to bottom of layer = 25.000000 ft
Effective unit weight at top of layer = 125.000000 pcf
Effective unit weight at bottom of layer = 125.000000 pcf
Friction angle at top of layer = 38.000000 deg.
Friction angle at bottom of layer = 38.000000 deg.
Subgrade k at top of layer = 25.000000 pci
Subgrade k at bottom of layer = 25.000000 pci

Layer 3 is weak rock, p-y criteria by Reese, 1997

Distance from top of pile to top of layer = 25.000000 ft

Distance from top of pile to bottom of layer	=	34.000000 ft
Effective unit weight at top of layer	=	125.000000 pcf
Effective unit weight at bottom of layer	=	125.000000 pcf
Uniaxial compressive strength at top of layer	=	500.000000 psi
Uniaxial compressive strength at bottom of layer	=	500.000000 psi
Initial modulus of rock at top of layer	=	1050000. psi
Initial modulus of rock at bottom of layer	=	1050000. psi
RQD of rock at top of layer	=	0.0000 %
RQD of rock at bottom of layer	=	0.0000 %
k rm of rock at top of layer	=	0.0005000
k rm of rock at bottom of layer	=	0.0005000

Layer 4 is massive rock, p-y criteria by Liang et al., 2009

Distance from top of pile to top of layer	=	34.000000 ft
Distance from top of pile to bottom of layer	=	35.000000 ft
Effective unit weight at top of layer	=	139.000000 pcf
Effective unit weight at bottom of layer	=	139.000000 pcf
Uniaxial compressive strength at top of layer	=	11600. psi
Uniaxial compressive strength at bottom of layer	=	11600. psi
Poisson's ratio at top of layer	=	0.250000
Poisson's ratio at bottom of layer	=	0.250000
Option 1: Intact rock modulus at top of layer	=	1500000. psi
Intact rock modulus at bottom of layer	=	1500000. psi
Option 1: Geologic Strength Index for layer	=	50.000000
Option 2: Rock mass modulus at top of layer	=	0.0000 psi
Rock mass modulus at bottom of layer	=	0.0000 psi

Option 1 will be used to compute values of rock mass modulus for the p-y curve in massive rock.
The rock type is (metamorphic) gneiss, Hoek-Brown Material Constant mi = 28

(Depth of the lowest soil layer extends 0.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Num.	Soil Type (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	Uniaxial qu psi	RQD %	E50 or krm	kpy pci
1	Cemented	14.0000	120.0000	500.0000	10.0000	--	--	0.01000	18.0000
--	--	0.00	0.00	0.00					
	Silt	16.0000	120.0000	500.0000	10.0000	--	--	0.01000	18.0000
--	--	0.00	0.00	0.00					
2	Sand	16.0000	125.0000	--	38.0000	--	--	--	25.0000
--	(Reese, et al.)	25.0000	125.0000	--	38.0000	--	--	--	25.0000
--	--	0.00	0.00	0.00					
3	Weak	25.0000	125.0000	--	--	500.0000	0.00	5.00E-04	--
1050000.	--	0.00	0.00	0.00					
	Rock	34.0000	125.0000	--	--	500.0000	0.00	5.00E-04	--
1050000.	--	0.00	0.00	0.00					
4	Massive	34.0000	139.0000	--	--	11600.	--	--	--
Internally	50.0000	1500000.	28.0000	0.2500					
	Rock	35.0000	139.0000	--	--	11600.	--	--	--
Computed	50.0000	1500000.	28.0000	0.2500					

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Distributed Lateral Loading Used For All Load Cases

Distributed lateral load intensity defined using 2 points

Point No.	Depth X in	Dist. Load lb/in
1	0.000	0.000
2	0.000	0.000

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length

1	2	V = 42800. lbs	S = 0.0000 in/in	226000.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with
specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic section properties

---

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	14.0000	0.00	N.A.	No	0.00	476.3127
2	16.0000	0.7388	No	No	476.3127	186660.
3	25.0000	11.0000	No	Yes	N.A.	N.A.
4	34.0000	20.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals
for Layer n. Layering correction equivalent depths are computed only
for soil types with both shallow-depth and deep-depth expressions for
peak lateral load transfer. These soil types are soft and stiff clays,
non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Pile-head Rotation (Loading Type 2)

Shear force at pile head = 42800.0 lbs
Rotation of pile head = 0.000E+00 radians
Axial load at pile head = 226000.0 lbs

(Zero slope for this load indicates fixed-head conditions)

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	6.9920	-7169895.	42800.	0.00	89100.	1.61E+10	0.00	0.00	0.00
0.3500	6.9881	-6989249.	42800.	-0.00184	87120.	1.61E+10	0.00	0.00	0.00
0.7000	6.9766	-6806878.	42800.	-0.00364	85122.	1.61E+10	0.00	0.00	0.00
1.0500	6.9576	-6622825.	42800.	-0.00538	83105.	1.61E+10	0.00	0.00	0.00
1.4000	6.9314	-6437137.	42800.	-0.00708	81070.	1.61E+10	0.00	0.00	0.00
1.7500	6.8981	-6249859.	42800.	-0.00873	79018.	1.61E+10	0.00	0.00	0.00
2.1000	6.8580	-6061038.	42800.	-0.01033	76949.	1.61E+10	0.00	0.00	0.00
2.4500	6.8113	-5870720.	42800.	-0.01189	74863.	1.61E+10	0.00	0.00	0.00
2.8000	6.7581	-5678952.	42800.	-0.01339	72761.	1.61E+10	0.00	0.00	0.00
3.1500	6.6988	-5485781.	42800.	-0.01484	70645.	1.61E+10	0.00	0.00	0.00
3.5000	6.6335	-5291256.	42800.	-0.01624	68513.	1.61E+10	0.00	0.00	0.00
3.8500	6.5624	-5095424.	42800.	-0.01760	66367.	1.61E+10	0.00	0.00	0.00
4.2000	6.4857	-4898333.	42800.	-0.01890	64207.	1.61E+10	0.00	0.00	0.00
4.5500	6.4036	-4700033.	42800.	-0.02014	62034.	1.61E+10	0.00	0.00	0.00
4.9000	6.3165	-4500572.	42800.	-0.02134	59848.	1.61E+10	0.00	0.00	0.00
5.2500	6.2244	-4300000.	42800.	-0.02249	57650.	1.61E+10	0.00	0.00	0.00
5.6000	6.1276	-4098365.	42800.	-0.02358	55440.	1.61E+10	0.00	0.00	0.00
5.9500	6.0263	-3895719.	42800.	-0.02462	53220.	1.61E+10	0.00	0.00	0.00
6.3000	5.9208	-3692110.	42800.	-0.02561	50988.	1.61E+10	0.00	0.00	0.00
6.6500	5.8112	-3487590.	42800.	-0.02654	48747.	1.61E+10	0.00	0.00	0.00
7.0000	5.6979	-3282208.	42800.	-0.02742	46496.	1.61E+10	0.00	0.00	0.00
7.3500	5.5809	-3076016.	42800.	-0.02825	44237.	1.61E+10	0.00	0.00	0.00
7.7000	5.4606	-2869064.	42800.	-0.02902	41969.	1.61E+10	0.00	0.00	0.00
8.0500	5.3371	-2661403.	42800.	-0.02974	39693.	1.61E+10	0.00	0.00	0.00
8.4000	5.2108	-2453085.	42800.	-0.03041	37410.	1.61E+10	0.00	0.00	0.00
8.7500	5.0817	-2244162.	42800.	-0.03102	35121.	1.61E+10	0.00	0.00	0.00
9.1000	4.9502	-2034684.	42800.	-0.03157	32825.	1.61E+10	0.00	0.00	0.00
9.4500	4.8165	-1824703.	42800.	-0.03208	30524.	1.61E+10	0.00	0.00	0.00
9.8000	4.6808	-1614272.	42800.	-0.03252	28218.	1.61E+10	0.00	0.00	0.00

10.1500	4.5433	-1403443.	42800.	-0.03292	25908.	1.61E+10	0.00	0.00	0.00
10.5000	4.4043	-1192266.	42800.	-0.03325	23594.	1.61E+10	0.00	0.00	0.00
10.8500	4.2640	-980796.	42800.	-0.03354	21276.	1.61E+10	0.00	0.00	0.00
11.2000	4.1226	-769083.	42800.	-0.03376	18956.	1.61E+10	0.00	0.00	0.00
11.5500	3.9804	-557180.	42800.	-0.03394	16634.	1.61E+10	0.00	0.00	0.00
11.9000	3.8376	-345139.	42800.	-0.03405	14310.	1.61E+10	0.00	0.00	0.00
12.2500	3.6943	-133014.	42800.	-0.03412	11986.	1.61E+10	0.00	0.00	0.00
12.6000	3.5510	79145.	42800.	-0.03412	11395.	1.61E+10	0.00	0.00	0.00
12.9500	3.4077	291284.	42800.	-0.03407	13720.	1.61E+10	0.00	0.00	0.00
13.3000	3.2648	503351.	42800.	-0.03397	16044.	1.61E+10	0.00	0.00	0.00
13.6500	3.1224	715294.	42800.	-0.03381	18367.	1.61E+10	0.00	0.00	0.00
14.0000	2.9807	927060.	42800.	-0.03360	20687.	1.61E+10	0.00	0.00	0.00
14.3500	2.8401	1138597.	42797.	-0.03333	23006.	1.61E+10	-1.4247	2.1068	0.00
14.7000	2.7008	1349828.	42784.	-0.03301	25320.	1.61E+10	-4.9941	7.7664	0.00
15.0500	2.5629	1560637.	42755.	-0.03263	27630.	1.61E+10	-8.7952	14.4133	0.00
15.4000	2.4267	1770906.	42710.	-0.03219	29935.	1.61E+10	-12.5442	21.7108	0.00
15.7500	2.2925	1980517.	42650.	-0.03171	32232.	1.61E+10	-15.9800	29.2768	0.00
16.1000	2.1604	2189356.	42576.	-0.03116	34520.	1.61E+10	-19.3272	37.5742	0.00
16.4500	2.0307	2397313.	42002.	-0.03057	36799.	1.61E+10	-253.7771	524.8795	0.00
16.8000	1.9036	2600202.	40832.	-0.02992	39023.	1.61E+10	-303.3411	669.2713	0.00
17.1500	1.7794	2797098.	39465.	-0.02921	41180.	1.61E+10	-347.5332	820.3068	0.00
17.5000	1.6582	2987173.	37922.	-0.02846	43263.	1.61E+10	-387.6588	981.8825	0.00
17.8500	1.5403	3169671.	36222.	-0.02766	45263.	1.61E+10	-421.4273	1149.	0.00
18.2000	1.4259	3343953.	34389.	-0.02681	47173.	1.61E+10	-451.6685	1330.	0.00
18.5500	1.3151	3509441.	32426.	-0.02592	48987.	1.61E+10	-483.1232	1543.	0.00
18.9000	1.2081	3665541.	30288.	-0.02499	50697.	1.61E+10	-535.0819	1860.	0.00
19.2500	1.1052	3811296.	27934.	-0.02402	52295.	1.61E+10	-585.5205	2225.	0.00
19.6000	1.0064	3945782.	25376.	-0.02301	53768.	1.61E+10	-632.8869	2641.	0.00
19.9500	0.9119	4068129.	22549.	-0.02196	55109.	1.61E+10	-713.1766	3285.	0.00
20.3000	0.8219	4176890.	19376.	-0.02089	56301.	1.61E+10	-797.5319	4076.	0.00
20.6500	0.7364	4270552.	15840.	-0.01979	57327.	1.61E+10	-886.3148	5055.	0.00
21.0000	0.6556	4347525.	11908.	-0.01867	58171.	1.61E+10	-986.0967	6317.	0.00
21.3500	0.5796	4406029.	7546.	-0.01753	58812.	1.61E+10	-1091.	7908.	0.00
21.7000	0.5083	4444196.	2883.	-0.01638	59230.	1.61E+10	-1129.	9330.	0.00
22.0500	0.4420	4461346.	-1646.	-0.01522	59418.	1.61E+10	-1028.	9765.	0.00
22.4000	0.3805	4459268.	-5744.	-0.01406	59395.	1.61E+10	-923.9724	10200.	0.00
22.7500	0.3238	4439790.	-9407.	-0.01291	59182.	1.61E+10	-819.9901	10635.	0.00
23.1000	0.2721	4404751.	-12634.	-0.01175	58798.	1.61E+10	-717.0654	11070.	0.00
23.4500	0.2251	4355976.	-15435.	-0.01061	58263.	1.61E+10	-616.6010	11505.	0.00
23.8000	0.1829	4295247.	-17822.	-0.00949	57598.	1.61E+10	-519.9409	11940.	0.00
24.1500	0.1454	4224286.	-19813.	-0.00838	56820.	1.61E+10	-428.3686	12375.	0.00
24.5000	0.1125	4144725.	-21433.	-0.00729	55948.	1.61E+10	-343.1060	12810.	0.00
24.8500	0.08413	4058089.	-22711.	-0.00623	54999.	1.61E+10	-265.3131	13245.	0.00
25.2000	0.06020	3965770.	-23680.	-0.00518	53987.	1.61E+10	-196.0890	13680.	0.00
25.5500	0.04061	3869012.	-37247.	-0.00416	52927.	1.61E+10	-6265.	647924.	0.00
25.9000	0.02524	3660793.	-66427.	-0.00318	50645.	1.61E+10	-7631.	1269678.	0.00
26.2500	0.01388	3317066.	-99989.	-0.00227	46878.	1.61E+10	-8351.	2527941.	0.00
26.6000	0.00613	2825203.	-134877.	-0.00148	41488.	1.61E+10	-8262.	5657558.	0.00
26.9500	0.00148	2186898.	-166527.	-8.24E-04	34493.	1.61E+10	-6809.	1.93E+07	0.00
27.3000	-7.85E-04	1427937.	-166809.	-3.53E-04	26176.	1.61E+10	6675.	3.57E+07	0.00
27.6500	-0.00149	786374.	-134195.	-6.54E-05	19146.	1.61E+10	8855.	2.50E+07	0.00
28.0000	-0.00133	300824.	-95424.	7.61E-05	13825.	1.61E+10	9607.	3.02E+07	0.00
28.3500	-8.50E-04	-15333.	-55363.	1.13E-04	10696.	1.61E+10	9470.	4.68E+07	0.00
28.7000	-3.83E-04	-164441.	-18805.	8.98E-05	12330.	1.61E+10	7939.	8.70E+07	0.00
29.0500	-9.58E-05	-173462.	9657.	4.59E-05	12429.	1.61E+10	5614.	2.46E+08	0.00
29.4000	2.05E-06	-83412.	19184.	1.25E-05	11442.	1.61E+10	-1077.	2.20E+09	0.00
29.7500	8.79E-06	-12342.	10434.	-7.31E-10	10663.	1.61E+10	-3089.	1.48E+09	0.00
30.1000	2.05E-06	4234.	1691.	-1.06E-06	10574.	1.61E+10	-1074.	2.20E+09	0.00
30.4500	-7.39E-08	1867.	-482.3674	-2.62E-07	10549.	1.61E+10	38.8160	2.20E+09	0.00
30.8000	-1.54E-07	183.0728	-231.5056	4.85E-09	10530.	1.61E+10	80.6420	2.20E+09	0.00
31.1500	-3.32E-08	-78.0158	-25.5354	1.85E-08	10529.	1.61E+10	17.4391	2.20E+09	0.00
31.5000	1.92E-09	-31.4601	8.9736	4.27E-09	10528.	1.61E+10	-1.0062	2.20E+09	0.00
31.8500	2.67E-09	-2.6458	3.9147	-1.64E-10	10528.	1.61E+10	-1.4028	2.20E+09	0.00
32.2000	5.36E-10	1.4239	0.3778	-3.23E-10	10528.	1.61E+10	-0.2815	2.20E+09	0.00
32.5500	-4.37E-11	0.5282	-0.1651	-6.93E-11	10528.	1.61E+10	0.02293	2.20E+09	0.00
32.9000	-4.63E-11	0.03688	-0.06595	4.18E-12	10528.	1.61E+10	0.02430	2.20E+09	0.00
33.2500	-8.59E-12	-0.02577	-0.00544	5.62E-12	10528.	1.61E+10	0.00451	2.20E+09	0.00
33.6000	0.00	-0.00883	0.00300	1.12E-12	10528.	1.61E+10	-4.93E-04	2.20E+09	0.00
33.9500	0.00	-5.91E-04	0.00105	0.00	10528.	1.61E+10	-4.33E-04	2.20E+09	0.00
34.3000	0.00	5.12E-06	7.05E-05	0.00	10528.	1.61E+10	-3.40E-05	2.20E+09	0.00
34.6500	0.00	1.68E-06	-6.50E-07	0.00	10528.	1.61E+10	1.00E-07	609267.	0.00
35.0000	-1.44E-12	0.00	0.00	0.00	10528.	1.61E+10	2.09E-07	304633.	0.00

* The above values of total stress are combined axial and bending stresses.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     6.99204679 inches
Computed slope at pile head      =       0.000000 radians
Maximum bending moment           =      -7169895. inch-lbs
Maximum shear force              =       -166809. lbs
Depth of maximum bending moment  =       0.000000 feet below pile head
Depth of maximum shear force     =    27.30000000 feet below pile head
Number of iterations             =             24
Number of zero deflection points =              7
```

Pile-head Deflection vs. Pile Length for Load Case 1

Boundary Condition Type 2, Shear and Slope

```
Shear      =          42800. lbs
Slope      =         0.00000
Axial Load =         226000. lbs
```

Pile Length feet	Pile Head Deflection inches	Maximum Moment ln-lbs	Maximum Shear lbs
35.00000	6.99204679	-7169895.	-166809.
33.25000	6.97746888	-7162030.	-167483.
31.50000	6.97855245	-7164465.	-170773.
29.75000	6.98987046	-7168126.	-171194.
28.00000	7.29575037	-7271278.	-188961.
26.25000	23.65668834	-13612986.	-80085.
24.50000	26.87277718	-16090088.	42800.
22.75000	24.05233379	-15702662.	42800.

Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	42800.	S, rad	0.00	226000.	6.9920	0.00	-166809.	-7169895.

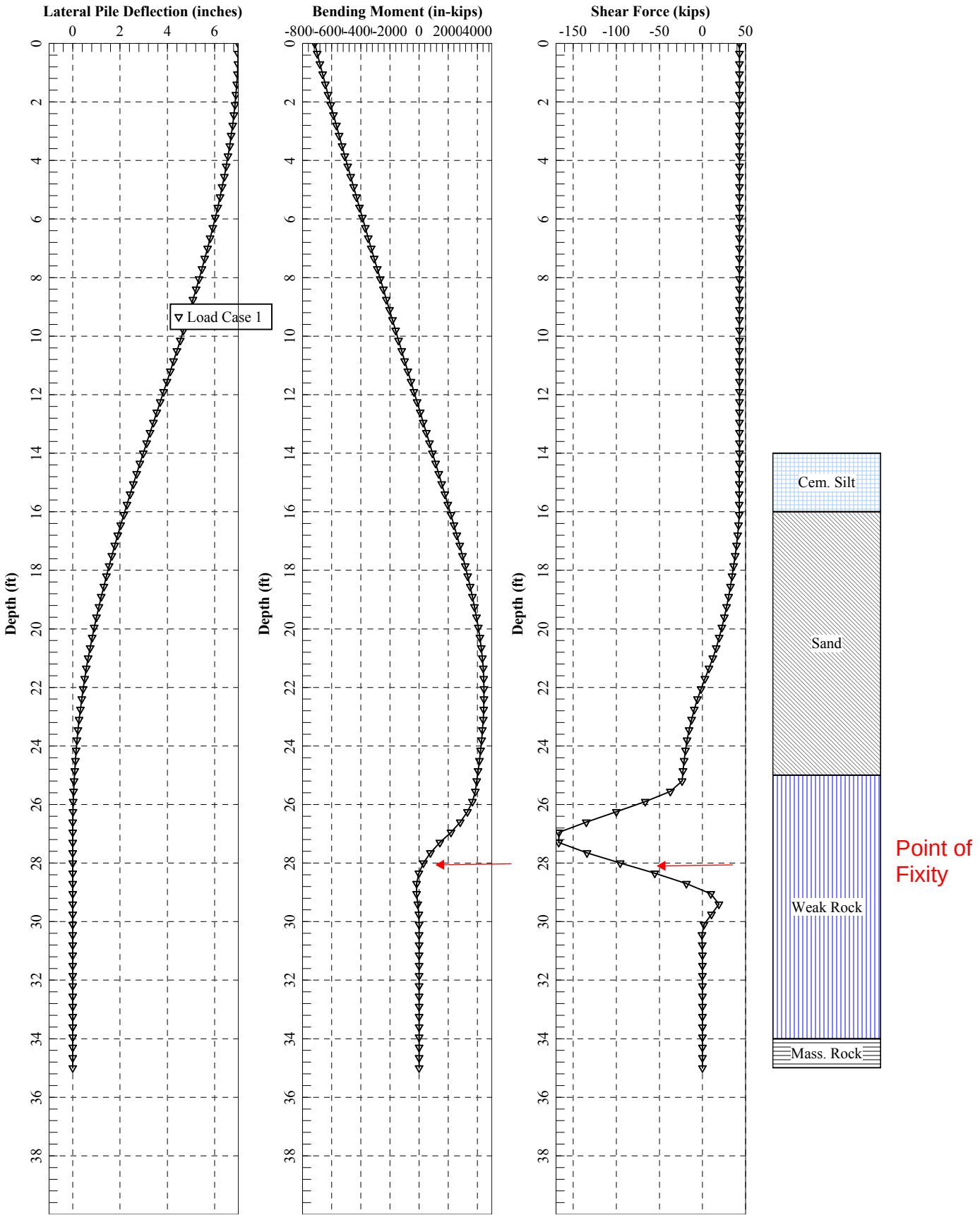
Maximum pile-head deflection = 6.9920467882 inches
Maximum pile-head rotation = -0.0000000000 radians = -0.000000 deg.

Summary of Warning Messages

The following warning was reported 298 times

WARNING: The ratio of intact rock modulus to uniaxial compressive strength
for massive rock appears to be outside the usual range of values.

This analysis ended normally


Lateral Pile Deflection (inches)
Bending Moment (in-kips)
Shear Force (kips)
Depth (ft)
Load Case 1
Cem. Silt
Sand
Weak Rock
Mass. Rock
Point of Fixity

BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

PROPOSED WIDENING ANALYSIS

Rehabilitaion of Bridge 01349, Route 136 Over Saugatuck River, Westport, CT

Client: CT DOT
Date: 3/24/2016

Company: Close, Jensen, and Miller PC
Engineer: Danielle Coutu

Swing Span

	Midas Civil 2016 V2.1		
	Displacement (in)	Stress (ksi)	Limit State
HL-93 Inventory	0.83	29.62	Strength I
HS-20	0.74	24.72	Strength I

Fixed Truss

	Midas Civil 2016 V2.1			
	Displacement (in)	Stress (ksi)	Limit State	Wind Speed (mph)
Cross Bracing		22.87	Strength III	100
Main Members		16.6	Strength III	100
add 1in CP				
Entire Truss		23.75	Strength III	100
Main Members	2.1	14.86	Strength III	100

Pier 2

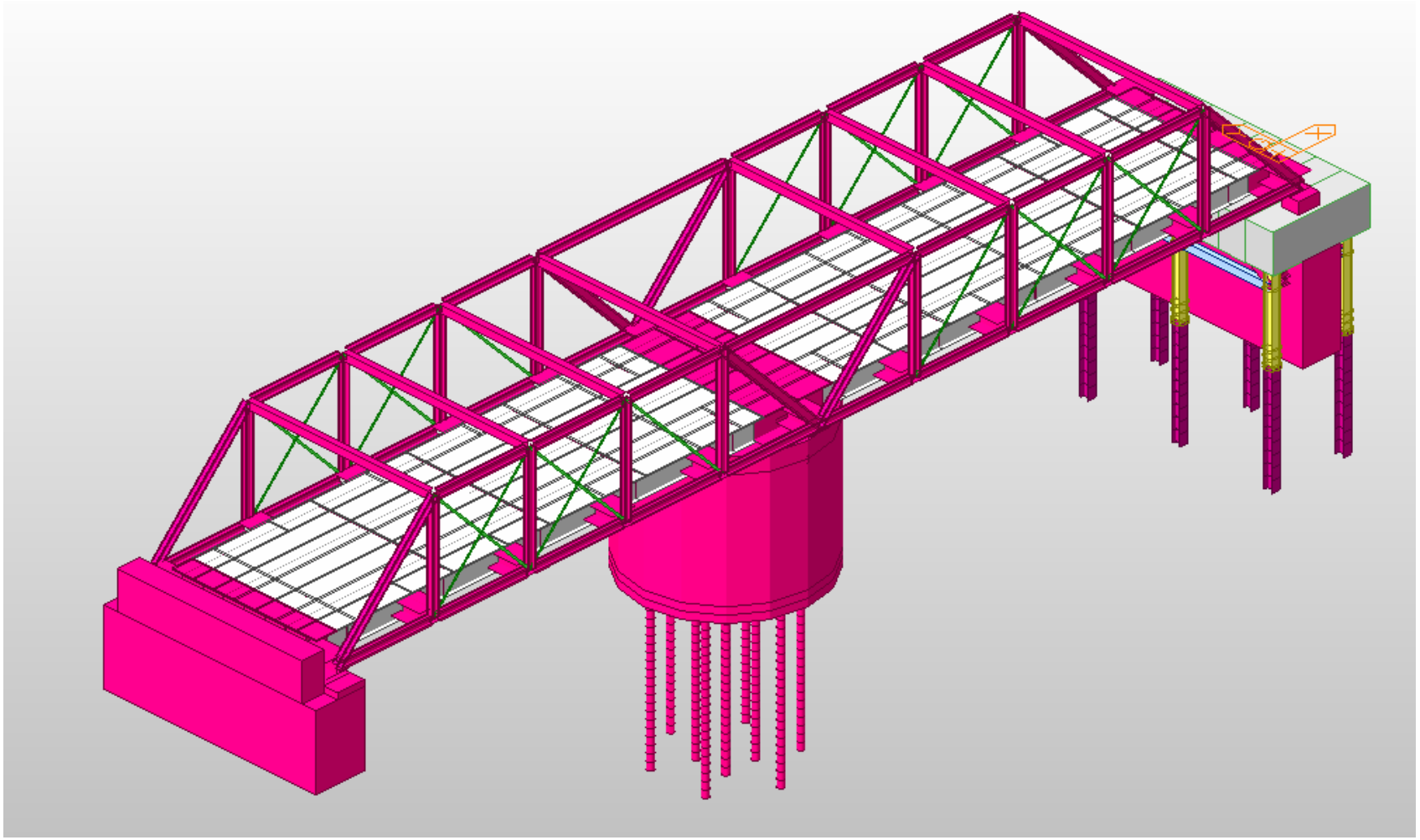
	Midas Civil 2016 V2.1		
	Displacement (in)	Stress (ksi)	Limit State
HL-93 Inventory	0.07	0.96	Strength I
HS-20	0.07	0.96	Strength I

	Midas Civil 2016 V2.1			L-pile V2015	A-Pile		Allowable Compressive Resistance			C_{Ma}=Combined Compressive and Flexural Resistance Factor* < 1
Live load	Shear (kip)	Axial (kip)	Moment (in-kip)	Max Moment in Pile (in-kip)	Bearing Capacity (kips)	Pile Type	Axial (kips)	Moment (kip-in)	C/D Ratio Axial	
HL-93 Inv.	14.1	225.0	1188.2	4337.1	520.0	HP14X117	1074.4	4570	**2.865**	**0.530**

*$C_{Ma}=P_U/P_R+\gamma((M_{Ux}/M_{rx})+(M_{Uy}/M_{ry})) < 1.0$ AASHTO 6.9.2.2-2

*C/D Ratio AASHTO 6.9.4

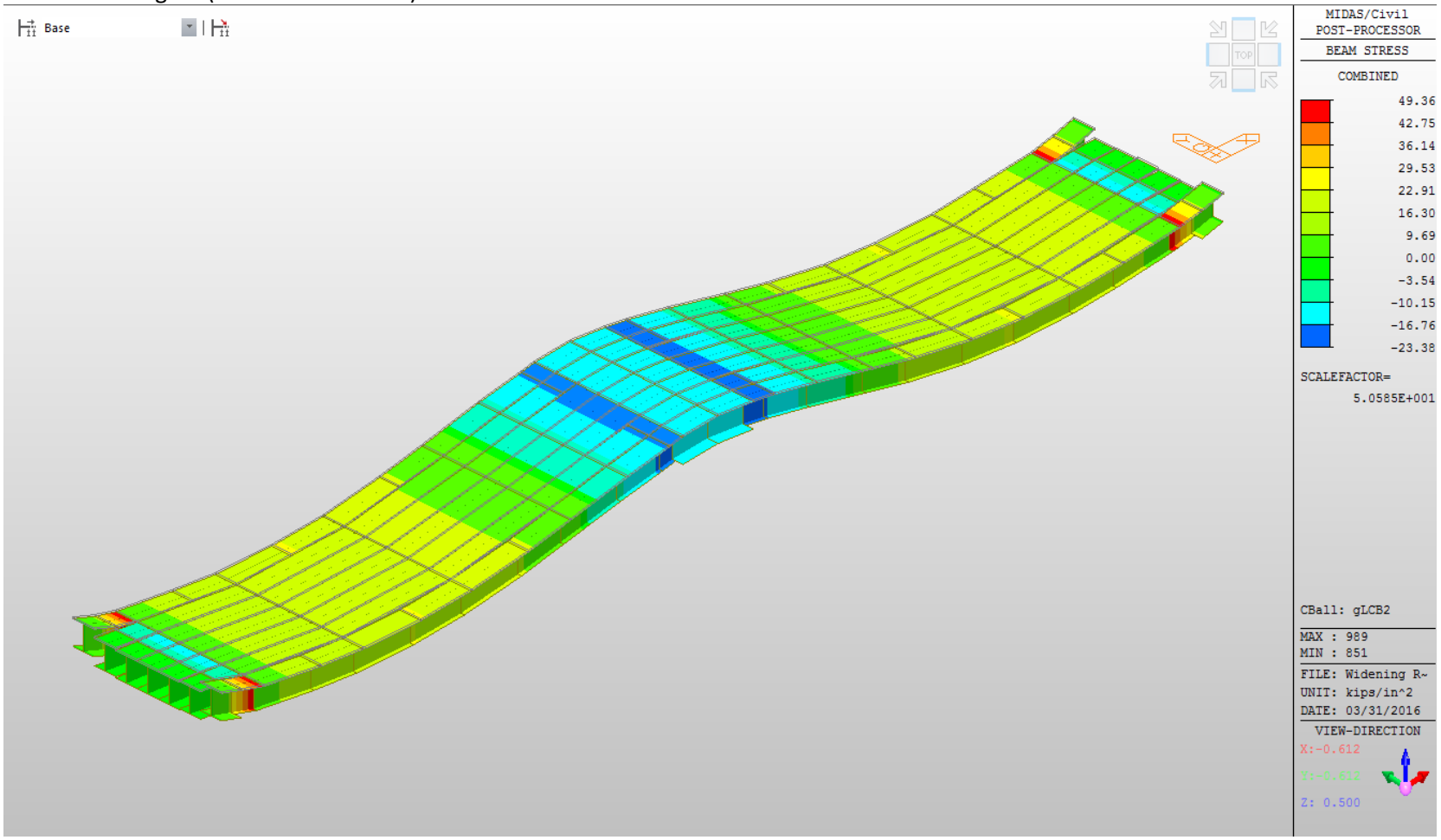
Truss Widening: Swing Span (widening Truss 2’ on each side)



LRFD ANALYSIS

Truss Widening: Swing Span

Stresses: Strength I (Factored DL and LL)



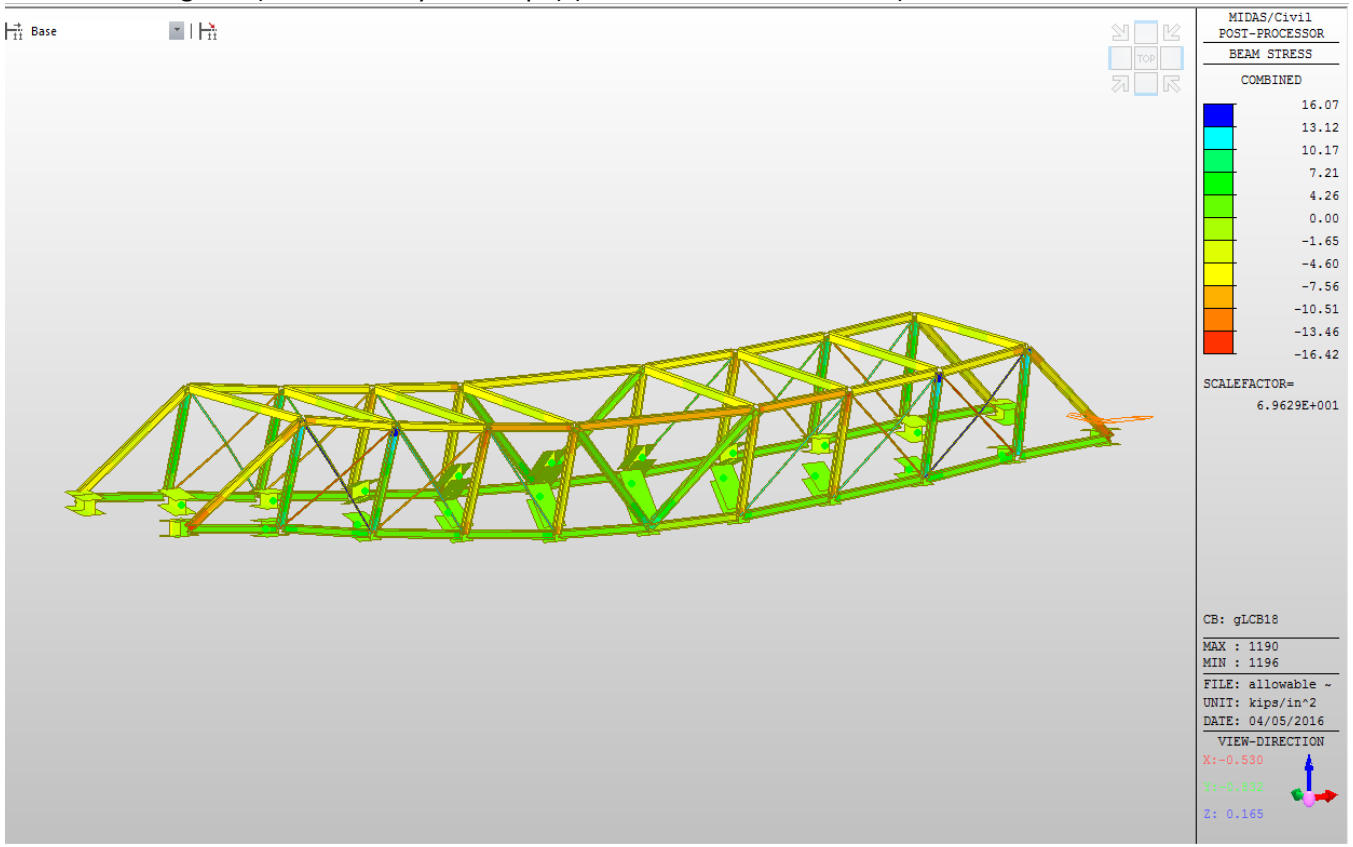
50 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Swing Truss: Proposed Widening

Stresses: Strength III (Wind Velocity= 125 mph) (Fixed Moment Connection)



Stress = 16.42 ksi 25.5 ksi Steel

Windward load = .08 ksf

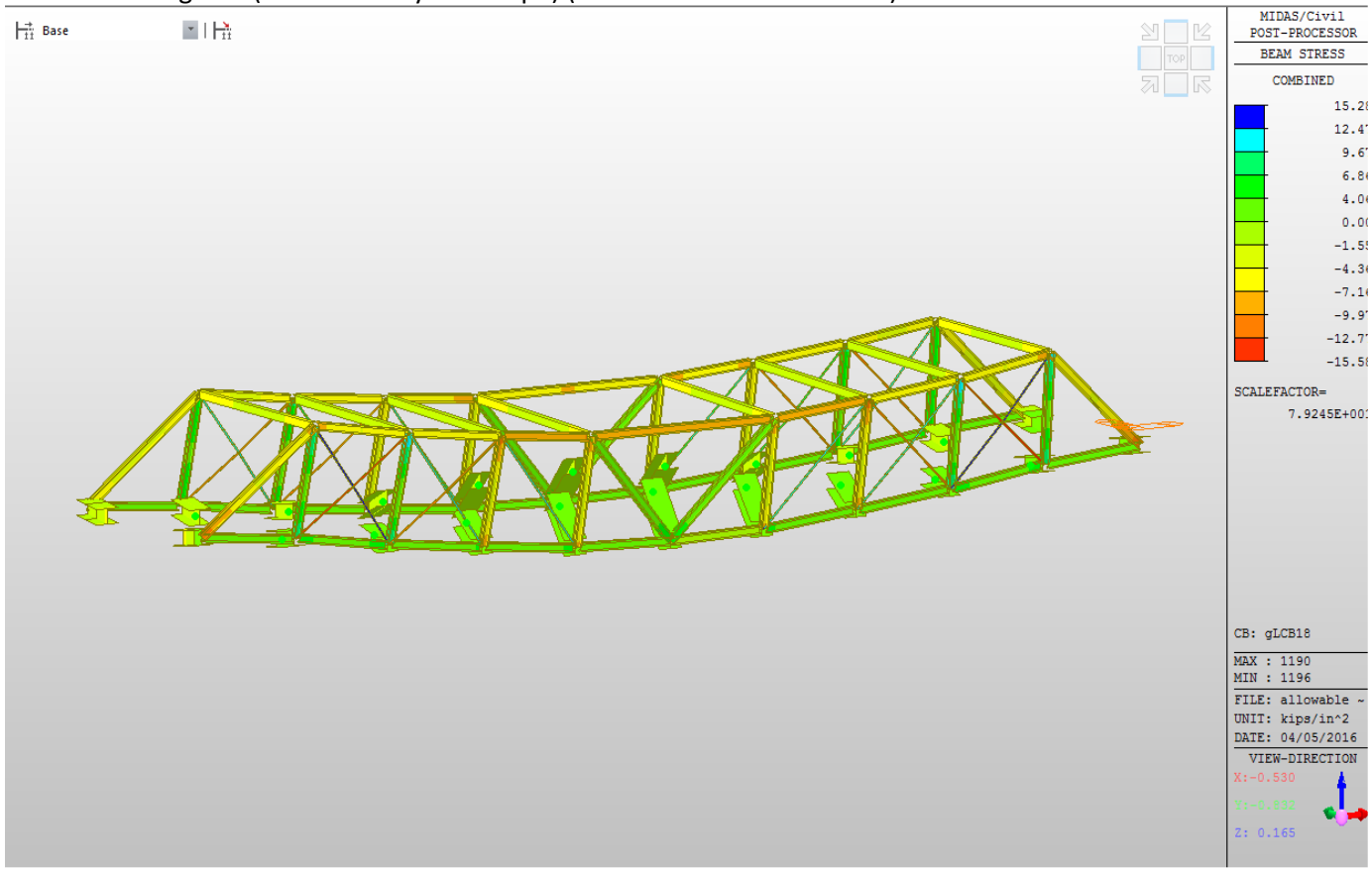
Leeward load = .04 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Swing Truss: Proposed Widening

Stresses: Strength III (Wind Velocity= 100 mph) (Fixed Moment Connection)



Stress = 15.58 ksi 25.5 ksi Steel

Windward load = .0512 ksf

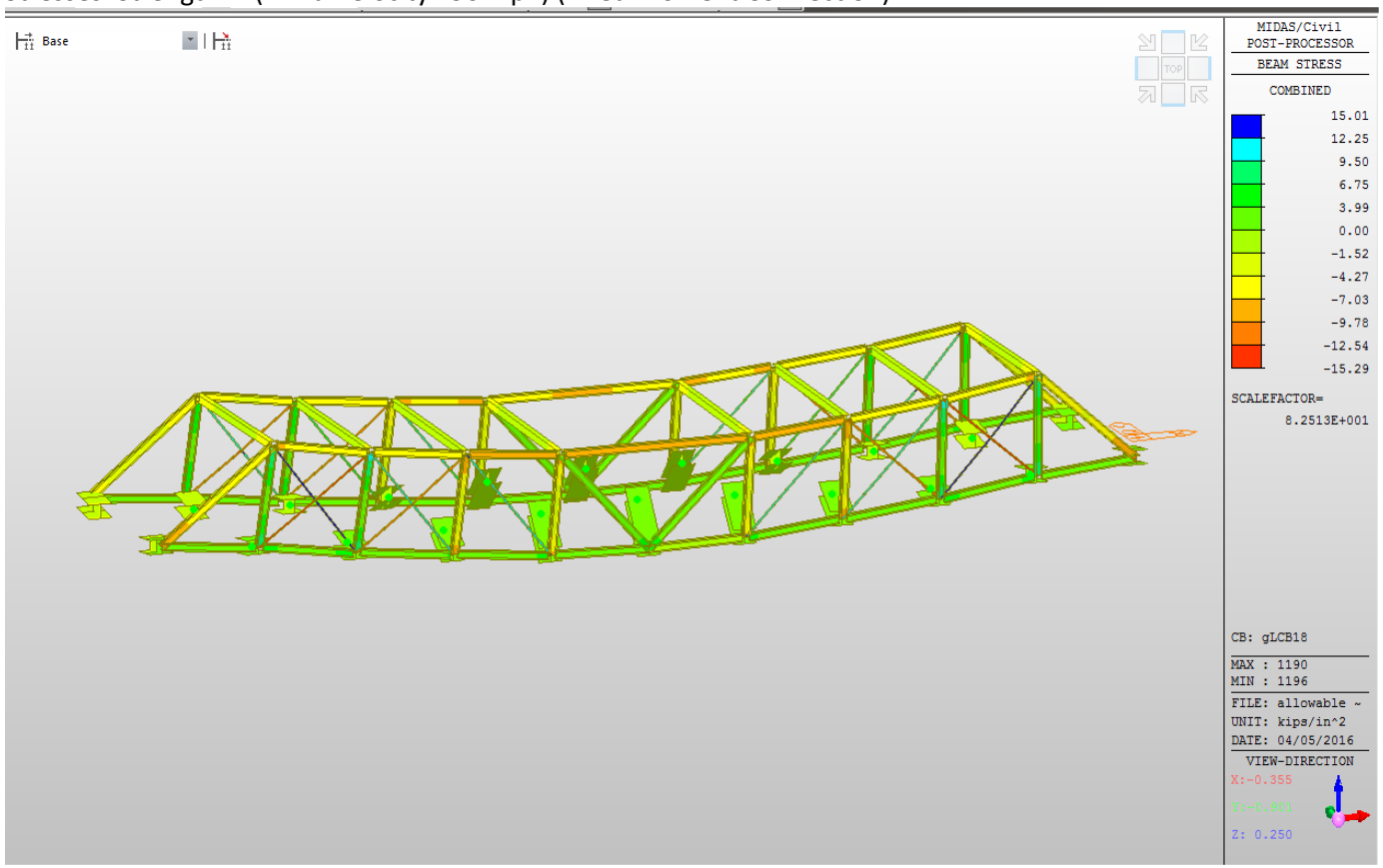
Leeward load = .0256 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Swing Truss: Proposed Widening

Stresses: Strength III (Wind Velocity= 90 mph) (Fixed Moment Connection)



Stress = 15.29 ksi 25.5 ksi Steel

Windward load = .0415 ksf

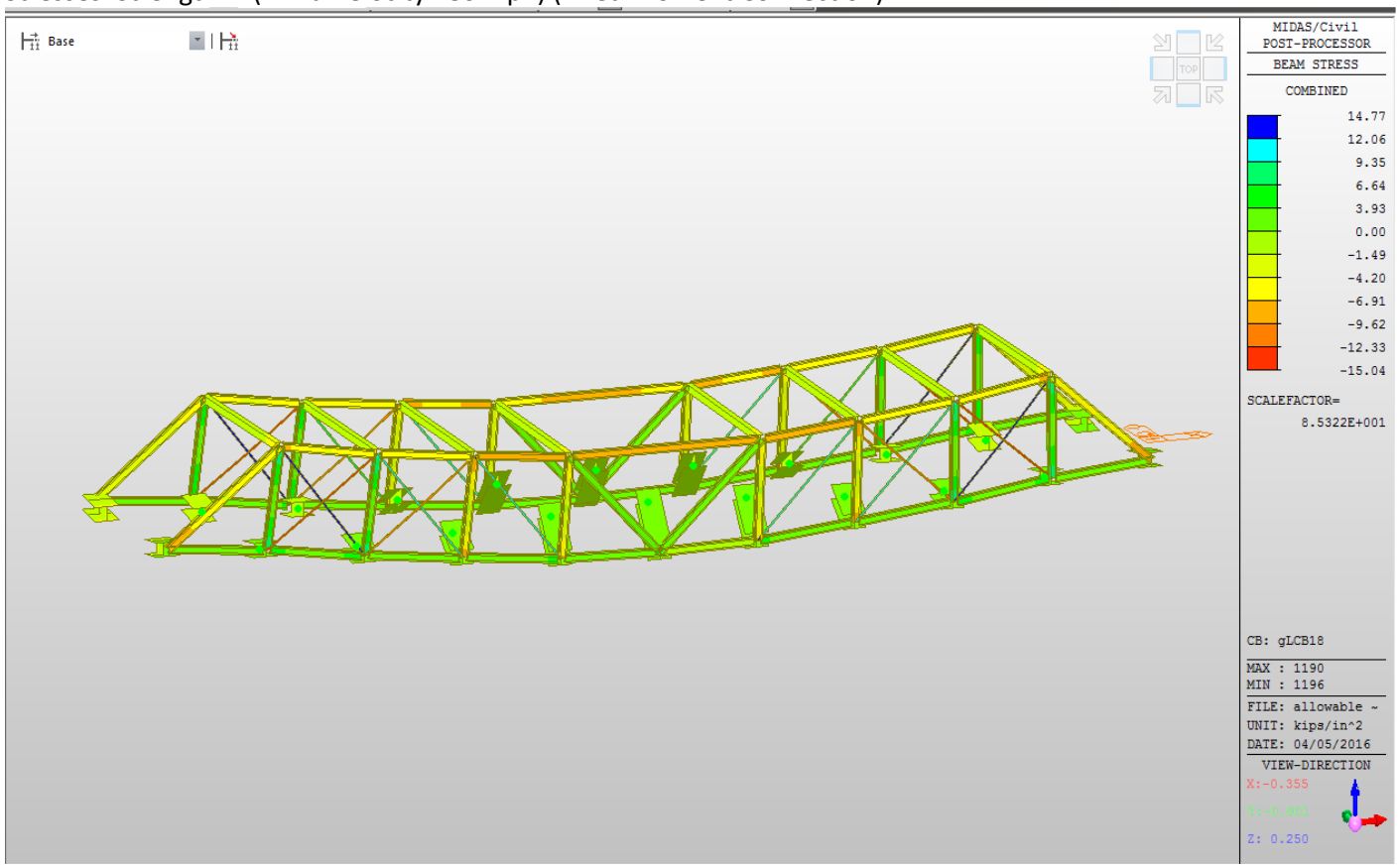
Leeward load = .0207 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Swing Truss: Proposed Widening

Stresses: Strength III (Wind Velocity= 80 mph) (Fixed Moment Connection)



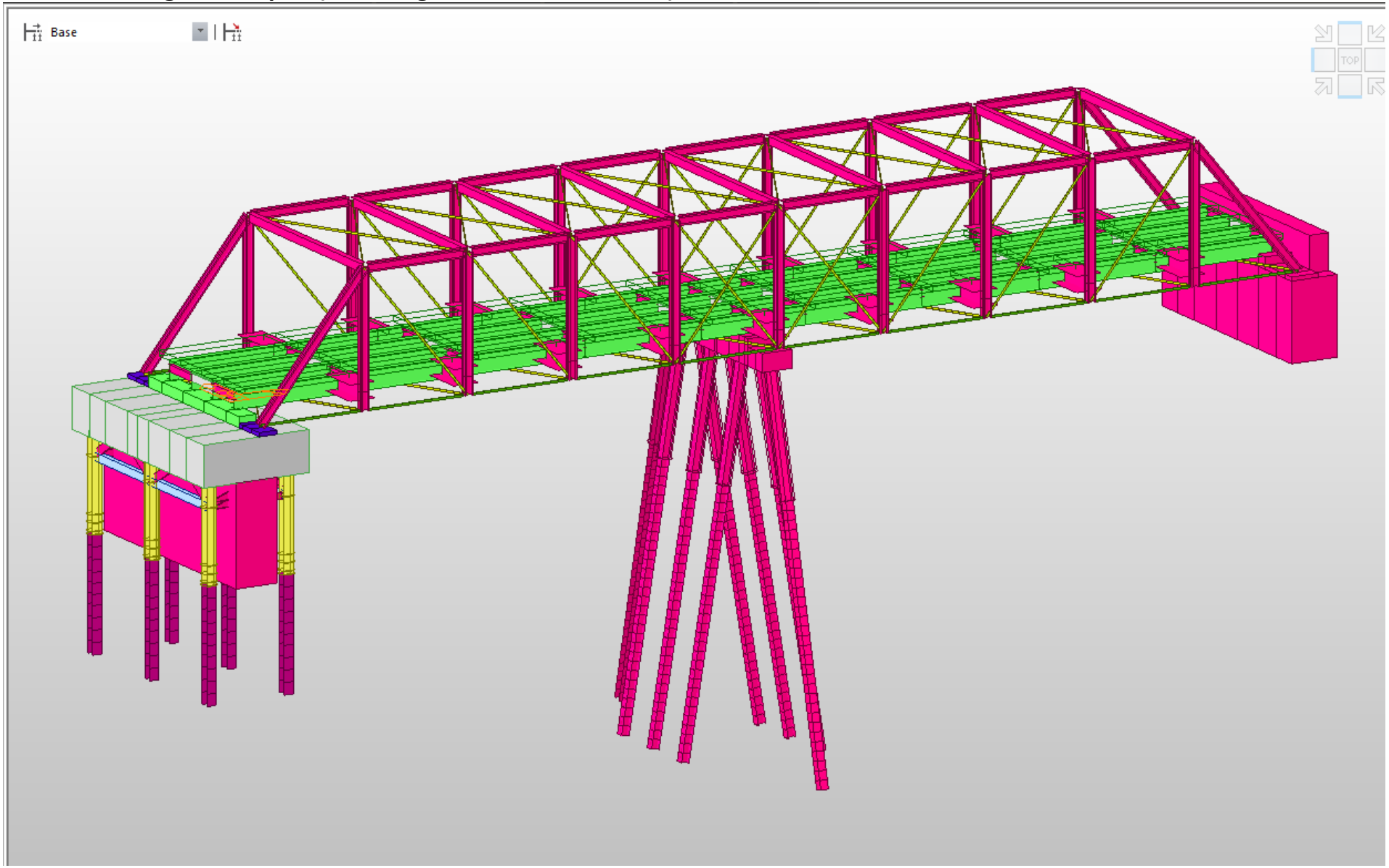
Stress = 15.02 ksi 25.5 ksi Steel

Windward load = .0328 ksf

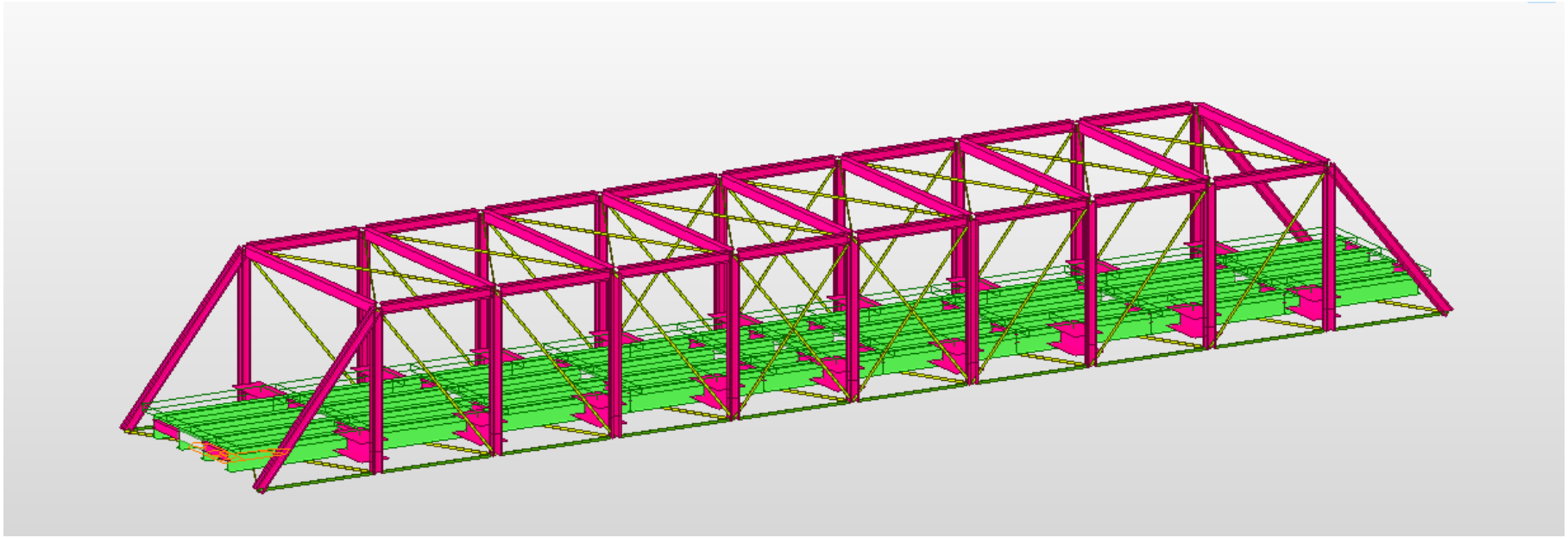
Leeward load = .0164 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

Truss Widening: Fixed Span (widening Truss 2’ on each side)



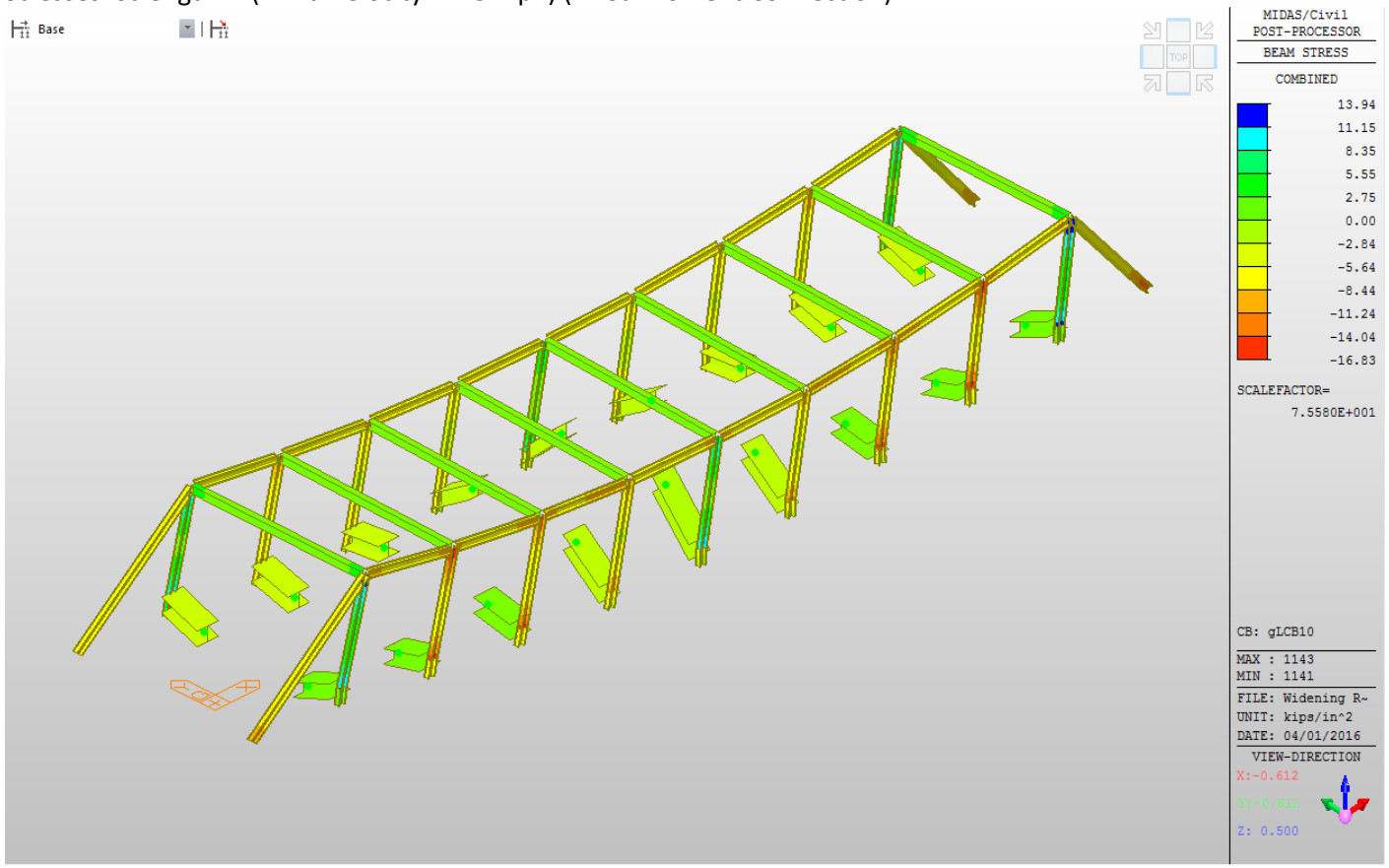
Truss Widening: Fixed Truss



LRFD ANALYSIS

Fixed Truss: Proposed Widening (Main Members)

Stresses: Strength III (Wind Velocity= 125 mph) (Fixed Moment Connection)



Stress = 16.83 ksi 25.5 ksi Steel

Windward load = .08 ksf

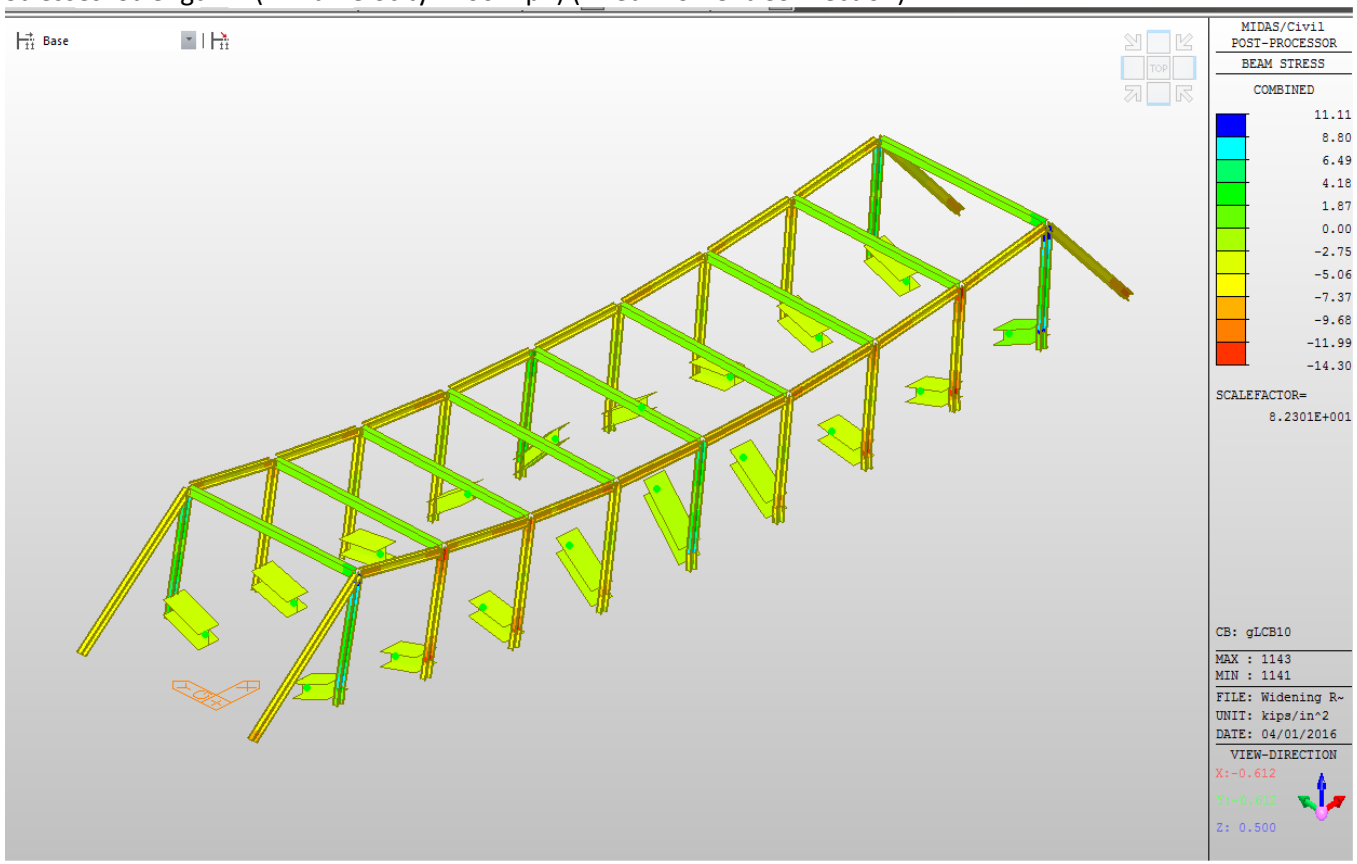
Leeward load = .04 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Fixed Truss: Proposed Widening (Main Members)

Stresses: Strength III (Wind Velocity= 100 mph) (Fixed Moment Connection)



Stress =14.30 ksi 25.5 ksi Steel

Windward load = .0512 ksf

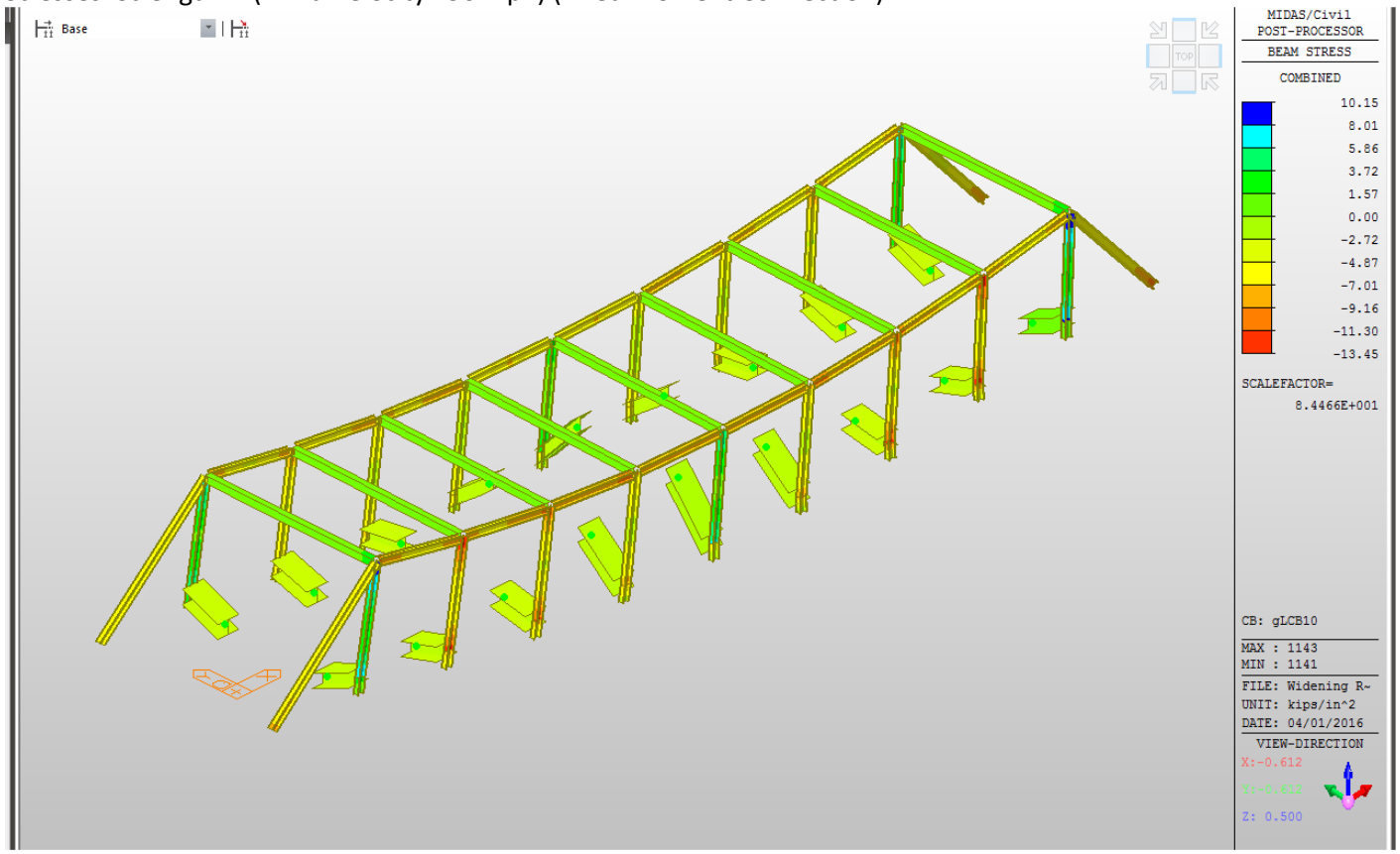
Leeward load = .0256 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Fixed Truss: Proposed Widening (Main Members)

Stresses: Strength III (Wind Velocity= 90 mph) (Fixed Moment Connection)



Stress = 13.45 ksi 25.5 ksi Steel

Windward load = .0415 ksf

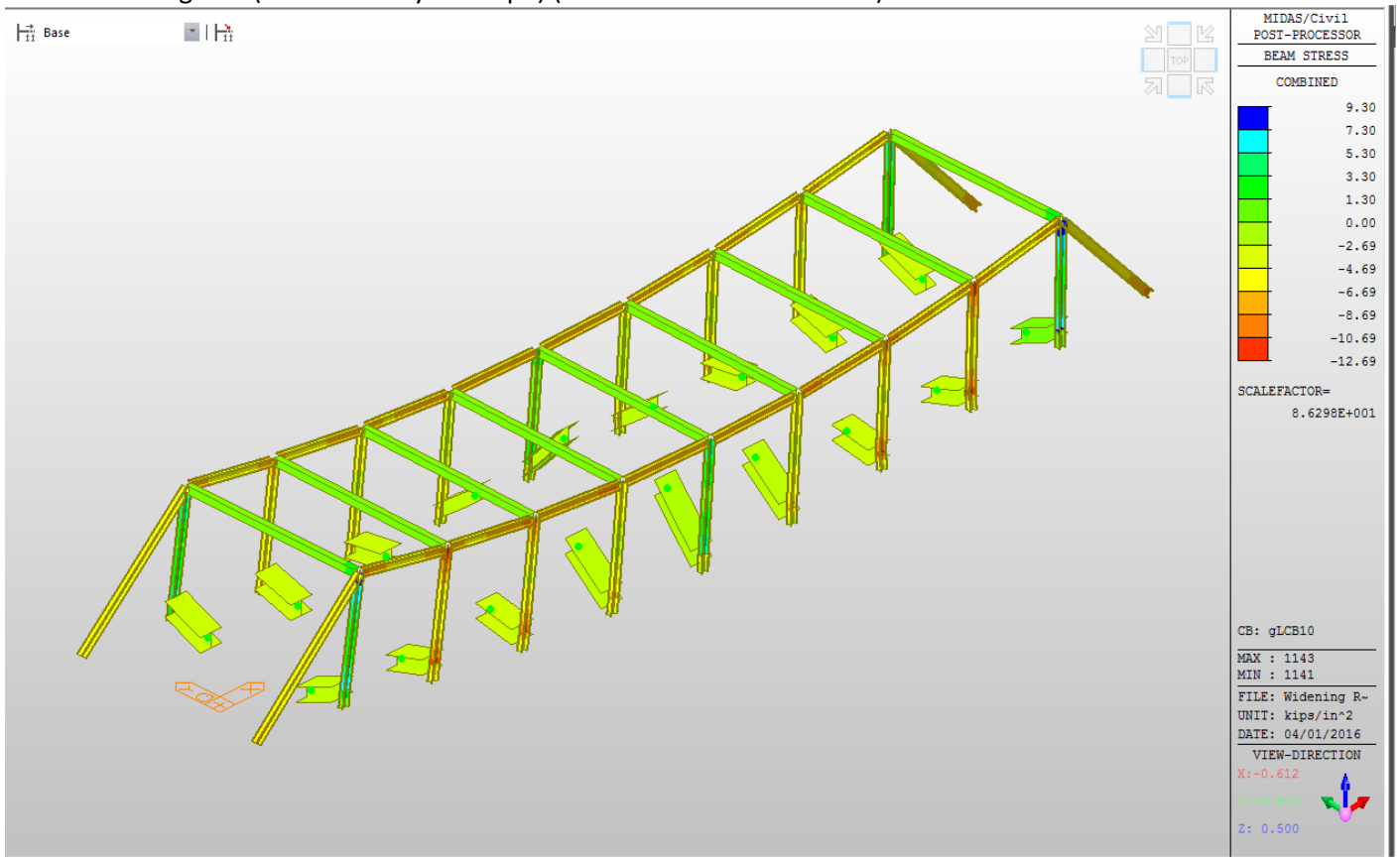
Leeward load = .0207 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Fixed Truss: Proposed Widening (Main Members)

Stresses: Strength III (Wind Velocity= 80 mph) (Fixed Moment Connection)



Stress = 12.69 ksi 25.5 ksi Steel

Windward load = .0328 ksf

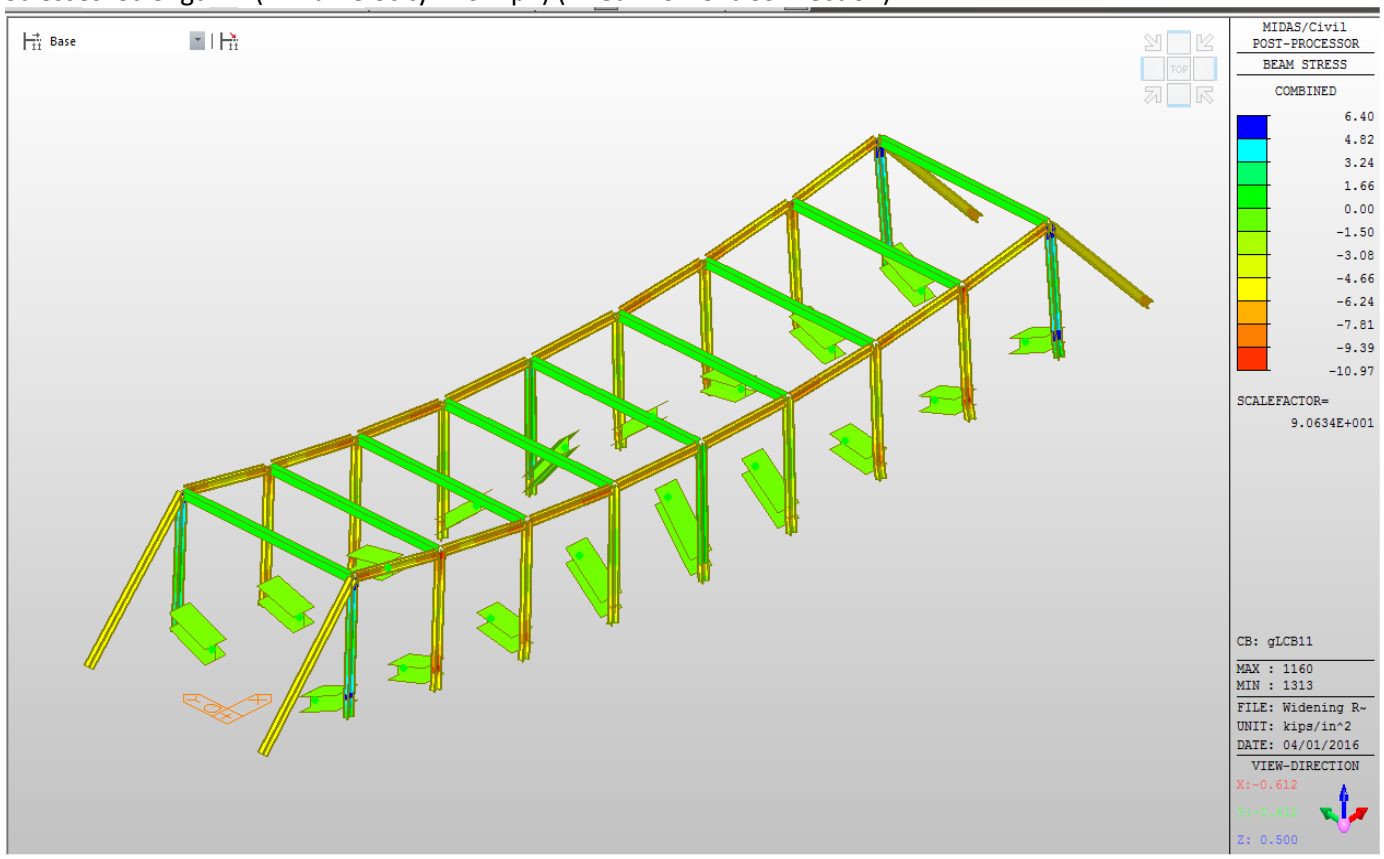
Leeward load = .0164 ksf

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Fixed Truss: Proposed Widening (Main Members)

Stresses: Strength III (Wind Velocity= 70 mph) (Fixed Moment Connection)



Stress = 10.97 ksi 25.5 ksi Steel

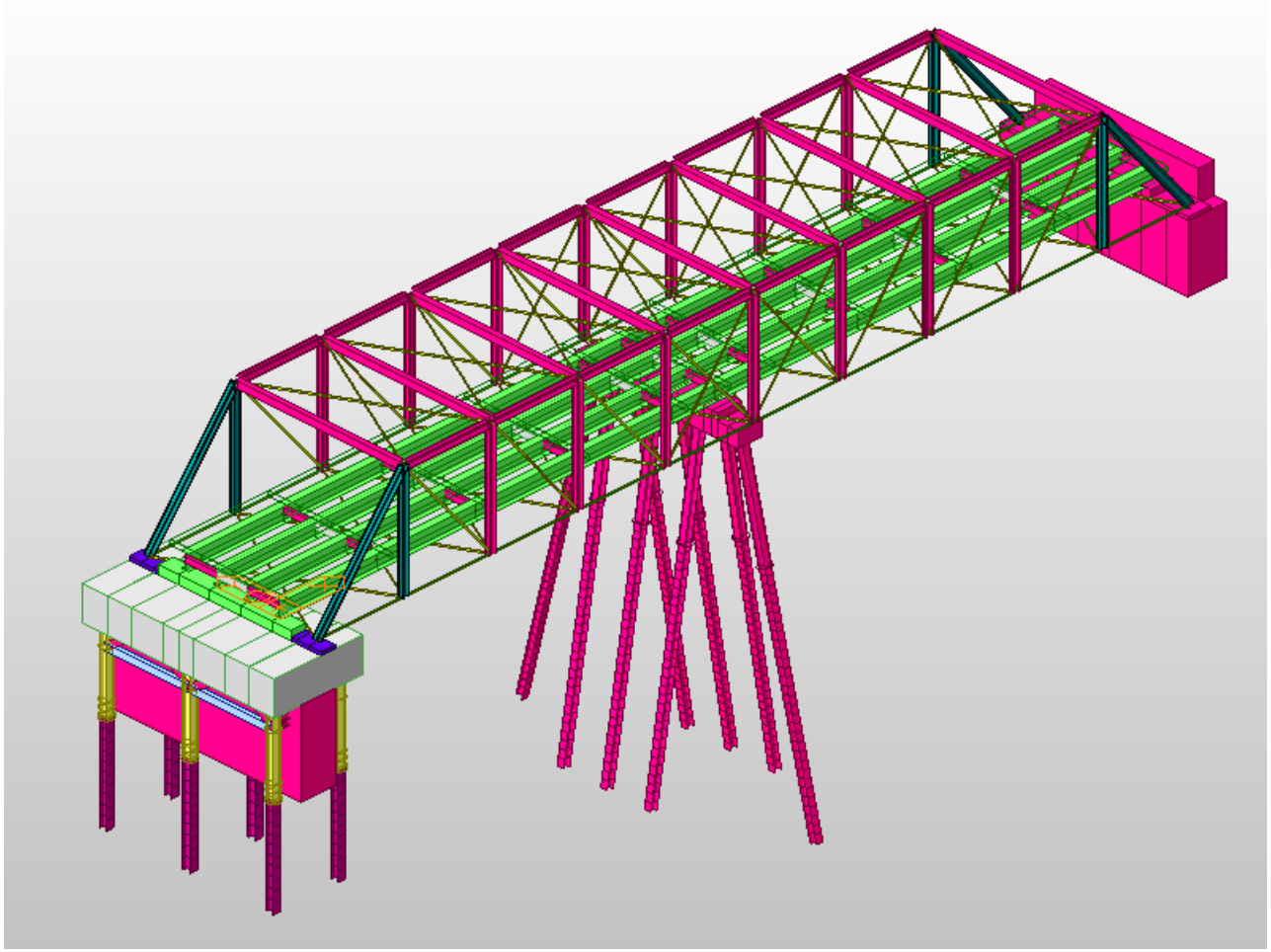
Windward load = .025 ksf

Leeward load = .0125 ksf

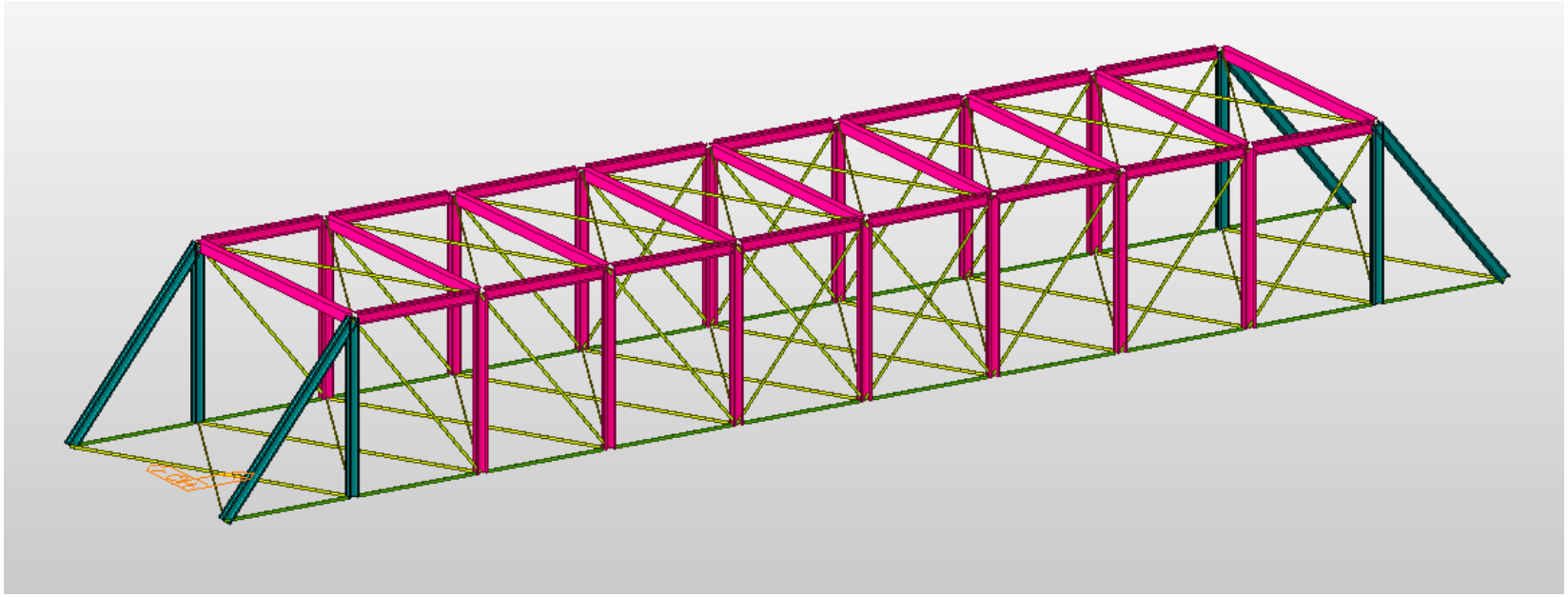
Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

LRFD ANALYSIS

Truss Widening: Fixed Span (adding 1” plate to diagonal and end columns)



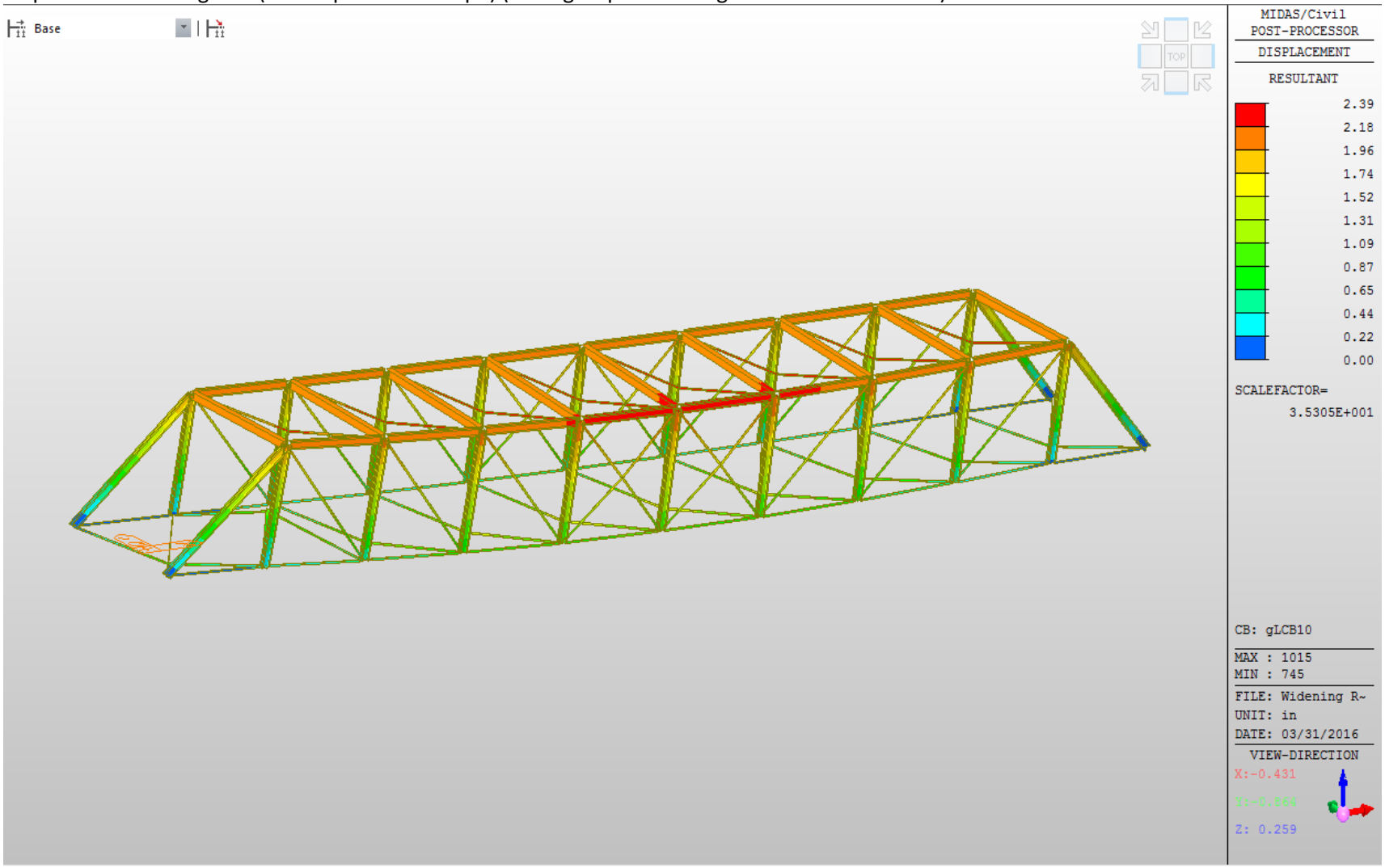
Truss Widening: Fixed Truss (adding 1” plate to diagonal and end columns)



LRFD ANALYSIS

Fixed Truss: Widening Truss 2’ on each side

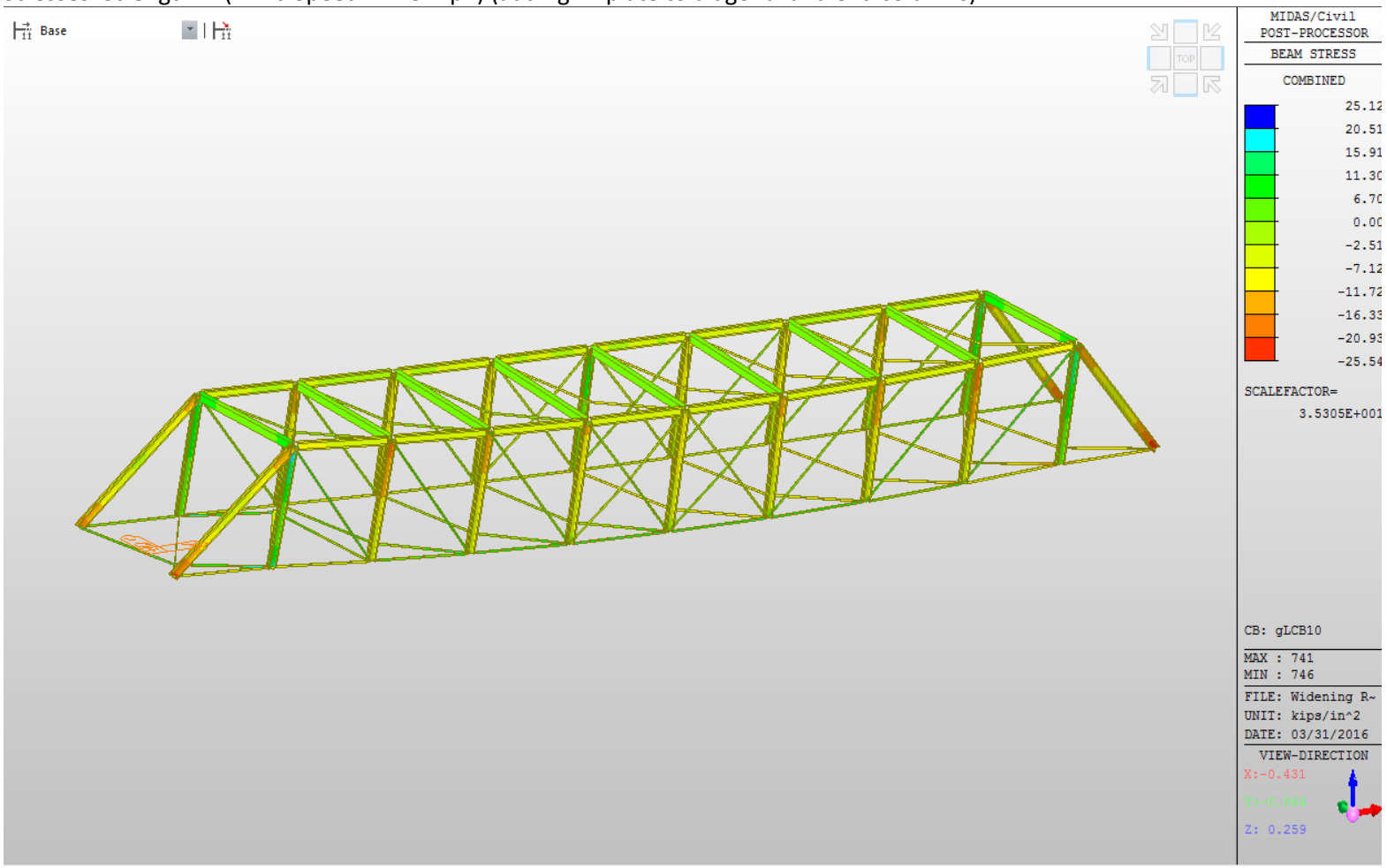
Displacement: Strength III (Wind Speed = 125 mph) (adding 1” plate to diagonal and end columns)



LRFD ANALYSIS

Truss Widening: Fixed Truss (Entire Truss)

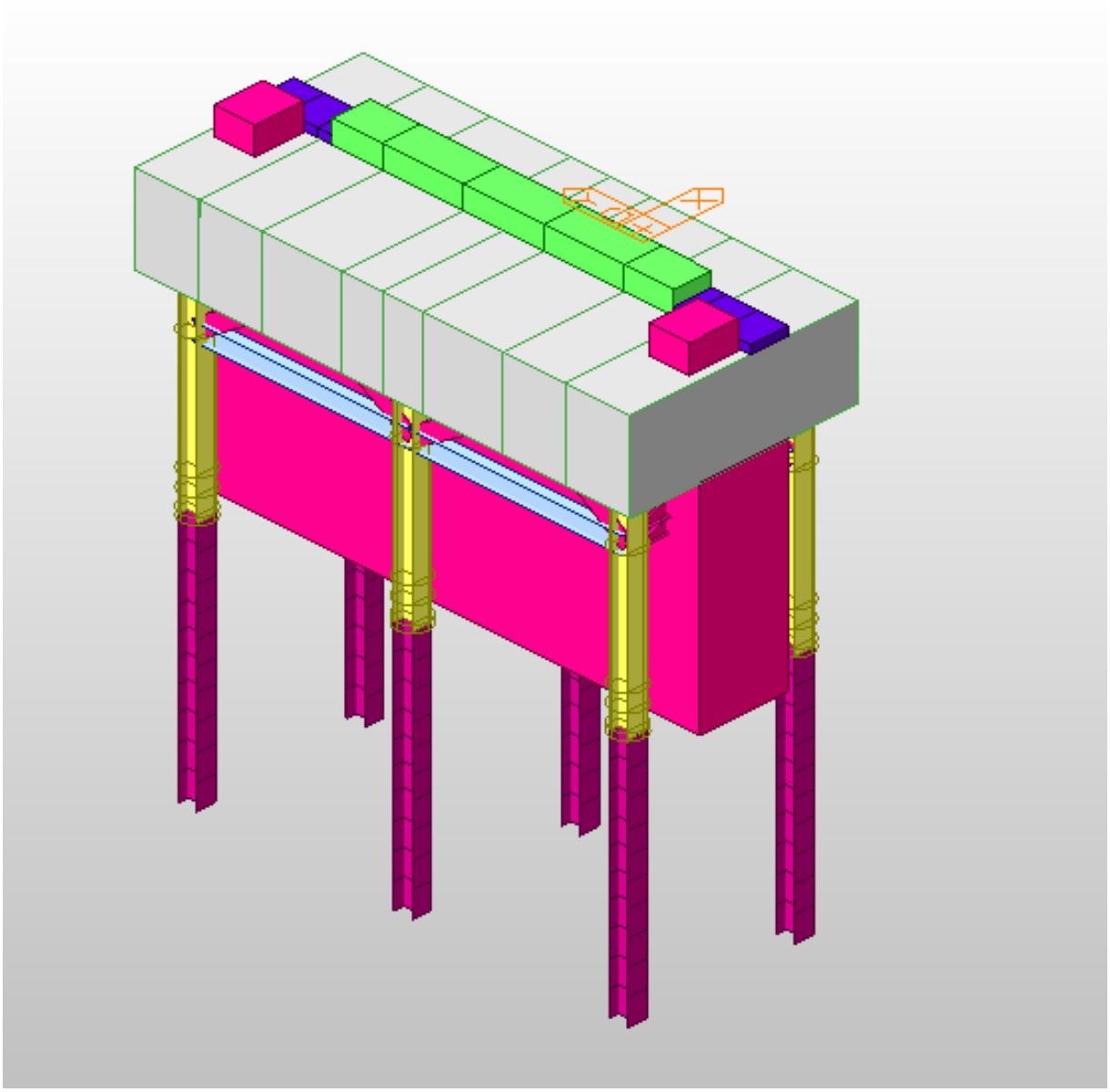
Stresses: Strength III (Wind Speed = 125 mph) (adding 1” plate to diagonal and end columns)



25.5 ksi Steel

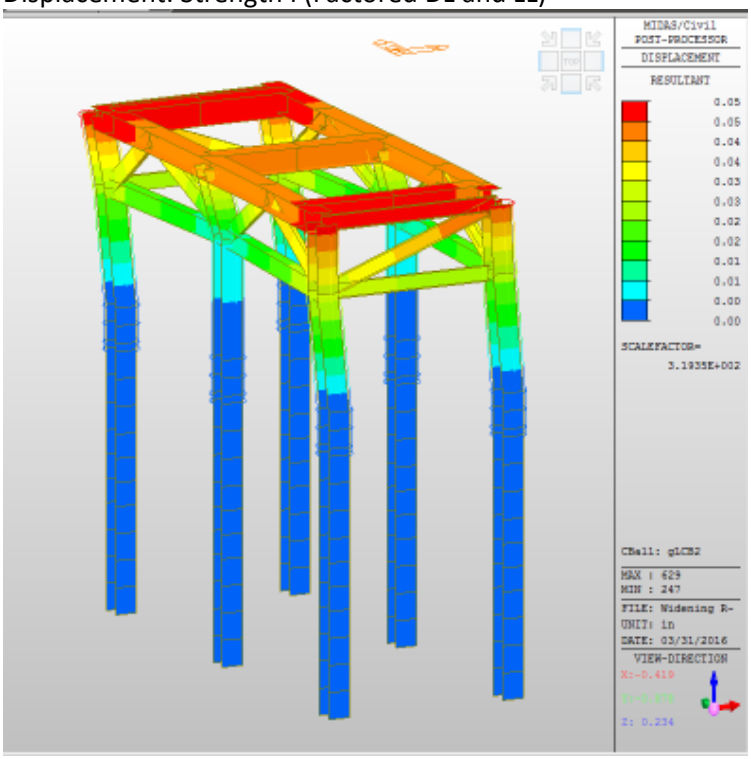
Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ±Sax (Warping).

Pier 2: Widening Truss 2’ on each side

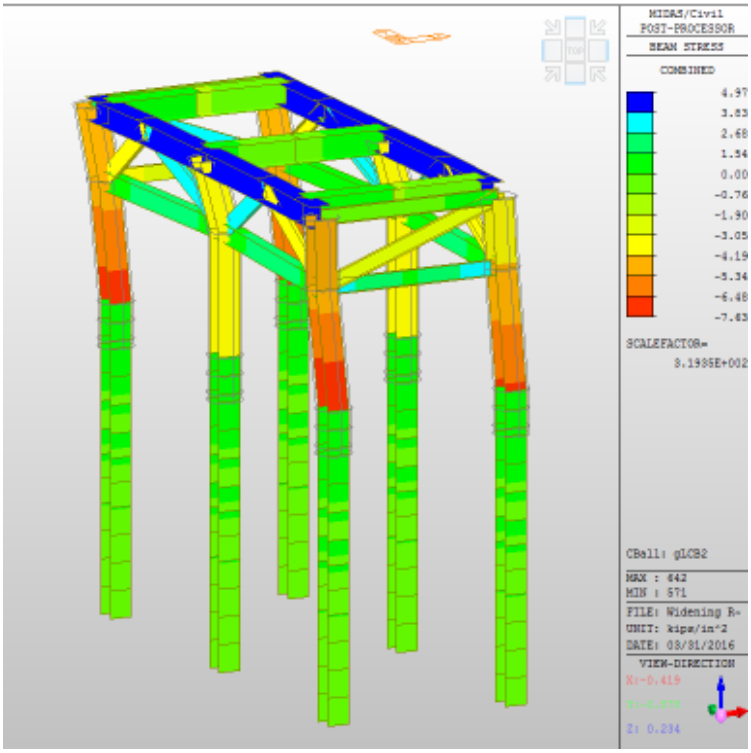


Pier 2: Widening Truss 2’ on each side

Displacement: Strength I (Factored DL and LL)



Stresses: Strength I (Factored DL and LL)

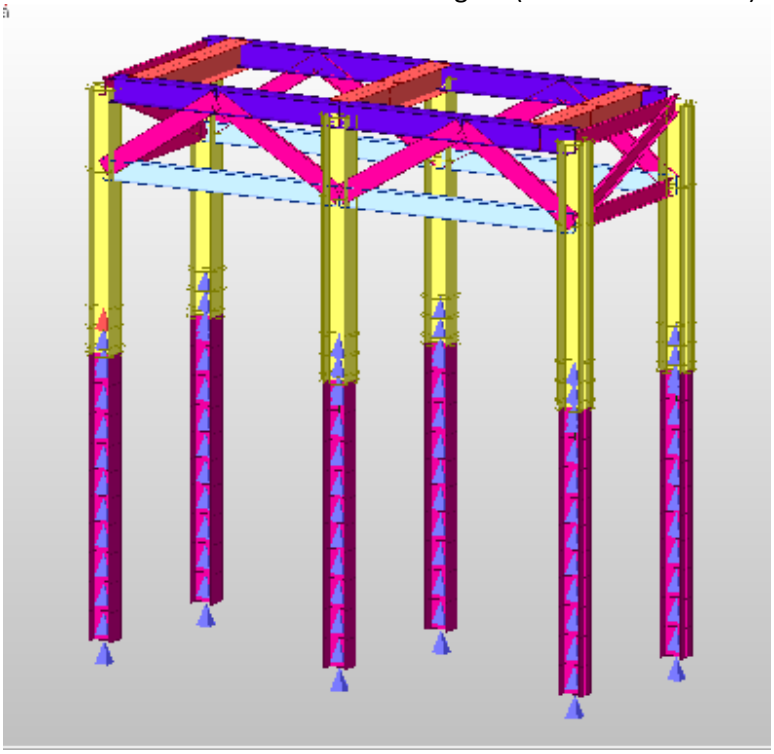


50 ksi Steel

Combined: Combined stress (Combined stress: Sax ± Sby ± Sbz). When warping effect is considered in Section Properties, combined moment is obtained by maximum or minimum value of Sax ± Sby ±Sbz ± Sax (Warping).

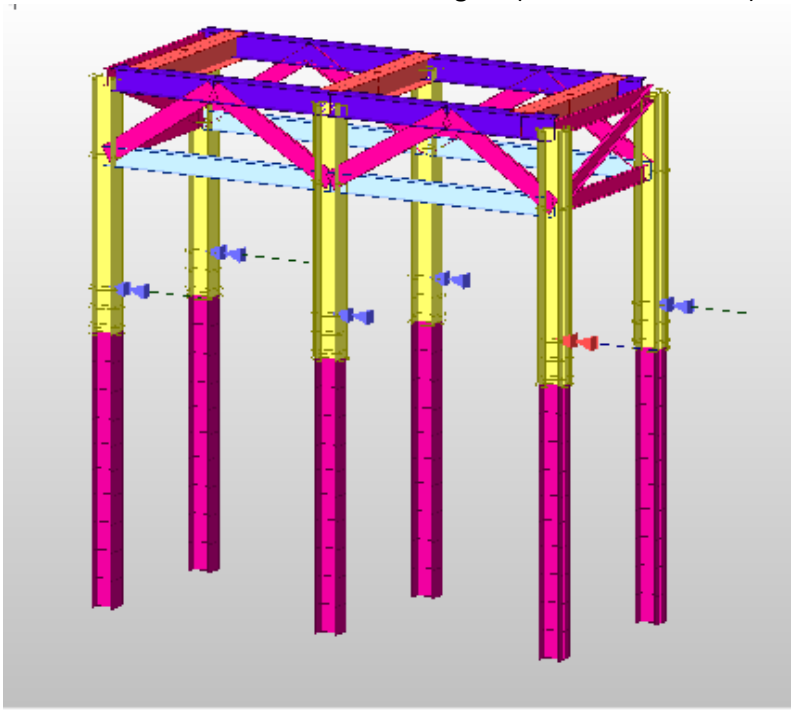
Pier 2: Widening Truss 2’ on each side

Reactions: Maximum Axial Load-Strength I (Factored DL and LL)



Maximum Axial Load = 225 kips

Reactions: Maximum Axial Load-Strength I (Factored DL and LL)



Maximum Moment = 1188.1 in-kips

LPile for Windows, Version 2015-08.007

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
© 1985-2015 by Ensoft, Inc.
All Rights Reserved

This copy of LPile is being used by:

CJM
Wethersfield

Serial Number of Security Device: 227885239

This copy of LPile is licensed for exclusive use by:

Close, Jensen and Miller, P.C.,

Use of this program by any entity other than Close, Jensen and Miller, P.C.,
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\Liaison\State Bridge Program\Project Files\01349, SPN 158-212, List 28\1-Pre-Design\Calculations\01349 L-Pile\

Name of input data file:
01349 pier 2 (max axial load) Widening Rehab.lp8d

Name of output report file:
01349 pier 2 (max axial load) Widening Rehab.lp8o

Name of plot output file:
01349 pier 2 (max axial load) Widening Rehab.lp8p

Name of runtime message file:
01349 pier 2 (max axial load) Widening Rehab.lp8r

Date and Time of Analysis

Date: May 16, 2016 Time: 12:13:16

Problem Title

Project Name: Rehabilitation Bridge No. 01349, ROute 136 Over Saugatuck

Job Number: 158-212

Client: CT DOT

Engineer: Danielle Coutu

Description: Pier 2 Analysis for Proposed Widening

Program Options and Settings

Computational Options:
- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- Analysis includes loading by one distributed lateral load acting on pile
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

- Output files use decimal points to denote decimal symbols.
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 29.000 ft
Depth of ground surface below top of pile = 11.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	14.8850
2	29.000	14.8850

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is an elastic pile
Cross-sectional Shape = Strong H-Pile
Length of section = 29.000000 ft
Flange Width = 14.885000 in
Section Depth = 14.250000 in
Flange Thickness = 0.805000 in
Web Thickness = 0.812500 in
Section Area = 34.234850 sq. in
Moment of Inertia = 1221. in^4
Elastic Modulus = 29000000. psi

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is cemented silt with cohesion and friction

Distance from top of pile to top of layer = 11.000000 ft
Distance from top of pile to bottom of layer = 13.000000 ft
Effective unit weight at top of layer = 120.000000 pcf
Effective unit weight at bottom of layer = 120.000000 pcf
Undrained cohesion at top of layer = 500.000000 psf
Undrained cohesion at bottom of layer = 500.000000 psf
Friction angle at top of layer = 10.000000 deg.
Friction angle at bottom of layer = 10.000000 deg.
Epsilon-50 at top of layer = 0.010000
Epsilon-50 at bottom of layer = 0.010000
Subgrade k at top of layer = 18.000000 pci
Subgrade k at bottom of layer = 18.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 13.000000 ft
Distance from top of pile to bottom of layer = 22.000000 ft
Effective unit weight at top of layer = 125.000000 pcf
Effective unit weight at bottom of layer = 125.000000 pcf
Friction angle at top of layer = 38.000000 deg.
Friction angle at bottom of layer = 38.000000 deg.
Subgrade k at top of layer = 25.000000 pci
Subgrade k at bottom of layer = 25.000000 pci

Layer 3 is weak rock, p-y criteria by Reese, 1997

Distance from top of pile to top of layer = 22.000000 ft

```
   Distance from top of pile to bottom of layer        =    29.000000 ft
   Effective unit weight at top of layer               =   125.000000 pcf
   Effective unit weight at bottom of layer            =   125.000000 pcf
   Uniaxial compressive strength at top of layer       =   500.000000 psi
   Uniaxial compressive strength at bottom of layer    =   500.000000 psi
   Initial modulus of rock at top of layer             =     1050000. psi
   Initial modulus of rock at bottom of layer          =     1050000. psi
   RQD of rock at top of layer                         =       0.0000 %
   RQD of rock at bottom of layer                      =       0.0000 %
   k rm of rock at top of layer                        =    0.0005000
   k rm of rock at bottom of layer                     =    0.0005000


Layer 4 is massive rock, p-y criteria by Liang et al., 2009

   Distance from top of pile to top of layer           =    29.000000 ft
   Distance from top of pile to bottom of layer        =    30.000000 ft
   Effective unit weight at top of layer               =   139.000000 pcf
   Effective unit weight at bottom of layer            =   139.000000 pcf
   Uniaxial compressive strength at top of layer       =       11600. psi
   Uniaxial compressive strength at bottom of layer    =       11600. psi
   Poisson's ratio at top of layer                     =     0.250000
   Poisson's ratio at bottom of layer                  =     0.250000
   Option 1: Intact rock modulus at top of layer       =     1500000. psi
             Intact rock modulus at bottom of layer    =     1500000. psi
   Option 1: Geologic Strength Index for layer         =    50.000000
   Option 2: Rock mass modulus at top of layer         =       0.0000 psi
             Rock mass modulus at bottom of layer      =       0.0000 psi
   Option 1 will be used to compute values of rock mass modulus for the p-y curve
            in massive rock.
   The rock type is (metamorphic) gneiss, Hoek-Brown Material Constant mi = 28


 (Depth of the lowest soil layer extends 1.000 ft below the pile tip)
```

Summary of Input Soil Properties

Layer Num.	Soil Type (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	Uniaxial qu psi	RQD %	E50 or krm	kpy pci
1	Cemented	11.0000	120.0000	500.0000	10.0000	--	--	0.01000	18.0000
--	--	0.00	0.00	0.00					
	Silt	13.0000	120.0000	500.0000	10.0000	--	--	0.01000	18.0000
--	--	0.00	0.00	0.00					
2	Sand	13.0000	125.0000	--	38.0000	--	--	--	25.0000
--	--	0.00	0.00	0.00					
	(Reese, et al.)	22.0000	125.0000	--	38.0000	--	--	--	25.0000
--	--	0.00	0.00	0.00					
3	Weak	22.0000	125.0000	--	--	500.0000	0.00	5.00E-04	--
1050000.	--	0.00	0.00	0.00					
	Rock	29.0000	125.0000	--	--	500.0000	0.00	5.00E-04	--
1050000.	--	0.00	0.00	0.00					
4	Massive	29.0000	139.0000	--	--	11600.	--	--	--
Internally	50.0000	1500000.	28.0000	0.2500					
	Rock	30.0000	139.0000	--	--	11600.	--	--	--
Computed	50.0000	1500000.	28.0000	0.2500					

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Distributed Lateral Loading Used For All Load Cases

Distributed lateral load intensity defined using 2 points

Point No.	Depth X in	Dist. Load lb/in
1	0.000	0.000
2	0.000	0.000

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length

1	1	V = 14100. lbs	M = 1188100. in-lbs	225000.	Yes

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with
specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic section properties

---

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	11.0000	0.00	N.A.	No	0.00	596.9777
2	13.0000	0.7588	No	No	596.9777	197499.
3	22.0000	11.0000	No	Yes	N.A.	N.A.
4	29.0000	18.0000	No	Yes	N.A.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals
for Layer n. Layering correction equivalent depths are computed only
for soil types with both shallow-depth and deep-depth expressions for
peak lateral load transfer. These soil types are soft and stiff clays,
non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 14100.0 lbs
Applied moment at pile head = 1188100.0 in-lbs
Axial thrust load on pile head = 225000.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	3.9493	1188100.	14100.	-0.02518	13814.	3.54E+10	0.00	0.00	0.00
0.2900	3.8619	1256836.	14100.	-0.02506	14233.	3.54E+10	0.00	0.00	0.00
0.5800	3.7749	1325475.	14100.	-0.02493	14651.	3.54E+10	0.00	0.00	0.00
0.8700	3.6883	1394013.	14100.	-0.02480	15069.	3.54E+10	0.00	0.00	0.00
1.1600	3.6023	1462443.	14100.	-0.02466	15486.	3.54E+10	0.00	0.00	0.00
1.4500	3.5167	1530761.	14100.	-0.02451	15902.	3.54E+10	0.00	0.00	0.00
1.7400	3.4317	1598960.	14100.	-0.02436	16318.	3.54E+10	0.00	0.00	0.00
2.0300	3.3472	1667037.	14100.	-0.02419	16733.	3.54E+10	0.00	0.00	0.00
2.3200	3.2633	1734986.	14100.	-0.02403	17147.	3.54E+10	0.00	0.00	0.00
2.6100	3.1800	1802801.	14100.	-0.02385	17561.	3.54E+10	0.00	0.00	0.00
2.9000	3.0973	1870477.	14100.	-0.02367	17973.	3.54E+10	0.00	0.00	0.00
3.1900	3.0152	1938009.	14100.	-0.02349	18385.	3.54E+10	0.00	0.00	0.00
3.4800	2.9338	2005392.	14100.	-0.02329	18795.	3.54E+10	0.00	0.00	0.00
3.7700	2.8531	2072621.	14100.	-0.02309	19205.	3.54E+10	0.00	0.00	0.00
4.0600	2.7731	2139691.	14100.	-0.02289	19614.	3.54E+10	0.00	0.00	0.00
4.3500	2.6938	2206595.	14100.	-0.02267	20022.	3.54E+10	0.00	0.00	0.00
4.6400	2.6153	2273330.	14100.	-0.02245	20429.	3.54E+10	0.00	0.00	0.00
4.9300	2.5376	2339890.	14100.	-0.02222	20834.	3.54E+10	0.00	0.00	0.00
5.2200	2.4606	2406270.	14100.	-0.02199	21239.	3.54E+10	0.00	0.00	0.00
5.5100	2.3845	2472465.	14100.	-0.02175	21642.	3.54E+10	0.00	0.00	0.00
5.8000	2.3092	2538469.	14100.	-0.02151	22045.	3.54E+10	0.00	0.00	0.00
6.0900	2.2348	2604279.	14100.	-0.02125	22446.	3.54E+10	0.00	0.00	0.00
6.3800	2.1613	2669887.	14100.	-0.02099	22846.	3.54E+10	0.00	0.00	0.00
6.6700	2.0887	2735291.	14100.	-0.02073	23244.	3.54E+10	0.00	0.00	0.00
6.9600	2.0170	2800484.	14100.	-0.02046	23642.	3.54E+10	0.00	0.00	0.00
7.2500	1.9463	2865461.	14100.	-0.02018	24038.	3.54E+10	0.00	0.00	0.00
7.5400	1.8766	2930218.	14100.	-0.01989	24432.	3.54E+10	0.00	0.00	0.00
7.8300	1.8079	2994749.	14100.	-0.01960	24826.	3.54E+10	0.00	0.00	0.00
8.1200	1.7402	3059050.	14100.	-0.01930	25218.	3.54E+10	0.00	0.00	0.00
8.4100	1.6735	3123116.	14100.	-0.01900	25608.	3.54E+10	0.00	0.00	0.00
8.7000	1.6079	3186941.	14100.	-0.01869	25997.	3.54E+10	0.00	0.00	0.00

8.9900	1.5434	3250521.	14100.	-0.01837	26385.	3.54E+10	0.00	0.00	0.00
9.2800	1.4801	3313851.	14100.	-0.01805	26771.	3.54E+10	0.00	0.00	0.00
9.5700	1.4178	3376925.	14100.	-0.01772	27155.	3.54E+10	0.00	0.00	0.00
9.8600	1.3567	3439740.	14100.	-0.01739	27538.	3.54E+10	0.00	0.00	0.00
10.1500	1.2968	3502291.	14100.	-0.01705	27919.	3.54E+10	0.00	0.00	0.00
10.4400	1.2381	3564572.	14100.	-0.01670	28299.	3.54E+10	0.00	0.00	0.00
10.7300	1.1806	3626578.	14100.	-0.01635	28677.	3.54E+10	0.00	0.00	0.00
11.0200	1.1243	3688305.	14099.	-0.01599	29053.	3.54E+10	-0.5035	1.5584	0.00
11.3100	1.0693	3749743.	14084.	-0.01562	29428.	3.54E+10	-7.9126	25.7516	0.00
11.6000	1.0156	3810796.	14044.	-0.01525	29800.	3.54E+10	-15.3912	52.7405	0.00
11.8900	0.9631	3871370.	13978.	-0.01487	30169.	3.54E+10	-22.6599	81.8738	0.00
12.1800	0.9121	3931371.	13887.	-0.01449	30535.	3.54E+10	-29.5309	112.6772	0.00
12.4700	0.8623	3990712.	13773.	-0.01410	30896.	3.54E+10	-35.9371	145.0314	0.00
12.7600	0.8139	4049311.	13638.	-0.01370	31253.	3.54E+10	-41.6541	178.0964	0.00
13.0500	0.7669	4107093.	12885.	-0.01330	31606.	3.54E+10	-391.0755	1775.	0.00
13.3400	0.7213	4159824.	11380.	-0.01290	31927.	3.54E+10	-473.8461	2286.	0.00
13.6300	0.6772	4206496.	9626.	-0.01249	32212.	3.54E+10	-534.2765	2746.	0.00
13.9200	0.6344	4246374.	7729.	-0.01207	32455.	3.54E+10	-555.7551	3048.	0.00
14.2100	0.5931	4279195.	5768.	-0.01165	32655.	3.54E+10	-571.1967	3351.	0.00
14.5000	0.5533	4304769.	3764.	-0.01123	32811.	3.54E+10	-580.9921	3654.	0.00
14.7900	0.5150	4322976.	1734.	-0.01081	32921.	3.54E+10	-585.5333	3957.	0.00
15.0800	0.4781	4333759.	-303.2702	-0.01038	32987.	3.54E+10	-585.2121	4260.	0.00
15.3700	0.4427	4337122.	-2331.	-0.00995	33008.	3.54E+10	-580.4192	4562.	0.00
15.6600	0.4088	4333121.	-4336.	-0.00953	32983.	3.54E+10	-571.5431	4865.	0.00
15.9500	0.3764	4321866.	-6303.	-0.00910	32915.	3.54E+10	-558.9689	5168.	0.00
16.2400	0.3455	4303509.	-8221.	-0.00868	32803.	3.54E+10	-543.0773	5471.	0.00
16.5300	0.3160	4278243.	-10078.	-0.00826	32649.	3.54E+10	-524.2437	5773.	0.00
16.8200	0.2880	4246300.	-11865.	-0.00784	32454.	3.54E+10	-502.8371	6076.	0.00
17.1100	0.2614	4207940.	-13574.	-0.00742	32220.	3.54E+10	-479.2195	6379.	0.00
17.4000	0.2363	4163453.	-15197.	-0.00701	31949.	3.54E+10	-453.7446	6682.	0.00
17.6900	0.2126	4113151.	-16729.	-0.00661	31643.	3.54E+10	-426.7575	6984.	0.00
17.9800	0.1904	4057364.	-18165.	-0.00620	31303.	3.54E+10	-398.5938	7287.	0.00
18.2700	0.1695	3996437.	-19502.	-0.00581	30931.	3.54E+10	-369.5791	7590.	0.00
18.5600	0.1499	3930727.	-20736.	-0.00542	30531.	3.54E+10	-340.0283	7893.	0.00
18.8500	0.1317	3860597.	-21868.	-0.00504	30103.	3.54E+10	-310.2452	8195.	0.00
19.1400	0.1149	3786413.	-22896.	-0.00466	29651.	3.54E+10	-280.5221	8498.	0.00
19.4300	0.09930	3708540.	-23821.	-0.00429	29176.	3.54E+10	-251.1394	8801.	0.00
19.7200	0.08500	3627340.	-24645.	-0.00393	28681.	3.54E+10	-222.3654	9104.	0.00
20.0100	0.07194	3543169.	-25370.	-0.00358	28168.	3.54E+10	-194.4562	9406.	0.00
20.3000	0.06009	3456369.	-26000.	-0.00324	27639.	3.54E+10	-167.6551	9709.	0.00
20.5900	0.04942	3367274.	-26539.	-0.00290	27096.	3.54E+10	-142.1931	10012.	0.00
20.8800	0.03991	3276197.	-26993.	-0.00257	26541.	3.54E+10	-118.2884	10315.	0.00
21.1700	0.03151	3183435.	-27366.	-0.00226	25976.	3.54E+10	-96.1464	10617.	0.00
21.4600	0.02421	3089264.	-27665.	-0.00195	25402.	3.54E+10	-75.9601	10920.	0.00
21.7500	0.01796	2993936.	-27898.	-0.00165	24821.	3.54E+10	-57.9098	11223.	0.00
22.0400	0.01273	2897676.	-35738.	-0.00136	24234.	3.54E+10	-4448.	1215929.	0.00
22.3300	0.00850	2747325.	-52664.	-0.00108	23318.	3.54E+10	-5279.	2162629.	0.00
22.6200	0.00520	2532827.	-71914.	-8.23E-04	22010.	3.54E+10	-5783.	3870565.	0.00
22.9100	0.00277	2248094.	-92230.	-5.88E-04	20275.	3.54E+10	-5893.	7401752.	0.00
23.2000	0.00111	1891823.	-111960.	-3.84E-04	18103.	3.54E+10	-5446.	1.71E+07	0.00
23.4900	9.68E-05	1469453.	-127306.	-2.19E-04	15529.	3.54E+10	-3373.	1.21E+08	0.00
23.7800	-4.14E-04	1006119.	-123712.	-9.74E-05	12705.	3.54E+10	5439.	4.57E+07	0.00
24.0700	-5.81E-04	608570.	-102828.	-1.80E-05	10282.	3.54E+10	6564.	3.93E+07	0.00
24.3600	-5.39E-04	290463.	-79094.	2.62E-05	8343.	3.54E+10	7077.	4.57E+07	0.00
24.6500	-3.99E-04	58036.	-54339.	4.33E-05	6926.	3.54E+10	7150.	6.24E+07	0.00
24.9400	-2.38E-04	-87806.	-30059.	4.18E-05	7107.	3.54E+10	6804.	9.94E+07	0.00
25.2300	-1.08E-04	-151240.	-7767.	3.01E-05	7494.	3.54E+10	6007.	1.94E+08	0.00
25.5200	-2.89E-05	-141911.	10757.	1.57E-05	7437.	3.54E+10	4639.	5.59E+08	0.00
25.8100	1.41E-06	-76393.	17538.	4.94E-06	7038.	3.54E+10	-741.6814	1.83E+09	0.00
26.1000	5.56E-06	-19851.	11171.	2.16E-07	6693.	3.54E+10	-2918.	1.83E+09	0.00
26.3900	2.91E-06	1356.	3433.	-6.93E-07	6581.	3.54E+10	-1530.	1.83E+09	0.00
26.6800	7.33E-07	4041.	101.5557	-4.28E-07	6597.	3.54E+10	-384.8622	1.83E+09	0.00
26.9700	-6.53E-08	2064.	-508.4341	-1.28E-07	6585.	3.54E+10	34.2933	1.83E+09	0.00
27.2600	-1.58E-07	502.2643	-304.5748	-1.91E-09	6575.	3.54E+10	82.8672	1.83E+09	0.00
27.5500	-7.86E-08	-55.8960	-88.5943	2.00E-08	6573.	3.54E+10	41.2595	1.83E+09	0.00
27.8400	-1.85E-08	-114.3836	0.05390	1.17E-08	6573.	3.54E+10	9.6878	1.83E+09	0.00
28.1300	2.56E-09	-55.5391	14.5682	3.31E-09	6573.	3.54E+10	-1.3462	1.83E+09	0.00
28.4200	4.59E-09	-12.9938	8.0356	-5.72E-11	6572.	3.54E+10	-2.4082	1.83E+09	0.00
28.7100	2.17E-09	0.3885	1.8668	-6.77E-10	6572.	3.54E+10	-1.1371	1.83E+09	0.00
29.0000	-1.22E-10	0.00	0.00	-6.58E-10	6572.	3.54E+10	0.06424	9.14E+08	0.00

* The above values of total stress are combined axial and bending stresses.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =     3.94927094 inches
Computed slope at pile head      =    -0.02517728 radians
Maximum bending moment           =       4337122. inch-lbs
Maximum shear force              =       -127306. lbs
Depth of maximum bending moment  =    15.37000000 feet below pile head
Depth of maximum shear force     =    23.49000000 feet below pile head
Number of iterations             =             17
Number of zero deflection points =              5
```

Pile-head Deflection vs. Pile Length for Load Case 1

Boundary Condition Type 1, Shear and Moment

```
Shear      =          14100. lbs
Moment     =        1188100. in-lbs
Axial Load =         225000. lbs
```

Pile Length feet	Pile Head Deflection inches	Maximum Moment ln-lbs	Maximum Shear lbs
29.00000	3.94927094	4337122.	-127306.
27.55000	3.98137026	4361231.	-127884.
26.10000	3.96128127	4338790.	-126433.
24.65000	4.03621985	4345560.	-138143.
23.20000	6.00171001	4656718.	-101664.
21.75000	-33.48974209	-2056373.	92581.
20.30000	-25.76099379	1188100.	63663.
18.85000	-20.49714153	1188100.	43152.
17.40000	-16.95013789	1188100.	27958.
15.95000	-14.86161209	1188100.	17975.

Summary of Pile-head Responses for Conventional Analyses

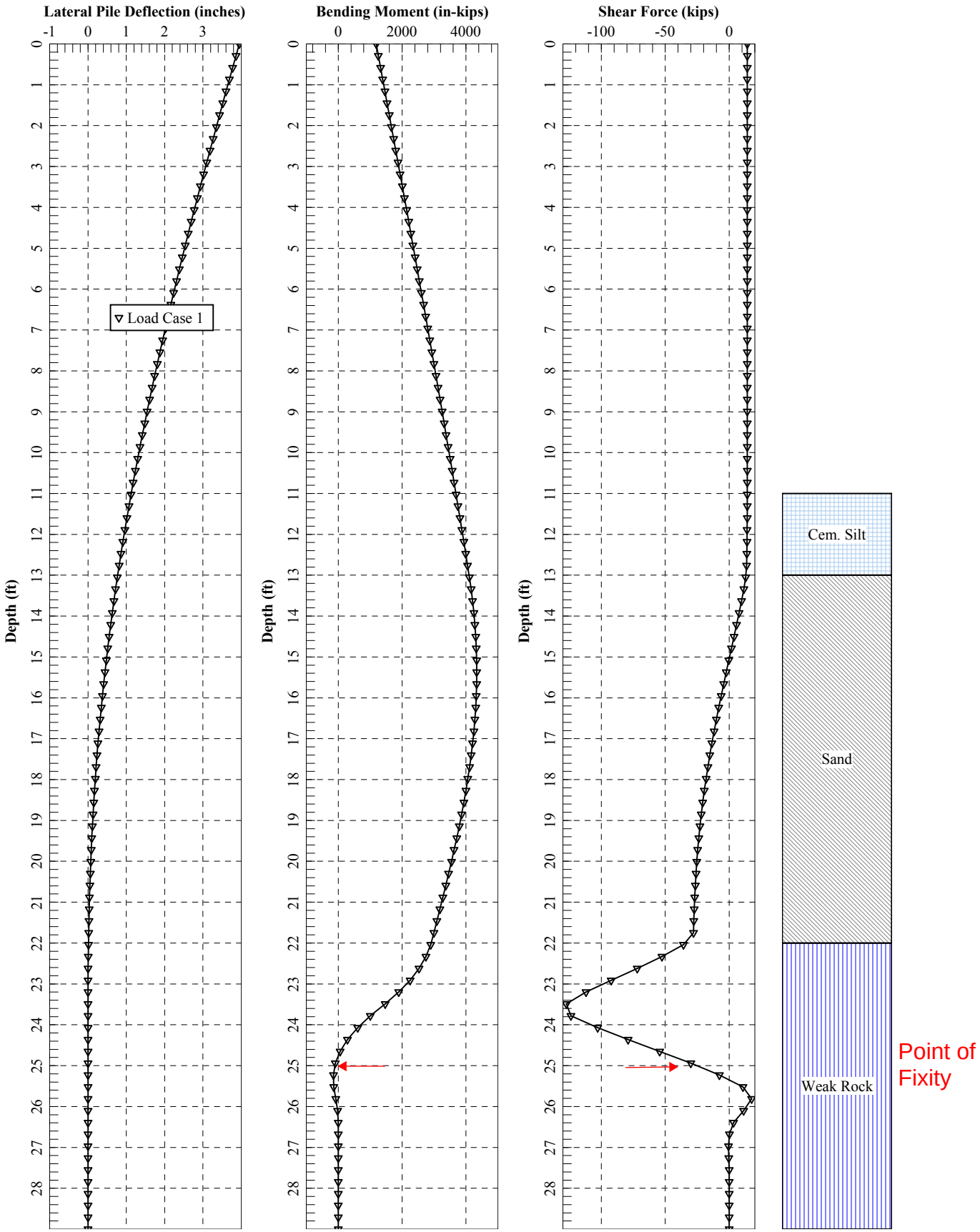
Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	14100.	M, in-lb	1188100.	225000.	3.9493	-0.02518	-127306.	4337122.

Maximum pile-head deflection = 3.9492709428 inches
Maximum pile-head rotation = -0.0251772797 radians = -1.442552 deg.

This analysis ended normally


Lateral Pile Deflection (inches)
-1
0
1
2
3
Load Case 1
Depth (ft)
Bending Moment (in-kips)
0
2000
4000
Depth (ft)
Shear Force (kips)
-100
-50
0
Depth (ft)
Cem. Silt
Sand
Weak Rock
Point of Fixity

Close, Jensen and Miller, P.C.

BY DC DATE 5/11/16 SUBJECT Rehab of Bridge 01349 SHEET NO. ..... OF .....

CHKD. BY ..... DATE ..... Proposed widening Pier 2 Analysis JOB NO. .....

HP 14 x 117 piles

Pier 2 (Rehabilitation)

Pile Analysis

HP 14 x 117 $A = 34.4\ in^2$ $I = 1220\ in^4$ $S = 172\ in^3$

P_w axial force = 225 kips ← from Midas

$P_n = {}^{P_{allow}}9 \times 34.4 = 309.6$ kips estimated

ϕP_n HP 14 x 117

$R_n = P_{allow} / \phi = .6$ K/pile

$= 225 / .6 = 375.0$ kips

Horizontal Load = .9 kips

AASHTO 6.9.5.1

$P_{allow} = \phi (.66)^{\lambda} F_y A_s$ if $\lambda < 2.25$

$= (.65)(.66)^{\lambda}(50)(34.4)$

$= .88 F_y A_s / \lambda$ if $\lambda \geq 2.25$

$\lambda = (KL/r_s\pi)^2 (F_y/E)$

$\lambda = \left(\frac{2 \times 20 \times 12}{3.59\ \pi}\right)^2 \left(\frac{50}{29000}\right) = 3.12$

$P_{allow} = \frac{(.88)(50)(34.4)}{3.12} = 485$ kips

$\phi P_{allow} = (.8)(485) = 291$ kips

$C/D = 291$ kips $/ 225$ kips $= 1.3$

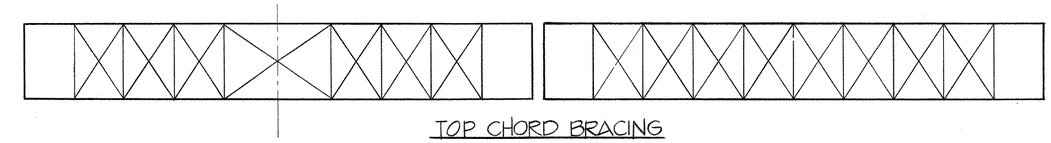
BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

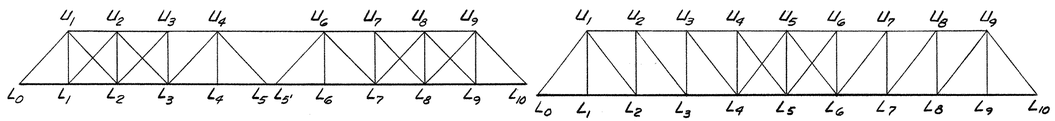
EXISTING PLANS

FORM NO. ENG. 158 ED 4-80

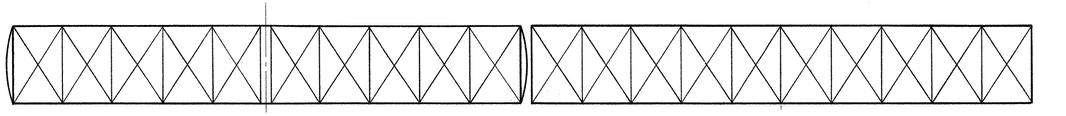
F.H.W.A. REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	–	158-150	1989	136	20-1	72



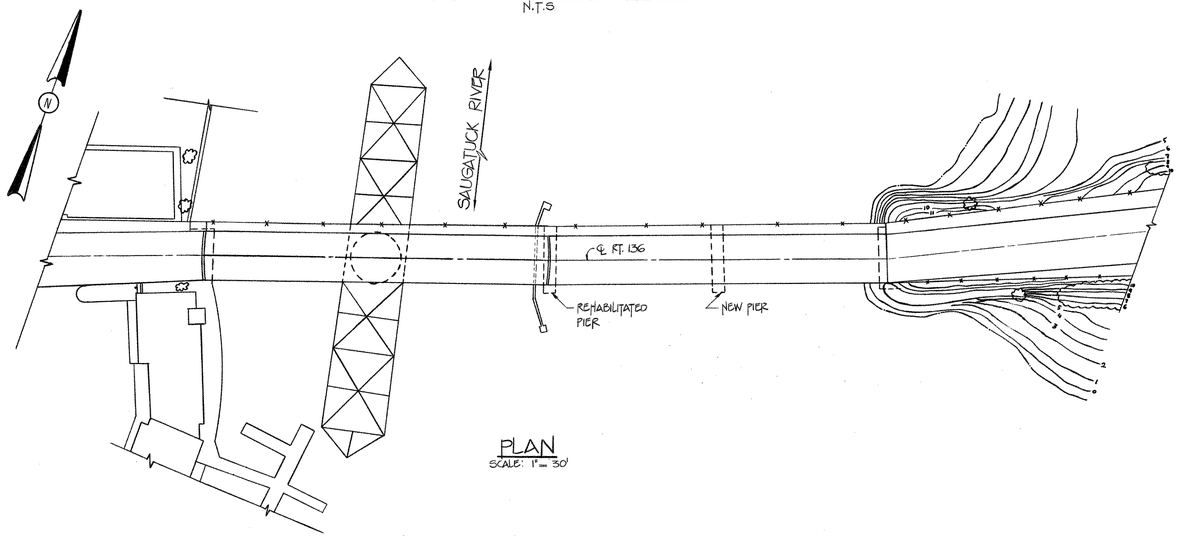
TOP CHORD BRACING



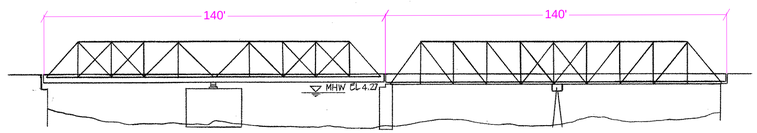
ELEVATION NORTH TRUSS (LOOKING NORTH)



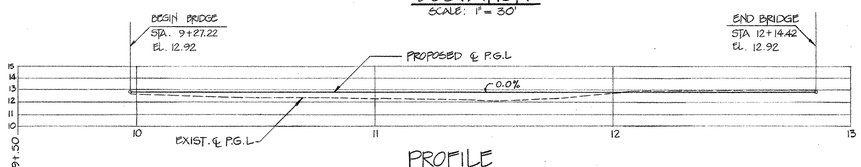
LOWER CHORD BRACING
EXISTING TRUSS LAYOUT
N.T.S



PLAN
SCALE: 1" = 30'



ELEVATION
SCALE: 1" = 30'



PROFILE
SCALE: HORIZONTAL: 1" = 30'-0"
VERTICAL : 1" = 6'-0"

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

ESTIMATED QUANTITIES

ITEM DESCRIPTION	UNIT	QUANTITY
STRUCTURE EXCAVATION-EARTH (COMPLETE)	C.Y	8
BITUMINOUS CONCRETE - CLASS 1	TON	52
BITUMINOUS CONCRETE - CLASS 12	TON	35
TEMPORARY CROSSING - BRIDGE	L.S	1
REHABILITATION OF EXISTING TRUSSES	L.S	1
REMOVAL OF SUPERSTRUCTURE - EXISTING FLOOR SYSTEM	L.S	1
BRIDGE SCUPPER	EA.	24
PREFABRICATED EXPANSION JOINT (MOVEMENT CAPACITY 2")	LF	20
ELASTOMERIC BEARING SYSTEM	EA.	20
CLASS 'A' CONCRETE	C.Y	139
DEFORMED STEEL BARS - EPOXY COATED	LBS	13,200
STRUCTURAL STEEL - BRIDGE № 01349	L.S	1
STRUCTURAL STEEL	CWT	5
FURNISHING AND INSTALLING EXODERMIC BRIDGE DECK	L.S.	1
REPOINTED MASONRY	S.Y.	71
CONCRETE CYLINDER CURING BOX	EA.	1
FURNISHING STEEL PILES (PIER#3)	LBS.	26,350
DRIVING STEEL PILES (PIER#3)	LF.	360
SPLICING STEEL PILES (PIER#3)	EA.	8
POINT REINFORCEMENT FOR STEEL PILES (PIER#3)	EA.	8
BITUMEN COATING OF PILES (PIER#3)	LF.	360
REMOVAL OF EXISTING FENDER SYSTEM	L.S.	1
METAL FOR FENDER SYSTEM AND SIDEWALK	LBS	6,200
TIMBER FOR FENDER SYSTEM AND SIDEWALK	M.B.F.	23
FURNISHING TREATED TIMBER PILES (50' LONG)	L.F	2130
DRIVING TREATED TIMBER PILES	L.F	2130
MEMBRANE WATERPROOFING (WOVEN GLASS FABRIC)	S.Y	635
PROTECTIVE COMPOUND FOR BRIDGES	S.Y.	205
METAL BEAM RAIL - BRIDGE	L.F.	575
METAL HAND RAIL - PEDESTRIAN	L.F.	290
REMOVAL OF EXISTING MASONRY	C.Y.	36
ELASTOMERIC SHEET	SF	110
REHABILITATION OF SWING PIER - (PIER # 1)	L.S	1
1½" POLYVINYL CHLORIDE PLASTIC PIPE	L.F	105
PILE ENCASEMENT CONCRETE (PIER#3)	LF	116
ABRASIVE BLAST CLEANING AND FIELD PAINTING OF STRUCTURE (SITE № 1)	L.S	1
CONTAINMENT AND COLLECTION OF SURFACE PREPARATION DEBRIS (SITE № 1)	L.S	1
(CONTINUE ON STRUCTURE SHEET №. 3....)		

NOTICE TO BRIDGE INSPECTORS

THE DEPARTMENT'S BRIDGE SAFETY PROCEDURES REQUIRE THIS BRIDGE TO BE INSPECTED FOR, BUT NOT LIMITED TO, ALL APPROPRIATE COMPONENTS INDICATED IN THE GOVERNING MANUALS FOR BRIDGE INSPECTION. ATTENTION MUST BE GIVEN TO INSPECTING THE FOLLOWING SPECIAL COMPONENTS AND DETAILS (THE LISTING OF COMPONENTS FOR SPECIFIC ATTENTION SHALL NOT BE CONSTRUED TO REDUCE THE IMPORTANCE OF INSPECTION OF ANY OTHER COMPONENT OF THE STRUCTURE.) THE FREQUENCY OF INSPECTION OF THIS STRUCTURE SHALL BE IN ACCORDANCE WITH THE GOVERNING MANUALS FOR BRIDGE INSPECTION, UNLESS OTHERWISE DIRECTED BY THE ENGINEER OF BRIDGE AND STRUCTURE, OR NOTED BELOW.

	COMPONENT OR DETAIL	BR. SH. REF.
FIXED SPAN	FIELD SPLICE	11 OF 24
	SIDEWALK END PLATE CONNECTION	11 OF 24
SWING SPAN	FIELD SPLICES	16 & 18 OF 24
	SIDEWALK END PLATE CONNECTION	11 OF 24
	PIVOT GIRDER	17 OF 24
	TRUSS TO PIVOT GIRDER CONNECTION	20 OF 24

BIDDERS SHALL EXAMINE AND MAKE THEIR OWN DETERMINATIONS AS TO THE WORK INVOLVED AND CONDITIONS TO BE ENCOUNTERED.

INSP. OF FIELD WELDS

METHOD	UNIT	QTY.
RADIOGRAPHIC OR ULTRASONIC	IN	0
MAGNETIC PARTICLE	LF	0
ULTRASONIC	IN	4276

CONCRETE DISTRIBUTION

	UNIT	QTY.
SUPERSTRUCTURE	CY	0
SUB-STRUCTURE	CY	139
TOTAL	CY	139

NO.	DATE	DESCRIPTION

REVISIONS

GENERAL NOTES

SPECIFICATIONS
CONNECTICUT DEPARTMENT OF TRANSPORTATION FORM 814 (1988), SUPPLEMENTAL SPECIFICATIONS 1 JULY 1989 AND SPECIAL PROVISIONS.

DESIGN SPECIFICATIONS:
STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES (AASHTO-1983), WITH THE INTERIM SPECIFICATIONS UP TO AND INCLUDING (1988), AS SUPPLEMENTED BY THE CONNECTICUT DEPARTMENT OF TRANSPORTATION BRIDGE MANUAL (1985)

ALLOWABLE DESIGN STRESSES:
CLASS 'A' CONCRETE BASED ON f'_c = 3,000 PSI
CLASS 'F' CONCRETE BASED ON f'_c = 4,000 PSI
REINFORCEMENT (ASTM A615 GRADE 60) f_s = 24,000 PSI
STRUCTURAL STEEL
ASTM A588 (PAINTED) f_t = 27,000 PSI ALL THICKNESS TO 4" INCLUSIVE

LIVE LOAD: HS 20-44

FUTURE PAVING ALLOWANCE
NONE

COMPOSITE CONSTRUCTION
NO TEMPORARY INTERMEDIATE SUPPORTS SHALL BE USED DURING THE PLACING AND SETTING OF THE EXODERMIC DECK MODULES. TEMPORARY SUPPORTS MAY BE USED FOR STRUCTURAL STEEL ERECTION ONLY. LIVE AND SUPERIMPOSED DEAD LOADS WILL BE PERMITTED WHEN DIRECTED BY THE ENGINEER, BUT NOT LESS THAN 10 DAYS AFTER THE FINAL PORTION OF THE EXODERMIC DECK MODULES JOINTS HAVE BEEN PLACED. SEE SPECIAL PROVISIONS FOR INSTALLATION OF THE EXODERMIC DECK MODULES AND CONCRETE MIX FOR MODULE TOP SURFACE.

CLASS 'A' CONCRETE
CLASS 'A' CONCRETE SHALL BE USED FOR THE ENTIRE SUBSTRUCTURE EXCEPT FOR PILE ENCASEMENT AND CONCRETE FILL FOR STEEL PIPE PILES. (SEE SPECIAL PROVISION)

CLASS 'F' CONCRETE
CLASS 'F' CONCRETE SHALL BE USED FOR THE EXODERMIC DECK MODULES CAST IN PLACE JOINTS, AND FILL FOR STEEL PIPE PILES.

EXPOSED EDGES
EXPOSED EDGES OF CONCRETE SHALL BE BEVELED 1"x 1" UNLESS DIMENSIONED OTHERWISE

STRUCTURAL STEEL
SEE STRUCTURE SHEET NUMBERS 18 OF 24 FOR ASTM DESIGNATIONS

REINFORCEMENT
ALL REINFORCEMENT SHALL BE ASTM A615 GRADE 60

EPOXY COATED REINFORCING BARS
ALL REINFORCEMENT SHALL BE EPOXY COATED.

JOINT SEAL: (SEE SPECIAL PROVISIONS)

PAINT
PAINT SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIAL PROVISION FOR "STRUCTURAL STEEL - BRIDGE NO. 01349" AND "ABRASIVE BLAST CLEANING AND FIELD PAINTING OF STRUCTURE (SITE NO.1)". THE COLOR OF THE TOPCOAT MATERIAL ON THE STRUCTURAL STEEL SHALL CONFORM TO FEDERAL STANDARD COLOR NO. 26329. [APPROXIMATELY THE DEPARTMENT'S STANDARD BRIDGE COLOR NO. 606 (BLUE)]. APPLY COATING SYSTEM ONE.

BITUMINOUS CONCRETE OVERLAY
THIS SHALL CONSIST OF TWO LIFTS. THE FIRST SHALL BE BITUMINOUS CONCRETE CLASS (12) (1" THICK MIN.) AND THE SECOND SHALL BE BITUMINOUS CONCRETE CLASS (1) (1½" THICK).

FOUNDATIONS PRESSURES AND PILE LOADS.
THE VARIOUS GROUP LOADINGS NOTED ON THE SUBSTRUCTURE PLAN SHEETS REFER TO THE GROUP LOADS AS GIVEN IN THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.

CONSTRUCTION JOINTS
CONSTRUCTION JOINTS OTHER THAN THOSE SHOWN ON THE PLANS, WILL NOT BE PERMITTED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.

DECIMAL DIMENSIONS
WHEN DIMENSIONS ARE GIVEN TO LESS THAN THREE DECIMAL PLACES, THE OMITTED DIGITS SHALL BE ASSUMED TO BE ZEROS.

VERIFICATION OF DIMENSIONS
DIMENSIONS OF THE EXISTING STRUCTURE SHOWN ON THE PLANS ARE FOR GENERAL REFERENCE ONLY AND THEY ARE NOT GUARANTEED. THE CONTRACTOR SHALL TAKE ALL FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF THE FINISHED WORK AND SHALL ASSUME FULL RESPONSIBILITY FOR THEIR ACCURACY. WHEN SHOP DRAWINGS BASED ON FIELD MEASUREMENTS ARE SUBMITTED FOR APPROVAL, THE FIELD MEASUREMENTS SHALL ALSO BE SUBMITTED FOR REFERENCE BY THE REVIEWER.

(GENERAL NOTES CONTINUED ON BRIDGE SHEET № 2 OF 24)

CONNECTICUT
DEPARTMENT OF TRANSPORTATION
WESTPORT
BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

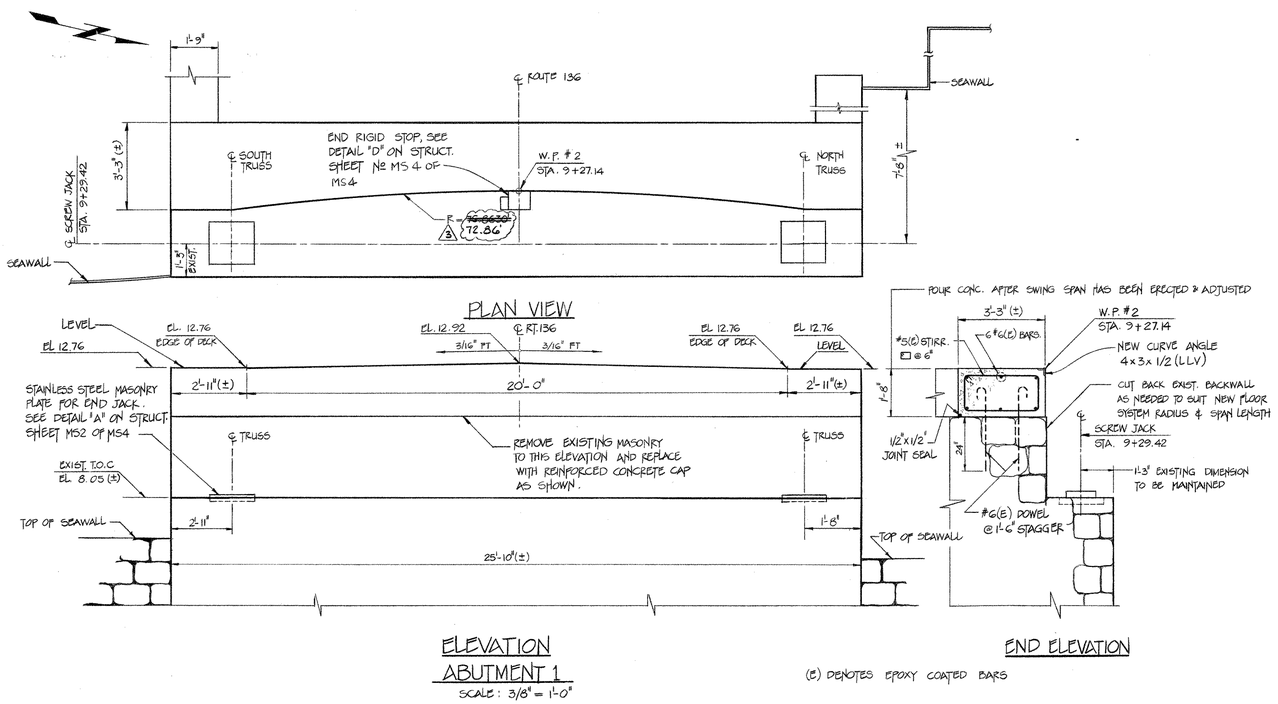
GENERAL PLAN I

ENGINEER	H. W. LOCHNER, INC.		
DESIGNER	LM	DRAFTER Dec Shan Floyd	CHECKER LM
APPROVED		DATE 9-6-89	
STRUCTURE NO.	158-150-1	BRIDGE LOC NO. 01349	STRUCTURE SHEET NO. 1 OF 24

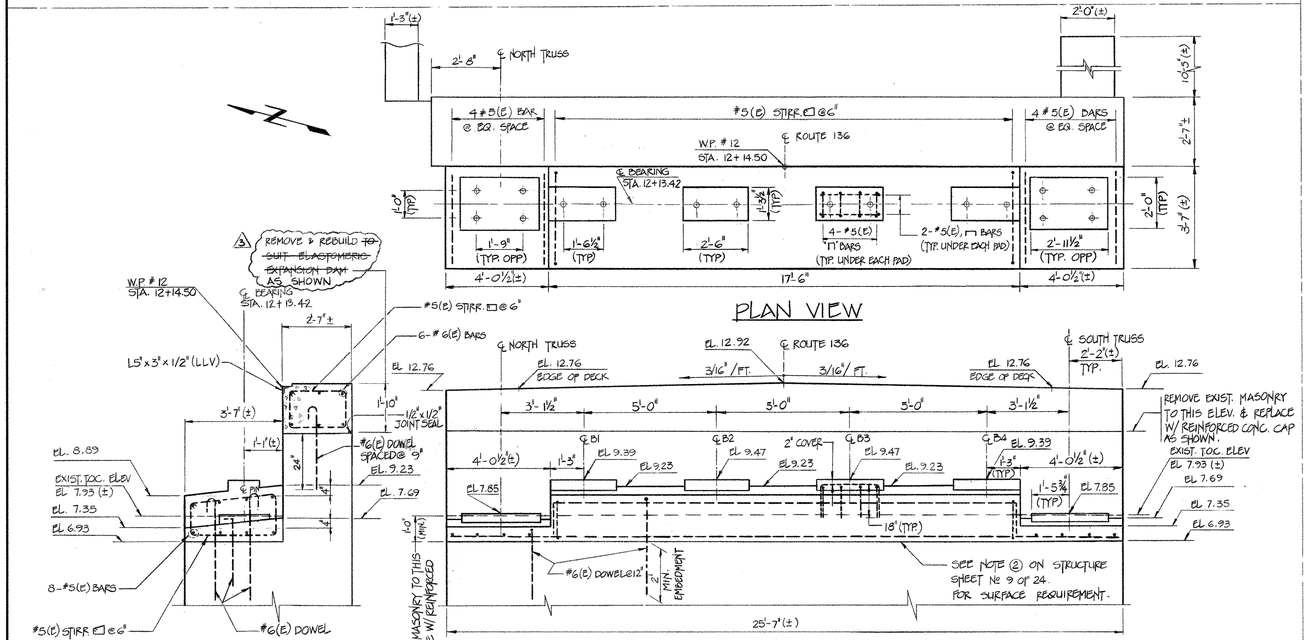
158-150

270-01

F.H.W.A. REGION NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	–	158 - 150	1989	136	27-2	72

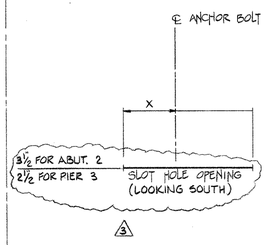


(E) DENOTES EPOXY COATED BARS

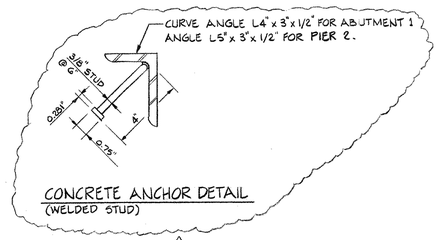


NOTE: FOR SWEDGE ANCHOR BOLT DETAILS SEE STRUCTURE SHEET # 12 OF 24

ANCHOR BOLT INSTALLATION NOTES



AMBIENT TEMPERATURE	"X" DISTANCE	
	PIER 3	ABUTMENT 2
50° F	1.3319'	1.9138'
55° F	1.3046'	1.8592'
60° F	1.2773'	1.8046'
65° F	1.25'	1.75'
70° F	1.2227'	1.6954'
75° F	1.1954'	1.6408'
80° F	1.1681'	1.5862'



CONCRETE ANCHOR DETAIL
(WELDED STUD)

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION
3	6/5/90	REVISED PER DOT COMMENTS (B.A.M.)

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

ABUTMENTS - 1 & 2

ENGINEER H. W. LOCHNER, INC.

DESIGNER LM | DRAFTER Sue Ann Knapik | CHECKER JD

APPROVED Leo T. Ora | DATE 9-6-89

STRUCTURE NO. 158-150-1 | BRIDGE LOG NO. 01349 | STRUCTURE SHEET NO. 8 OF 24

158-150

270-01

27-2

STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION FORM NO ENG 15A ED 4-80

F.H.W.A. REGION	STATE	TOWN	FED. AID. PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WEST PORT	—	158-150	1989	136	28-1	72

CORED HOLE NOTES:

ALL HOLES TO BE CORE DRILLED (24" DEEP.)
SEE ALSO NOTE #5 ON STRUCT. SHEET № M2 OF M4
AND NOTE #3 ON STRUCT. SHEET № M3 OF M4.

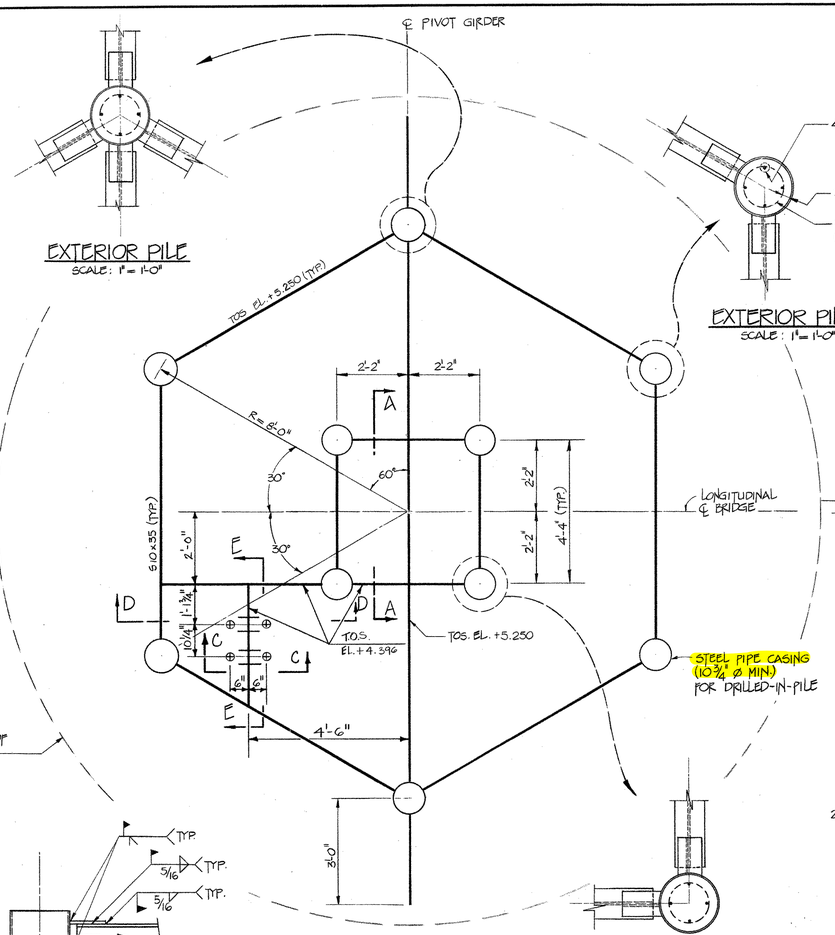
NOTES

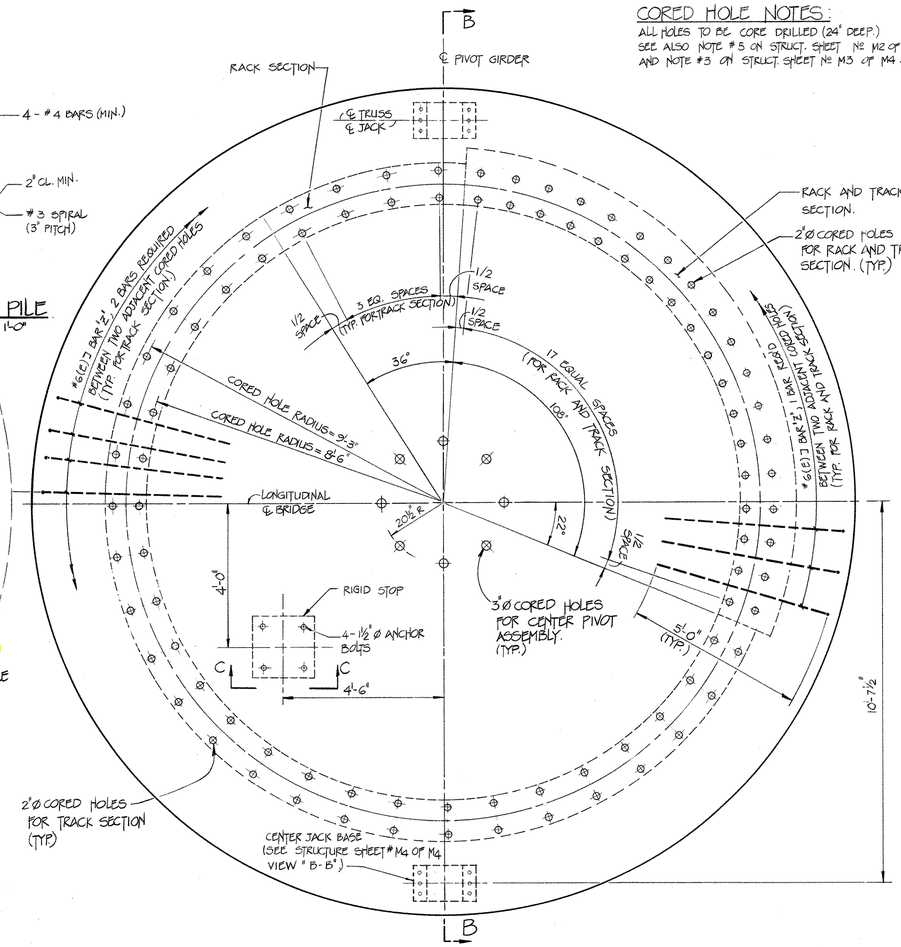
1. REMOVE EXISTING PIER CONCRETE AND STONE TO ELEVATION +2.0 ..... OR LOWER THE EXISTING METAL SHELL SHALL REMAIN AND SHALL BE USED AS A FORM FOR THE NEW CONCRETE. (SEE ALSO NOTE (5))

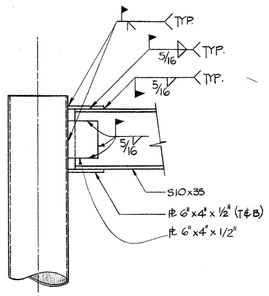
   REMOVAL SHALL NOT PROCEED UNTIL A METHOD TO PREVENT CONSTRUCTION DEBRIS OR OTHER MATERIALS FROM ENTERING THE WATERCOURSE HAS BEEN SUBMITTED TO AND APPROVED BY THE ENGINEER, AND SUCH METHOD HAS BEEN IMPLEMENTED AS THE SEQUENCE OF CONSTRUCTION NECESSITATES. THESE MATERIALS SHALL BE COLLECTED AND DISPOSED OF IN AN ENVIRONMENTALLY SAFE MANNER AS DETEMINED BY FEDERAL STATE AND LOCAL LAW. (SEE SPECIAL PROVISION "BEST MANAGEMENT PRACTICES FOR PROTECTION OF THE ENVIRONMENT").
2. EXISTING SURFACE SHALL BE FREE OF ALL DUST, GREASE, LOOSE STONE OR CONCRETE AND ANY OTHER DEBRIS (SEE SPECIAL PROVISIONS)
3. DESIGN OF THE DRILLED-IN-PILES SHALL BE A RESPONSIBILITY OF THE CONTRACTOR SUBJECT TO APPROVAL BY THE ENGINEER (SEE SPECIAL PROVISIONS)
4. THE DRILLING SHALL NOT RELEASE DRILL SPOIL INTO THE WATERCOURSE. DRILLING FLUID RECIRCULATION IS REQUIRED. ALL WASTE AND SPOIL SHALL BE PUMPED INTO SEDIMENTATION FILTRATION POOL. (SEE SPECIAL PROVISIONS).
5. THE COST OF REPAIR TO DAMAGED METAL SHELL DUE TO CONCRETE REMOVAL TO BE INCLUDED IN THE ITEM "REHABILITATION OF SWING PIER - PIER № 1."

STEEL PIPE PILE NOTES:

1. STEEL PIPE PILE SHALL CONFORM TO ASTM A252 - GRADE 2.
2. PILES SHALL BE SEAMLESS STEEL PIPE PILES (GRADE 2) WITH A MINIMUM OUTSIDE DIAMETER OF 10¾" WITH A MINIMUM NOMINAL WALL THICKNESS OF 3/8"; AND SHALL HAVE A MINIMUM OF 4.20 IN² CORE STEEL.
3. PILES SHALL BE DRILLED-IN-PILES SOCKETED 6 FT. INTO THE BEDROCK.
4. ALL PILES SHALL BE FILLED W/CLASS 'F' CONCRETE AND REINFORCED WITH ASTM A615, GRADE 60 REINFORCEMENTS. THESE ITEMS ARE INCLUDED IN THE PAY ITEM "REHABILITATION OF SWING PIER - (PIER #1).
   VERTICAL REINFORCEMENT SHALL CONSIST OF NOT LESS THAN FOUR BARS.
   THE FULL LENGTH OF VERTICAL REINFORCEMENT SHALL BE ENCLOSED W/SPIRAL REINFORCEMENT.
   THE REINFORCEMENT SHALL BE PLACED AT A CLEAR DISTANCE OF NOT LESS THAN 2" FROM THE STEEL SHELL.
5. STRUCTURAL STEEL FOR PILE TOP FRAMING SHALL CONFORM TO ASTM A36.
6. ESTIMATED PILE ORDER LENGTH = 50 FT.
7. MAXIMUM PILE DESIGN LOAD = 110 TONS.
8. MAXIMUM TORSION AT TOP OF PIER = 385 FT-KIP.

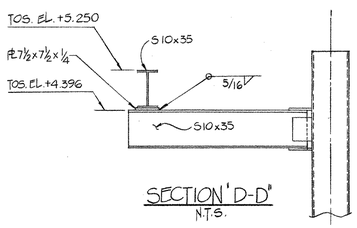




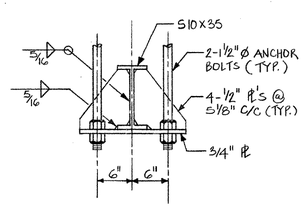


TYPICAL BEAM TO PIPE PILE CONNECTION

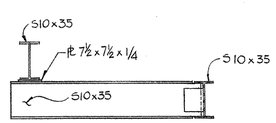
ELEVATION VIEW
SCALE: 1"= 1'-0"



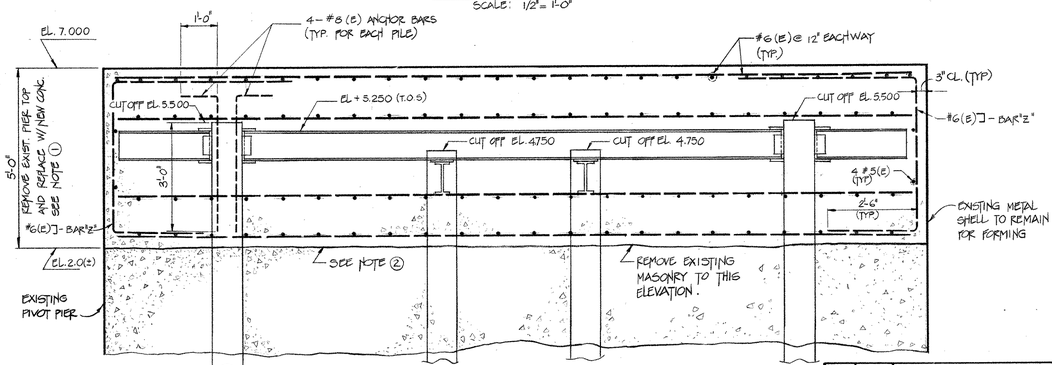
SECTION "D-D"
N.T.S.



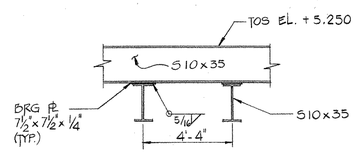
SECTION C-C
SCALE: 1" = 1'-0"



SECTION "E-E"
N.T.S.



SECTION "B-B" THROUGH CENTER LINE OF PIER
SCALE: 1/2"= 1'-0"



SECTION "A-A"
N.T.S.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION

REVISIONS

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

PIER 1 REHABILITATION

ENGINEER	H. W. LOCHNER, INC.		
DESIGNER LM	DRAFTER Douglas Stagel	CHECKER JD	
APPROVED Arvo T. Pica	DATE 9-6-89		
STRUCTURE NO. 158-150-1	BRIDGE LOG NO 01349	STRUCTURE SHEET NO 9 of 24	

JOSEPH MERRITT & CO. 131525

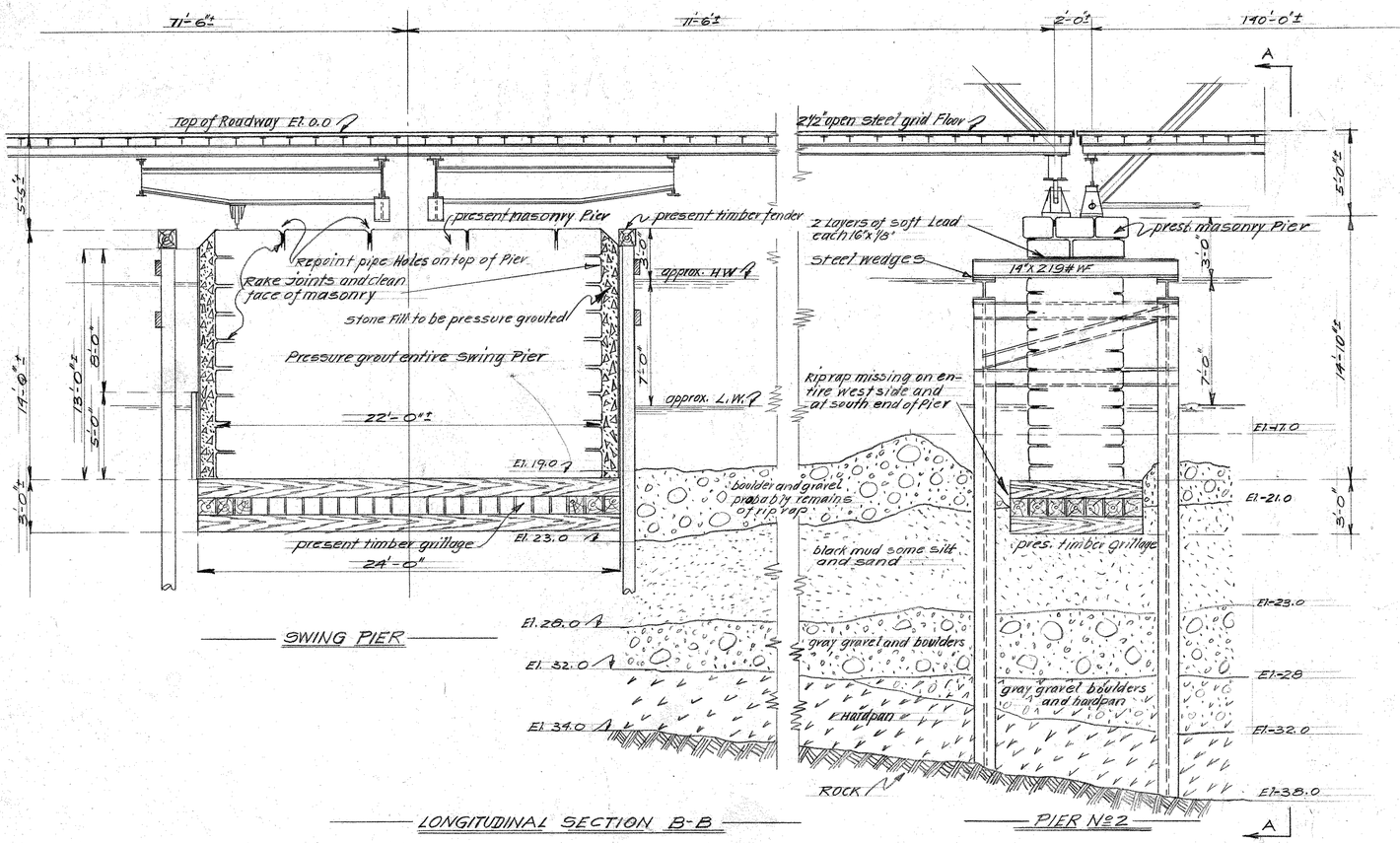
158-150

270-01

28-1

FED ROAD DIV. NO.	STATE	TOWN	FED AID PROJ. NO.	FISCAL YEAR	ROUTE NO	SHEET NO.	TOTAL SHEETS
1	CONN	Westport		1951	136	2	8

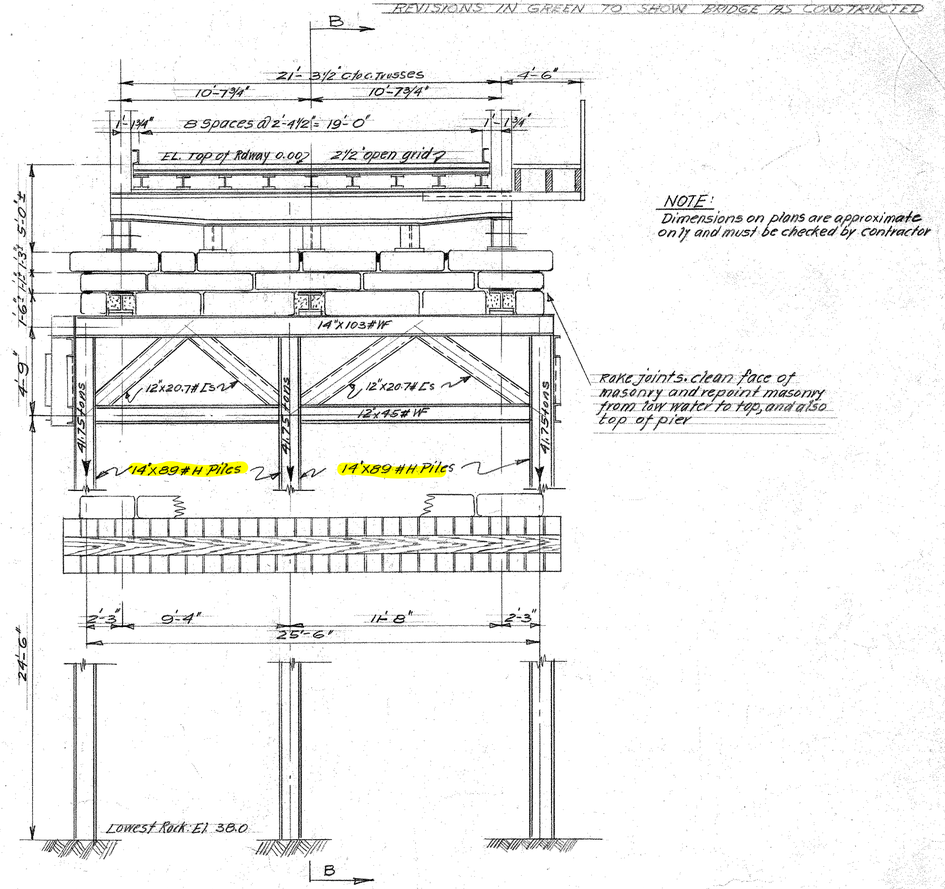
REVISIONS IN GREEN TO SHOW BRIDGE AS CONSTRUCTED



SWING PIER

LONGITUDINAL SECTION B-B

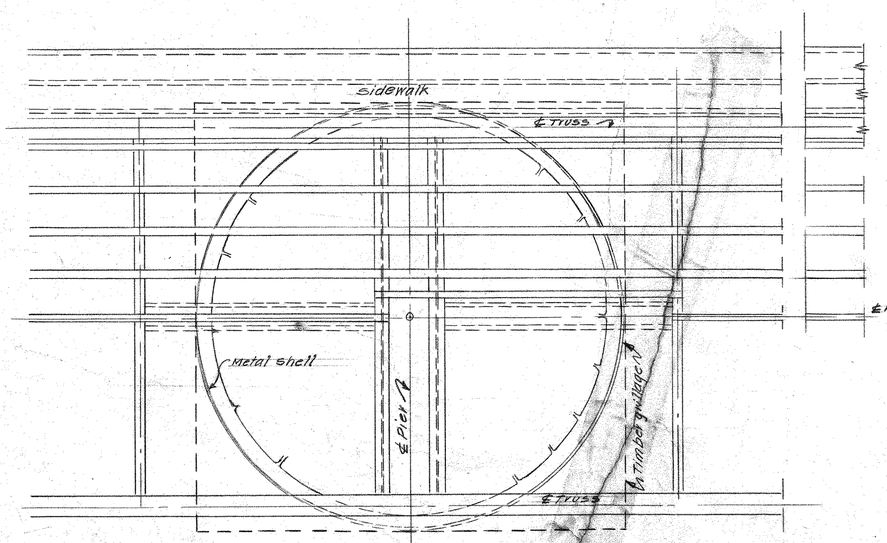
PIER No 2



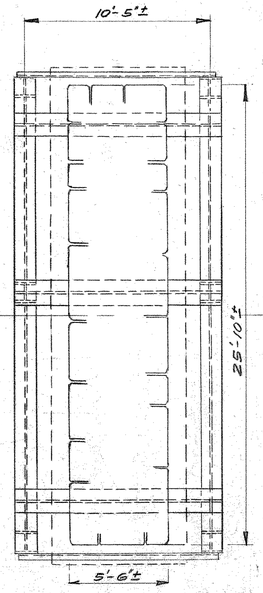
NOTE:
Dimensions on plans are approximate only and must be checked by contractor

Rake joints, clean face of masonry and repoint masonry from low water to top, and also top of pier

SECTION A-A



PART PLAN



QUANTITIES

ALTERATION TO MASONRY	LS.
FURNISHING STEEL PILES	34590 Lb.
DRIVING STEEL PILES	240 LF.
PORTLAND CEMENT	8 Bbl.
RAKING JOINTS & CLEANING FACE OF MASONRY	210 SY.
STRUCTURAL STEEL	5721 Lb.
METAL SHELL AROUND SWING PIER	15600 Lb.
STONE FILL	56 tons
LIQUID ACCELERATING AND WATER RESISTING AGENT	62 gal.
POWDER ACCELERATING AND WATER RESISTING AGENT	248 Lb.
REPOINTING MASONRY JOINTS	596 LF.
DENSIFYING AND RETARDING AGENT	120 Lb.
PRESSURE GROUTING OF STONE FILL	218 bags
PRESSURE GROUTING SWING PIER	160 bags

GENERAL NOTES

CONN. STATE HWY. DEPT. SPECIFICATIONS FORM 807. ALL NEW STEEL EXCEPT THE METAL SHELL AROUND SWING PIER SHALL BE PAINTED ONE SHOP COAT OF ZINC CHROMATE AND IRON OXIDE AND TWO FIELD COATS OF PAINT OF A COLOR AND SHADE SELECTED BY THE ENGINEER

REVISIONS		
No	DATE	DESCRIPTION

CONNECTICUT
STATE HIGHWAY DEPARTMENT

BRIDGE No 136-09 (FA 136)
OVER SAUGATUCK RIVER
IN THE TOWN OF
WESTPORT
PLANS SHOWING
PROPOSED REPAIRS TO PIERS

DESIGNED BY A.E.
SCALE: ¼"=1'-0"
MADE BY A. Lehmfeld DATE: 5/14/51
CHECKED BY GAH DATE: 5/14/51
APPROVED J.O. Drury DATE: 6/11/51

PROJECT No M.C.-18

Bridge Sheet No 1 of 2

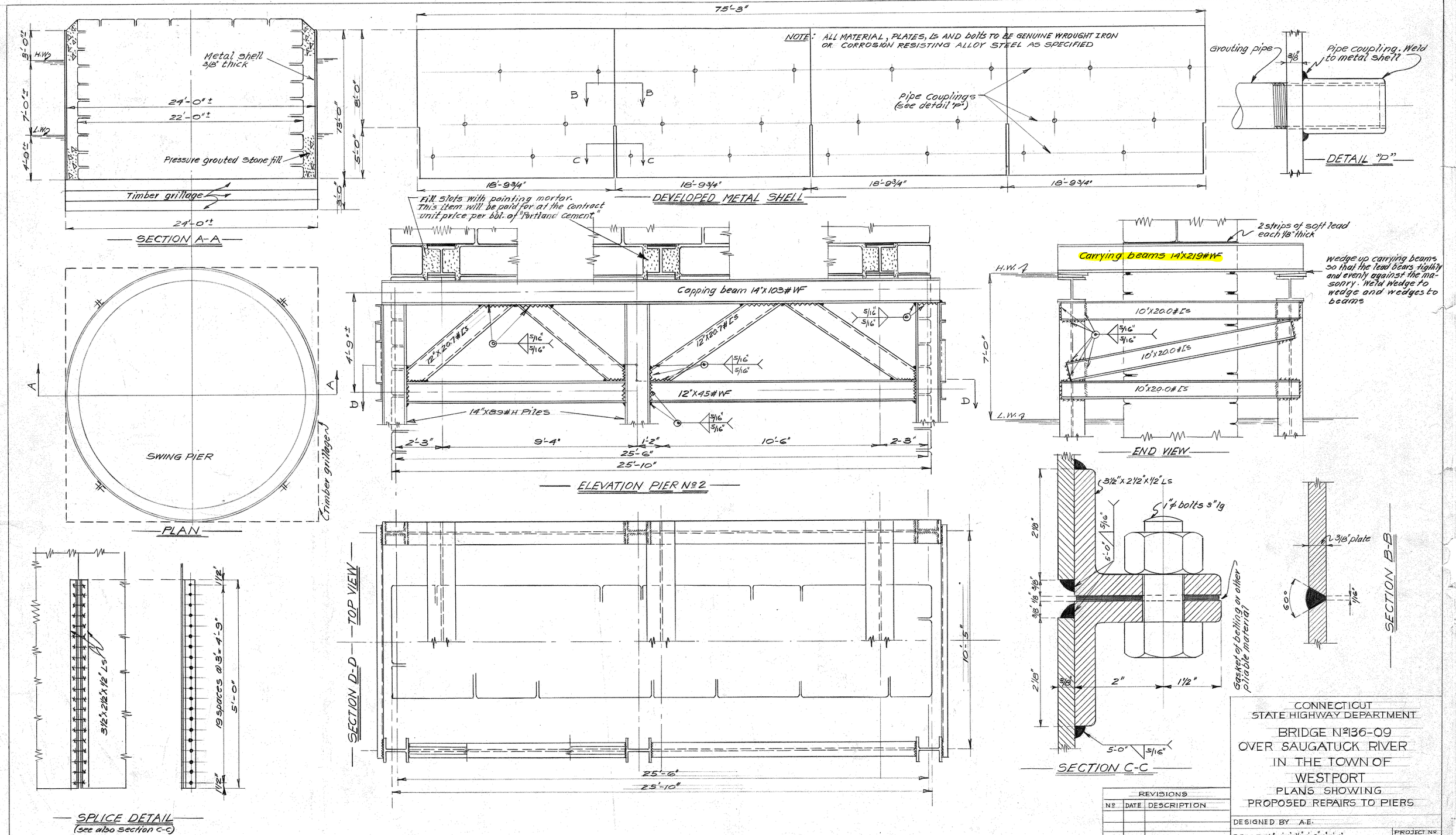
MC-18 FORMERLY 158 58

165 05

2

NO REVISIONS SUBMITTED FOR THIS SHEET

PUB ROAD DIV. NO	STATE	TOWN	FED AID PROJ. NO	FISCAL YEAR	ROUTE NO	SHEET NO	TOTAL SHEETS
1	CONN	Westport		1951	136	3	3



CONNECTICUT
STATE HIGHWAY DEPARTMENT

BRIDGE No 136-09
OVER SAUGATUCK RIVER
IN THE TOWN OF
WESTPORT
PLANS SHOWING
PROPOSED REPAIRS TO PIERS

REVISIONS		
No	DATE	DESCRIPTION

DESIGNED BY A.E.
SCALE 1/4" = 1'-0", 1/2" = 1'-0", 1" = 1'-0"
MADE BY A. Chumfes DATE: 6/7/51
CHECKED BY GAH DATE 6/11/51
APPROVED J.O. Drury DATE 6/11/51

PROJECT No MC-18
BRIDGE SHEET No 2 OF 2

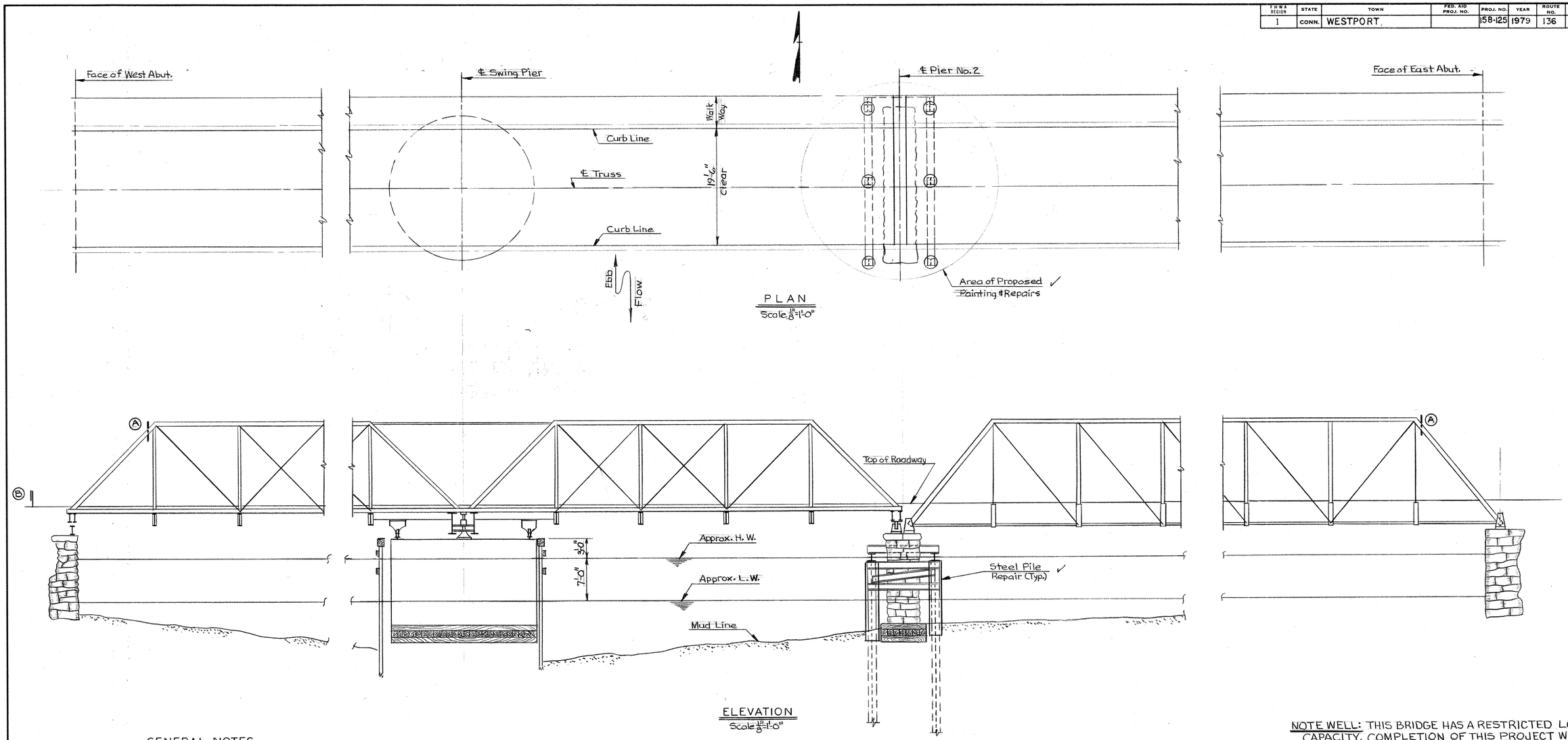
MC-18 FORMERLY 158 58

165 05

3

FORM NO. ENG. 158 ED 1-75

FHWA REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT		158-125	1979	136	2	7



PLAN
Scale 1/8"=1'-0"

ELEVATION
Scale 1/8"=1'-0"

NOTE WELL: THIS BRIDGE HAS A RESTRICTED LOAD CAPACITY. COMPLETION OF THIS PROJECT WILL NOT CHANGE THE RESTRICTION.

GENERAL NOTES

Specifications: Connecticut Department of Transportation Form 811 (1974), Interim Specifications and Special Provisions.
Design Specifications: Standard Specifications for Highway Bridges AASHTO-1977, with the Interim Specifications up to and including 1978, as supplemented by the Connecticut Department of Transportation Bridge Manual (1964).
Allowable Design Stresses:
Concrete fc' = 5000 psi
Reinforcement ASTM A 615 Grade 40 fs (tensile) = 20,000 psi
Structural Steel ASTM A 36 Ft = 20,000 psi All Thicknesses
Reinforcement: Grade 60 bars may be substituted for grade 40 bars, Size and spacing shall be the same as for grade 40 bars.
Decimal Dimensions: When dimensions are given to less than three decimal places, the omitted digits shall be assumed to be zeros.
Charpy V-Notch Tests: Replacement steel bracing will not require Charpy V-Notch Tests
Welding: Welding of Structural Steel shall be done in accordance with the American Welding Society Structural Welding Code AWS D1.1-75, as modified by the 1977 AASHTO Standard Specifications for Welding of Structural Steel Highway Bridges.

QUANTITES		
ITEM	UNIT	AMOUNT
Underwater Steel Pile Repair	L.F.	100
Underwater Steel Protective Coating	S.F.	460

INSPECTION OF FIELD WELDS		
METHOD	UNIT	QUANTITY
Radiographic or Ultrasonic	in.	0
Ultrasonic	in.	0
Magnetic Particle	l.f.	0

NOTES

✓ (A) Remove Existing "LOAD LIMIT" Sign and Erect R12-1 (10 Tons).
✓ (B) Remove Existing "LOW CLEARANCE" Sign and Erect W12-2 (13'-4") on Existing Post.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

CONN. RTE. 136
OVER
SAUGATUCK RIVER
SUBSTRUCTURE REPAIRS

GENERAL PLAN

ENGINEER Bridge Design Unit
DESIGNER W.F.C. DRAFTSMAN F.T.R. CHECKER W.F.C.
APPROVED Milton Q Johnson / HJK DATE 12-26-78
STRUCTURE NO. 158-125-01349 BRIDGE LOG NO. 01349 STRUCTURE SHEET NO. 1 OF 2

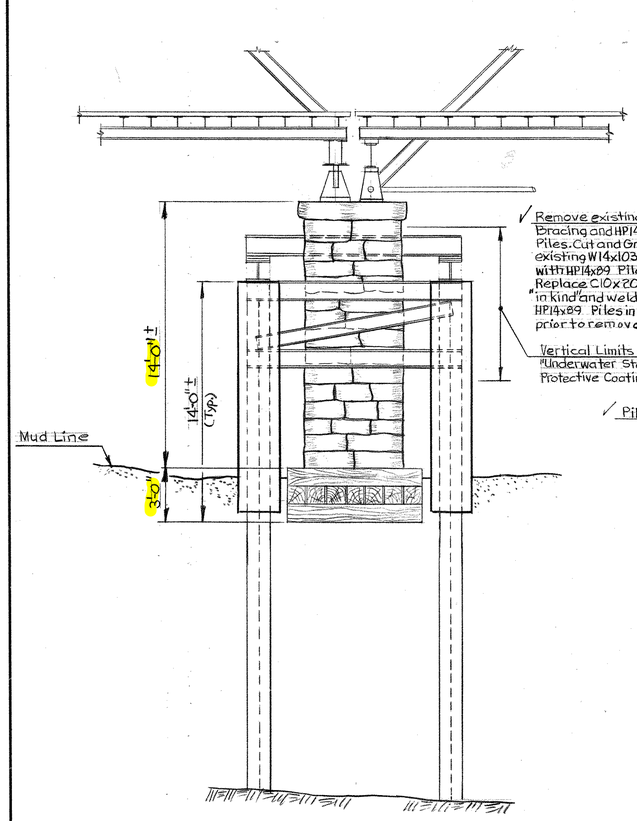
OGILVIE PRESS BUFFALO, N.Y.

158 125

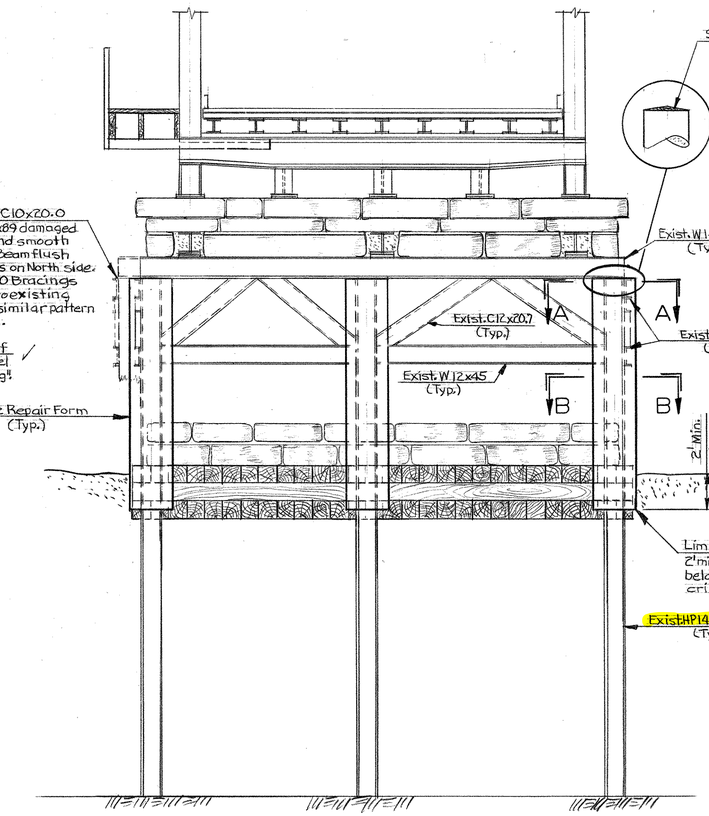
483-10

FORM NO. ENG. 158 ED. 1-75

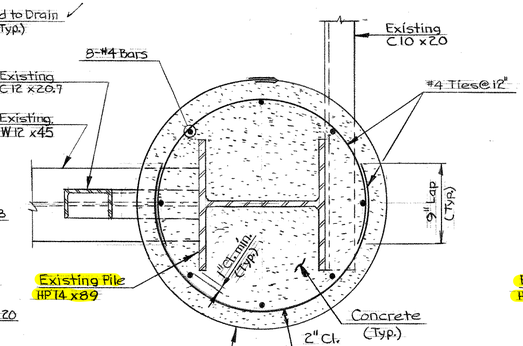
F.H.W.A. REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT		158-125	1979	136	3	7



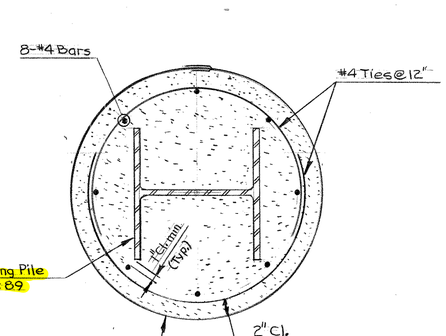
SOUTH END VIEW
Scale $\frac{1}{4}$"=1'-0"



WEST ELEVATION
Scale $\frac{1}{4}$"=1'-0"



SECTION A-A
Scale $1\frac{1}{2}$"=1'-0"



SECTION B-B
Scale $1\frac{1}{2}$"=1'-0"

PROPOSED REPAIRS – PIER NO. 2

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

CONN. RTE. 136
OVER
SAUGATUCK RIVER
SUBSTRUCTURE REPAIRS

DETAIL SHEET

ENGINEER Bridge Design Unit
DESIGNER W.F.C. | DRAFTSMAN F.T.R. | CHECKER W.F.C.
APPROVED Milton G. Johnson / HJK DATE 12-26-78
STRUCTURE NO. 158-125-01349 | BRIDGE LOG NO. 01349 | STRUCTURE SHEET NO. 2 OF 2

OGILVIE PRESS BUFFALO, NY

158 125

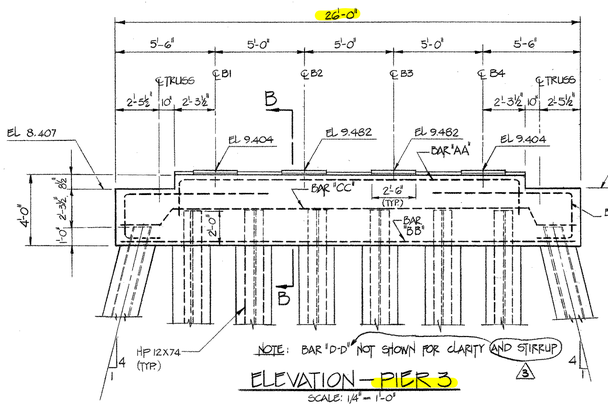
458 - 10

3

STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION

FORM NO ENG 15A ED 4-80

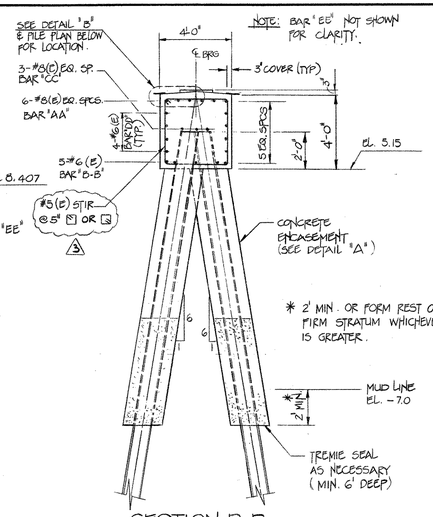
F.H.W.A. REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	—	158-150	1989	136	29-2	72



ELEVATION — PIER 3

SCALE: 1/4" = 1'-0"

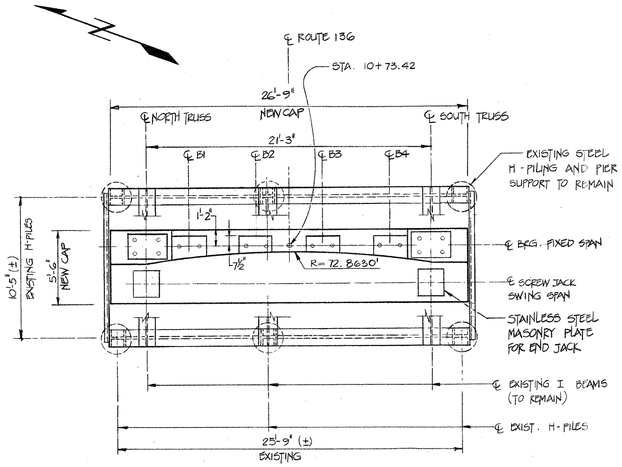
NOTE: FOR ANCHOR BOLT INSTALLATION SEE "ANCHOR BOLT INSTALLATION NOTES" ON STRUCTURE SHEET № 8 OF 24.



NOTE: BAR "EE" NOT SHOWN FOR CLARITY.

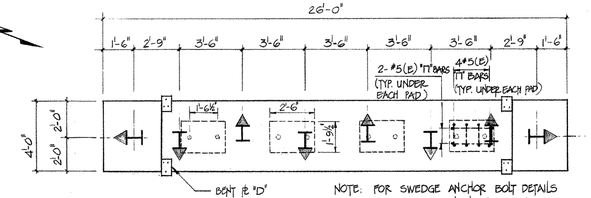
SECTION B-B

SCALE 1/4" = 1'-0"



PLAN — PIER 2

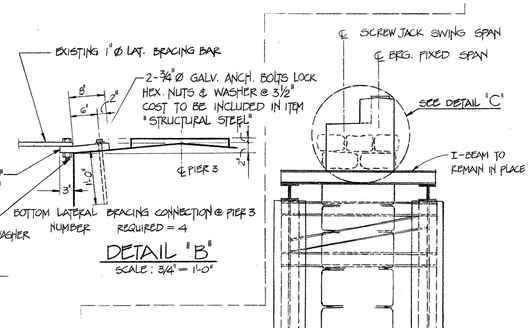
SCALE 3/16" = 1'-0"



NOTE: FOR SWEDGE ANCHOR BOLT DETAILS SEE STRUC. SH. № 12 OF 24

PILE PLAN — PIER 3

SCALE: 1/4" = 1'-0"

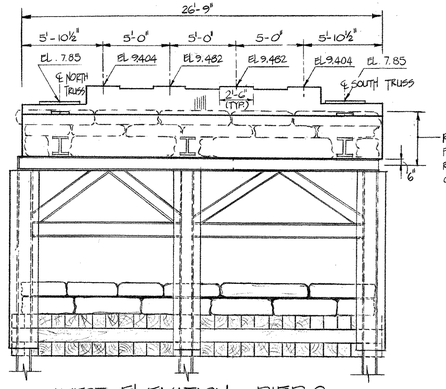


DETAIL "B"

SCALE: 3/4" = 1'-0"

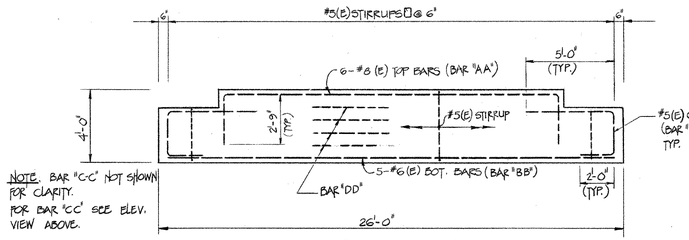
SIDE VIEW — PIER 2

SCALE: 3/16" = 1'-0"



WEST ELEVATION — PIER 2

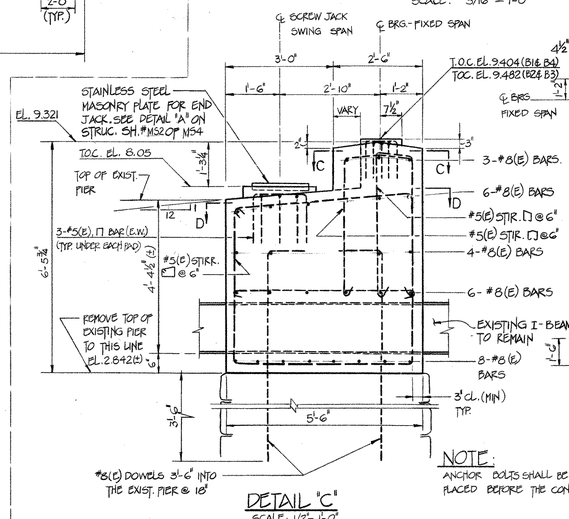
SCALE: 3/16" = 1'-0"



NOTE: BAR "CC" NOT SHOWN FOR CLARITY. FOR BAR "CC" SEE ELEV. VIEW ABOVE.

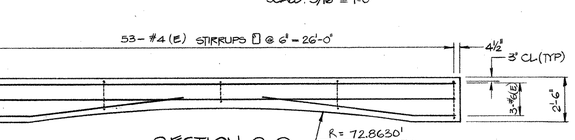
REINFORCEMENT FRONT VIEW - PIER 3

SCALE: 1/4" = 1'-0"



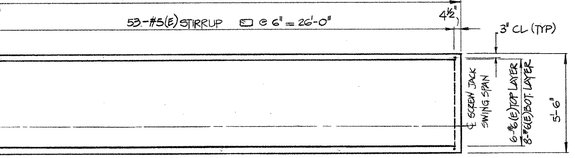
DETAIL "C"

SCALE: 1/2" = 1'-0"



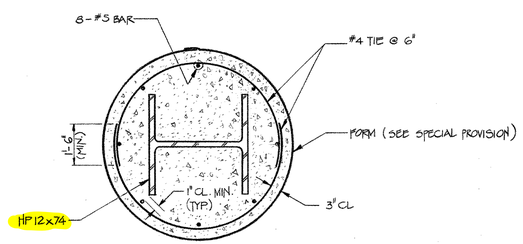
SECTION C-C

SCALE: 1/4" = 1'-0"



SECTION D-D

SCALE: 1/4" = 1'-0"



DETAIL "A"

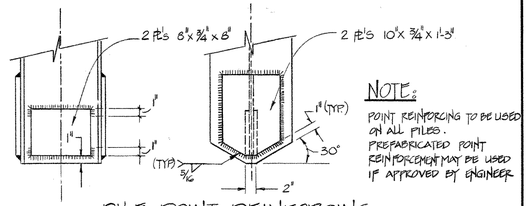
N.T.S.

NOTE: ANCHOR BOLTS SHALL BE SET IN FORMS WHICH SHALL BE PLACED BEFORE THE CONCRETE IS POURED.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION
3	9/5/90	REVISED PER DOT COMMENTS (B.A.M.)

REVISIONS

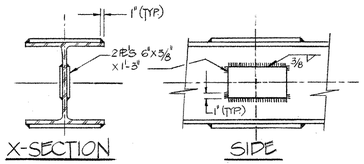


NOTE:

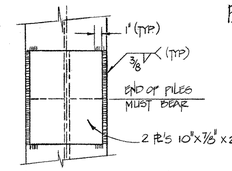
POINT REINFORCING TO BE USED ON ALL PILES. PREFABRICATED POINT REINFORCEMENT MAY BE USED IF APPROVED BY ENGINEER

PILE POINT REINFORCING

NOT TO SCALE



X-SECTION SIDE



FRONT

PILE SPLICE DETAIL

NOT TO SCALE

PILE SPLICE NOTES

1. PILES SHALL NOT BE SPLICED EXCEPT W/ APPROVAL OF THE ENGINEER.
2. FOR PILES TO BE SPLICED DURING DRIVING THE UPPER PILE SECTION, WITH SPLICE PLATES ATTACHED SHALL BE SET IN PLACE ON TOP OF THE DRIVEN SECTION AND TAPPED SEVERAL TIMES WITH THE HAMMER TO IMPROVE THE BEARING CONTACT, AFTER WHICH WELDING SHALL BE COMPLETED.
3. PILES TO BE SPLICED BEFORE DRIVING SHALL BE WELDED BY USING A 100% SINGLE BEVEL, BUTT WELD, ALL AROUND AS PER "STRUCTURAL WELDING CODE" AWS
4. PREFABRICATED SPLICING DEVICES MAY BE USED IF APPROVED BY THE ENGINEER.

PILE NOTES

1. ALL PILES ARE HP 12x74 TO BE COAL-TAR-EPOXY COATED FOR PROTECTION AGAINST CORROSION IN THE ORGANIC DEPOSITS AS PER SPECIAL PROVISION
2. ALL EXPOSED PILES SHALL BE ENCASED IN CONCRETE TO 2 FEET BELOW THE MUDLINE
3. HP DESIGNATES BATTER PILES
4. PILES TO BE DRIVEN TO REFUSAL IN THE GRANULAR DEPOSITS OR ON THE BEDROCK
5. ALL PILES TO HAVE A MINIMUM YIELD STRENGTH Fy = 50 KSI
6. THE HAMMER USED SHALL BE CAPABLE OF DELIVERING NOT LESS THAN 36,000 FT-LBS OF ENERGY PER BLOW
7. ESTIMATED PILE ORDER LENGTH = 50 FT.
8. MAX. PILE LOAD = 98 TONS (GROUP I)

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

PIER 2 AND PIER 3 REHABILITATION

ENGINEER	H.W. LOCHNER, INC.
DESIGNER	LM
DRAFTER	Dave Glen Bryant
CHECKER	JD
APPROVED	Arvo T. Ora
DATE	9-6-89
STRUCTURE NO.	158-150-1
BRIDGE LOG NO.	01349
STRUCTURE SHEET NO.	10 of 24

JOSEPH MERRITT & CO.

158-150

270-01

29-2

		Pedestal for truss 1 at the west abutment has a 1' diameter hollow area, 1' diameter x 1/4" deep scale and a 2' x 1' area of map cracking. The pedestal for girder 4 at the east abutment has a 4" diameter x 1/2" deep spall. Also, see the Underwater Inspection Report dated 12/7/2012. See field sheets 19 - 20 and photo 38.
ABUTMENTS-BACKWALL:	7	Both backwalls have isolated vertical hairline cracks up to full height. The east abutment backwall has a 1' wide x 1' high area of map cracking. See field sheets 19 - 20.
ABUTMENTS-FOOTINGS:	N	Not visible.
ABUTMENTS-SETTLEMENT:	8	None noted.
ABUTMENTS-WINGWALLS:	N	Stone masonry abutment end faces. Rating revised to N.
PIERS/BENTS-CAPS:	6	The pier caps have hairline cracks and areas of map cracking with efflorescence and rust. The north and south faces of pier 4 have spalls up to 22" long x 10" high x 4" deep. The cap beams at pier 2 have isolated areas of light rust. The carrier beams have areas of heavy laminted rust. The north and south carrier beam top flange shim plates at the east elevation of pier 2 have section loss with as little as 2' long x 3" wide x 1/8" remaining thickness (north beam). See field sheets 21 - 26 and photo 39 - 42.
PIERS/BENTS-PILE BENT:	5	There are concrete encased H-piles with fiberglass jackets at piers 2 and 3. The fiberglass jackets at pier 2 are loose and/or missing. The exposed concrete has scaling up to full perimeter x 3' high x up to 4" deep with exposed rebar. Also, see the Underwater Inspection Report dated 12/07/2012. See field sheets 21 - 26 and photos 40, 41 and 43.
PIERS/BENTS-COLUMNS:	5	The pier 1 steel jackets have heavy laminated rust and rusted through holes up to 1' diameter that expose the concrete. The exposed concrete has severe scale and spalls. Also, see the Underwater Inspection Report dated 12/7/2012. See field sheets 21 - 22 and photo 39.
PIERS/BENTS-FOOTING:	N	Per the 2012 Underwater Inspection Report the footing is intermittently exposed and undermined up to 1.8' long x 1.3' high x 2.1' deep at the southwest and the northwest corners of pier 2. The timber cribbing has splits and shown marine borer activity. The steel framework installed to repair the pier uses carrier beams to transfer load from the pier cap to the steel piles, leaving the timber cribbing to carry only the dead load of the masonry pier stem. Rating revised to 'N'.
PIERS/BENTS-SETTLMT:	8	None detected.
EROSION-SCOUR:	5	Per the 2012 Underwater Inspection Report there is scour up to 1.3' deep along the west abutment and up to 0.7' deep along pier 1. There is 2.4' of aggraddation along piers 2 and 3. The mudline is unchanged along the east abutment.
CONCRETE CRACK-SPALL:	5	See items above.
STEEL CORROSION:	5 ✓	The steel diagonal cross-bracing members at pier 2 have heavy rust and perforations up to 3' long x full height. The southeast cross-brace horizontal member is completely detached. Also, see "Piers/Bent Columns" and "Piers/Bents Caps" items above and the 2012 Underwater Inspection Report. See sheets 23 and 24 and photo 44.
PAINT:	N	-

1A

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

subject: **BMM No.** 11-133
Bridge No. 01349
Route 136 over Saugatuck River
Westport

MEMORANDUM

date: 3/4/11

to: Mr. Robert P. Mongillo
Transportation Maintenance Administrator
Bureau of Highway Operations

from: Joseph C. Kozlowski
Transportation Supervising Engineer
Bureau of Engineering and Construction

Attached are two copies of our most recent inspection report for the subject structure, which indicates the location of the following structural deficiencies:

1. The turnbuckles for the barrier gate stay wires are not provided with lock nuts at each end of the turnbuckle and were noted to be loose.
2. The west abutment and Pier 2 end floor beams have a 10 in. hole cut in the solid end diaphragm at each end allowing pigeon access and there is an accumulation of debris including pigeon debris inside, especially pier 2. See report photos 20 and 22.
3. The east abutment joint has a 6 ft. length of missing steel extrusion with a 1 ft. x 4 in. x 2 in. deep spall in the elastomeric header, see report photo 15.

Please direct persons under your jurisdiction to:

1. Provide lock nuts at the turnbuckles for the barrier gates to secure wires. (1) Installed
2. Provide pigeon screens that are removable for mechanical inspection access. NOT DONE (1)
3. Repair or replace joint (20 LF). (1) Replaced

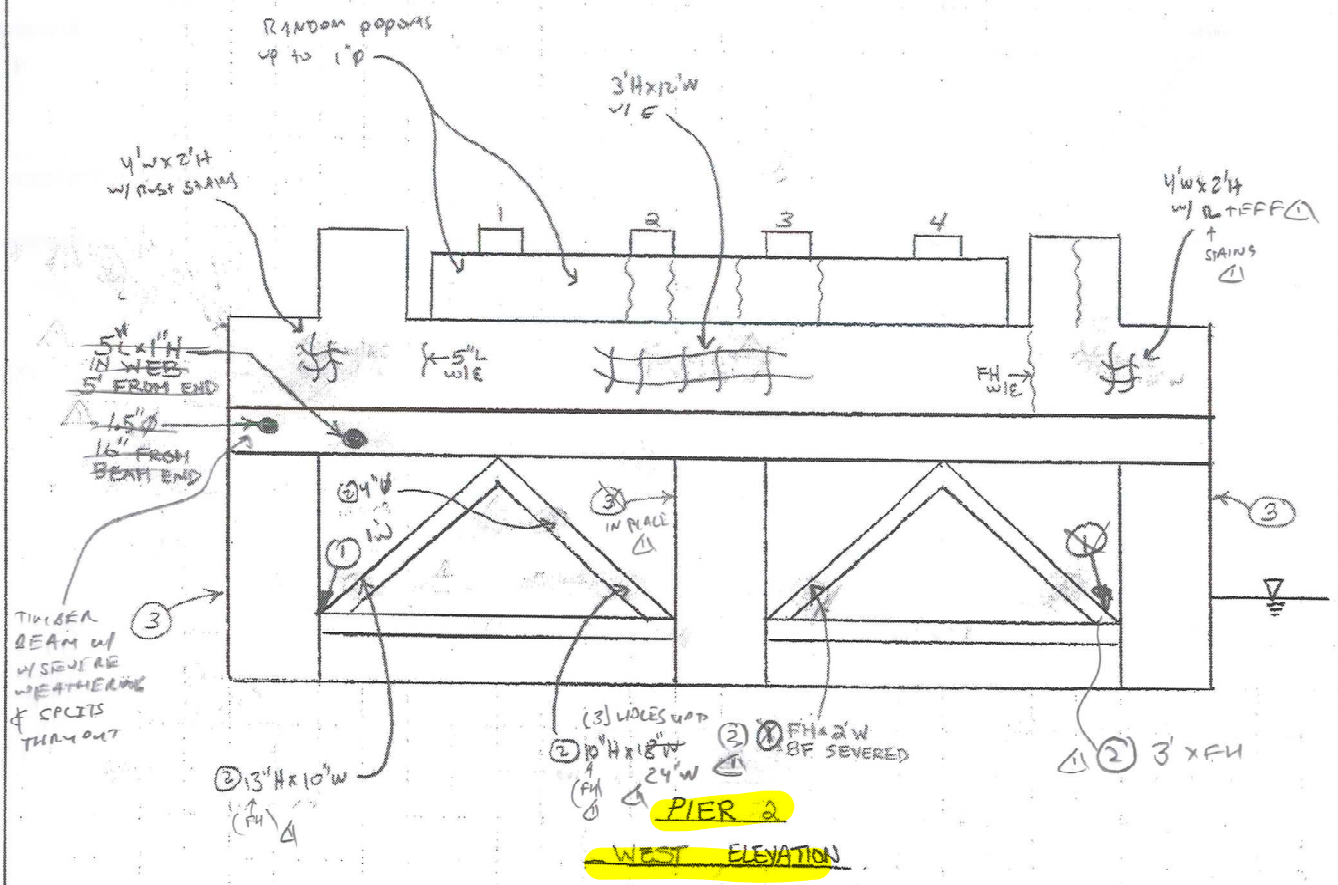
All repairs shall be performed utilizing appropriate approved materials and tried and proven methods unless otherwise specified.

Item No. 1 should be considered Priority C. The remaining items should be considered Priority D. There are also other deficiencies which are considered routine maintenance that should be corrected. In addition, the inspection report contains listings of various mechanical and electrical items from previous reports that have not been addressed.

TranSystems

Field Notes

PROJECT NO P712100021 BRIDGE NO 01349
DATE 11/9/2012 SHEET 23
CREW GAH / NPH / ASW



LEGEND:

- MAPCRACKING
- HAIRLINE CRACK / CRK
- HOLE
- W/E W/EFFD
- W/R W/RUST
- W/RS W/RUST STAINS
- BF BOTTOM FLANGE
- FH FULL HEIGHT

GENERAL NOTES:

SEE NOTE (2)

~~(1) STEEL CROSS BRACING HAS SEVERAL LOCATIONS OF 100% SECTION LOSS UP TO 2'W @ THE ENDS. (UN CONNECTED TO PILES @ THESE LOCATIONS~~

(2) RUSTED THROUGH HOLE IN WEB

(3) FIBERGLASS SHELL MISSING EXPOSED CONC. PILE W/ HEAVY SCALING & SPALLING, FULL PERIMETER x 3'H x UP TO 4"D W/EXP. REBAR

- HEAVY BARNACLE GROWTH IN TIDAL ZONE
- LT SAND ACCUMULATION ON PIER CAP
- CONCRETE SKIMCOAT PEELING @ RANDOM LOCATIONS

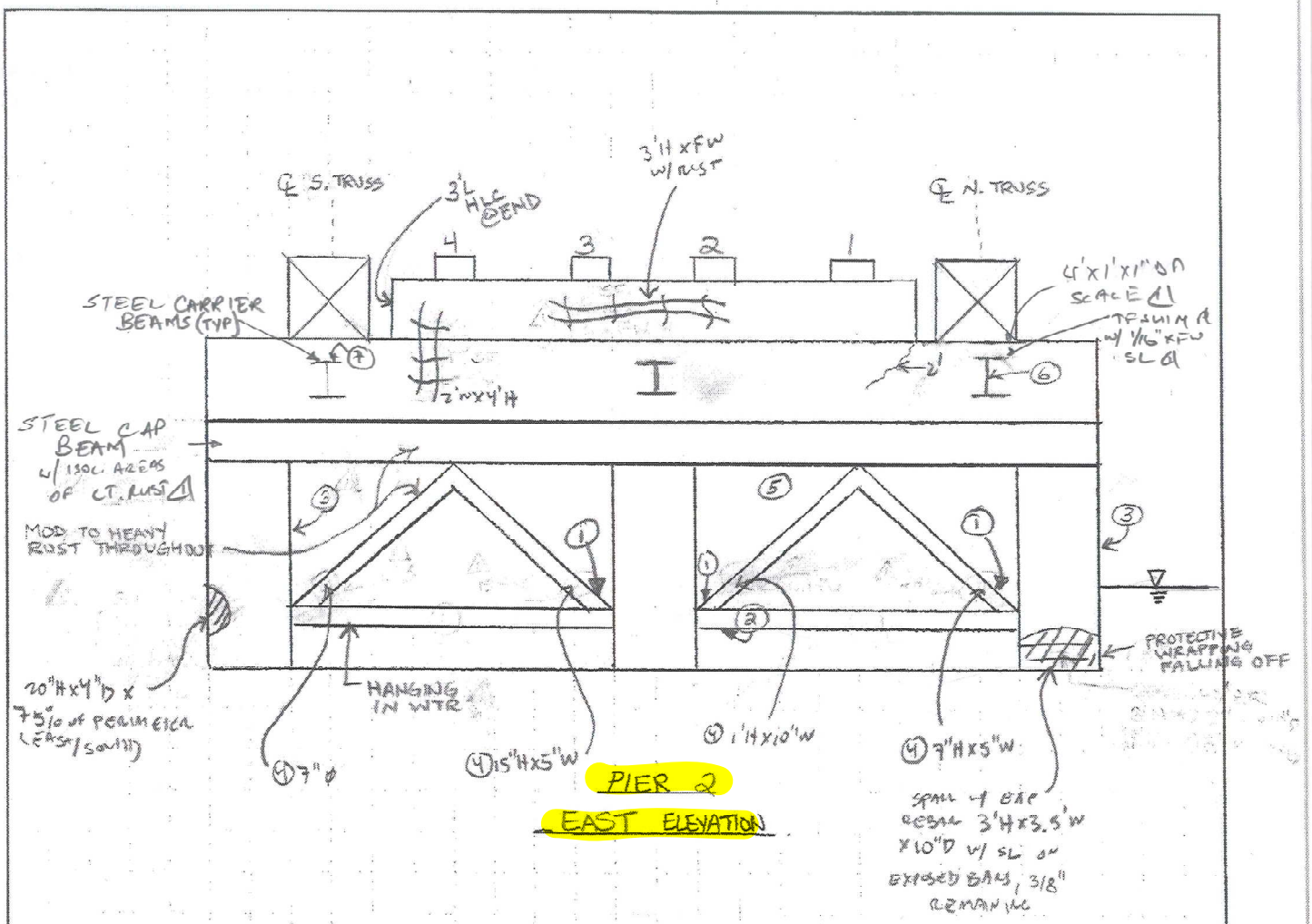
REVISION 1	DATE 11/3/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems

Field Notes

PROJECT NO P712100021 BRIDGE NO 01349
DATE 11/9/2012 SHEET 24
CREW GAH / NPH / ASW



NOT VISIBLE DUE TO HIGH WATER 1

1 (7) SHIM R w/ 2'L x 3"W x 1/8" REM.

LEGEND:

- ~ CRACK / HLCR
- MAP CRACK / HLMPR
- HOLLOW AREA / HA
- SPALL
- SPALL w/ EXPOSED REBAR
- W/E : EFFLORESCENCE

GENERAL NOTES:

1. STEEL CROSS BRACING HAS SEVERAL LOCATIONS OF 100% SECTION LOSS x UP TO 2"W @ THE ENDS. (UNCONNECTED TO PILES @ THESE LOCATIONS)
2. 100% BOTTOM FLG LOSS x 2'L
3. FIBERGLASS SHELL MISSING, EXPOSED CONC. PILE w/ HEAVY SCALING UP TO FULL PERIMETER x 3'H x UP TO 4"D
4. RUSTED THROUGH HOLE IN W/B
5. 3'L x 1.5'W x 5"D CHIP STONE & 15"D MORTAR VOID (-CARLIEL 1)
6. STEEL BEAMS ~~ENCASED IN PIER CAP~~ 1 w/ ~~HVY SAND, RUST~~ AREAS OF RUST; CR IN TF SHIM R (TYP.) 1

- HEAVY BARNACLE GROWTH IN TIDAL ZONE
- CONCRETE SKIN/DAP PEELING @ RANDOM LOCATIONS
- LT SAND ACCUMULATION ON PIER CAP

REVISION 1	DATE 11/4/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 39: **Pier 1, east elevation. Note the fender system.**



Photo 40: **Pier 2, east elevation.**

Bridge No.	01349	**Inspected by 1:**	Y. Skoplyak
Town:	Westport	**Inspected by 2:**	J. McKenna
Feature Carried:	Route 136 (Bridge Street)	**Date Inspected:**	11/3/2014
Feature Crossed:	Saugatuck River	**Project No.:**	170-3225



Photo 43: **Pier 2, west elevation, pile 1 with detached fiberglass jacket and spalling.**



Photo 44: **Rusted out cross bracing at the west elevation of pier 2.**

Connecticut Department of Transportation

UNDERWATER INSPECTION

BRI-58 Form

Bridge No: 01349
Inspection Date: 12/7/2012

Town: WESTPORT
Route Carried: 00136
Feature Crossed: SAUGATUCK RIVER

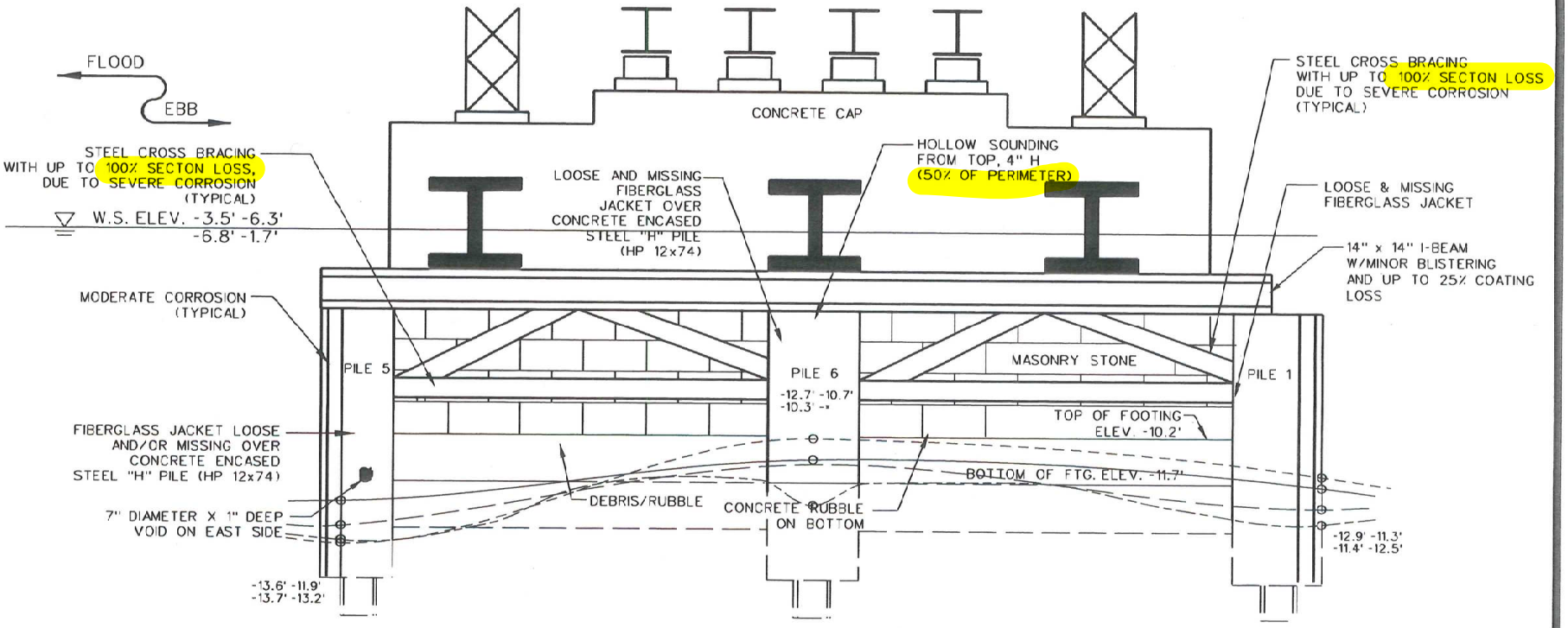
ITEM	RATING	REMARKS
		jacket.
PILES	4 (ADT 4/23/13: 5 — For Pile Condition)	The piles exhibit areas of missing or loose fiberglass jacket. The exposed concrete encasement at Pile 4 (worst case scenario) exhibits delamination and spalls up to 3.5' W x 3' H x 7" D with exposed reinforcement. This spall also exposes the southeast flange of Pile 4. The exposed flange portion is in good condition. The reinforcement exhibits moderate to severe corrosion. Pile 5 exhibits a loose and or missing fiberglass jacket and a void up to 7" dia x 1" D, Pile 6 exhibits hollow sounding area up to 4" H x 50% of perimeter. The steel cross bracing members between the piles display severe corrosion with up to 100% section loss. (Sheet 12, 13 & 14; Photos 9, 13 & 15) Deficiencies in cross bracing members and pile jackets noted on BMM No. 06-091 and have not been addressed (See Sheet 19, Item Nos. 1 & 3). (For Bracing — Rating = "2")
STEM	5 (ADT 4/23/13)	Stone masonry section exhibits mortar loss up to 25% with up to 2.5' penetration into the joints.
FOOTING	5 (ADT 4/23/13: 4)	Concrete footing on timber cribbing: The non-structural footing is intermittently exposed. The timber cribbing is no longer exposed. The footing is no longer bearing the live load since the installation of the concrete encased H piles. (Sheets 12, 13 & 14)
SCOUR	5	Mudline elevations primarily exhibit aggradation up to 2.0' since the 2010 inspection. (Sheets 12, 13 & 14)
SETTLEMENT	7	SW corner undermining 30"L x 5"H x 4"dp - exposed timber cribbing w/ splitting + marine borers. NW corner undermined
General remarks:		

PIER NO. 3

	6	Concrete cap supported by eight concrete encased H piles with plastic jacket. 22"L x 16"H x 25"dp
PILES	7	Eight concrete encased steel H piles with plastic jackets. No deficiencies noted. (Sheets 15 & 16; Photos 10 & 11)
STEM	N	(Void — cribbing eroded away)
FOOTING	N	
SCOUR	6	Mudline elevations exhibit aggradation up to 2.4, since the 2010 inspection. (Sheets 15 & 16) (ADT 4/23/13)
SETTLEMENT	8	
General remarks:		

61. CHANNEL& CHANNEL PROTECTION:

	5	
CHANNEL SCOUR	6 (ADT 4/23/13: 5 — Isolated minor undermine @ P2)	Mudline elevations exhibit random areas of scour with no specific pattern up to 3.6', with the exception of the areas surrounding Pier Nos. 2 & 3, that exhibits aggradation of 3' to 5' since the 2008 and 2010 inspection. (Sheet 7 & 8)
EMBANKMENT EROSIO	8	
DEBRIS	7	Minor scattered debris.
VEGETATION	8	
CHANNEL CHANGE	7	No notable channel change was observed.
FENDER SYSTEM	5	Timber piles and horizontal wales exhibit splits and checks 1/4" to 1/2" w. throughout. Several piles with up to 30% section loss at mudline were abandoned and or part of the old Fender system. The hardware exhibits moderate to heavy corrosion in the tidal zone. Wales at random locations exhibit minor abrasion damage, possibly due to impact.
SPUR DIKES & JETTIE	N	



NOTES:

- MISSING MORTAR UP TO 25% WITH 2.5' HORIZONTAL PENETRATION INTO THE PIER, BETWEEN THE STONEWORK.
- INTERMITTENT CRACKS IN THE STONEWORK AND CAPPING WAS OBSERVED.

PIER 2 (WEST ELEVATION)

N.T.S.

LEGEND FOR BOTTOM ELEVATIONS

DEC, 2010 ← -0.0' -0.0' → DEC, 2012
DEC, 2008 ← -0.0' -0.0' → DEC, 2006

LEGEND FOR MUDLINE PROFILES

DEC, 2012
DEC, 2010
DEC, 2008
DEC, 2006

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -3.5' -6.3' -6.8' -1.7'

* INDICATES NO INFORMATION

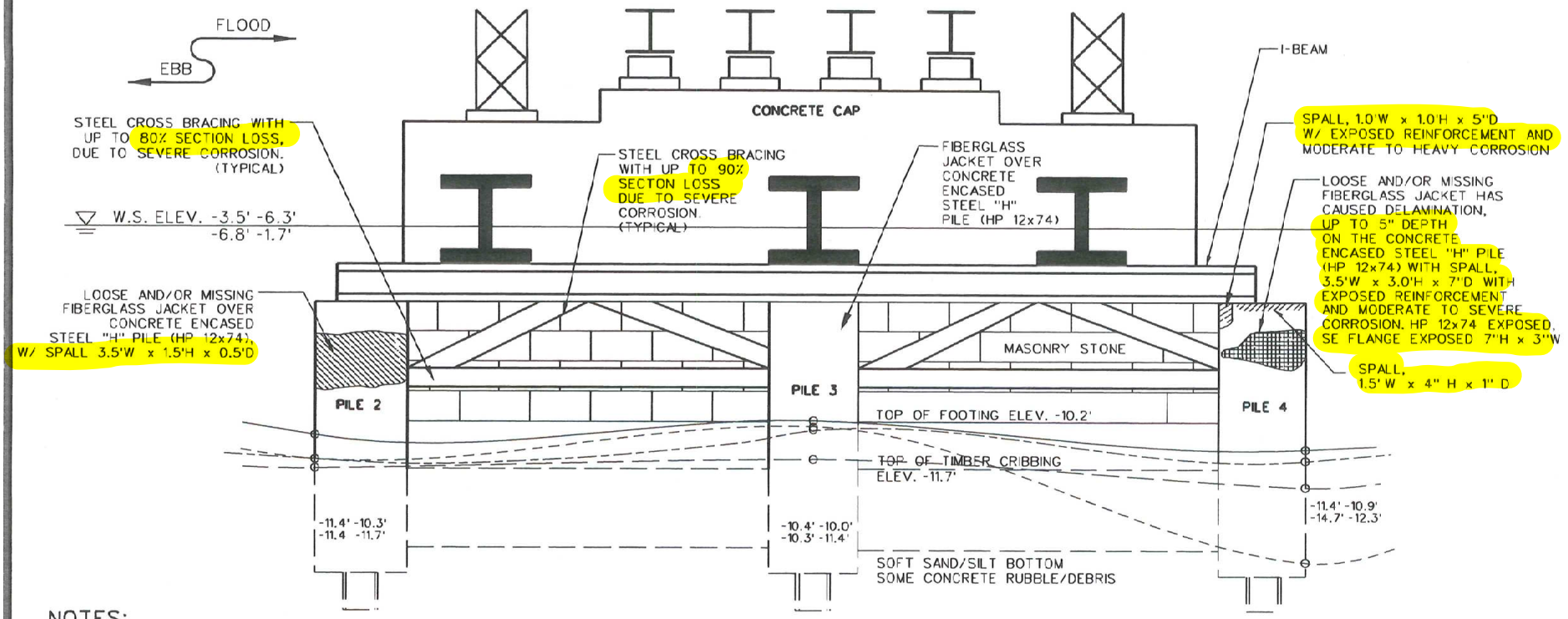
A.DiCesare Associates, P.C.
690 Clinton Ave. Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 2 (WEST ELEVATION)

INSPECTED BY: BM REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 01349F



NOTES:

- MISSING MORTAR, UP TO 5%, ABOVE THE WATERLINE AND 25% BELOW THE WATERLINE, WITH UP TO 2.5' HORIZONTAL PENETRATION INTO THE PIER, BETWEEN THE STONE WORK.
- INTERMITTENT CRACKS IN THE STONEWORK AND CAPPING WAS OBSERVED.

PIER 2 (EAST ELEVATION)

N.T.S.

LEGEND FOR BOTTOM ELEVATIONS

DEC, 2010 → -0.0' -0.0' ← DEC, 2012
DEC, 2008 → -0.0' -0.0' ← DEC, 2006

LEGEND FOR MUDLINE PROFILES

- DEC, 2012
- DEC, 2010
- DEC, 2008
- DEC, 2006

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -3.5' -6.3' -6.8' -1.7'

* INDICATES NO INFORMATION

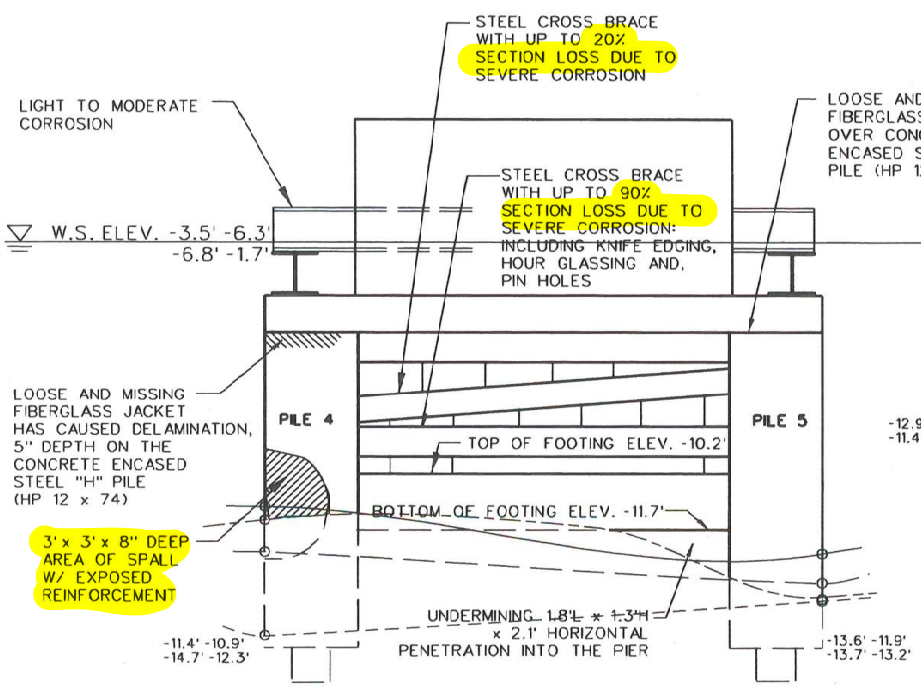
A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

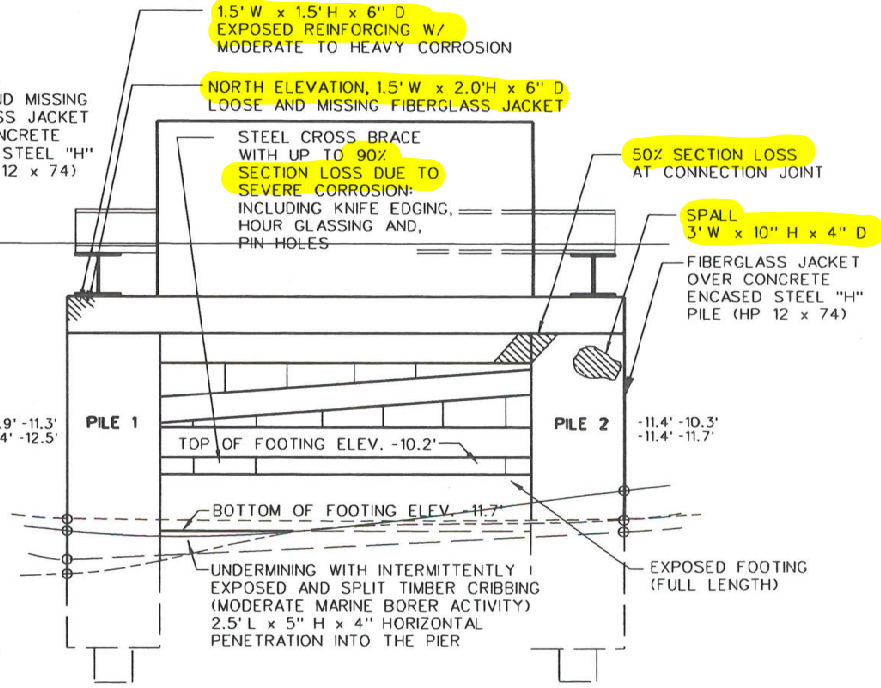
PIER 2 (EAST ELEVATION)

INSPECTED BY: BM REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 01349G



PIER 2 (NORTH ELEVATION)

N.T.S.



PIER 2 (SOUTH ELEVATION)

N.T.S.

NOTES:

- MISSING MORTAR, UP TO 20% WITH 2.5' HORIZONTAL PENETRATION INTO THE PIER, BETWEEN THE STONEWORK.

LEGEND FOR BOTTOM ELEVATIONS

DEC, 2010 → -0.0' -0.0' ← DEC, 2012
DEC, 2008 → -0.0' -0.0' ← DEC, 2006

LEGEND FOR MUDLINE PROFILES

DEC, 2012
DEC, 2010
DEC, 2008
DEC, 2006

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -3.5' -6.3' -6.8' -1.7'

* INDICATES NO INFORMATION

A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

CONNECTICUT DEPARTMENT OF TRANSPORTATION

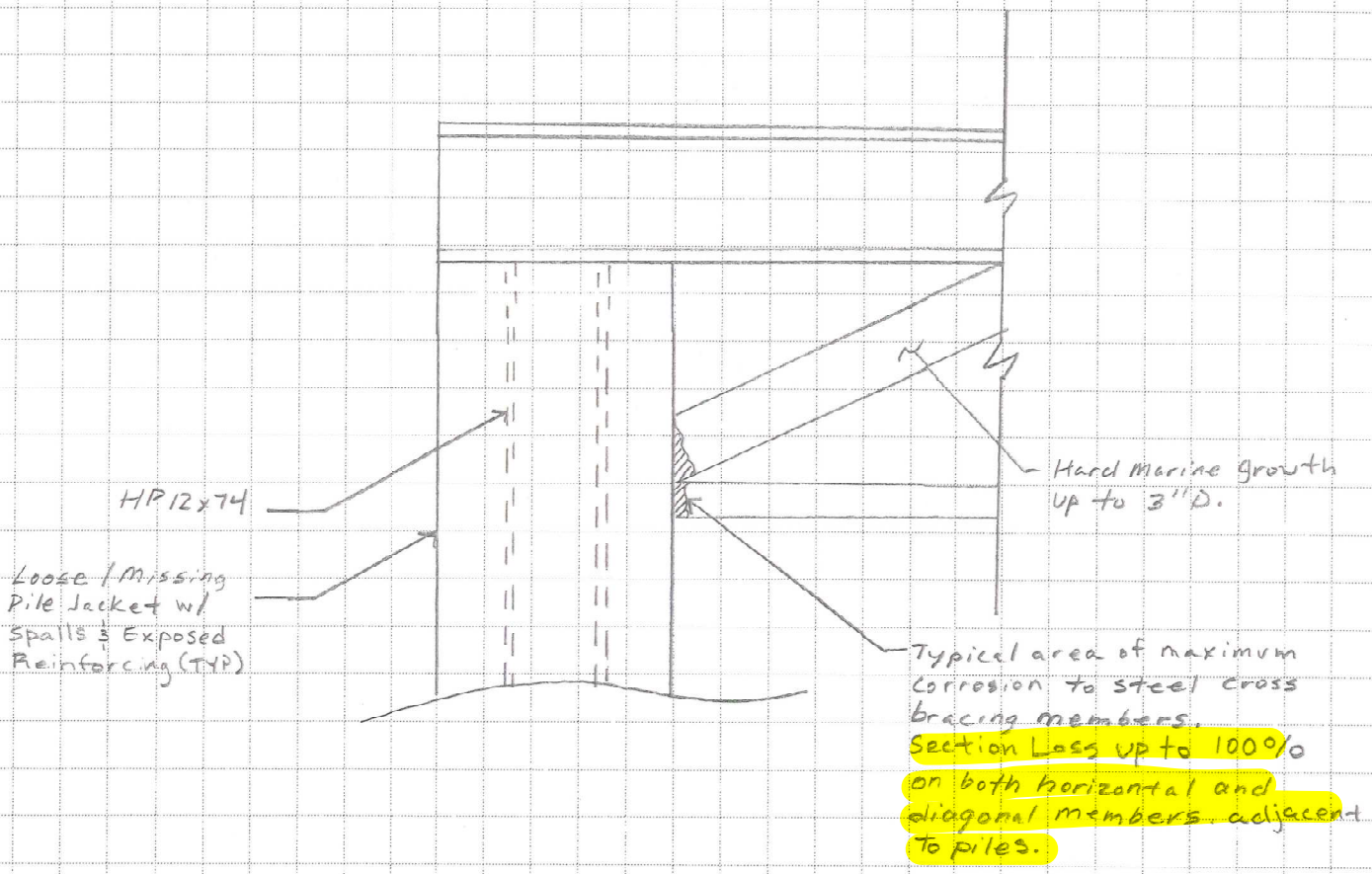
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 2 NORTH AND SOUTH ELEVATIONS

INSPECTED BY: BM REVISED BY: DM	SCALE: AS SHOWN	DATE OF INSPECTION 12 / 07 / 12	DRAWING NO. 01349H

A. DiCesare Associates, P.C.
690 Clinton Avenue
Bridgeport, Connecticut 06604
(203) 696-0444 • dicesare@adicesarepc.com

JOB BR No. 01349
SHEET NO. 14a OF 28
CALCULATED BY BM DATE 12/7/2012
CHECKED BY DATE
SCALE NTS



Pier 2 Typical Section Loss to Steel Cross Brace Members

NTS

A.DiCesare Associates, P.C.

Bridge No.	01349	**Project No.**	170-3013
Town	Westport	**Inspected By**	Bill McLachlan
Feature Carried	Route 136	**Inspected By**	Clay Carlson/Kurt Gabrielson
Feature Crossed	Saugatuck River	**Date Inspected**	12/7/2012



Photo No. 9:
Pier No. 2 (East Elevation)



Photo No. 10:
Pier No. 3 (West Elevation)

A.DiCesare Associates, P.C.

Bridge No.	01349	**Project No.**	170-3013
Town	Westport	**Inspected By**	Bill McLachlan
Feature Carried	Route 136	**Inspected By**	Clay Carlson/Kurt Gabrielson
Feature Crossed	Saugatuck River	**Date Inspected**	12/7/2012



Photo No. 13:
Typical Section Loss up to 100% in Cross Bracing at Pier No. 2



Photo No. 14:
Typical Missing Mortar in Stone Masonry

A.DiCesare Associates, P.C.

Bridge No.	01349	**Project No.**	170-3013
Town	Westport	**Inspected By**	Bill McLachlan
Feature Carried	Route 136	**Inspected By**	Clay Carlson/Kurt Gabrielson
Feature Crossed	Saugatuck River	**Date Inspected**	12/7/2012

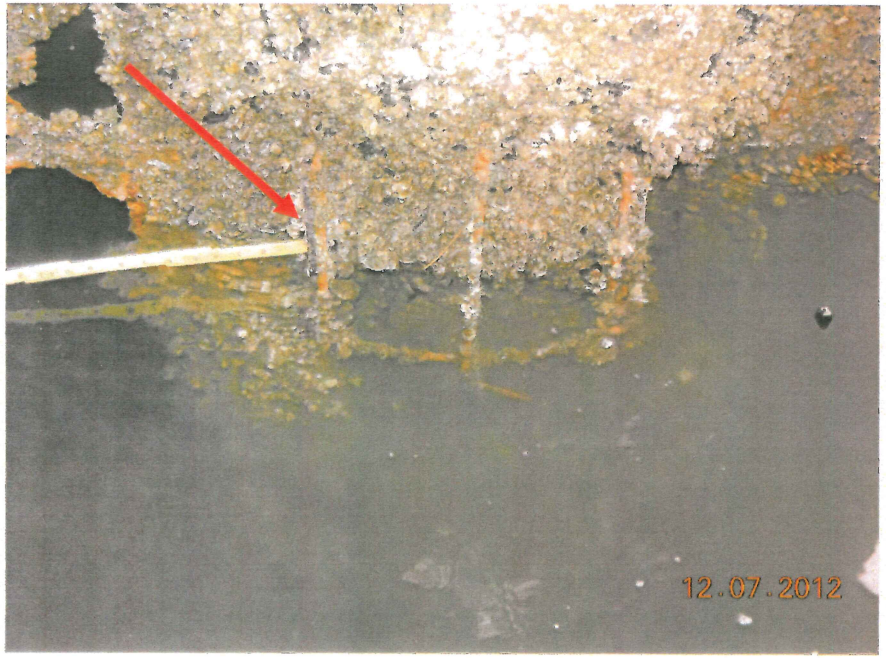


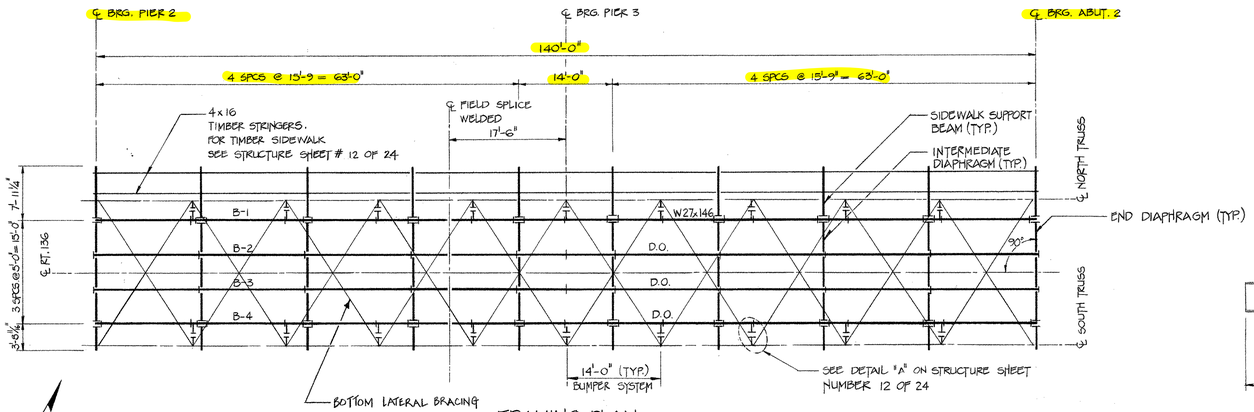
Photo No. 15:
Spalling of Protective Jacket Pile No. 4, Pier No. 2
Note Flange of Steel Pile Exposed 5"H , Edges Remain Square



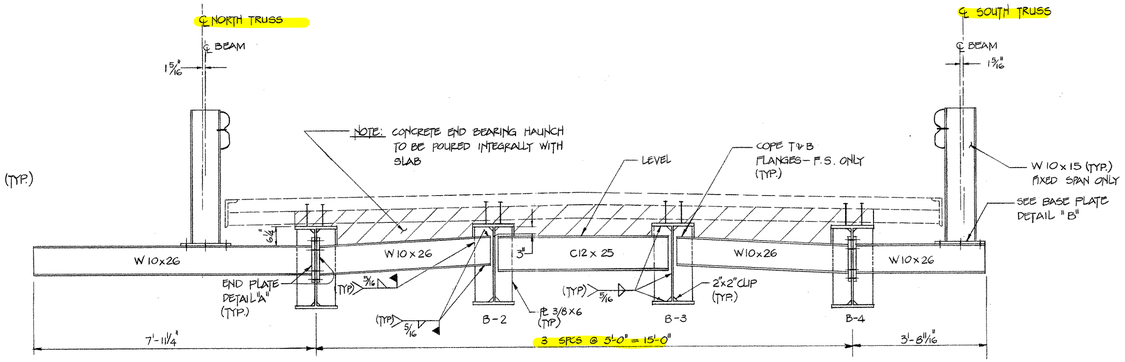
Photo No. 16:
Failing Epoxy Repair at Abutment (Typ.)

STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION — FORM NO ENG 15A ED 4-80

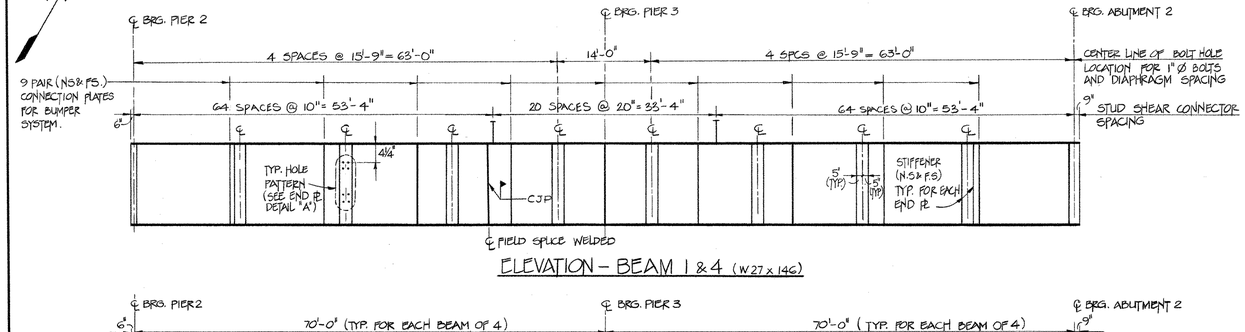
F.H.W.A. REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	—	158-150	1959	136	30	72



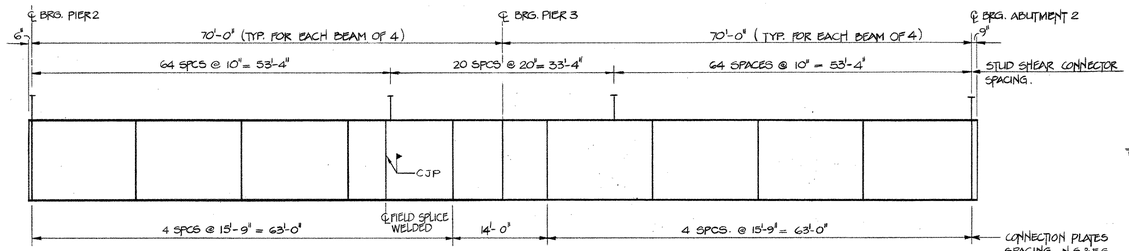
FRAMING PLAN
SCALE: 3/32" = 1'-0"



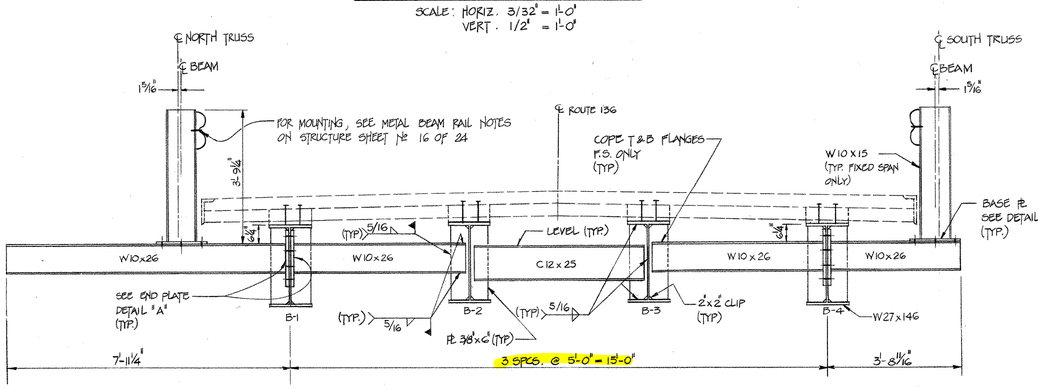
END BEARING DIAPHRAGM & METAL BEAM RAIL SUPPORT
SCALE: 1/2" = 1'-0"



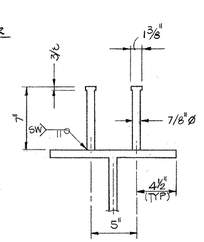
ELEVATION - BEAM 1 & 4 (W27 x 146)



ELEVATION - BEAM 2 & 3 (W27 x 146)
SCALE: HORIZ. 3/32" = 1'-0"
VERT. 1/2" = 1'-0"

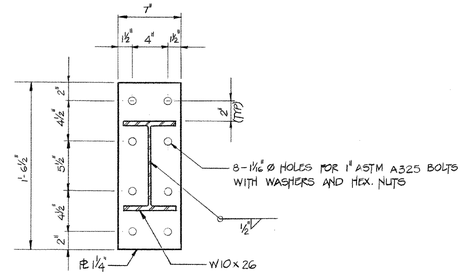


INTERMEDIATE DIAPHRAGM & METAL BEAM RAIL SUPPORT
SCALE: 1/2" = 1'-0"

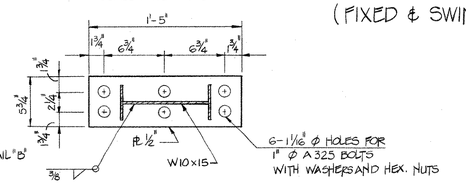


ESTIMATED № OF STUD = 1192

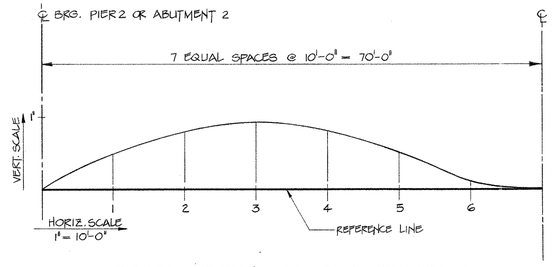
SHEAR CONNECTOR
SCALE: 1½" = 1'-0"



END PLATE DETAIL "A"
SCALE: 1½" = 1'-0"
(FIXED & SWING SPANS)



BEAM RAIL POST - FIXED SPAN ONLY
BASE PLATE DETAIL "B"
SCALE: 1½" = 1'-0"



TYPICAL TOTAL CAMBER DIAGRAM

DEAD LOAD DEFLECTION & CAMBER (INCH)

	PT	STRUCTURAL STEEL	OTHER DEAD LOADS	TOTAL DEAD LOADS DEFLECTION	TOTAL CAMBER
BEAM B1	1	.110	.367	.477	.477
	2	.187	.623	.810	.810
	3	.212	.706	.918	.918
	4	.184	.613	.797	.797
	5	.116	.386	.502	.502
	6	.039	.129	.168	.168
BEAM B2	1	.110	.353	.463	.463
	2	.187	.600	.787	.787
	3	.212	.679	.891	.891
	4	.184	.590	.774	.774
	5	.116	.372	.488	.488
	6	.039	.124	.163	.163
BEAM B3	1	.110	.339	.449	.449
	2	.187	.576	.763	.763
	3	.212	.653	.865	.865
	4	.184	.567	.751	.751
	5	.116	.357	.473	.473
	6	.039	.119	.158	.158
BEAM B4	1	.110	.325	.435	.435
	2	.187	.553	.740	.740
	3	.212	.626	.838	.838
	4	.184	.544	.728	.728
	5	.116	.343	.459	.459
	6	.039	.115	.154	.154

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION

REVISIONS

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

FIXED SPAN - FRAMING PLAN & DETAILS

ENGINEER	H.W. LOCHNER, INC.		
DESIGNER	LRT & TO	DRAFTER Duc Phan Huynh	CHECKER LM
APPROVED	Robert T. Ora	DATE	9-6-89
STRUCTURE NO.	158-150-1	BRIDGE LOG NO. 01349	STRUCTURE SHEET NO. 11 OF 24

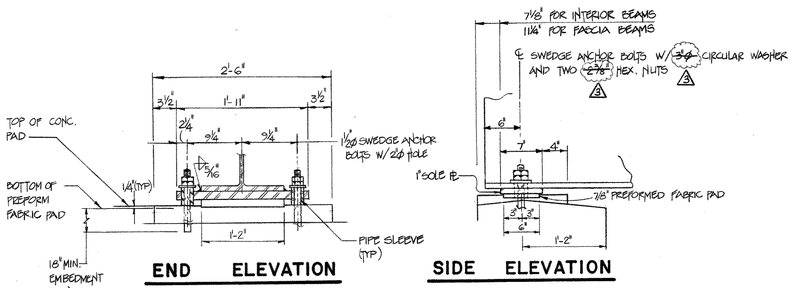
JOSEPH MERRITT & CO. 131525

158-150

270-01

FORM NO. ENG. 158 ED 4-80

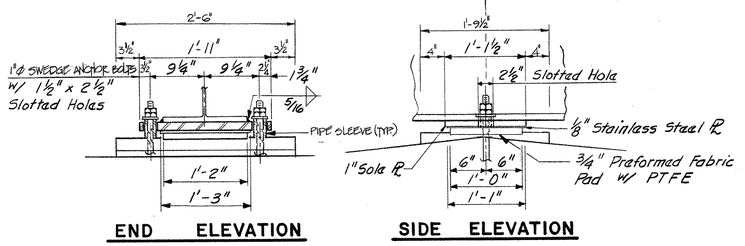
F.H.W.A. REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	—	158-150	1989	136	31-2	72



END ELEVATION — SIDE ELEVATION

FIXED BEARING — PIER 2

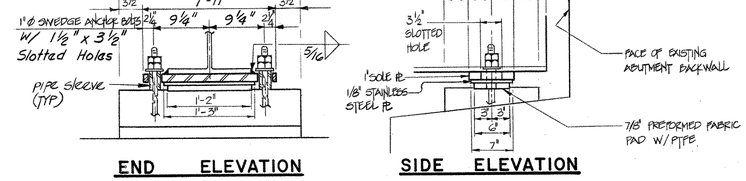
Scale : 1" = 1'-0"



END ELEVATION — SIDE ELEVATION

EXPANSION BEARING — PIER 3

Scale : 1" = 1'-0"



END ELEVATION — SIDE ELEVATION

EXPANSION BEARING — ABUTMENT 2

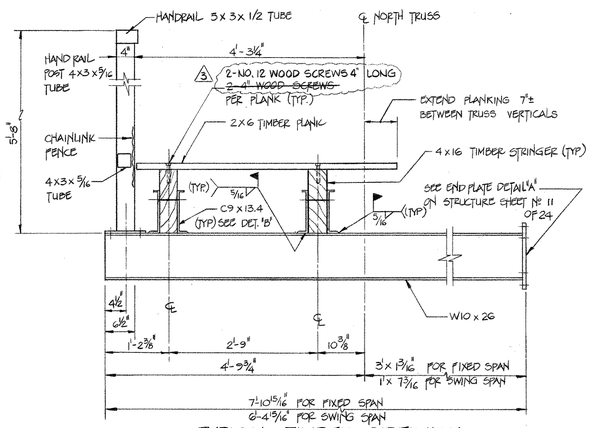
Scale : 1" = 1'-0"

NOTES:

① ALL SOLE PLATES SHALL BE BEVELED TO GRADE.
② THE COST OF FURNISHING AND INSTALLING SWEDGE ANCHOR BOLTS TO BE INCLUDED IN THE PAY ITEM "ELASTOMERIC BEARING SYSTEM".
③ ALL SWEDGE ANCHOR BOLT, WASHER AND NUT SHALL BE GALVANIZED

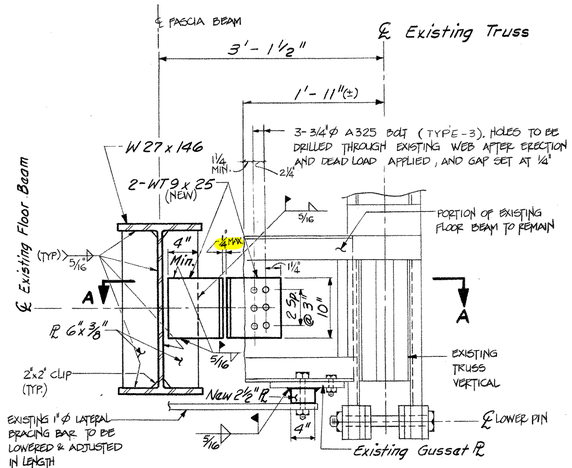
TIMBER FOR SIDEWALK NOTES:

4 ~~① TIMBER SHALL BE SOUTHERN PINE NO. 1 AND PRESSURE TREATED WITH CREOSOTE.~~
② SIDEWALK PLANK SHALL BE FIRMLY ATTACHED WITH TWO 4" WOOD SCREWS TO EACH SUPPORTING TIMBER STRINGER. SCREWS SHALL BE COUNTERSUNK AND THE RECESSES FILLED WITH HOT WATERPROOFING ASPHALT. SEE SPECIAL PROVISIONS
GAP BETWEEN TWO ADJACENT PLANKS SHALL NOT EXCEED ⅛"



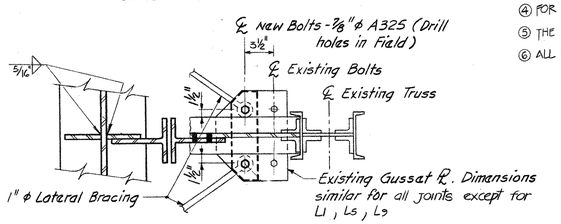
TYPICAL TIMBER SIDEWALK

Scale : 3/4" = 1'-0"



DETAIL A - ELEVATION

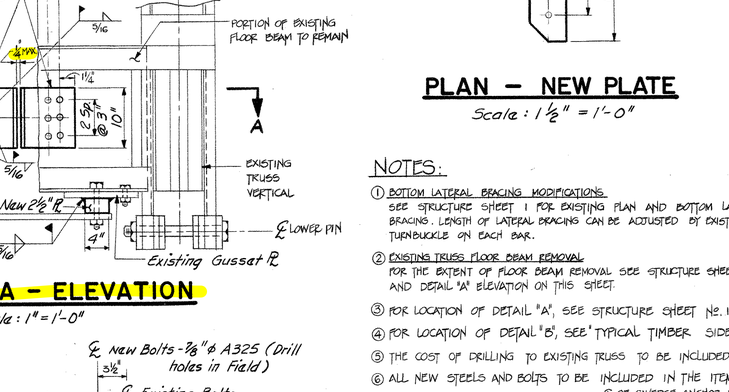
Scale : 1" = 1'-0"



SECTION A-A

Scale : 1" = 1'-0"

NOTE:
FOR ANCHOR BOLT INSTALLATION, SEE "ANCHOR BOLT INSTALLATION NOTES" ON STRUCTURE SHEET Nº. 8 OF 24.

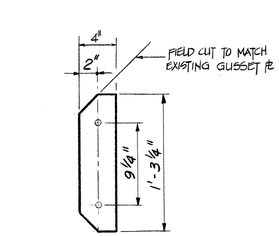


HANDRAIL POST BASE PLATE DETAIL

SCALE: 1½" = 1'-0"

DETAIL "B"

SCALE: 1½" = 1'-0"

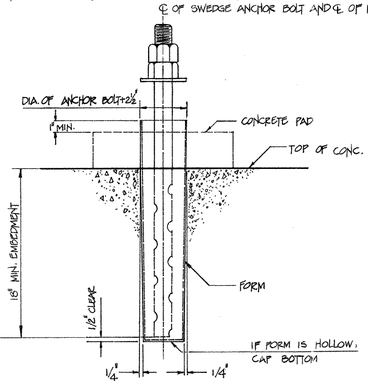


PLAN — NEW PLATE

Scale : 1½" = 1'-0"

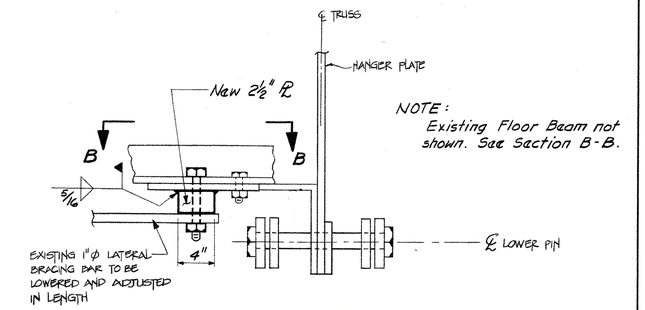
NOTES:

① BOTTOM LATERAL BRACING MODIFICATIONS.
SEE STRUCTURE SHEET 1 FOR EXISTING PLAN AND BOTTOM LATERAL BRACING. LENGTH OF LATERAL BRACING CAN BE ADJUSTED BY EXISTING TURNBUCKLE ON EACH BAR.
② EXISTING TRUSS FLOOR BEAM REMOVAL
FOR THE EXTENT OF FLOOR BEAM REMOVAL SEE STRUCTURE SHEET Nº 15 OF 24. AND DETAIL "A" ELEVATION ON THIS SHEET.
③ FOR LOCATION OF DETAIL "A", SEE STRUCTURE SHEET Nº. 11 OF 24
④ FOR LOCATION OF DETAIL "B", SEE "TYPICAL TIMBER SIDEWALK" ON THIS SHEET
⑤ THE COST OF DRILLING TO EXISTING TRUSS TO BE INCLUDED IN THE ITEM "FIELD DRILLING".
⑥ ALL NEW STEELS AND BOLTS TO BE INCLUDED IN THE ITEM "STRUCTURAL STEEL"



NOTE:
FORM SHALL BE UNOILED, HELD IN PLACE ACCURATELY BY TEMPLATE, AND REMOVED AFTER CONCRETE HAS HARDENED. ANCHOR BOLTS SHALL BE SET ACCURATELY AND GROUTED WITH NON-SHRINK GROUT. THE COST OF FURNISHING AND INSTALLING FORMS TO BE INCLUDED IN THE ITEM 'CLASS A CONCRETE'

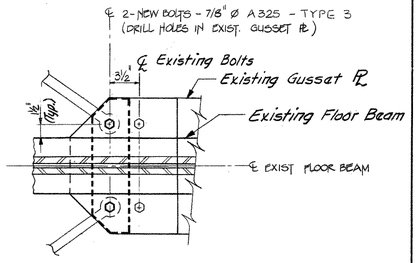
ANCHOR BOLTS FORMS @ PIER 2 & 3, AND ABUTMENT 2



ELEVATION -- BOTTOM LATERAL BRACING MODIFICATIONS - JOINTS L1 & L9

SCALE: 1½" = 1'-0"

(FOR OTHER JOINTS SEE DETAIL "A" ON THIS SHEET)



SECTION B-B

Scale 1½" = 1'-0"

NOTE TO THE CONTRACTOR

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT, DUE TO THE NATURE OF RECONSTRUCTION PROJECTS, THE ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS TO CONSTRUCTION DETAILS AND WORK QUANTITIES. THE CONTRACTOR SHALL PERFORM THE WORK IN ACCORDANCE WITH FIELD CONDITIONS.

MEASUREMENTS: THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL DIMENSIONS BEFORE ANY REPAIR, RECONSTRUCTION OR REPLACE WORK IS BEGUN.

NO.	DATE	REVISIONS
4	11-21-90	Revise Timber for Sidewalk
3	6/5/90	REVISED PER DOT COMMENTS (B.A.M.)

CONNECTICUT
DEPARTMENT OF TRANSPORTATION
WESTPORT
BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER
BEARING AND STEEL DETAILS

ENGINEER H. W. LOCHNER, INC.
DESIGNER L.R.T | DRAFTER Stephen Forsyth | CHECKER LM
APPROVED Leo T. Cia | DATE 9-6-89
STRUCTURE NO. 158-150-1 | BRIDGE LOC NO. 01349 | STRUCTURE SHEET NO. 12 OF 24

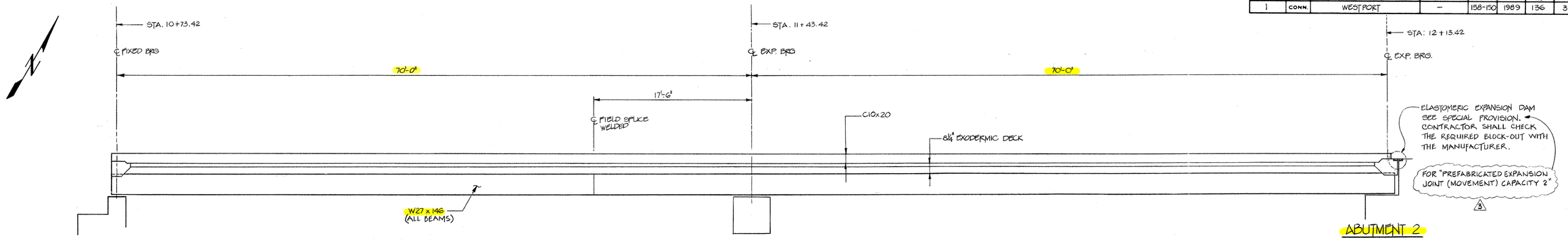
158-150

270-01

31.2

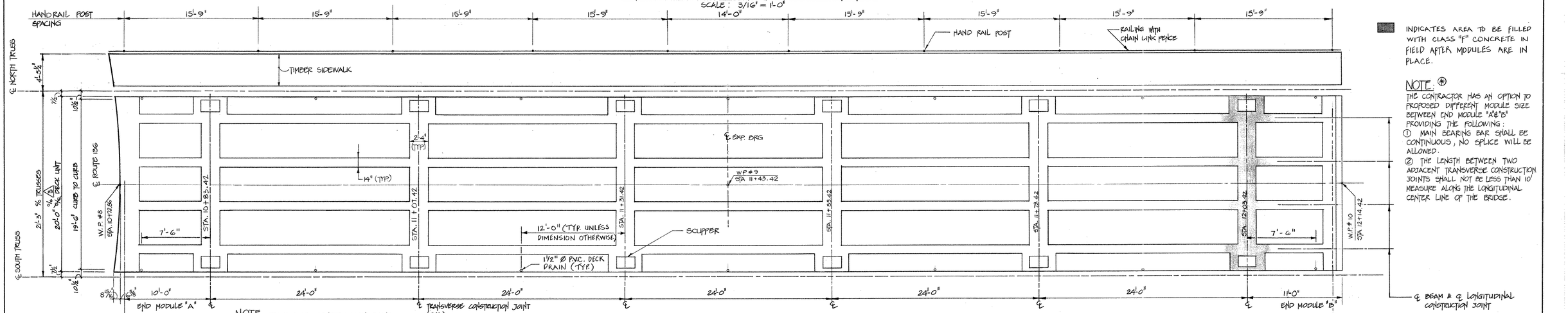
FORM NO. ENG. 158 ED 4-80

F.H.W.A. REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	—	158-150	1989	136	32-2	72



PROPOSED ELEVATION FIXED SPAN

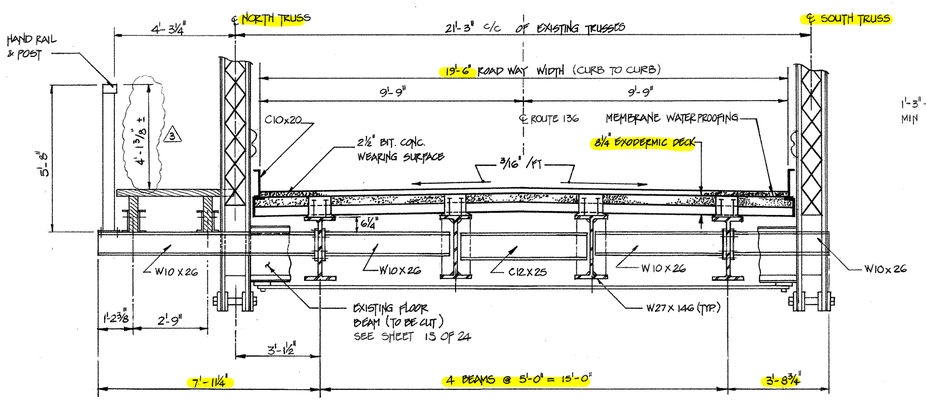
SCALE: 3/16" = 1'-0"



NOTE: TRANSVERSE CONSTRUCTION JOINT AT STATION 10+73.42 SHALL NOT BE POURED PRIOR TO THE COMPLETION OF THE SWING SPAN AND END SCREW JACKS ADJUSTMENT

INDICATES AREA TO BE FILLED WITH CLASS "F" CONCRETE IN FIELD AFTER MODULES ARE IN PLACE.

NOTE: ⊛
THE CONTRACTOR HAS AN OPTION TO PROPOSED DIFFERENT MODULE SIZE BETWEEN END MODULE "A" & "B" PROVIDING THE FOLLOWING:
① MAIN BEARING BAR SHALL BE CONTINUOUS, NO SPLICE WILL BE ALLOWED.
② THE LENGTH BETWEEN TWO ADJACENT TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE LESS THAN 10' MEASURE ALONG THE LONGITUDINAL CENTER LINE OF THE BRIDGE.

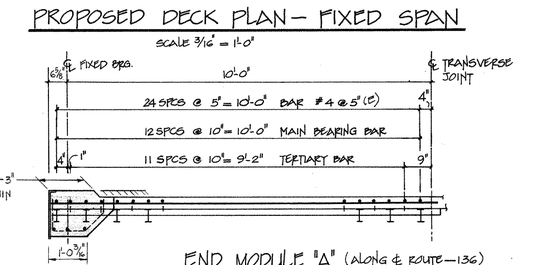


PROP. CROSS SECTION — FIXED SPAN

SCALE 3/8" = 1'-0"

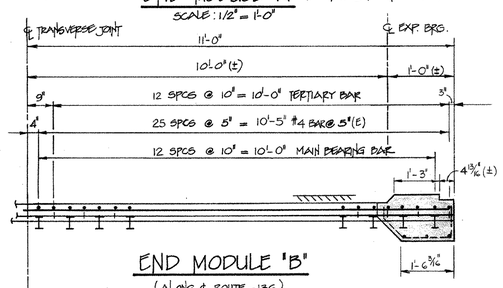
PROPOSED DECK PLAN — FIXED SPAN

SCALE 3/16" = 1'-0"



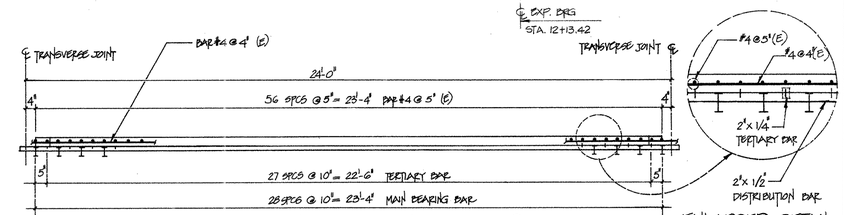
END MODULE "A" (ALONG ℄ ROUTE—136)

SCALE: 1/2" = 1'-0"



END MODULE "B"

(ALONG ℄ ROUTE—136)
SCALE: 1/2" = 1'-0"

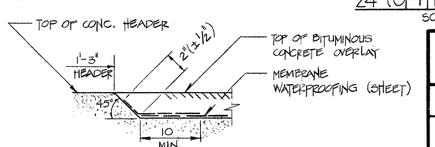


24' (OPTIONAL) MODULE ⊛

SCALE: 3/8" = 1'-0"

ENLARGED DETAIL

SCALE 3/4" = 1'-0"



TREATMENT OF MEMBRANE WATERPROOFING AT HEADER

NO.	DATE	DESCRIPTION
3	6/5/90	REVISED PER DOT COMMENTS (B.A.M.)
		REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION
WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

FIXED SPAN
DECK PLAN AND DETAILS

ENGINEER	H. W. LOCHNER, INC.		
DESIGNER	LM	DRAFTER	CHECKER JD
APPROVED		DATE	9-6-89
STRUCTURE NO.	158-150-1	BRIDGE LOG NO. 01349	STRUCTURE SHEET NO. 13 of 24

158-150

270-61

32-2

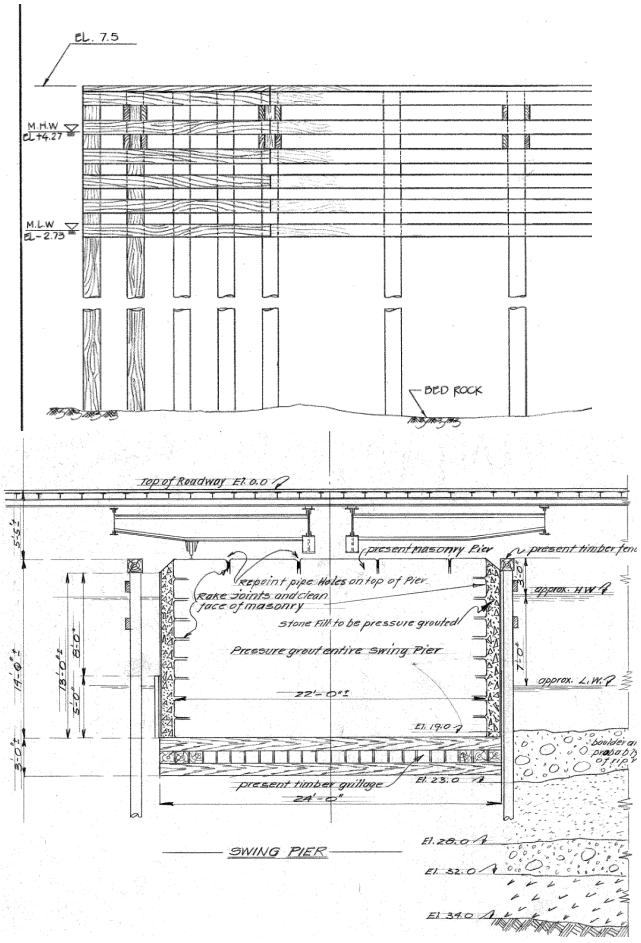
BRIDGE NO. 01349
ROUTE 136 OVER
SAUGATUCK RIVER
WESTPORT, CONNECTICUT

PROJECT NO. 158-212

VESSEL COLLISION ANALYSIS

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

BARGE AND VESSEL COLLISION



$EL._{MHW}$	=	4.27	ft
$EL._{MUD}$	=	-19	ft

D_{water} = $EL._{MHW}$ - $EL._{MUD}$
= 4.27 - -19
D_{water} = 23.27 ft

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

DESIGN SHIP — G.S. TABLE 3.5.2-1

DWT =	1000	tonnes
LOA =	200	ft
B_M =	29.2	ft
D_B =	27.2	
D_L =	14.1	ft
W_L =	1500	tonnes
D_{EB} =	3.5	ft
D_{ES} =	7.1	ft
W_E =	600	tonnes

DESIGN BARGE

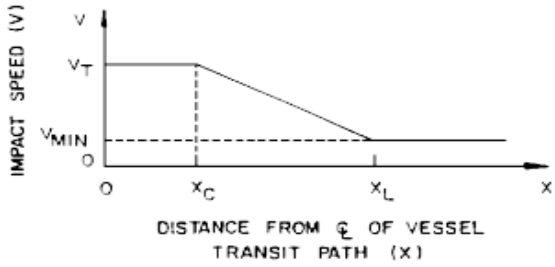
35 ft by 195 ft — AASHTO 3.14.1

d_{empty} = 200 ton

depth =	12	ft
D_E =	1.7	ft
D_L =	8.7	ft
DWT =	1700	ton

AASHTO 3.14.11

DESIGN COLLISION VELOCITY — AASHTO FIG. 3.14.6-1



V_T = typical vessel transity velocity in channel under normal environmental conditions
V_{MIN} = minimum design impact velocity taken as not less than the yearly mean current velocity
X = distance to face of pier from centerline of channel
X_C = distance to edge of channel
X_L = distance equal to three times the length overall of the design vessel

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

WIDTH OF CHANNEL, C = 50 ft

V_T = 5 knots
= 8.439049 ft/s

V_{MIN} = 1 knots — min. 1 recommended
= 1.68781 ft/s

X = 25 ft
X_C = 25 ft

FOR SHIP
X_L = 3 x LOA = 3 x 200
= 600 ft

V = 8.439049 ft/s

FOR BARGE
X_L = 3 x LOA = 3 x 195
= 585 ft

V = 8.439049 ft/s

VESSEL SHIP COLLISION

VESSEL COLLISION ENERGY, KE

UNDERKEEL
if draft > 0 , UK = D_{water} - D_E
= 23.27 - 7.1
= 16.17 ft
if draft < 0 , UK = 0

D_E = 7.1 > 0 , therefore

UK = 16.17 ft

C_H = hydrodynamic mass coefficient

if UK > 0.5 x D_E , C_H = 1.05 — AASHTO EQ. 3.14.7-2
if 16.17 > 7.1 , C_H = 1.05

if UK < 0.1 x D_E , C_H = 1.25 — AASHTO EQ. 3.14.7-3
if 16.17 < 7.1 , C_H = 1.25

C_H = 1.05

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

W = 600 tonnes Vessel + Cargo + Ballast G.S. 3.8
V = 8.439049 ft/s

$$KE = \frac{C_H \times W \times V^2}{29.2}$$ AASHTO EQ. 3.14.7-1

$$= \frac{1.05 \times 600 \times 8.439^2}{29.2}$$

KE = 1536.543 k-ft

EQUIVALENT STATIC VESSEL IMPACT FORCE ON PIER, P_S

DEADWEIGHT TONNAGE OF VESSEL
DWT = 1000 tonnes

$$P_S = 8.15 \times V \times DWT^{0.5}$$ AASHTO EQ. 3.14.8-1

$$= 8.15 \times 8.439 \times 1000^{0.5}$$

P_S = 2174.959 kips

SHIP BOW DAMAGE LENGTH

$$a_S = 1.54 \times \frac{KE}{P_S}$$ AASHTO EQ. 3.14.9-1

$$= 1.54 \times \frac{1536.5}{2175}$$

a_S = 1.087964 ft

SHIP COLLISION FORCE ON SUPERSTRUCTURE

COLLISION WITH BOW
D_B = 27.2 ft
D_{SUPER} = 17.75 ft

$R_{BH} = D_{SUPER} / D_B = 17.75 / 27.2 = 0.6526$

$$P_{BH} = R_{BH} \times P_S$$ AASHTO EQ. 3.14.10.1-1

$$= 0.653 \times 2175$$

P_{BH} = 1419.321 kips

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

COLLISION WITH DECKHOUSE

DWT = 1000 tonnes

IF DWT > 100000 , R_{DH} = 0.1

IF DWT < 100000 , $R_{DH} = 0.2 - \left(\frac{DWT}{100000}\right) x \ 0.1$ AASHTO EQ. 3.14.10.2-2

$= 0.2 - \left(\frac{1000}{100000}\right) x \ 0.1 = 0.199$

DWT = 1000 < 100000 , therefore

R_{DH} = 0.199

$P_{BH} = R_{DH} \ x \ P_S$ AASHTO EQ. 3.14.10.1-1

$= 0.199 \ x \ 2175$

P_{BH} = 432.8169 kips

BARGE COLLISION

BARGE COLLISION ENERGY, KE

UNDERKEEL

if draft > 0 , UK = $D_{water} - D_E$

= 23.27 - 1.7

= 21.57 ft

if draft < 0 , UK = 0

D_E = 1.7 > 0 , therefore

UK = 21.57 ft

C_H = hydrodynamic mass coefficient

if UK > 0.5 x D_E , C_H = 1.05 AASHTO EQ. 3.14.7-2

if 21.57 > 0.85 , C_H = 1.05

if UK < 0.1 x D_E , C_H = 1.25 AASHTO EQ. 3.14.7-3

if 21.57 < 0.17 , C_H = 1.25

C_H = 1.05

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

W = 200 ton
V = 8.439049 ft/s

$$KE = \frac{C_H \times W \times V^2}{29.2}$$ AASHTO EQ. 3.14.7-1

$$= \frac{1.05 \times 200 \times 8.439^2}{29.2}$$

KE = 512.181 k-ft

BARGE BOW DAMAGE DEPTH

$$a_B = \left(\sqrt{1 + \frac{KE}{5672}} - 1 \right) \times 10.2$$ AASHTO EQ. 3.14.12-1

$$= \left(\sqrt{1 + \frac{512.18}{5672}} - 1 \right) \times 10.2$$

a_B = 0.450578 ft

EQUIVALENT STATIC BARGE IMPACT FORCE, P_B

FOR $a_B <$ 0.34 , $P_B = 4112 \times a_B$ AASHTO EQ. 3.14.11-1
$= 4112 \times 0.4506$
$= 1852.8$ kips

FOR $a_B \geq$ 0.34 , $P_B = 1349 + 110 \times a_B$ AASHTO EQ. 3.14.11-2
$= 1349 + 110 \times 0.4506$
$= 1398.6$ kips

a_B = 0.450578 ≥ 0.34 , therefore

P_B = 1398.564 kips

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

VESSEL CRUSHING FORCE (PIER IMPACT LOAD)

FENDER STIFFNESS

KE = 1536.543 k-ft
= 18438.52 k-in
X = deformation
= 0.5 in

KE = 1/2 x k x X^2 G.S. C7.3.1-2
18439 = 1/2 x k x 0.5^2

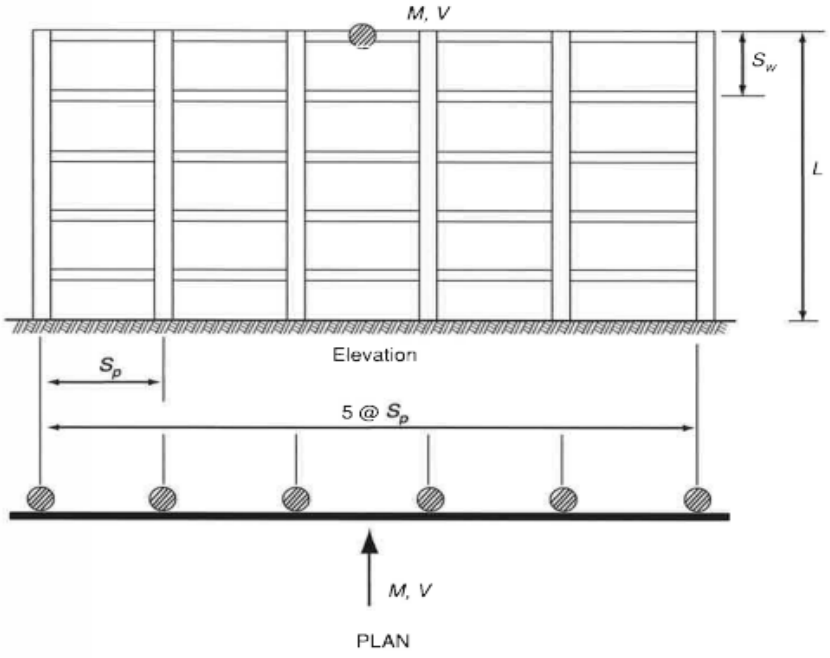
k = 12292.34 k/in

x = depth of timber cribbing framework
= 8.75 ft

F = KE / x G.S. C7.3.1.1-1
1536.543 / 8.75
F = 175.6049 kips

PILE SUPPORTED FENDER SYSTEM

SPRING CONSTANT OF PILE AND FENDER, K_p AND K_f G.S. FIGURE C7.3.2-7



b. Multiple Pile Fender Structure

Figure C7.3.2-7—Typical Pile-Structure Geometry for Derucher's Dynamic Analysis

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

E = 1600 ksi

L = 41 ft
= 492 in

$$I_p = \frac{\pi \times r^4}{4}$$
$$= \frac{3.141593 \times 13^4}{4}$$
I_p = 22431.76 in^4 $\quad I_w$ = 415.28 in^4 SEE CUTSHEET

S_p = 7.75 ft = 93 in $\quad S_w$ = 9.5 ft = 114 in

$$Dy = E \times I_p / S_p$$
$$= 1600 \times 22432 / 93$$
Dy = 385922.7

$$Dx = E \times I_w / S_w$$
$$= 1600 \times 415.28 / 114$$
Dx = 5828.491

$$F = 3.5 \times 10^{-13} Dy^2 + 3.1 \times 10^{-7} Dy + 0.335$$ G.S. C7.3.2-6
$$= 3.5 \times 10^{-13} 385923^2 + 3.1 \times 10^{-7} 385923 + 0.335$$
F = 0.506764

$$DF = \left(-6E\text{-}07 \times Dx + F \right) \times L^{-0.006}$$ G.S. C7.3.2-5
$$= \left(-6E\text{-}07 \times 5828.5 + 0.5068 \right) \times 492^{-0.006}$$
DF = 0.484894

$$\Delta_p = \left(\frac{L^3}{3 \times E \times I_p} \right) \times DF$$ G.S. C7.3.2-4
$$= \left(\frac{492^3}{3 \times 1600 \times 22432} \right) \times 0.4849$$
Δ_p = 0.536336 in

$$K_p = 1 / \Delta_p = 1 / 0.5363$$ G.S. C7.3.2-3
= 1.864502

K_f = 1

$$K = \frac{K_p \times K_f}{K_p + K_f}$$ G.S. C7.3.2-2
$$= \frac{1.864502 \times 1}{1.864502 + 1}$$
K = 0.650899

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

MAXIMUM SYSTEM DEFLECTION, Y (in)

V = 8.439 ft/s
= 101.269 in/s

DWT = 1000 tonnes
= 2205 kips

a_g = 32 ft/s^2
= 384 in/s^2

M = DWT / a_g
= 2205 / 384
M = 5.742188 kips-s_2/in

$\lambda = \sqrt{K / M}$ G.S. C7.3.2

$= \sqrt{0.650899 / 5.7422}$
λ = 0.336681

Y = V / λ
= 101.269 / 0.3367
Y = 300.7853 in

ACCELERATION, a AND STOPPING TIME, t

a = V x λ
= 101.269 x 0.3367
= 34.095 in/s^2

t = π / 2 x λ
= 3.141593 / 2 x 0.3367
t = 4.665538 seconds

VESSEL COEFFICIENT, C

C = C_H = 1.05 for head on impact G.S. C7.3.2

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

APPLIED FORCE TO STRUCTURE, P

$P = K \times Y \times C$ G.S. C7.3.2-1

$= 0.650899 \times 300.79 \times 1.05$

$P = 205.5699$ kips

$N_{piles} =$ 20 ea

$P_1 = P / N_{piles}$

$= 205.5699 / 20$

$P_1 =$ 10.2785 kip/pile

SINGLE-SPAN BEAM ANALYSIS

For Simple, Propped, Fixed, or Cantilever Beams

Job Number:	158-212	Originator:	BM	Subject:	BR. 01349 RT. 136 OVER SAUGATUCK RIVER
Date:	3/17/2016	Checker:	BA		VESSEL COLLISION ON FENDER

The drop-down beams consider bending in the strong axis direction only.
To consider a beam not in the drop-down, choose "User defined"
and enter your own Ix & Sx below

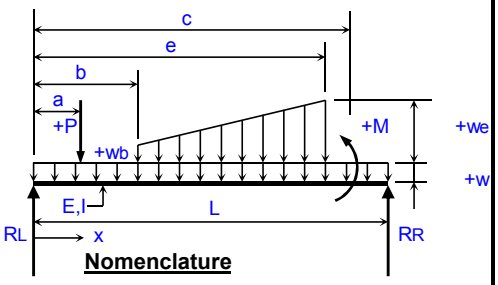
Input Data:

Beam Data:

Span Type?	Simple	
Span, L =	7.7500	ft.
Modulus, E =	1600	ksi
Size:	User defined	
Inertia, Ix =	2491.68	in.^4
Sec. Mod. Sx =	442.98	in.^3
User defined Ix =	2491.68	in.^4
User defined Sx =	442.98	in.^3

Simple Beam
Propped Beam
Fixed Beam
Cantilever Beam

Enter your values for Ix & Sx down here



Nomenclature

Beam Loadings: Sect. prop. for 6 layers

Full Uniform: w = 0.0000 kips/ft.

Distributed:	Start b (ft.)	Wb (kips/ft.)	End e (ft.)	We (kips/ft.)
#1:				
#2:				
#3:				
#4:				
#5:				
#6:				
#7:				
#8:				

Enter Allowable Stress for Beam Material

Allowable Stress, Sa = 2640.00 psi

Note: Southern Pine or Equivalent 2.64ksi Allowable = 2640 psi

Results:

Reactions:

RL =	87.80 k	RR =	87.80 k
ML =	N.A.	MR =	N.A.

Maximum Moments:

+M(max) =	340.23 ft-k	@ x =	3.88 ft.
-M(max) =	0.00 ft-k	@ x =	0.00 ft.

Maximum Deflections:

-Δ(max) =	-0.738 in.	@ x =	3.88 ft.
+Δ(max) =	0.000 in.	@ x =	0.00 ft.
Δ(ratio) =	L/126		

Maximum Bending Stress:

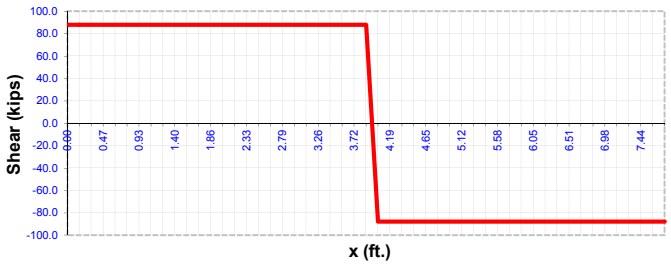
Smax =	9,216 psi
Stress Ratio =	3.49

Allowable Stress is Exceeded

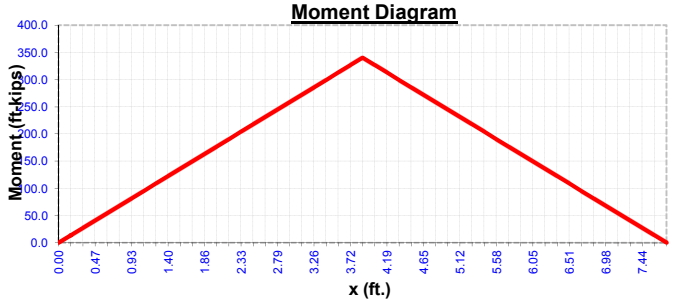
Point Loads:	a (ft.)	P (kips)
#1:	3.8750	175.60
#2:		
#3:		
#4:		
#5:		
#6:		
#7:		
#8:		
#9:		
#10:		
#11:		
#12:		
#13:		
#14:		
#15:		

Moments:	c (ft.)	M (ft-kips)
#1:		
#2:		
#3:		
#4:		

Shear Diagram



Moment Diagram



4/12/2016 12:00 PM

SINGLE-SPAN BEAM ANALYSIS

For Simple, Propped, Fixed, or Cantilever Beams

Job Number:	158-212	Originator:	BM	Subject:	BR. 01349 RT. 136 OVER SAUGATUCK RIVER
Date:	3/17/2016	Checker:	BA		VESSEL COLLISION ON PILE

The drop-down beams consider bending in the strong axis direction only.
To consider a beam not in the drop-down, choose "User defined"
and enter your own Ix & Sx below

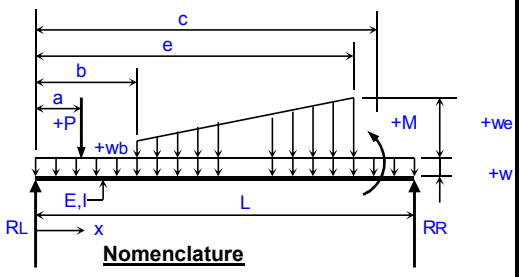
Input Data:

Beam Data:

Span Type?	Cantilever	
Span, L =	41.0000	ft.
Modulus, E =	1600	ksi
Size:	User defined	
Inertia, Ix =	490.87	in.^4
Sec. Mod. Sx =	98.17	in.^3
User defined Ix =	490.87	in.^4
User defined Sx =	98.17	in.^3

Simple Beam | Propped Beam | Fixed Beam | Cantilever Beam

Enter your values for Ix & Sx down here



Nomenclature

Beam Loadings: Sect. prop. Averaged

Full Uniform: w = 0.0000 kips/ft.

Distributed:	Start b (ft.)	Wb (kips/ft.)	End e (ft.)	We (kips/ft.)
#1:				
#2:				
#3:				
#4:				
#5:				
#6:				
#7:				
#8:				

Enter Allowable Stress for Beam Material

Allowable Stress, Sa = 2640.00 psi

Note: Southern Pine or Equivalent 2.64ksi Allowable = 2640 psi

Results:

Reactions:

RL =	N.A.	RR =	10.28 k
ML =	N.A.	MR =	-421.42 ft-k

Maximum Moments:

+M(max) =	0.00 ft-k	@ x =	0.00 ft.
-M(max) =	-421.42 ft-k	@ x =	41.00 ft.

Maximum Deflections:

-Δ(max) =	-519.534 in.	@ x =	0.00 ft.
+Δ(max) =	0.000 in.	@ x =	0.00 ft.
Δ(ratio) =	L/1		

Maximum Bending Stress:

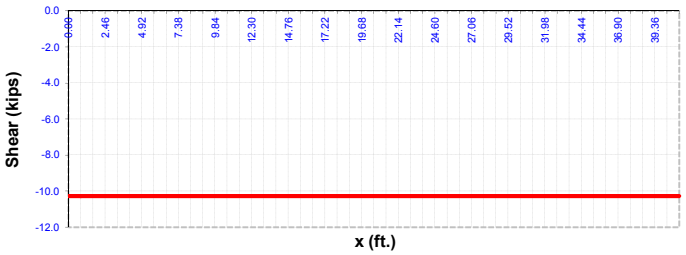
Smax =	51,510 psi
Stress Ratio =	19.51

Allowable Stress is Exceeded

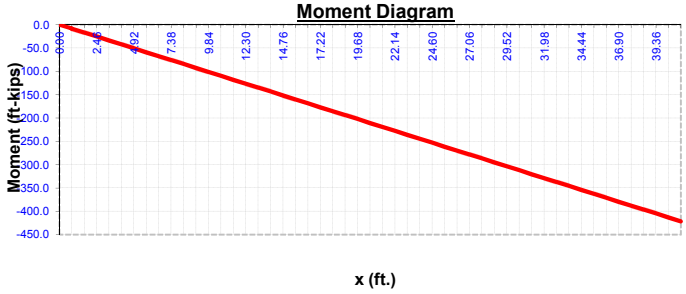
Point Loads:	a (ft.)	P (kips)
#1:	0.0000	10.28
#2:		
#3:		
#4:		
#5:		
#6:		
#7:		
#8:		
#9:		
#10:		
#11:		
#12:		
#13:		
#14:		
#15:		

Moments:	c (ft.)	M (ft-kips)
#1:		
#2:		
#3:		
#4:		

Shear Diagram



Moment Diagram



4/12/2016 12:00 PM

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

VESSEL COLLISION ON PILE

d_{pile} = 13 in
= 1.0833 ft

H = 10.278 k
e = 26.25 ft
B = 1.0833 ft
γ_{soil} = 0.125 kcf
Φ = 38 degrees

LF = 1.5
R_{Kp} = 0.75

H_u = LF x H
= 1.5 x 10.278
H_u = 15.418 k

RANKINE COEFFICIENT OF PASSIVE PRESSURE

$$K_p = \frac{1 + \sin(\Phi)}{1 - \sin(\Phi)} = \frac{1 + \sin(38)}{1 - \sin(38)} = \frac{1 + 0.6157}{1 - 0.6157}$$

K_p = 4.2037

Reduced K_p = 0.75 x 4.204
= 3.1528

REQUIRED EMBEDMENT, L
Moments about the bottom must be zero.

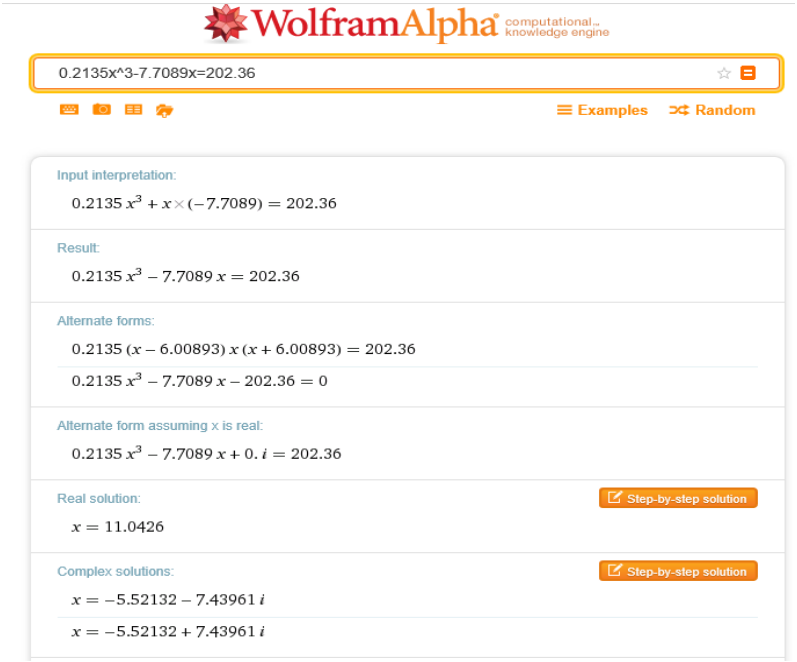
p = 3 x B x γ_{soil} x L x K_p
= 3 x 1.0833 x 0.125 x L x 3.153
p = 1.2808 x L

M_{bot} = H_u x(e + L)- 1/6 x p x L^2
0 = 15.418 x(26.25 + L)- 1/6 x(1.281 x L)x L^2
0 = 404.72 +(15.418 x L)- 0.213 x L^3

404.72 = 0.213 x L^3 - 15.42 x L

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

Solved Equation (See Wolfram Alpha)



L = 11.043 ft

p = 3 x B x γ_{soil} x L x K_p
= 3 x 1.0833 x 0.125 x 11.04 x 3.153
p = 14.144 k/ft

ZERO SHEAR LOCATION, f

p_f = 3 x B x γ_{soil} x f x K_p
= 3 x 1.0833 x 0.125 x f x 3.153
p_f = 1.2808 x f

V_f = H_u - 1/2 x p_f x f
0 = 15.418 - 1/2 x 1.281 x f x f
15.418 = 0.6404 x f^2
24.075 = f^2

f = 4.9066 ft

p_f = 1.2808 x f
= 1.2808 x 4.9066
p_f = 6.2845 k/ft

V_f = H_u - 1/2 x p_f x f
= 15.418 - 1/2 x 6.285 x 4.907
V_f = 0 k CHECKS

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

FACTORED MOMENT AT f

$M_{max} = H_u \times (e + f) - 1/6 \times p_f \times f^2$
$= 15.418 \times (26.25 + 4.907) - 1/6 \times 6.285 \times 4.907^2$
$M_{max} = 455.15$ k-ft

Ratio L/B

Ratio = L / B < 10
= 11.043 / 1.0833 < 10
10.193 ~ 10 METHOD IS VALID

ACTUAL EMBEDMENT, L_{act}

Moments about the bottom must be zero.

$L_{act} =$ 15 ft

$p = 3 \times B \times \gamma_{soil} \times L \times K_p$
$= 3 \times 1.0833 \times 0.125 \times 15 \times 3.153$
$p = 19.212$ k/ft

$M_{bot} = H_u \times (e + L) - 1/6 \times p \times L^2$
$= 15.418 \times (26.25 + 15) - 1/6 \times 19.21 \times 15^2$
$= 635.98 - 720.47$
$M_{bot} = -84.48$ k-ft

STRESS OF PILE

MAXIMUM NEGATIVE MOMENT AT BOTTOM OF PILE

$M_{bot} = -84.48$ k-ft
$= -1014$ k-in

$$S_{pile} = \frac{\pi \times d^3}{32}$$
$$= \frac{3.1416 \times 13^3}{32}$$
$S_{pile} = 215.69$ in^3

$\sigma_{max} =$ 2460 psi
$= 2.46$ ksi

$$\sigma_{max} > \frac{M_{bot}}{S_{pile}}$$
$$2.46 > \frac{1014}{215.69}$$

$2.46 < 4.7003$ ksi NO GOOD

MAXIMUM MOMENT AT LOCATION f

$M_{max} = 455.15$ k-ft
$= 5462$ k-in

BR. 01349 IN WESTPORT
ROUTE 136 OVER SAUGATUCK RIVER

$$S_{pile} = \frac{\pi \times d^3}{32}$$

$$= \frac{3.1416 \times 13^3}{32}$$

$S_{pile} = 215.69 \text{ in}^3$

$\sigma_{max} = 2640$ psi
$= 2.64$ ksi

$$\sigma_{max} > \frac{M_{bot}}{S_{pile}}$$

$$2.64 > \frac{5462}{215.69}$$

$2.64 < 25.322$ ksi NO GOOD

3.12.6—Settlement

Force effects due to extreme values of differential settlements among substructures and within individual substructure units shall be considered. Estimates of settlement for individual substructure units may be made in accordance with the provisions in Article 10.7.2.3.

C3.12.6

Force effects due to settlement may be reduced by considering creep. Analysis for the load combinations in Tables 3.4.1-1 and 3.4.1-2 which include settlement should be repeated for settlement of each possible substructure unit settling individually, as well as combinations of substructure units settling, that could create critical force effects in the structure.

3.12.7—Secondary Forces from Post-Tensioning, *PS*

The application of post-tensioning forces on a continuous structure produces reactions at the supports and internal forces that are collectively called secondary forces, which shall be considered where applicable.

C3.12.7

In frame analysis software, secondary forces are generally obtained by subtracting the primary prestress forces from the total prestresssing.

3.13—FRICTION FORCES: *FR*

Forces due to friction shall be established on the basis of extreme values of the friction coefficient between the sliding surfaces. Where appropriate, the effect of moisture and possible degradation or contamination of sliding or rotating surfaces upon the friction coefficient shall be considered.

C3.13

Low and high friction coefficients may be obtained from standard textbooks. If so warranted, the values may be determined by physical tests, especially if the surfaces are expected to be roughened in service.

3.14—VESSEL COLLISION: *CV*

3.14.1—General

The provisions of this Article apply to the accidental collision between a vessel and a bridge. These provisions may be revised as stated in Article 3.14.16 to account for intentional collisions.

All bridge components in a navigable waterway crossing, located in design water depths not less than 2.0 ft, shall be designed for vessel impact.

The minimum design impact load for substructure design shall be determined using an empty hopper barge drifting at a velocity equal to the yearly mean current for the waterway location. The design barge shall be a single 35.0-ft × 195-ft barge, with an empty displacement of 200 ton, unless approved otherwise by the Owner.

Where bridges span deep draft waterways and are not sufficiently high to preclude contact with the vessel, the minimum superstructure design impact may be taken to be the mast collision impact load specified in Article 3.14.10.3.

C3.14.1

Intentional collision between a vessel and a bridge may be considered when conducting security studies.

The determination of the navigability of a waterway is usually made by the U.S. Coast Guard.

The requirements herein have been adapted from the AASHTO *Guide Specifications and Commentary for Vessel Collision Design of Highway Bridges (1991)* using the Method II risk acceptance alternative, and modified for the second edition (2009). The 1991 Guide Specifications required the use of a single vessel length overall (*LOA*) selected in accordance with the Method I criteria for use in estimating the geometric probability and impact speed to represent all vessel classifications. This was a conservative simplification applied to reduce the amount of effort required in the analysis. With the introduction of personal computers and programming, the simplification can be lifted and *AF* can be quickly obtained for each design vessel, which was originally envisioned. The end result is a more accurate model for the vessel collision study as well as more informative conclusions about the vessel fleet and associated probabilities of collision.

Another source of information has been the proceedings of an international colloquium, Ship Collisions with Bridges and Offshore Structures (IABSE, 1983).

Barges are categorized by ton = 2,000 lbs. and ships by tonne = 2,205 lbs.

Copyright American Association of State Highway and Transportation Officials
Provided by IHS under license with AASHTO
No reproduction or networking permitted without license from IHS
© 2012 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication
Licensee=Dept of Transportation/5950087001
Not for Resale, 09/07/2012 16:59:20 MDT

$$R_{DH} = 0.2 - \left(\frac{DWT}{100{,}000}\right)(0.10) \qquad (3.14.10.2\text{-}2)$$

3.14.10.3—Collision with Mast

The mast collision impact force on a superstructure shall be taken as:

$$P_{MT} = 0.10P_{DH} \qquad (3.14.10.3\text{-}1)$$

where:

P_{MT} = ship mast impact force (kip)
P_{DH} = ship deck house impact force specified in Eq. 3.14.10.2-1 (kip)

C3.14.10.3

Eq. 3.14.10.3-1 was developed by estimating the impact forces based on bridge girder and superstructure damage from a limited number of mast impact accidents.

3.14.11—Barge Collision Force on Pier

For the purpose of Article 3.14, the standard hopper barge shall be taken as an inland river barge with:

width	=	35.0 ft
length	=	195.0 ft
depth	=	12.0 ft
empty draft	=	1.7 ft
loaded draft	=	8.7 ft
DWT	=	1,700 tons

The collision impact force on a pier for a standard hopper barge shall be taken as:

- If $a_B < 0.34$ then:

$$P_B = 4{,}112a_B \qquad (3.14.11\text{-}1)$$

- If $a_B \geq 0.34$ then:

$$P_B = 1{,}349 + 110a_B \qquad (3.14.11\text{-}2)$$

where:

P_B = equivalent static barge impact force (kip)
a_B = barge bow damage length specified in Eq. 3.14.12-1 (ft)

C3.14.11

There is less reported data on impact forces resulting from barge collisions than from ship collision. The barge collision impact forces determined by Eqs. 3.14.11-1 and 3.14.11-2 were developed from research conducted by Meir-Dornberg (*1983*) in West Germany. Meir-Dornberg's study included dynamic loading with a pendulum hammer on barge bottom models in scale 1:4.5, static loading on one bottom model in scale 1:6, and numerical analysis. The results for the standard European Barge, Type IIa, which has a similar bow to the standard hopper barge in the United States, are shown in Figure C3.14.11-1 for barge deformation and impact loading. No significant difference was found between the static and dynamic forces measured during the study. Typical barge tow impact forces using Eqs. 3.14.11-1 and 3.14.11-2 are shown in Figure C3.14.11-2.

where:

E_B = deformation energy (kip-ft)
$\bar{P}_B$ = average equivalent static barge impact force resulting from the study (kip)

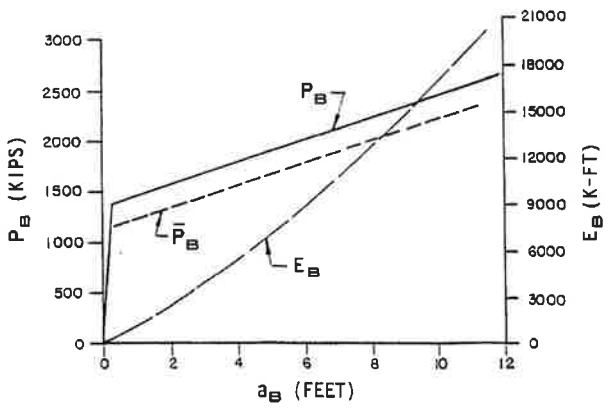


Figure C3.14.11-1—Barge Impact Force, Deformation Energy, and Damage Length Data

Copyright American Association of State Highway and Transportation Officials
Provided by IHS under license with AASHTO
No reproduction or networking permitted without license from IHS
© 2012 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication
Licensee=Dept of Transportation/5950087001
Not for Resale, 09/07/2012 16:59:20 MDT

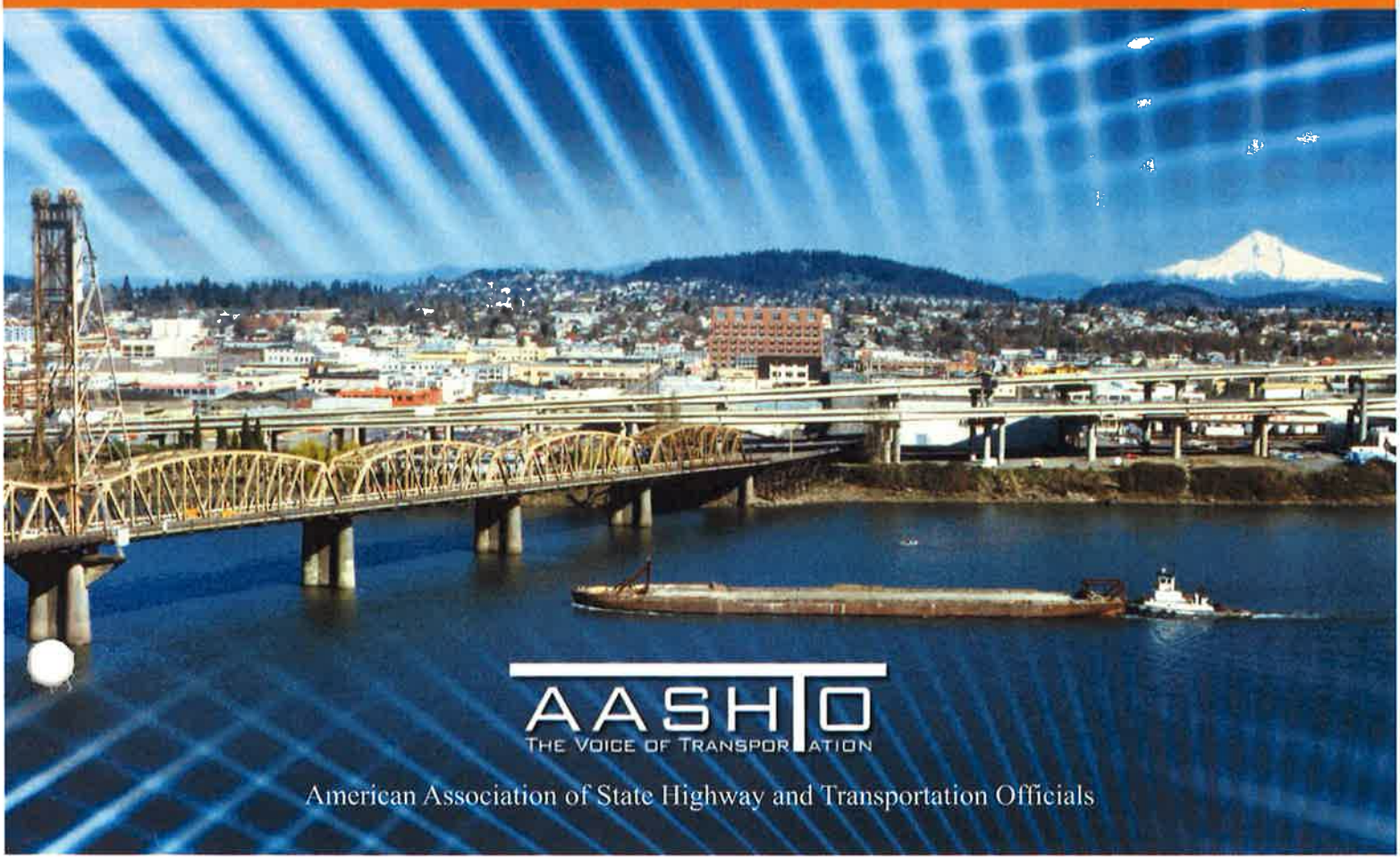




Guide Specifications and Commentary for

Vessel Collision Design of Highway Bridges

Second Edition, 2009



AASHTO
THE VOICE OF TRANSPORTATION

American Association of State Highway and Transportation Officials

Table 3.5.2-1—Typical Bulk Carrier Ship Characteristics

				Fully Loaded		Ballasted		
Ship *DWT*, tonnes	Length *LOA*, ft	Beam, B_M, ft	Bow Depth D_B	Draft D_L, (ft)	Displacement W_L, tonnes	Draft D_{EB}, ft	Draft D_{ES}, ft	Displacement W_E, tonnes
1,000	200	29.2	27.2	14.1	1,500	3.5	7.1	600
3,000	289	41.7	38.2	22.3	4,200	5.6	11.2	1,600
5,000	341	48.9	45.2	21.3	6,800	5.3	10.7	2,600
10,000	459	61.4	57.6	26.6	13,100	6.7	13.3	4,900
15,000	515	70.5	64.2	29.5	19,300	7.4	14.8	7,200
20,000	558	77.8	68.4	31.5	25,500	7.9	15.8	9,600
25,000	577	82.4	70.8	32.2	31,500	8.1	16.1	11,800
30,000	630	89.6	74.1	34.8	37,500	8.7	17.4	14,100
40,000	682	99.1	77.8	37.4	49,400	9.4	18.7	18,500
50,000	728	107.0	80.2	39.0	61,100	9.8	19.5	22,900
60,000	771	109.3	83.7	40.4	72,800	10.1	20.2	27,300
80,000	850	120.1	86.2	43.3	95,800	10.8	21.7	35,900
100,000	902	137.8	92.8	52.8	118,600	13.2	26.4	44,500
150,000	1027	146.0	99.7	59.1	174,700	14.8	29.6	65,500

Table 3.5.2-2—Typical Product Carrier/Tanker Ship Characteristics

				Fully Loaded		Ballasted		
Ship *DWT*, tonnes	Length *LOA*, ft	Beam B_M, ft	Bow Depth, D_B	Draft D_L, ft	Displacement W_L, tonnes	Draft D_{EB}, ft	Draft D_{ES}, ft	Displacement W_E, tonnes
1,000	187	30.8	25.0	13.8	1,400	3.5	6.9	500
3,000	279	42.0	35.4	19.4	4,100	4.9	9.7	1,500
5,000	335	48.2	41.8	22.6	6,700	5.7	11.3	2,500
10,000	456	62.3	53.6	26.6	13,000	6.7	13.3	4,900
15,000	515	71.2	60.2	29.5	19,300	7.4	14.8	7,200
20,000	561	78.1	65.1	32.2	25,400	8.1	16.1	9,500
25,000	577	83.7	68.7	33.1	31,500	8.3	16.6	11,800
30,000	637	89.2	71.7	34.8	37,500	8.7	17.4	14,100
40,000	692	98.1	75.8	38.4	49,500	9.6	19.2	18,600
50,000	741	105.3	78.5	41.0	61,400	0.3	20.5	23,000
60,000	774	111.5	81.8	42.0	73,200	0.5	21.0	27,500
80,000	853	122.4	83.6	45.6	96,500	11.4	22.8	36,200
100,000	886	128.0	85.0	47.9	119,700	12.0	24.0	44,900
120,000	915	138.9	88.2	50.9	142,600	12.7	25.5	53,500
150,000	955	145.0	90.6	58.7	176,800	14.7	29.4	66,300

© 2009 by the American Association of State Highway and Transportation Officials.
All rights reserved. Duplication is a violation of applicable law.

Table 9-4. Comparative Merits of Different Construction Materials in Energy-Absorption Capacity

Comparative Merits of Different Construction Materials In Energy-Absorption Capacity a

Material	Modulus of elasticity (1,000 psi)	State bending stress		Internal strain [b] energy capacity (each pile)		No. of piles required [c]	Maximum spacing of fender piles [d] (ft)
		At proportional limit (psi)	At allowable working stress due to transient loading (psi)	At proportional limit (in.-tons)	At allowable working stress due to transient loading (in.-tons)		
Douglas Fir 12" x 12".	1,600	4,580[a]	2,640	31.5	10.5	43	3.6
Southern Yellow Pine 12" x 12".	1,600	4,580[a]	2,640	31.5	10.5	43	3.6
Douglas Fir or Southern Yellow Pine 14" diam.	1,600	4,580	2,640	25.2	8.4	54	2.8
Douglas Fir or Southern Yellow Pine 12" diam.	1,600	4,580	2,640	18.6	6.2	73	2.1
Greenheart 12" x 12".	3,200	12,000[a]	6,900	108.0	36.0	13	12.5
Oak 12" x 12".	1,400	3,940	2,270	26.7	8.9	51	3.0
12WF190.	29,000	36,000	20,000	. . . .	28.2	16	10.0
12WF65	29,000	50,000	20,000	. . . .	9.6	47	3.2
Steel cylindrical fender 34.5-inch diam by 0.5-inch thick.	29,000	36,000	20,000	. . . .	18.7		
Steel cylindrical fender 34.5-inch diam by 0.5-inch thick.	29,000	62,000	34,400	. . . .	53.0		
ASTM A-242, A-440 (rolled fender piles), A-441 (welded fender pile) 12" x 12" WF190.	29,000	50,000	27,800	. . . .	54.4		
Reinforced concrete 12" x 12" (3.000 psi. n = 10).	29,000	. . . . .	1,200	. . . .	1.16	387	Not suitable.
Prestressed concrete 14" x 14" (17-7/16" diam).	29,000	. . . . .	1,630	. . . .	2.50	180	Not suitable when impact acted near waterline.

a Assume 12% reduction of basic proportional limit of extreme fiber strew in bending at 5,270 psi, allowing for knots.

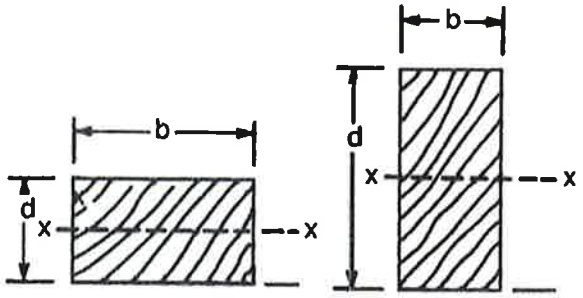
B Assume the supported length of pile as 50 feet.

c Number of piles required to absorb 450 in.-tons of designed capacity (transient-load allowable working stress) or to absorb 1,350 in.-tons of maximum capacity (stressed at nearly the safe elastic limit of materials).

d Assume the ship berths broadside with a length of contact of 150 feet, which is the shortest parallel wall side of cargo ship

Department of the Navy

Table 16-2. —Section properties of structural lumber[a]



Nominal size *b* x *d* (in.)	Dressed size *b* x *d* (in.)	Area *A* (in²)	*S* (in³)	*I* (in⁴)	Volume (ft³/ft)	Weight[b] (lb/ft)
1 x 3	3/4 x 2-1/2	1.88	0.78	0.98	0.01	0.65
1 x 4	3/4 x 3-1/2	2.63	1.53	2.68	0.02	0.91
1 x 6	3/4 x 5-1/2	4.13	3.78	10.40	0.03	1.43
1 x 8	3/4 x 7-1/4	5.44	6.57	23.82	0.04	1.89
1 x 10	3/4 x 9-1/4	6.94	10.70	49.47	0.05	2.41
1 x 12	3/4 x 11-1/4	8.44	15.82	88.99	0.06	2.93
2 x 3	1-1/2 x 2-1/2	3.75	1.56	1.95	0.03	1.30
2 x 4	1-1/2 x 3-1/2	5.25	3.06	5.36	0.04	1.82
2 x 6	1-1/2 x 5-1/2	8.25	7.56	20.80	0.06	2.86
2 x 8	1-1/2 x 7-1/4	10.88	13.14	47.63	0.08	3.78
2 x 10	1-1/2 x 9-1/4	13.88	21.39	98.93	0.10	4.82
2 x 12	1-1/2 x 11-1/4	16.88	31.64	177.98	0.12	5.86
2 x 14	1-1/2 x 13-1/4	19.88	43.89	290.78	0.14	6.90
3 x 1	2-1/2 x 3/4	1.88	0.23	0.09	0.01	0.65
3 x 2	2-1/2 x 1-1/2	3.75	0.94	0.70	0.03	1.30
3 x 4	2-1/2 x 3-1/2	8.75	5.10	8.93	0.06	3.04
3 x 6	2-1/2 x 5-1/2	13.75	12.60	34.66	0.10	4.77
3 x 8	2-1/2 x 7-1/4	18.13	21.90	79.39	0.13	6.29
3 x 10	2-1/2 x 9-1/4	23.13	35.65	164.89	0.16	8.03
3 x 12	2-1/2 x 11-1/4	28.13	52.73	296.63	0.20	9.77
3 x 14	2-1/2 x 13-1/4	33.13	73.15	484.63	0.23	11.50
3 x 16	2-1/2 x 15-1/4	38.13	96.90	738.87	0.26	13.24
4 x 1	3-1/2 x 3/4	2.63	0.33	0.12	0.02	0.91
4 x 2	3-1/2 x 1-1/2	5.25	1.31	0.98	0.04	1.82
4 x 3	3-1/2 x 2-1/2	8.75	3.65	4.56	0.06	3.04
4 x 4	3-1/2 x 3-1/2	12.25	7.15	12.51	0.09	4.25
4 x 6	3-1/2 x 5-1/2	19.25	17.65	48.53	0.13	6.68
4 x 8	3-1/2 x 7-1/4	25.38	30.66	111.15	0.18	8.81
4 x 10	3-1/2 x 9-1/4	32.38	49.91	230.84	0.22	11.24
4 x 12	3-1/2 x 11-1/4	39.38	73.83	415.28	0.27	13.67
4 x 14	3-1/2 x 13-1/4	46.38	102.41	678.48	0.32	16.09
4 x 16	3-1/2 x 15-1/4	53.38	135.66	1,034.42	0.37	18.54
6 x 1	5-1/2 x 3/4	4.13	0.52	0.19	0.03	1.43
6 x 2	5-1/2 x 1-1/2	8.25	2.06	1.55	0.06	2.86
6 x 3	5-1/2 x 2-1/2	13.75	5.73	7.16	0.10	4.77
6 x 4	5-1/2 x 3-1/2	19.25	11.23	19.65	0.13	6.68

[a] Based on dressed (S4S) sizes.

[b] Based on a unit weight of 50 lb/ft³.

Timber Pile Design and Construction Manual



Timber Piling Council
American Wood Preservers Institute

Table 3-3 provides specified butt circumferences with corresponding minimum tips sizes for Southern pine. Table 3-4 provide specified tip circumferences with corresponding minimum butt circumferences for Southern Pine. The corresponding tables for Douglas fir and other western species are in Tables 3-5 and 3-6.

Table 3-2
Allowable Pile Capacity in Compression (kips)

Timber Species	Allowable Pile Capacity in Compression (kips)					
	Pile Tip Diameter (inches)					
	7	8	9	10	11	12
Southern Pine	46	60	76	94	114	136
Douglas Fir	48	63	80	98	119	141

Table 3-3 Southern Pine Foundation Piling – Specified Butt Circumferences with Corresponding Minimum Tip Circumferences [A,B,C,D,E] (from ASTM D25 - Table X1.3)

[Approximate Diameters in Brackets]

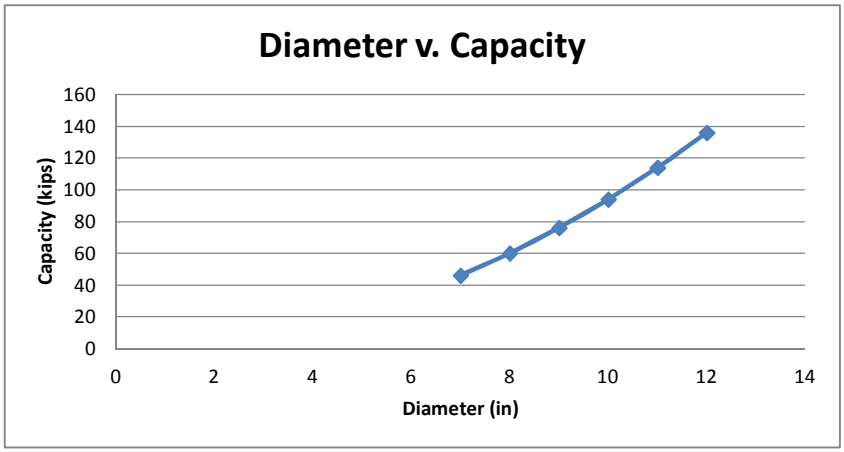
Required Minimum Circumference, in. 3 ft from Butts	22 [7]	25 [8]	28 [9]	31 [10]	35 [11]	38 [12]	41 [13]	44 [14]	47 [15]	50 [16]	57 [18]
Length (ft)	Minimum Tip Circumferences, in.										
20	16 [5.1]	16 [5.1]	18 [5.7]	21 [6.7]	25 [8.0]	**28 [8.9]**	**31 [9.9]**	**34 [10.8]**	**37 [11.8]**	40 [12.7]	47 [15.0]
25	16 [5.1]	16 [5.1]	17 [5.4]	20 [6.4]	24 [7.6]	**27 [8.6]**	**30 [9.5]**	**33 [10.5]**	**36 [11.4]**	39 [12.4]	46 [14.6]
30	16 [5.1]	16 [5.1]	16 [5.1]	19 [6.0]	23 [7.3]	**26 [8.3]**	**29 [9.2]**	**32 [10.2]**	**35 [11.1]**	38 [12.1]	45 [14.3]
35				18 [5.7]	22 [7.0]	**25 [8.0]**	**28 [8.9]**	**31 [9.9]**	**34 [10.8]**	37 [11.8]	44 [14.0]
40				17 [5.4]	21 [6.7]	**24 [7.6]**	**27 [8.6]**	**30 [9.5]**	**33 [10.5]**	36 [11.4]	43 [13.7]
45					20 [6.4]	**23 [7.3]**	**26 [8.3]**	**29 [9.2]**	**32 [10.2]**	35 [11.1]	42 [13.4]
50					19 [6.0]	**22 [7.0]**	**25 [8.0]**	**28 [8.9]**	**31 [9.9]**	34 [10.8]	41 [13.0]
55						**21 [6.7]**	**24 [7.6]**	**27 [8.6]**	**30 [9.5]**	33 [10.5]	40 [12.7]
60						**20 [6.4]**	**23 [7.3]**	**26 [8.3]**	**29 [9.2]**	32 [10.2]	39 [12.4]
65						19 [6.0]	**22 [7.0]**	**25 [8.0]**	**28 [8.9]**	31 [9.9]	38 [12.1]
70						18 [5.7]	**21 [6.7]**	**24 [7.6]**	27 [8.6]	30 [9.5]	37 [11.8]
75							**20 [6.4]**	23 [7.3]	26 [8.3]	29 [9.2]	36 [11.4]
80							19 [6.0]	22 [7.0]	25 [8.0]	28 [8.9]	35 [11.1]
85							18 [5.7]	21 [6.7]	24 [7.6]	27 [8.6]	34 [10.8]

Commonly available sizes are shown within the bold outline:

[A] Where the taper applied to the butt circumferences calculate to a circumference at the tip of less than 16 in., the individual values have been increased to 16 in. to ensure a minimum of 5-in. tip for purposes of driving.
[B] To convert to metric dimensions, 1 in. = 25.4 mm.
[C] Class A piles are all those listed with a specified required minimum circumference of 44 in. at 3 ft from butt.
[D] Class B piles are those listed with a specified required minimum circumference at 3 ft from butt of 35 in. and lengths of 20 to 25 ft minimum circumference at 3 ft from butt of 38 in. and lengths of 20 to 50 ft, and minimum circumference at 3 ft from butt of 41 in. and lengths of 55 to 80 ft.
[E] Southern Yellow Pine piles are generally available in lengths shorter than 70 ft or girth of less than 50 in. at 3 ft from butt. The purchaser should inquire as to availability of sizes below the lines.

FROM TIMBER MANUAL

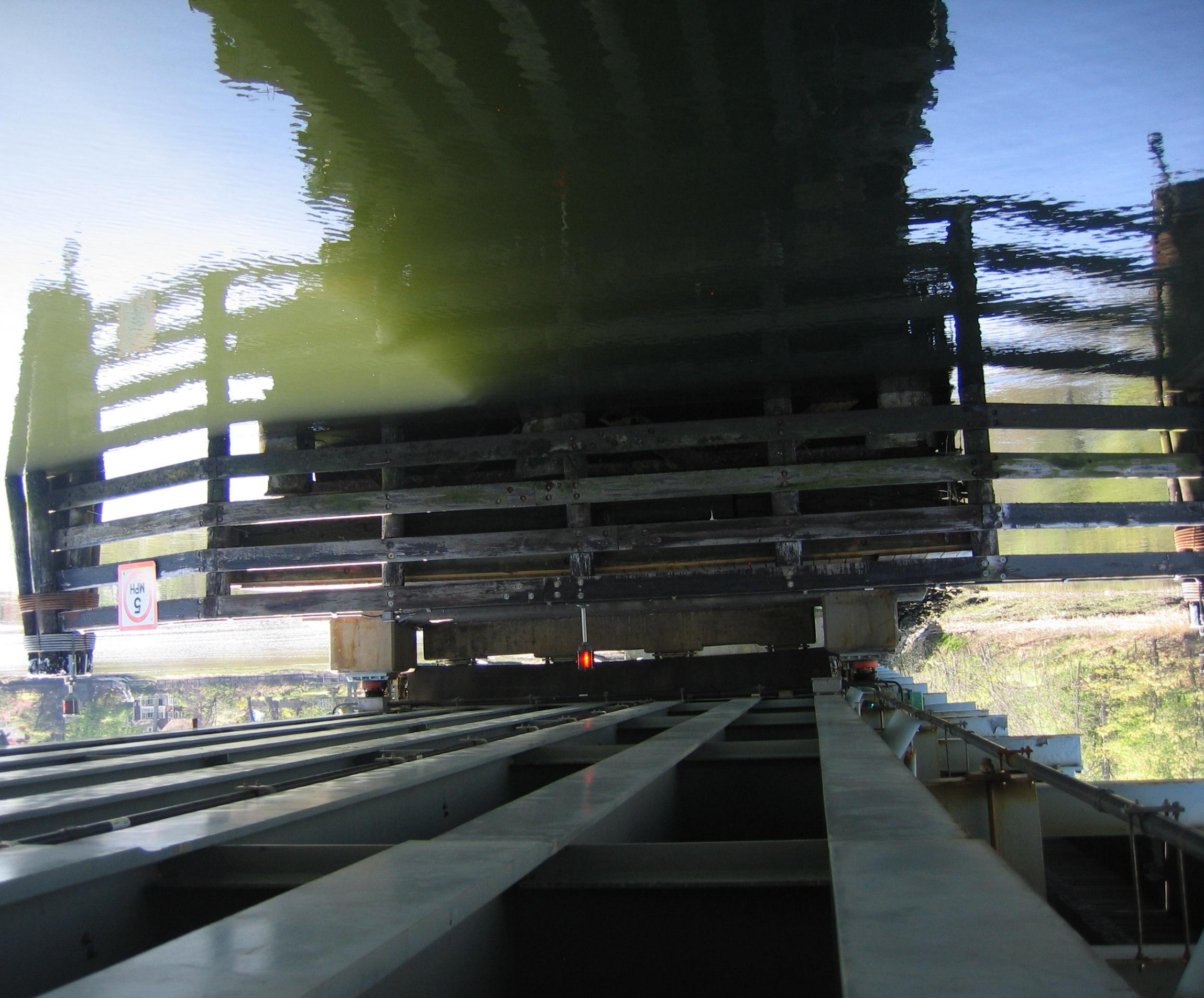
Diameter	Capacity
7	46
8	60
9	76
10	94
11	114
12	136



USING LINE OF BEST FIT:

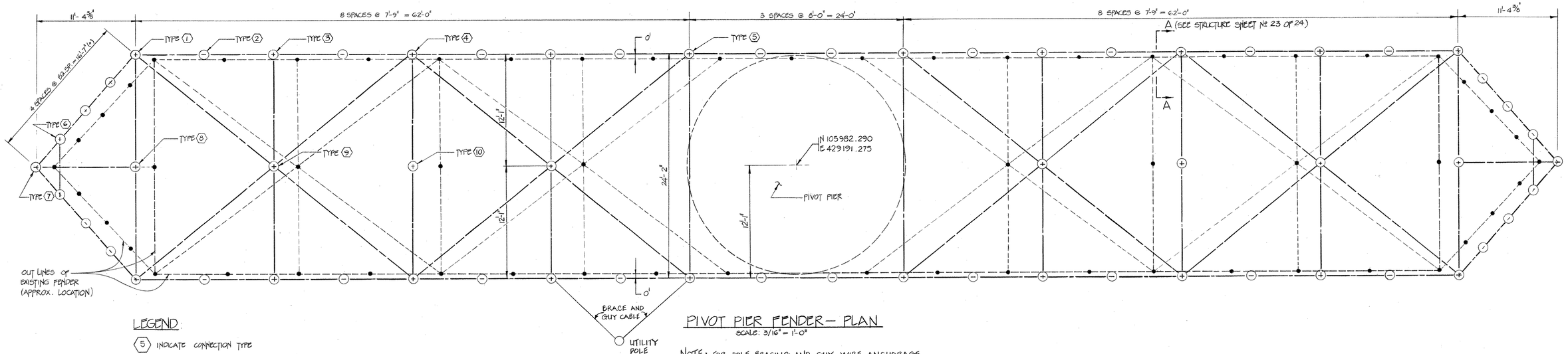
Diameter	Capacity
1	4
2	6
3	10
4	16
5	24
6	34
7	46
8	60
9	76
10	94
11	114
12	136
13	160
14	186
15	214
16	244
17	276
18	310
19	346
20	384




5
MPH

FORM NO. ENG. 158 ED 4-80

FHWA REGION	STATE	TOWN	FED AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	—	158-150	1989	136	41-1	72



LEGEND:

⑤ INDICATE CONNECTION TYPE

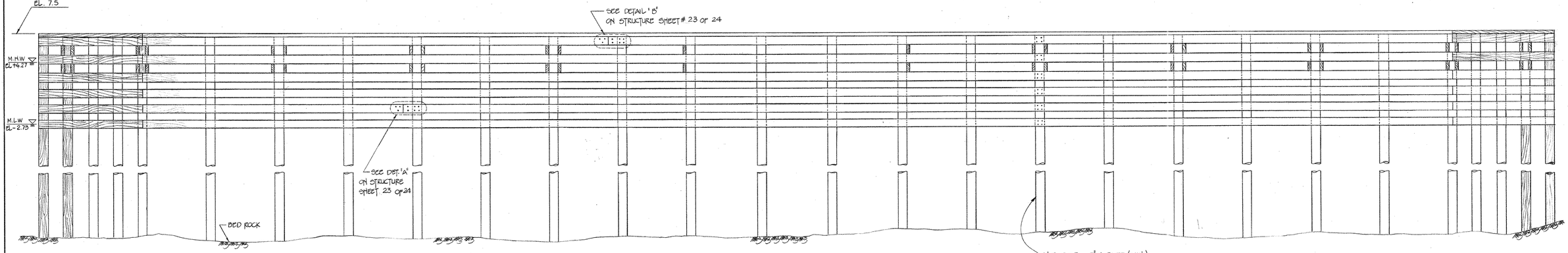
● INDICATE EXISTING FENDER PILES (TIMBER) TO BE REMOVED

○ INDICATE NEW FENDER PILES (TIMBER)

PIVOT PIER FENDER — PLAN

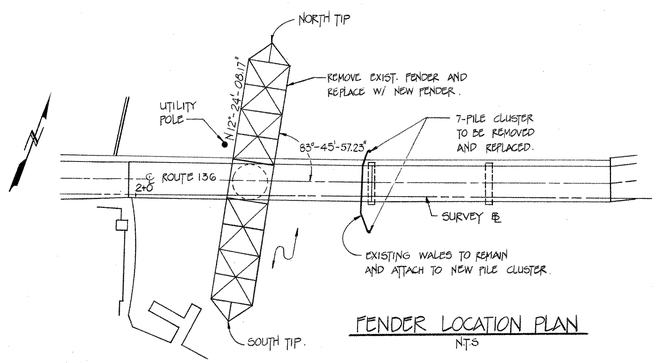
SCALE: 3/16" = 1'-0"

NOTE: FOR POLE BRACING AND GUY WIRE ANCHORAGE, SEE BRIDGE PLAN ELECTRICAL WORK SHEET # E1 OF E7 THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING AND INSTALLING THE UTILITY POLE.



PIVOT PIER FENDER — ELEVATION

SCALE: 3/16" = 1'-0"



FENDER LOCATION PLAN

NTS

POINT	SURVEY ℄ STATION	OFFSET	COORDINATES	
			NORTH	EAST
NORTH TIP	2+76.99	93.17'	106065.663	429172.941
SOUTH TIP	2+56.37	76.30'	105898.918	429209.609

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED

NO.	DATE	DESCRIPTION

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

FENDER SYSTEM — I

ENGINEER H. W. LOCHNER, INC.

DESIGNER LM | DRAFTER Stan Sykes Wright | CHECKER JD

APPROVED Leo T. Ora | DATE 9-6-89

STRUCTURE NO. 158-150-1 | BRIDGE LOG NO. 01349 | STRUCTURE SHEET NO. 22 OF 24

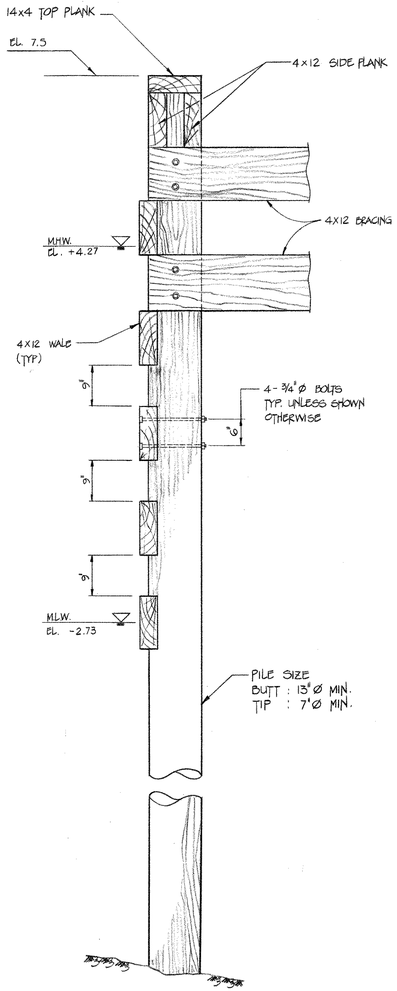
158-150

270-01

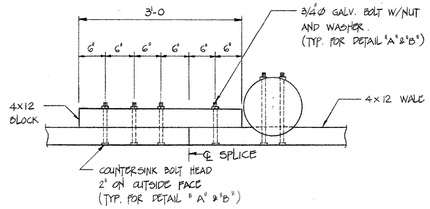
41-1

F.H.W.A. REGION NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WEST PORT	—	158 - 150	1989	136	42	72

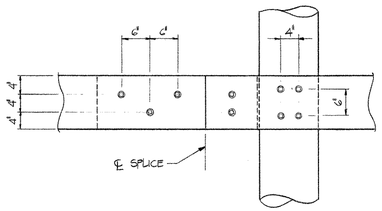
NOTE: TOP PLANK SHALL BE SECURELY ATTACHED TO SIDE PLANKS W/ 70d NAILS SPACED AT 12" MAX. AND SHALL HAVE 3 NAILS OVER PILE TOP



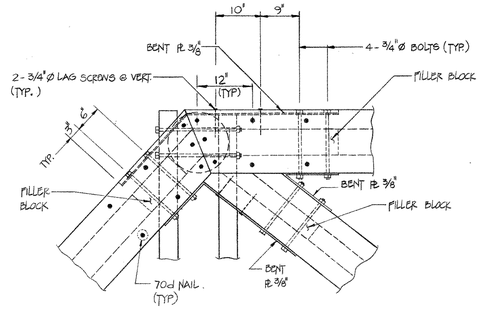
SECTION - "A-A"
(FOR LOCATION, SEE STRUCTURE SHEET № 22 of 24)



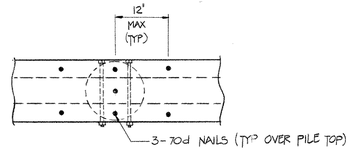
PLAN - SPLICE DETAIL "A"



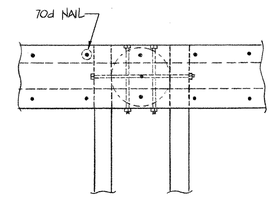
ELEVATION - SPLICE DETAIL "A"



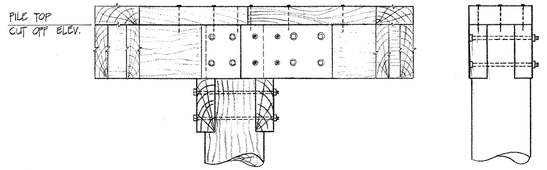
PLAN - TYPE ⟨1⟩



PLAN - TYPE ⟨2⟩

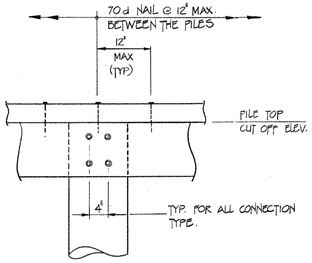


PLAN - TYPE ⟨3⟩

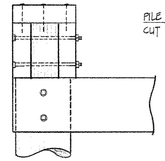


ELEVATION - TYPE ⟨1⟩

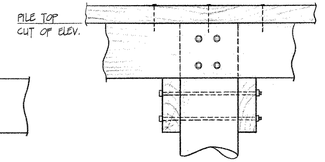
SIDE - TYPE ⟨2⟩



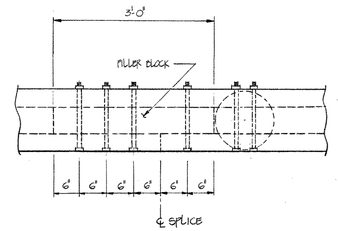
ELEVATION - TYPE ⟨2⟩



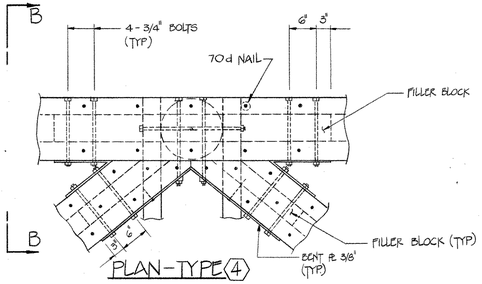
SIDE - TYPE ⟨3⟩



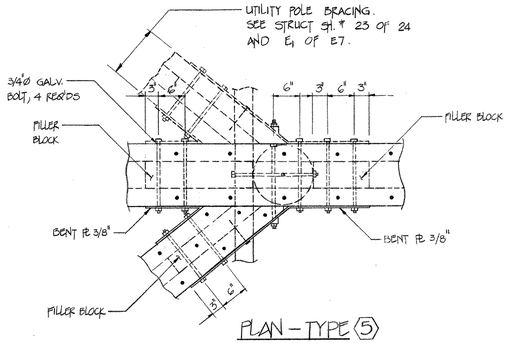
ELEVATION - TYPE ⟨3⟩



PLAN - SPLICE DETAIL "B"



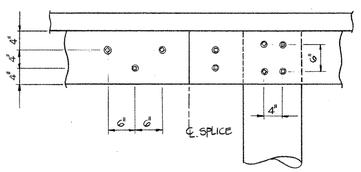
PLAN - TYPE ⟨4⟩



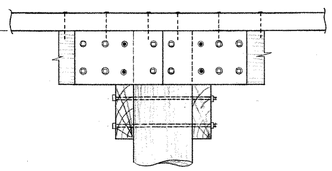
PLAN - TYPE ⟨5⟩

LEGEND

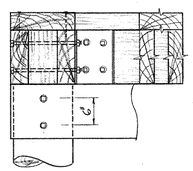
- ◇ BOLT
- ◉ LAG SCREW
- • NAIL



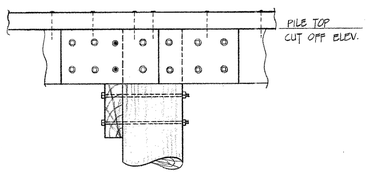
ELEVATION - SPLICE DETAIL "B"



ELEVATION - TYPE ⟨4⟩



SIDE - TYPE ⟨4⟩
(SECTION B-B)



ELEVATION - TYPE ⟨5⟩

SCALE 3/4" = 1'-0"

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION
REVISIONS		

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF
U.S. ROUTE 136
OVER
SAUGATUCK RIVER

FENDER SYSTEM — II

ENGINEER	H.W. LOCHNER, INC.		
DESIGNER	LM	DRAFTER Shic-yhan Hsieh	CHECKER JD
APPROVED	Carlo T. Ora	DATE	9-6-89
STRUCTURE NO.	158-150-1	BRIDGE LOG NO. 01349	STRUCTURE SHEET NO. 23 of 24

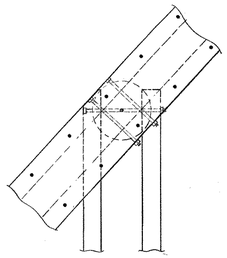
158-150

270-01

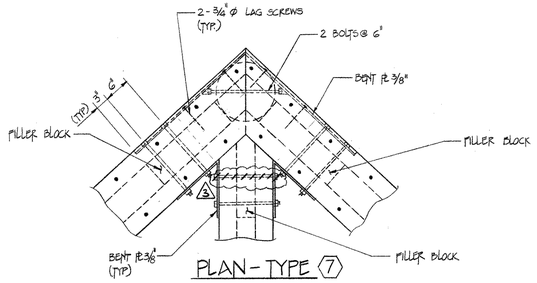
42

STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION — FORM NO ENG 15A ED. 1-88

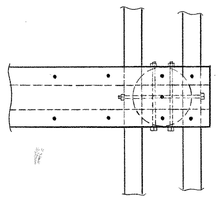
FHWA REGION NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	—	158 – 150	1989	136	43-1	72



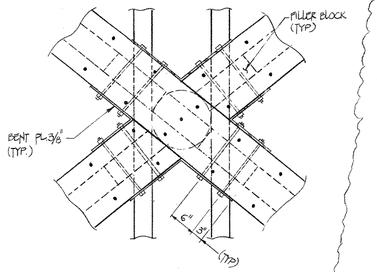
PLAN – TYPE ⟨6⟩



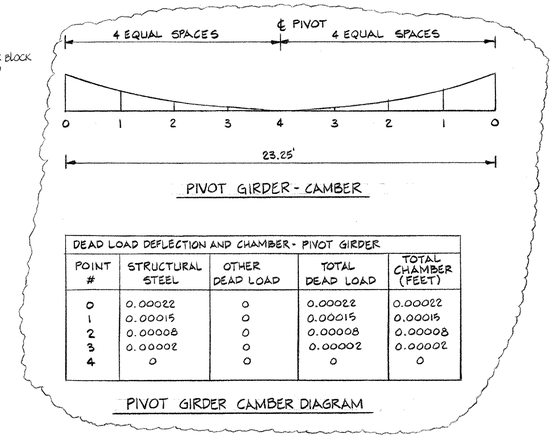
PLAN – TYPE ⟨7⟩



PLAN – TYPE ⟨8⟩



PLAN – TYPE ⟨9⟩



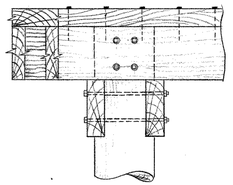
PIVOT GIRDER - CAMBER

DEAD LOAD DEFLECTION AND CHAMBER - PIVOT GIRDER

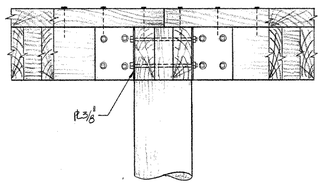
POINT #	STRUCTURAL STEEL	OTHER DEAD LOAD	TOTAL DEAD LOAD	TOTAL CHAMBER (FEET)
0	0.00022	0	0.00022	0.00022
1	0.00015	0	0.00015	0.00015
2	0.00008	0	0.00008	0.00008
3	0.00002	0	0.00002	0.00002
4	0	0	0	0

PIVOT GIRDER CAMBER DIAGRAM

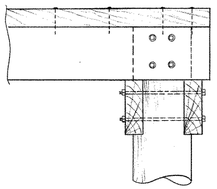
5



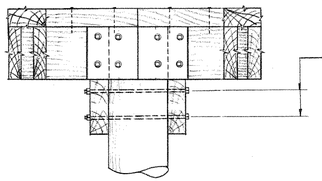
ELEVATION – TYPE ⟨6⟩



ELEVATION – TYPE ⟨7⟩



ELEVATION – TYPE ⟨8⟩

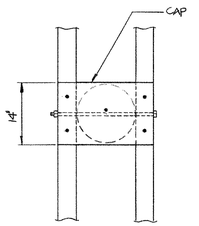


ELEVATION – TYPE ⟨9⟩

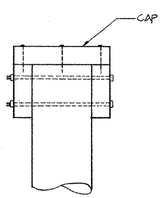
NOTES:

1. ALL TIMBER SHALL BE SOUTHERN YELLOW PINE AND PRESSURE TREATED WITH CREOSOTE. (SEE SPECIAL PROVISIONS.)
2. ALL HARDWARE SHALL BE GALVANIZED.
3. 4 - 3/4" Ø BOLTS SHALL BE USED TO SECURE WALES TO PILES.
4. 5 - 3/4" Ø BOLTS SHALL BE USED TO SECURE WALES TO BLOCKS WHEN SPLICING.
5. PILES SHALL HAVE A MINIMUM BUTT CIRCUMFERENCE OF 41" AND SHALL CONFORM TO ASTM D25 " STANDARD SPECIFICATIONS FOR ROUND TIMBER PILES".
6. PILE TOP SHALL HAVE TREATMENT AS SPECIFIED IN SPECIAL PROVISION.
7. PILES TO BE DRIVEN TO REFUSAL IN THE GRANULAR DEPOSITS OR ON THE BEDROCK
8. ALL BOLTS SHALL BE 3/4" Ø UNLESS NOTED OTHERWISE. BOLTS SHALL HAVE WASHERS UNDERNEATH THE HEADS AND THE NUTS
9. ESTIMATED PILE ORDER LENGTH = 50 FT

SCALE: 3/4" = 1'-0"
UNLESS NOTED OTHERWISE

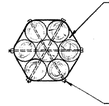


PLAN – TYPE ⟨10⟩

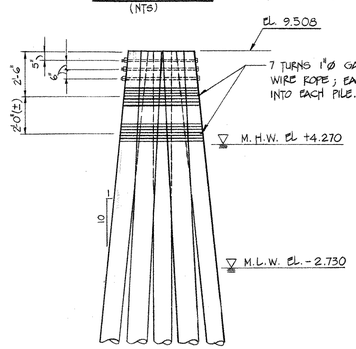


ELEVATION – TYPE ⟨10⟩

SCALE: 3/4" = 1'-0"



TIEING DETAIL
(NTS)



7-PILE CLUSTER
SCALE: 1/4" = 1'-0"

7-PILE CLUSTER NOTES

EXISTING WALES SHALL BE PROPERLY DETACHED FROM EXISTING CLUSTER AND SECURELY ATTACHED BACK TO THE NEW CLUSTER.

THE INTERIOR PILE SHALL BE DRIVEN VERTICALLY, AND THE 6 OUTSIDE PILES SHALL BE DRIVEN WITH A SLOPE OF 1:10. THE PILES SHALL BE DRAWN TOGETHER AT THE TOP. WRAP CLUSTER AT TWO ELEVATIONS APPROXIMATELY 2 FT. APART, EACH WITH 7 TURNS OF 1" Ø, 6X19 GALVANIZED WIRE ROPE, EACH CABLE SHALL BE SECURED TO THE FACE OF EACH PILE WITH 3/8" Ø GALVANIZED IRON STAPPLES.

DEAD LOAD DEFLECTIONS AT CENTER LINE OF SPAN (FEET)			CAMBERS AT CENTER LINE OF SPAN (FEET)			
GIRDER / BEAM DESCRIPTION	STRUCT. STEEL	OTHER DEAD LOADS	TOTAL DEAD LOADS	VERTICAL CURVE ORDINATE	EXTRA	TOTAL
END FLOOR BEAM	0.00058	0	0.00058	0	0	.00058

2

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION
2	6/6/90	REVISED PER DOT COMMENTS (B.A.M.)

REVISIONS

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF
U.S. ROUTE 136
OVER
SAUGATUCK RIVER

FENDER SYSTEM — III

ENGINEER	H. W. LOCHNER, INC.		
DESIGNER LM	DRAFTER DPH	CHECKER JD	
APPROVED Leo T. Rea	DATE 9-6-89		
STRUCTURE NO. 158-150-1	BRIDGE LOG NO. 01348	STRUCTURE SHEET NO. 24 OF 24	

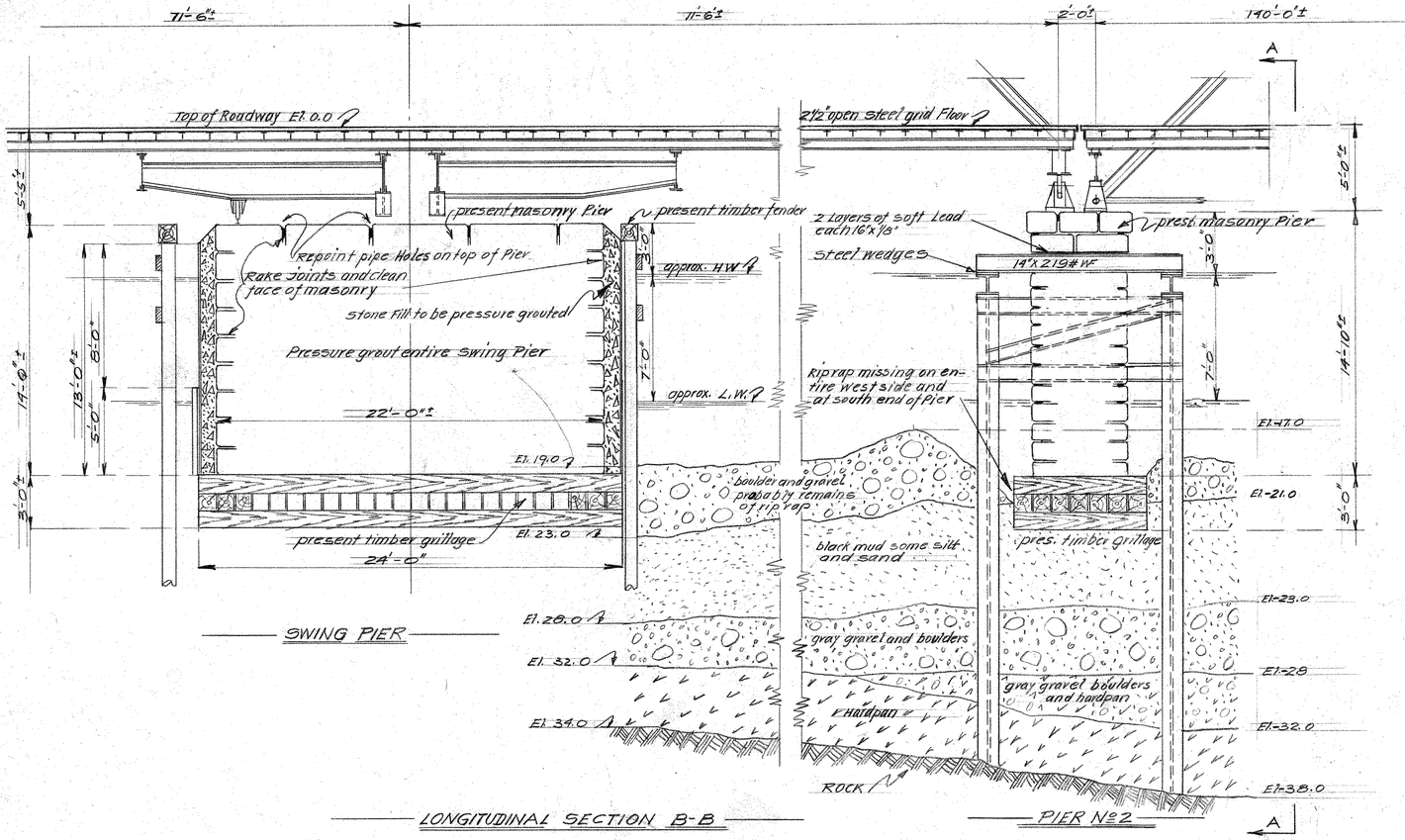
158-150

270-01

43-1

PUB ROAD DIV. NO.	STATE	TOWN	FED AID PROJ. NO.	FISCAL YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN	Westport		1951	136	2	3

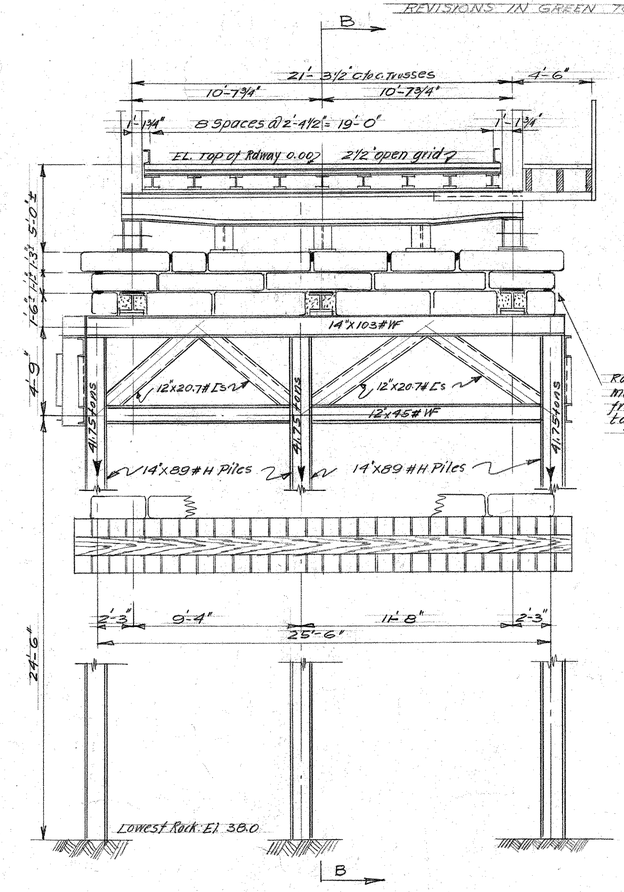
REVISIONS IN GREEN TO SHOW BRIDGE AS CONSTRUCTED



SWING PIER

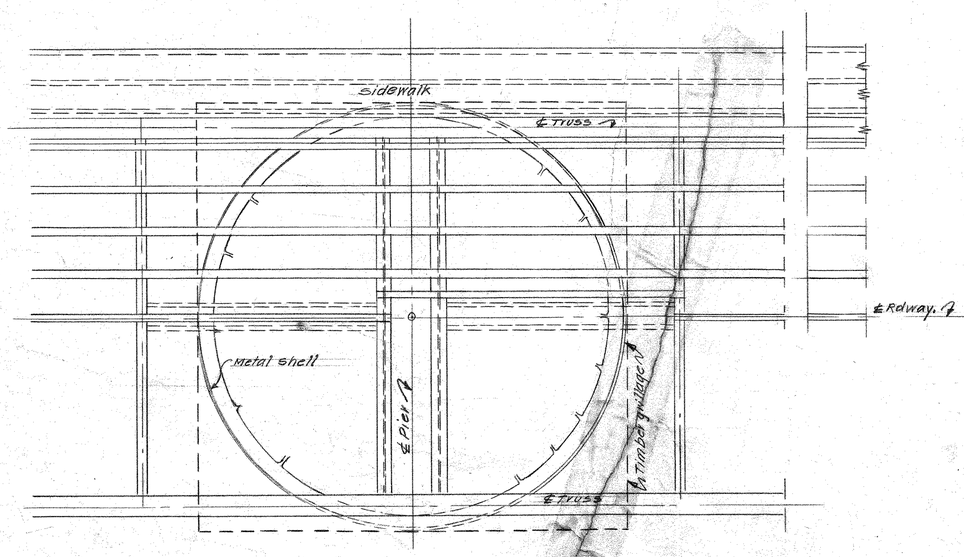
LONGITUDINAL SECTION B-B

PIER No. 2

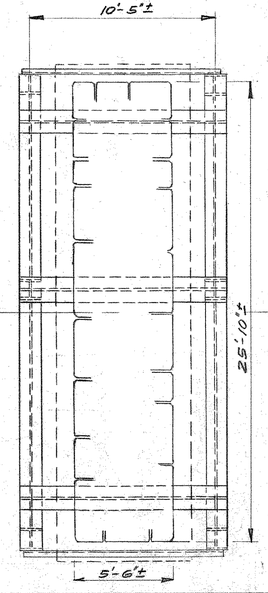


SECTION A-A

NOTE:
Dimensions on plans are approximate only and must be checked by contractor



PART PLAN



QUANTITIES

ALTERATION TO MASONRY	LS.
FURNSHING STEEL PILES	34590 Lb
DRIVING STEEL PILES	240 LF.
PORTLAND CEMENT	8 Bbl.
RAKING JOINTS & CLEANING FACE OF MASONRY	210 SY.
STRUCTURAL STEEL	5721 Lb.
METAL SHELL AROUND SWING PIER	15600 Lb.
STONE FILL	56 tons
LIQUID ACCELERATING AND WATER RESISTING AGENT (ALTERNATE A)	62 gal.
POWDER ACCELERATING AND WATER RESISTING AGENT (ALTERNATE B)	248 Lb.
REPOINTING MASONRY JOINTS	598 LF.
DENSIFYING AND RETARDING AGENT	120 Lb.
PRESSURE GROUTING OF STONE FILL	218 bags
PRESSURE GROUTING SWING PIER	160 bags

GENERAL NOTES

CONN. STATE HWY. DEPT. SPECIFICATIONS FORM 807. ALL NEW STEEL EXCEPT THE METAL SHELL AROUND SWING PIER SHALL BE PAINTED ONE SHOP COAT OF ZINC CHROMATE AND IRON OXIDE AND TWO FIELD COATS OF PAINT OF A COLOR AND SHADE SELECTED BY THE ENGINEER

REVISIONS		
No.	DATE	DESCRIPTION

CONNECTICUT
STATE HIGHWAY DEPARTMENT

BRIDGE No. 136-09 Rt 136
OVER SAUGATUCK RIVER
IN THE TOWN OF
WESTPORT
PLANS SHOWING
PROPOSED REPAIRS TO PIERS

DESIGNED BY A.E.

SCALE: ¼" = 1'-0"
MADE BY A. Ekenfelo. DATE: 5/14/51
CHECKED BY GAH DATE: 5/14/51
APPOVED J.O. Drury DATE: 6/11/51

PROJECT No. M.C.-18
Bridge Sheet No. 1 of 2

MC-18 FORMERLY 158 58

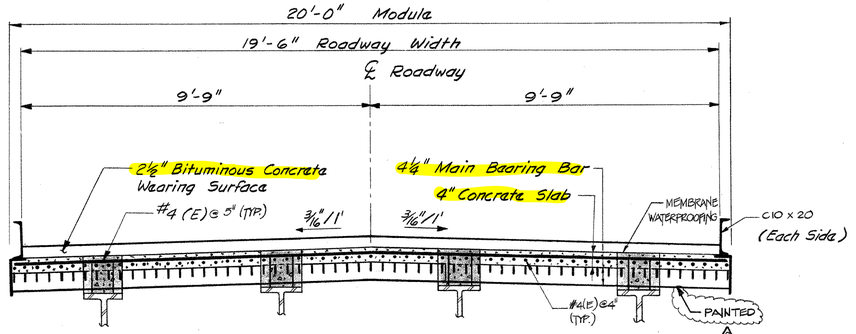
165 05

2

STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION

FORM NO ENG 15A ED 4-80

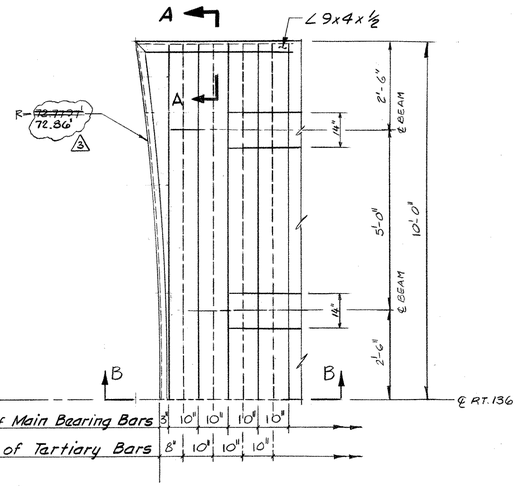
F.H.W.A. REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	—	158-150	1989	136	33-1	72



TYPICAL SECTION THRU EXODERMIC DECK

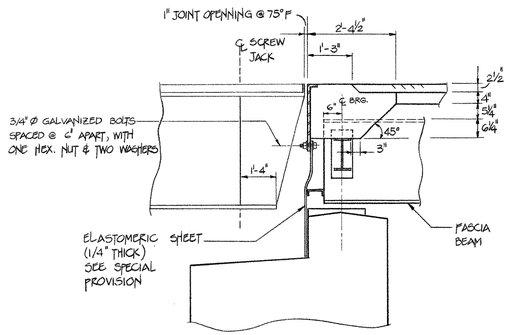
Scale: ½" = 1'-0"

NOTE: AREA TO BE FILLED WITH CLASS "F" CONCRETE IN FIELD AFTER MODULE ARE IN PLACE AND THE COST OF THE CONCRETE SHALL BE INCLUDED IN THE PAY ITEM "FURNISHING AND INSTALLING EXODERMIC BRIDGE DECK"



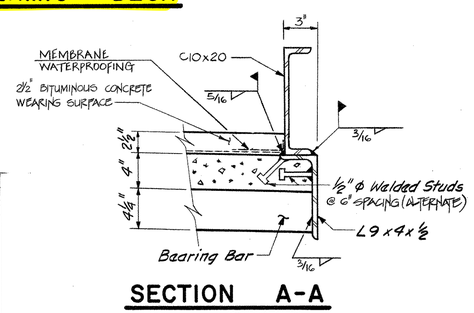
END EXODERMIC DECK PANEL PLAN AT PIER 2

SCALE: 1/2" = 1'-0"



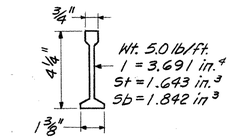
SECTION B-B

N.T.S.



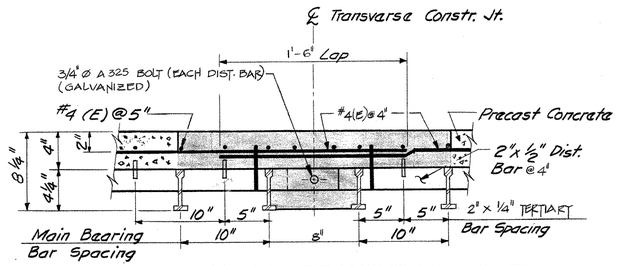
SECTION A-A

Scale: 1½" = 1'-0"



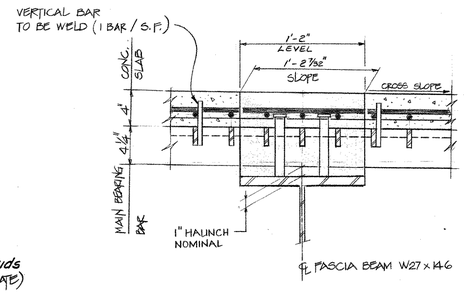
MAIN BEARING BAR

Scale: 3" = 1'-0"



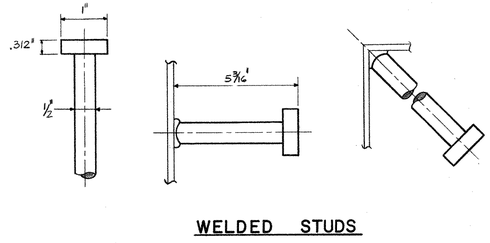
SECTION THRU TYPICAL TRANSVERSE JOINT

Scale: 1½" = 1'-0"

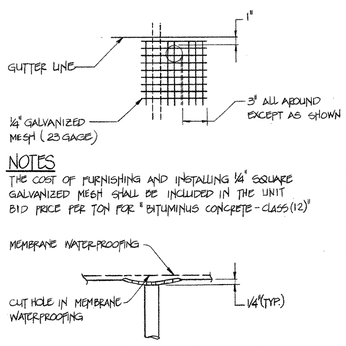


TYPICAL CONNECTION TO STRINGER

Scale: 1½" = 1'-0"

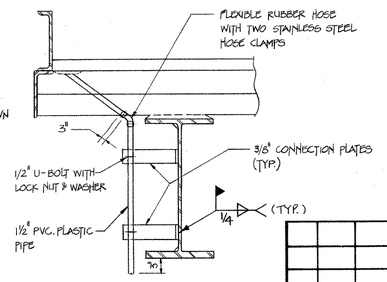


WELDED STUDS



TYPICAL DRAIN DETAIL

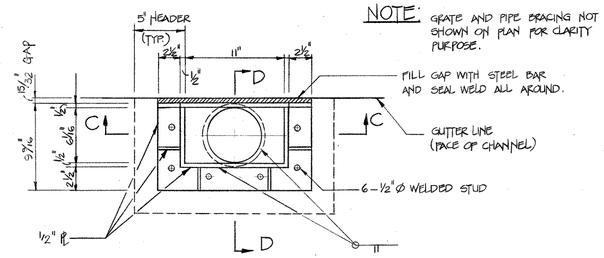
N.T.S



DRAIN PIPE BRACING

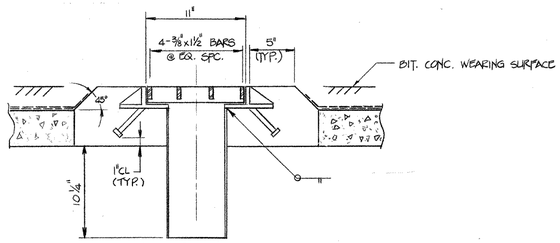
N.T.S

NOTE: GRATE AND PIPE BRACING NOT SHOWN ON PLAN FOR CLARITY PURPOSE.



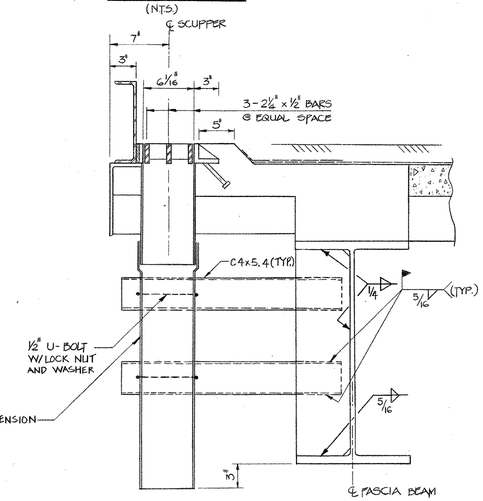
PLAN - FIXED SPAN SCUPPER

N.T.S



SECTION C-C

(N.T.S)



SECTION D-D

(N.T.S)

NOTES

THE COST OF FURNISHING AND INSTALLING ¼" SQUARE GALVANIZED MESH SHALL BE INCLUDED IN THE UNIT BID PRICE PER TON FOR "BITUMINUS CONCRETE - CLASS(12)"

NO.	DATE	REVISIONS
3	6/5/90	REVISED PER DOT COMMENT (B.A.M.)

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

EXODERMIC DECK DETAILS

ENGINEER H.W. LOCHNER, INC.

DESIGNER LRT DRAFTER Dan Glen Knight CHECKER TO

APPROVED Leo T. Ora DATE 9-6-89

STRUCTURE NO. 158-150-1

BRIDGE LOG NO. 01349

STRUCTURE SHEET NO. 14 OF 24

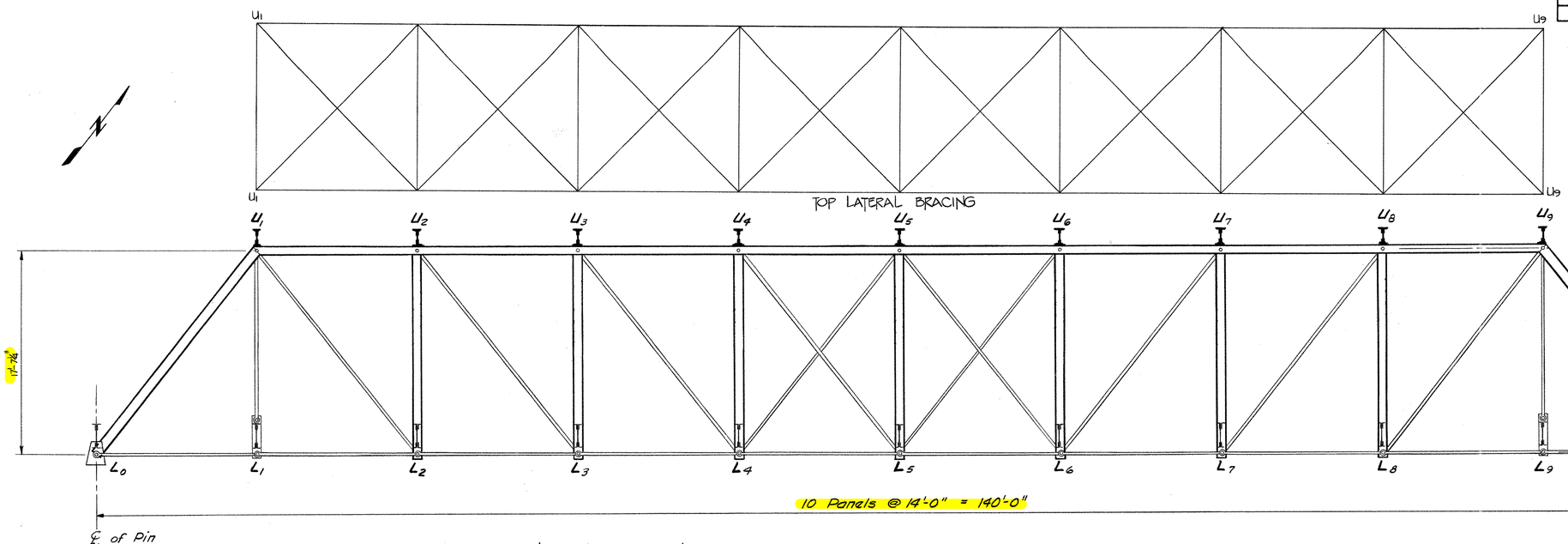
158-150

270-01

331

FORM NO. ENG. 158 ED 4-80

F.H.W.A. REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	—	158-150	1989	136	34-1	72



PIER 2
(FIXED END)

ABUTMENT 2
(EXPANSION END)

FIXED SPAN — ELEVATION

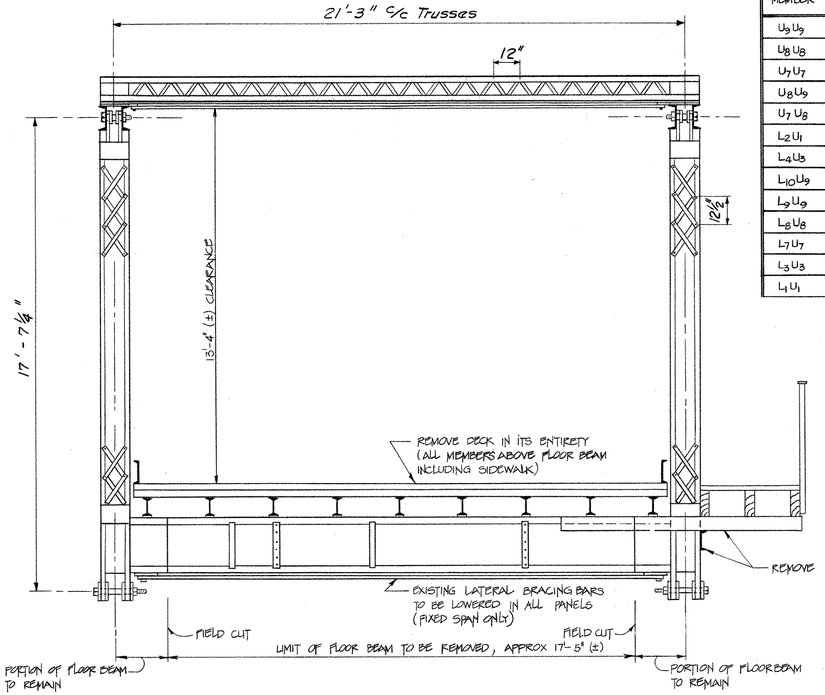
SCALE: 3/16" = 1'-0"

NOTES:

1. DIMENSIONS OF THE EXISTING STRUCTURE SHOWN ON THE PLANS ARE FOR GENERAL REFERENCE ONLY. THEY ARE BASED ON LIMITED FIELD INVESTIGATIONS AND ARE NOT GUARANTEED. THE CONTRACTOR SHALL TAKE ALL FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF THE FINISHED WORK AND SHALL ASSUME FULL RESPONSIBILITY FOR THEIR ACCURACY. WHEN SHOP DRAWINGS BASED ON FIELD MEASUREMENTS ARE SUBMITTED FOR APPROVAL, THE FIELD MEASUREMENTS SHALL ALSO BE SUBMITTED FOR REFERENCE BY THE REVIEWER.
2. REPAIR OF EXISTING TRUSS MEMBERS SHALL CONFORM TO THE NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT № 271 "GUIDE LINES FOR EVALUATION AND REPAIR OF DAMAGED STEEL BRIDGE MEMBERS."
3. THE COST OF WELDED THREADED STUDS FOR TRUSS BEARING REPAIR WILL BE INCLUDED IN THE PAY ITEM "REHABILITATION OF EXISTING TRUSSES".

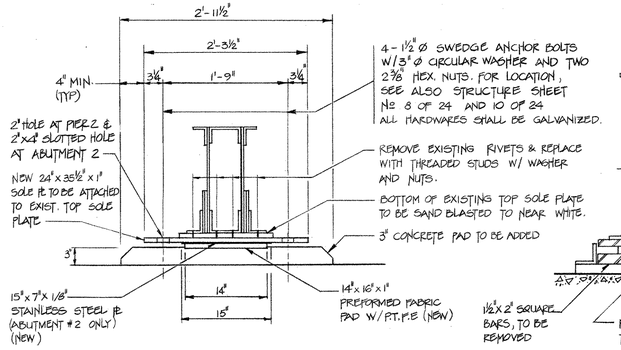
TRUSS REPAIR

MEMBER	DESCRIPTION	NORTH/SOUTH TRUSS	TYPE OF DAMAGE	REPAIR / REPLACE	REMARKS
U_9U_9	TOP LATERAL	N/A	BENT & TWISTED	REPAIR	SEVERE
U_8U_8	TOP LATERAL		BENT & TWISTED		SEVERE
U_7U_7	TOP LATERAL		BENT		MINOR
U_8U_9	TOP X-BRACING				SEVERE
U_7U_8	TOP X-BRACING				MINOR
L_2U_1	DIAGONAL	NORTH			SEVERE
L_4U_3	DIAGONAL				SEVERE
$L_{10}U_9$	DIAGONAL		LOOSE		MINOR
L_2U_2	VERTICAL		BENT		SEVERE
L_8U_8	VERTICAL				MINOR
L_7U_7	VERTICAL				MINOR
L_3U_3	VERTICAL				SEVERE
L_4U_4	VERTICAL				SEVERE



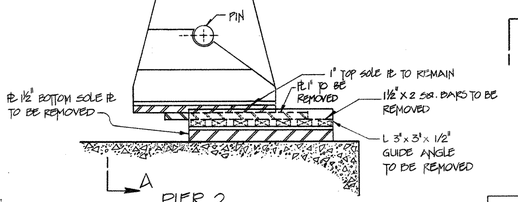
TYPICAL CROSS SECTION

SCALE 3/8" = 1'-0"

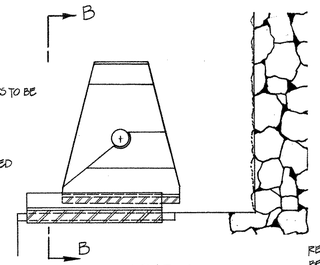


TRUSS BEARING REPAIR
FIXED SPAN
(N.T.S.)

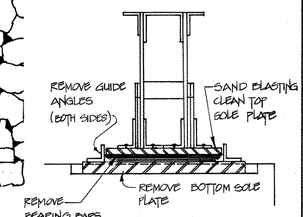
NOTE: FOR ANCHOR BOLT INSTALLATION SEE "ANCHOR BOLT INSTALLATION NOTES" ON STRUCT. SHEET №. 8 OF 24.



PIER 2
LOOKING NORTH
EXISTING CONDITION
N.T.S

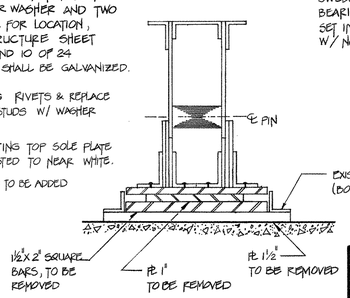


ABUTMENT 2
LOOKING NORTH
EXISTING CONDITION
N.T.S.



SECTION B-B
(N.T.S.)

NOTE:
SWEDGE ANCHOR BOLTS FOR TRUSS BEARINGS AT EXPANSION END SHALL BE SET IN CORE DRILLED HOLE AND GROUTED W/ NON SHRINK GROUT



SECTION A-A
(N.T.S.)

NO.	DATE	DESCRIPTION

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

FIXED SPAN — EXISTING TRUSS REHABILITATION

ENGINEER	H. W. LOCHNER, INC.		
DESIGNER	LM	DRAFTER	CHECKER JD
APPROVED		DATE	9-6-89
STRUCTURE NO.	158-150-1	BRIDGE LOC NO. 01349	STRUCTURE SHEET NO. 15 OF 24

158 — 150

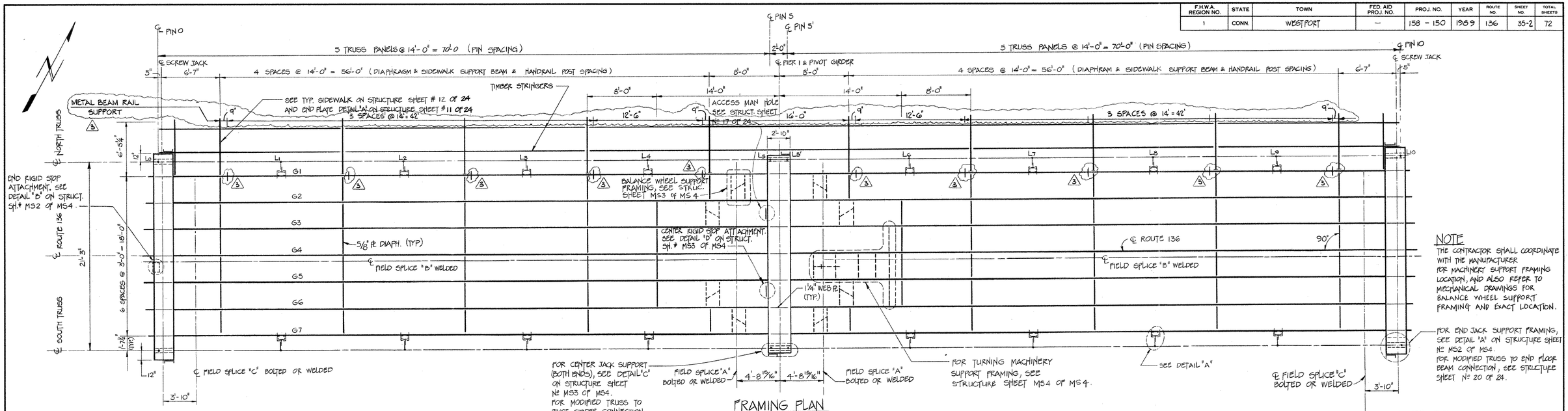
270-01

34-1

STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION

FORM NO. ENG. 15B ED 3-86

F.H.W.A. REGION NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	—	158 - 150	1989	136	35-2	72



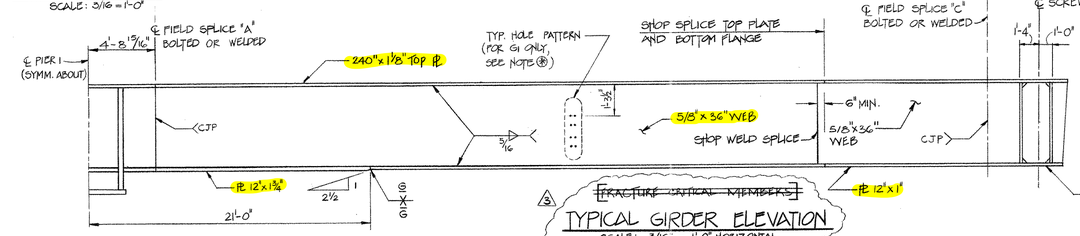
NOTE

THE CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER FOR MACHINERY SUPPORT FRAMING LOCATION, AND ALSO REFER TO MECHANICAL DRAWINGS FOR BALANCE WHEEL SUPPORT FRAMING AND EXACT LOCATION.

FOR END JACK SUPPORT FRAMING, SEE DETAIL 'A' ON STRUCTURE SHEET № MS2 OF MS4. FOR MODIFIED TRUSS TO END FLOOR BEAM CONNECTION, SEE STRUCTURE SHEET № 20 OF 24.

FRAMING PLAN

SCALE: 3/16" = 1'-0"



NOTE ⊛

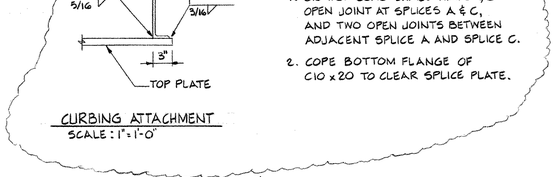
FOR SIDEWALK SUPPORT BEAM END CONNECTION PLATE AND BOLT HOLES. SEE END PLATE DETAIL 'A' ON STRUCTURE SHEET № 11 OF 24

FOR MORE DETAILS, SEE END FLOOR BEAM ON STRUCTURE SHEET # 18 OF 24.

TYPICAL GIRDER ELEVATION

SCALE: 3/16" = 1'-0" HORIZONTAL
3/8" = 1'-0" VERTICAL

FRACTURE CRITICAL MEMBERS

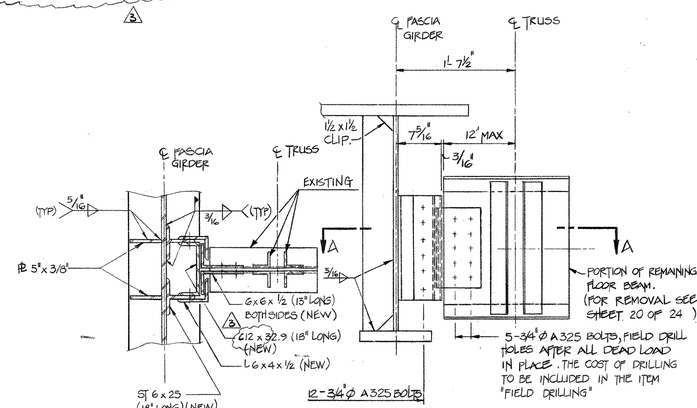


CURBING ATTACHMENT

SCALE: 1" = 1'-0"

SWING SPAN CURBING NOTES:

1. C10 x 20 CURB SHALL HAVE 1/8" OPEN JOINT AT SPLICES A & C, AND TWO OPEN JOINTS BETWEEN ADJACENT SPLICE A AND SPLICE C.
2. COPE BOTTOM FLANGE OF C10 x 20 TO CLEAR SPLICE PLATE.



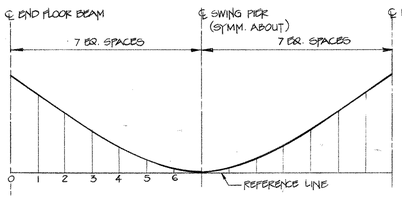
SECTION 'A-A'

SCALE: 1" = 1'-0"

TRUSS TO FASCIA GIRDER CONNECTION AT L1 TO L4 AND L6 TO L9

DETAIL "A" - ELEVATION

SCALE: 1" = 1'-0"



TYPICAL TOTAL CAMBER DIAGRAM

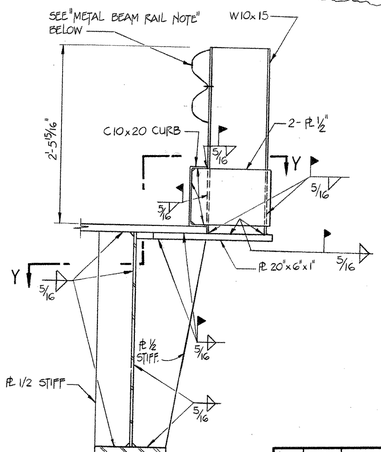
DEAD LOAD DEFLECTION AND CAMBER (FEET)

	PT	STRUCTURAL STEEL	OTHER DEAD LOAD	TOTAL DEAD LOAD	TOTAL CAMBER
GIRDER (G1 TO G7)	0	0.222	0.014	0.236	0.236
	1	0.179	0.012	0.191	0.191
	2	0.137	0.009	0.146	0.146
	3	0.096	0.007	0.103	0.103
	4	0.059	0.005	0.064	0.064
	5	0.029	0.003	0.032	0.032
	6	0.009	0.001	0.010	0.010

(SYMMETRICAL ABOUT CENTER LINE OF PIER 1)

METAL BEAM RAIL NOTE

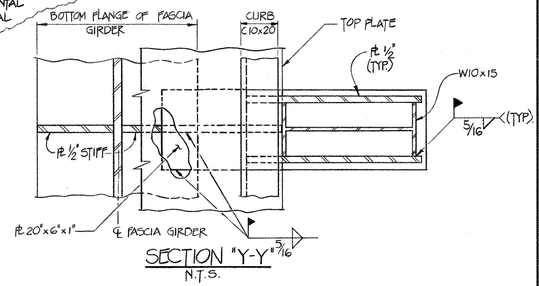
METAL BEAM RAIL SHALL BE MOUNTED TO THE POST IN ACCORDANCE WITH DETAIL 'C', DETAIL 'F', DETAIL 'H', DETAIL 'I', AND DETAIL 'J' AS SHOWN ON THE CDOT STANDARD DRAWING NUMBER 220-F, METAL BEAM RAIL (TYPE R-I).



SWING SPAN METAL BEAM RAIL SUPPORT

SCALE: 1" = 1'-0"

(FOR LOCATION SEE STRUCT. SHEET № 19 OF 24)



SECTION "Y-Y"

N.T.S.

NO.	DATE	REVISIONS
2	6/5/90	REVISED PER DOT COMMENTS (B.A.M.)

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

SWING SPAN — FRAMING PLAN AND DETAILS I

ENGINEER H.W. LOCHNER, INC.

DESIGNER LM | DRAFTER Dino Thanh Huynh | CHECKER TO

APPROVED Leo T. Ora | DATE 9-6-89

STRUCTURE NO. 158-150-1 | BRIDGE LOG NO. 01349 | STRUCTURE SHEET NO. 16 OF 24

35-2

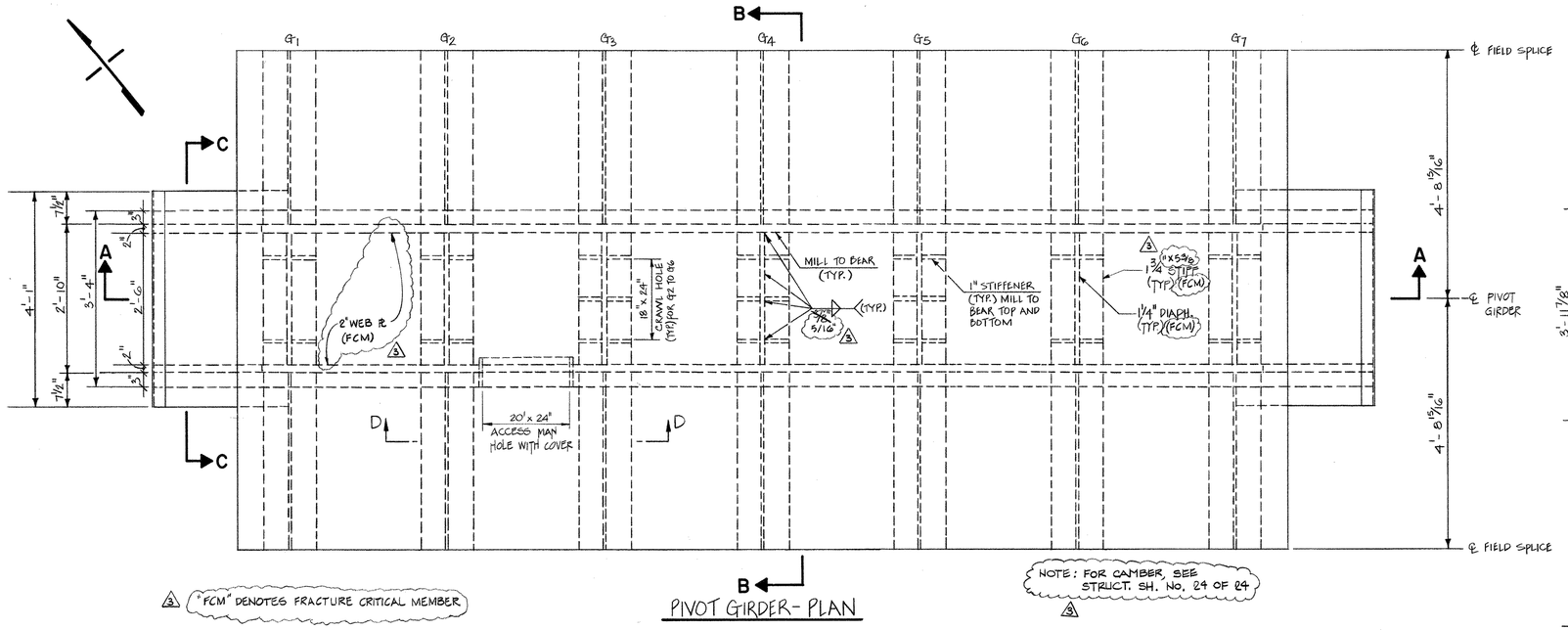
158 - 150

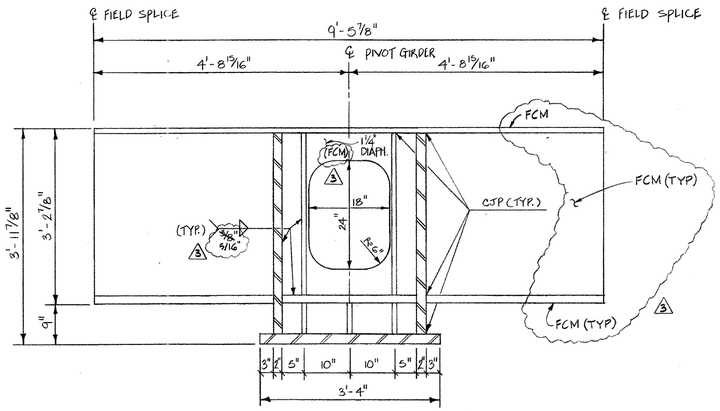
270 - 01

STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION

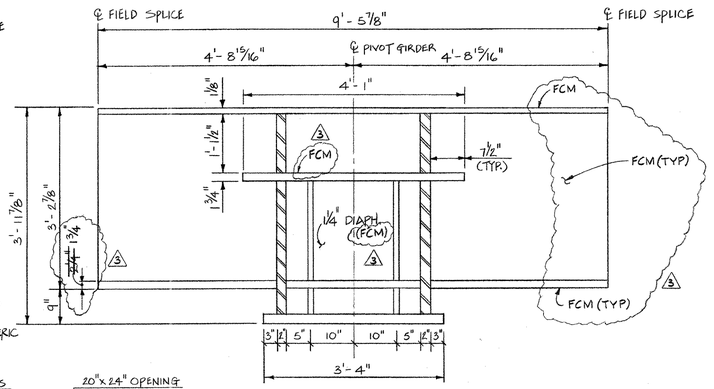
FORM NO. ENG. 158 ED 3-86

F.H.W.A. REGION NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	—	158-150	1989	136	36-1	72

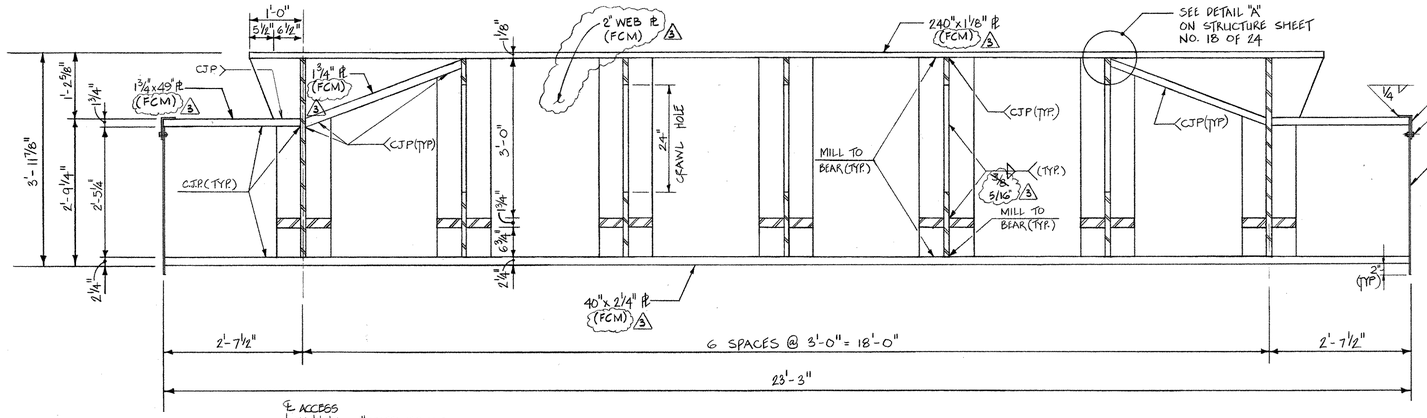




SECTION B-B

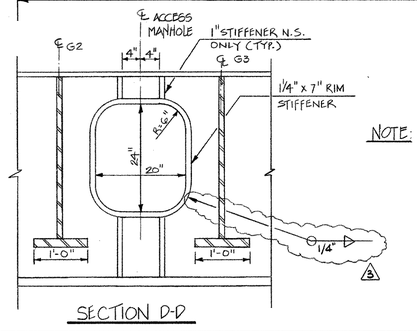


SECTION C-C

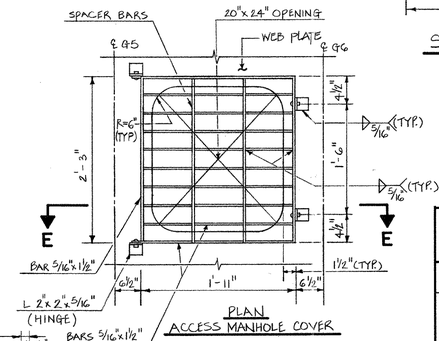


SECTION A-A
PIVOT GIRDER- ELEVATION
(FRACTURE CRITICAL MEMBER)

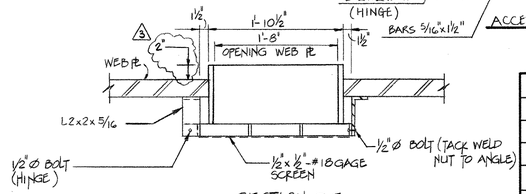
NOTE: INTERIOR SURFACE OF THE PIVOT GIRDER AND END FLOOR BEAM SHALL BE PAINTED WHITE.



SECTION D-D



PLAN
ACCESS MANHOLE COVER



SECTION E-E
NTS

SCALE: 3/4"= 1'-0"
UNLESS NOTED OTHERWISE

NO.	DATE	DESCRIPTION
3	6/5/90	REVISED PER DOT COMMENTS (B.A.M.)

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

SWING SPAN - PIVOT GIRDER & DETAILS

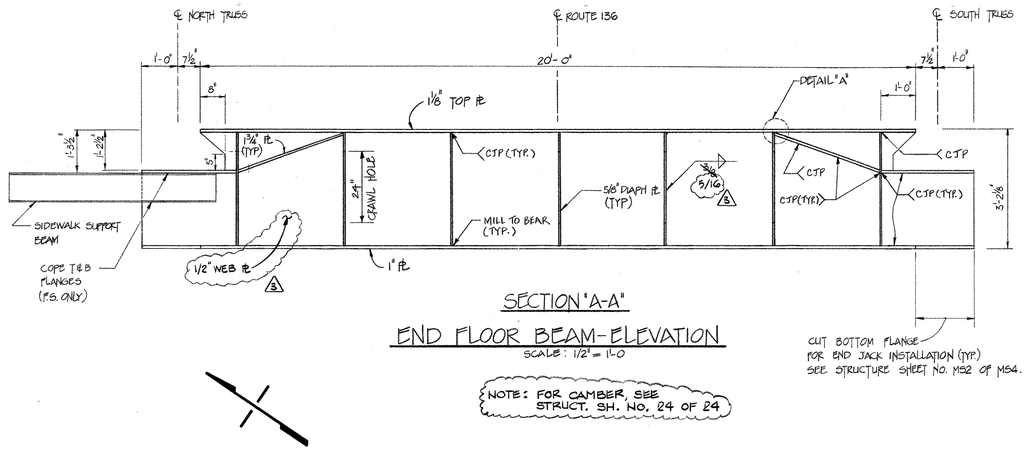
ENGINEER H.W. LOCHNER, INC.
DESIGNER L.M. | DRAFTER R.A.H./D.P.H. | CHECKER J.D.
APPROVED [signature] DATE 9-6-89
STRUCTURE NO. 158-150-1 | BRIDGE LOG NO. 01349 | STRUCTURE SHEET NO. 17 OF 24

158-150 270-01 36-1

STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION — FORM NO ENG 15A ED 4-80

F.H.W.A. REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WEST PORT	—	158-150	1989	136	37-1	72

NOTE: BOLTS FOR TOP PLATE SHALL BE COUNTERSUNK.

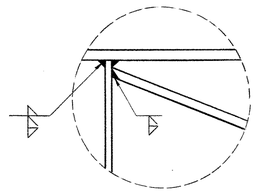


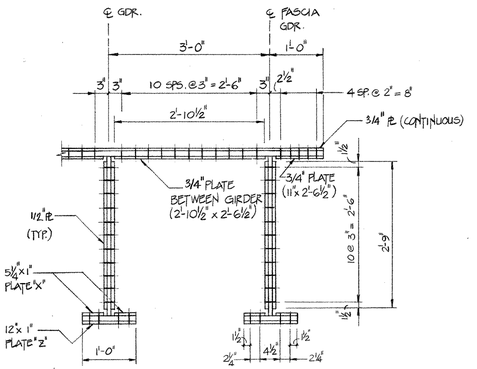
SECTION "A-A"

END FLOOR BEAM-ELEVATION

SCALE: 1/2" = 1'-0"

NOTE: FOR CAMBER, SEE STRUCT. SH. NO. 24 OF 24





SECTION D-D

SCALE: 3/4" = 1'-0"

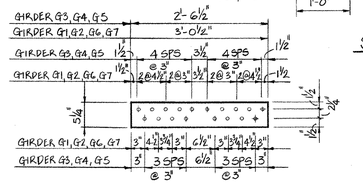


PLATE "X" - DETAIL

SCALE: 3/4" = 1'-0"

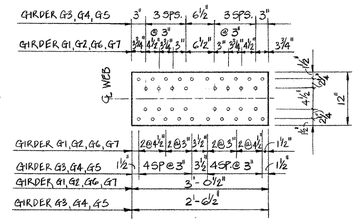
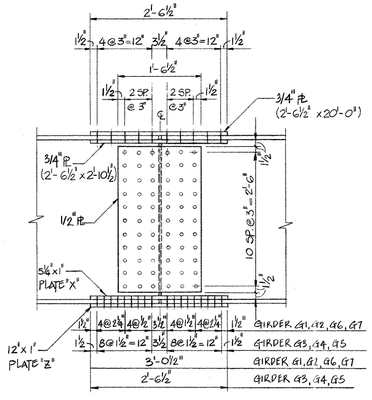


PLATE "Z" - DETAIL

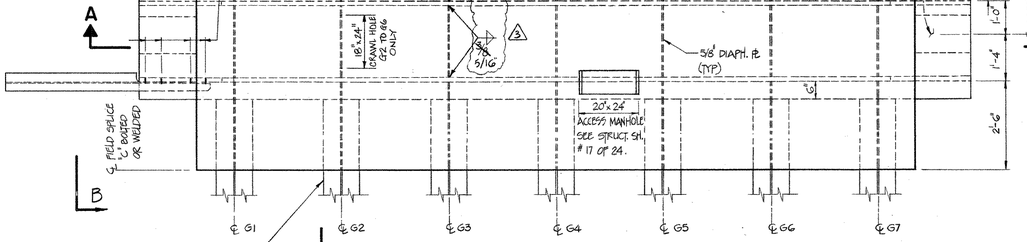
SCALE: 3/4" = 1'-0"

NOTE: FOR COUNTERSUNKS BOLTS ON PLATE "X" AND PLATE "Z", (SEE MECHANICAL DWGS.) 3



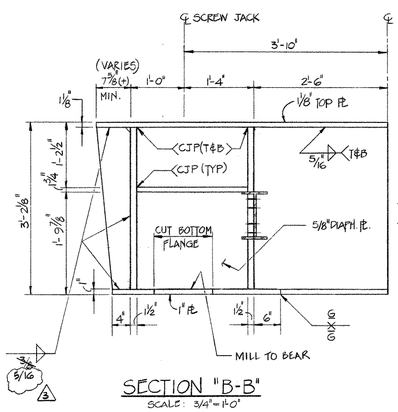
SECTION "E-E"

SCALE: 3/4" = 1'-0"



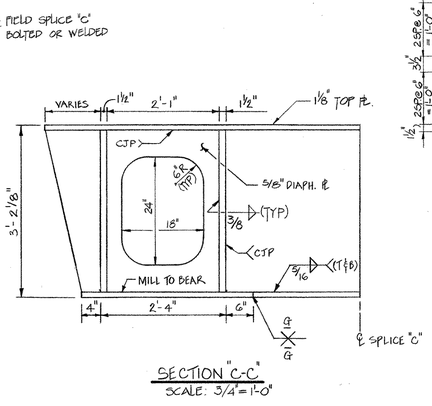
FRACTURE CRITICAL MEMBER
END FLOOR BEAM - PLAN

SCALE: 1/2" = 1'-0"
(EAST FLOOR BEAM AS SHOWN WEST FLOOR BEAM SIMILAR)



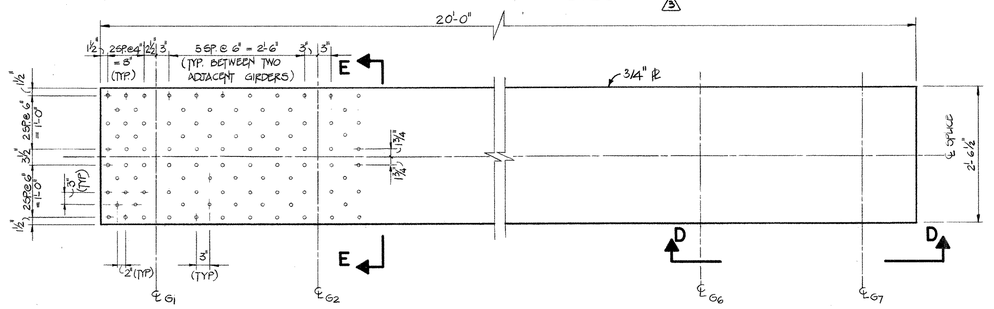
SECTION "B-B"

SCALE: 3/4" = 1'-0"



SECTION "C-C"

SCALE: 3/4" = 1'-0"



SPLICE "A" - PLAN

SCALE: 3/4" = 1'-0"
(FOR LOCATION SEE SHEET 19 OF 24)

BOLTS FOR ALL SPLICES SHALL BE 7/8" Ø ASTM A325 - TYPE 3

NOTE:
3 ALL COMPONENTS OF END FLOOR BEAM ARE FRACTURE CRITICAL MEMBER.

3 ~~THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.~~

STRUCTURAL STEEL NOTES

1. STRUCTURAL STEEL (LOW ALLOY) SHALL CONFORM TO ASTM A588 (PAINTED)
3 2. WELDING DETAILS, PROCEDURES AND TESTING METHODS SHALL CONFORM TO THE AWS D1.5-(88) AS ~~MODIFIED BY THE AASHTO STANDARD SPECIFICATIONS FOR WELDING OF STRUCTURAL STEEL HIGHWAY BRIDGES, UNLESS OTHERWISE NOTED ON THE PLANS.~~
3. WELD FIELD SPLICES, OTHER THAN THOSE INDICATED ON THE PLANS, WILL NOT BE ALLOWED EXCEPT WITH THE WRITTEN PERMISSION OF THE ENGINEER PRIOR TO THE SUBMISSION OF SHOP PLANS. IF ALLOWED, THESE SPLICES SHALL BE DESIGNED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. THE COST OF THESE SPLICES, INCLUDING THE COST OF DESIGN AND THE NONDESTRUCTIVE TESTING OF THEIR WELDS, AS DETERMINED BY THE ENGINEER, SHALL BE AT NO EXTRA EXPENSE TO THE STATE.
4. ALL SHOP GROOVE WELDS IN THE WEB AND FLANGES SHALL BE COMPLETELY INSPECTED BY RADIOGRAPHIC OR ULTRASONIC TESTING AND FINISHED SMOOTH AND FLUSH WITH THE BASE METAL ON ALL SURFACES BY GRINDING IN THE DIRECTION OF APPLIED STRESS LEAVING THE SURFACES FREE FROM DEPRESSIONS. CHIPPING MAY BE USED PROVIDED IT IS FOLLOWED BY SUCH GRINDING. (THE GRINDING SHALL NOT REDUCE THE THICKNESS OF THE BASE METAL BY MORE THAN 1/32 OF AN INCH OR (5%) OF THE THICKNESS WHICHEVER IS SMALLER.
5. ALL WEB TO FLANGE AND WEB TO BEARING STIFFENER FILLET WELDS SHOULD BE INSPECTED BY THE MAGNETIC PARTICLE METHOD. AT LEAST ONE (1) FOOT OF EVERY TEN (10) FOOT LENGTH OF FILLET WELD AND ONE (1) FOOT OF EACH FILLET WELD LESS THAN TEN (10) FEET IN LENGTH SHALL BE TESTED. IF UNACCEPTABLE DISCONTINUITIES ARE FOUND IN ANY TEST LENGTH OF WELD, THE FULL LENGTH OF THE WELD, OR FIVE (5) FEET ON EITHER SIDE OF THE TEST LENGTH, WHICHEVER IS LESS, SHALL BE TESTED.
6. MULTIPLE PASS WELDS, INSPECTED BY THE MAGNETIC PARTICLE METHOD SHALL HAVE EACH PASS OR LAYER INSPECTED AND ACCEPTED BEFORE PROCEEDING TO THE NEXT PASS OR LAYER, AS DETERMINED BY THE ENGINEER.
7. SHOP WEB SPLICES SHALL BE LOCATED WITHIN THE MIDDLE THIRD OF SPAN.
8. SHOP FLANGE SPLICES SHALL BE LOCATED A MINIMUM OF SIX (6) INCHES FROM WEB SPLICES.
9. STIFFENERS AND CONNECTION PLATES SHALL BE LOCATED A MINIMUM OF SIX (6) INCHES FROM FLANGE OR WEB SPLICES.
10. BEARING STIFFENERS AND THE ENDS OF GIRDERS OR BEAMS SHALL BE VERTICAL AFTER THE APPLICATION OF FULL DEAD LOADS.- FIXED SPAN ONLY.
11. THE STRUCTURAL STEEL FABRICATORS SHALL BE CERTIFIED UNDER THE AISC CONTROL PROGRAM, CATEGORY III - MAJOR STEEL BRIDGES.
12. FLANGE AND WEB PLATES ~~DENOTED AS FRACTURE CRITICAL MEMBERS~~ & OTHER COMPONENTS 3 SHALL BE FABRICATED IN CONFORMANCE WITH THE REQUIREMENTS OF THE "GUIDE SPECIFICATIONS FOR FRACTURE CRITICAL NON-REDUNDANT STEEL BRIDGE MEMBERS (AASTHO-1978)," INCLUDING THE LASTEST INTERIM SPECIFICATIONS.
13. THE CONTRACTOR SHALL TAKE THE PROPER PRECAUTIONS TO INSURE THE STABILITY OF ALL STRUCTURAL ELEMENTS UNTIL THE TOTAL STRUCTURE IS IN BEING.
14. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ANY ADDITIONAL TEMPORARY BRACING REQUIRED TO MAINTAIN THE GEOMETRY OF THE INDIVIDUAL GIRDERS, AS WELL AS THE TOTAL STEEL STRUCTURE, THROUGHOUT ALL PHASES OF CONSTRUCTION INCLUDING PLACEMENT OF THE CONCRETE DECK.
15. CONNECTION BOLTS SHALL CONFORM TO ASTM A325 - TYPE 3 UNLESS INDICATED OTHERWISE.
3 16. IF BACK-UP BARS ARE USED, THEY MUST BE REMOVED AND THE JOINTS SHALL BE GROUND FLUSH.

NO.	DATE	REVISIONS
3	6/5/90	REVISED PER DOT COMMENTS (B.A.M.)

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

SWING SPAN - FRAMING PLAN & DETAILS II

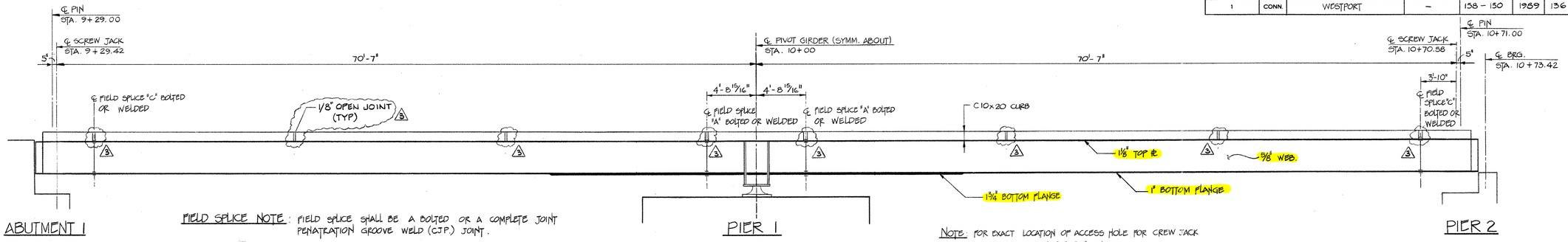
ENGINEER H. W. LOCHNER, INC.
DESIGNER LM — DRAFTER DPH — CHECKER JD
APPROVED Geo T. Dix — DATE 9-6-89
STRUCTURE NO. 158-150-1 — BRIDGE LOG NO. 01349 — STRUCTURE SHEET NO. 18 of 24

JOSEPH MERRITT & CO. 131828

158-150 270-01 37-1

STATE OF CONNECTICUT - DEPT. OF TRANSPORTATION — FORM NO. ENG. 158 ED 3-86

F.H.W.A. REGION NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	–	158 – 150	1989	136	38-1	72

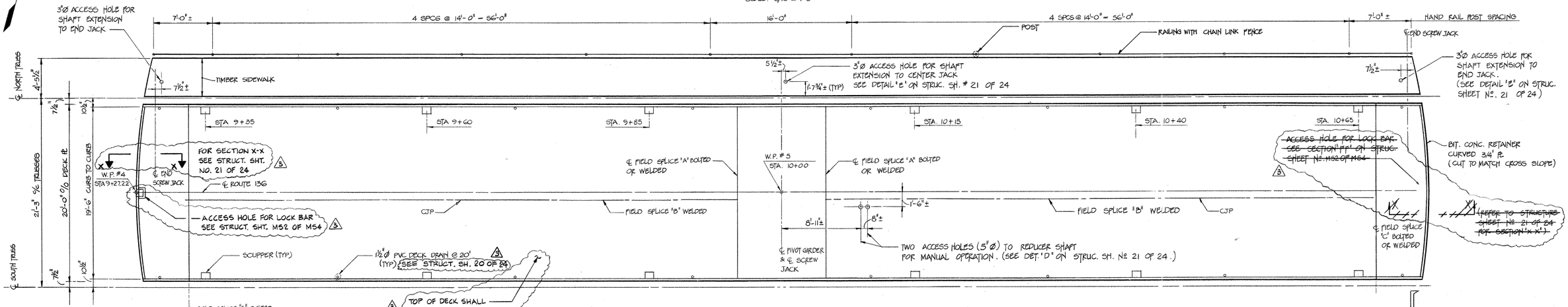


FIELD SPLICE NOTE: FIELD SPLICE SHALL BE A BOLTED OR A COMPLETE JOINT PENETRATION GROOVE WELD (CJP.) JOINT.

NOTE: FOR EXACT LOCATION OF ACCESS HOLE FOR CREW JACK SHAFT, SEE DETAIL "A", "C" ON STRUCT. SHEET Nº MS2 & MS3 OF MS4. FOR REDUCER SHAFT, SEE STRUCT SHEET Nº M1 OF M4.

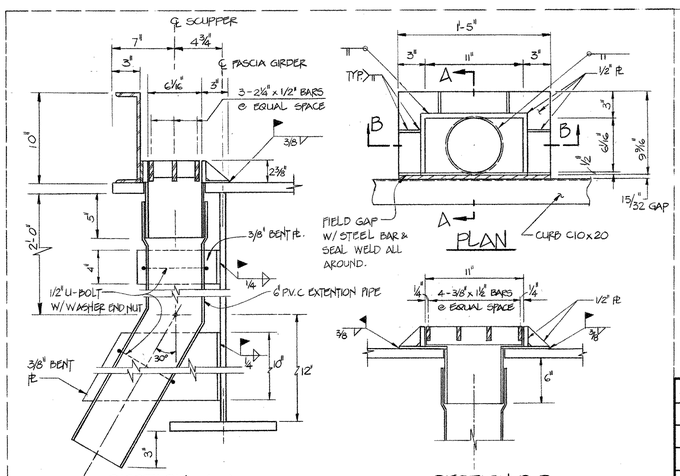
ELEVATION – SWING SPAN

SCALE: 3/16" = 1'-0"



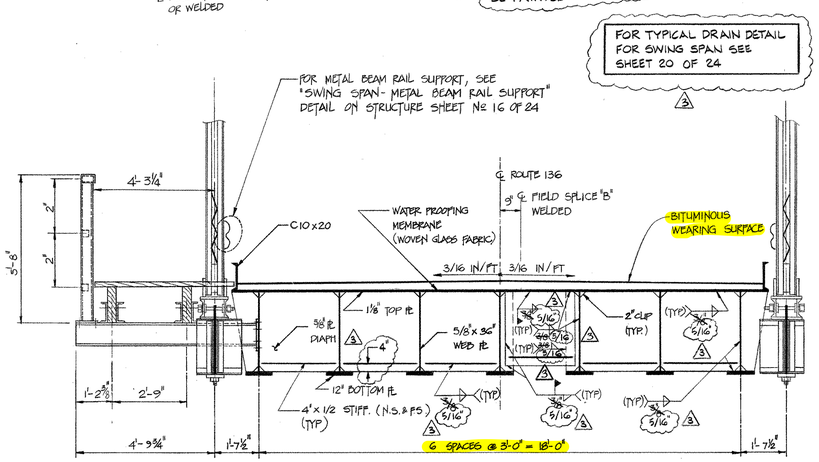
PROPOSED DECK PLAN – SWING SPAN

SCALE: 3/16" = 1'-0"



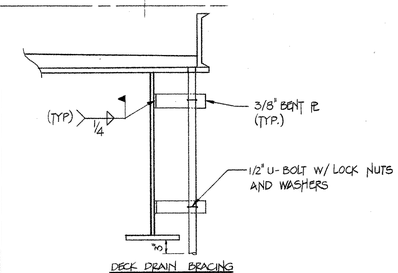
SWING SPAN SCUPPER

SCALE: 1½" = 1'-0"



PROP. CROSS SECTION – SWING SPAN

SCALE: 3/8" = 1'-0"



DECK DRAIN BRACING (N.T.S.)

TREATMENT OF MEMBRANE WATER PROOFING FOR SWING SPAN (N.T.S.)

NO.	DATE	DESCRIPTION
2	4/5/90	REVISED PER DOT COMMENTS (B.A.M.)
REVISIONS		

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

SWING SPAN
DECK PLAN & DETAILS

ENGINEER	H.W. LOCHNER, INC.		
DESIGNER	LM	DRAFTER	CHECKER JD
APPROVED		DATE	9-6-89
STRUCTURE NO.	158-150-1	BRIDGE LOG NO. 01349	STRUCTURE SHEET NO. 19 OF 24

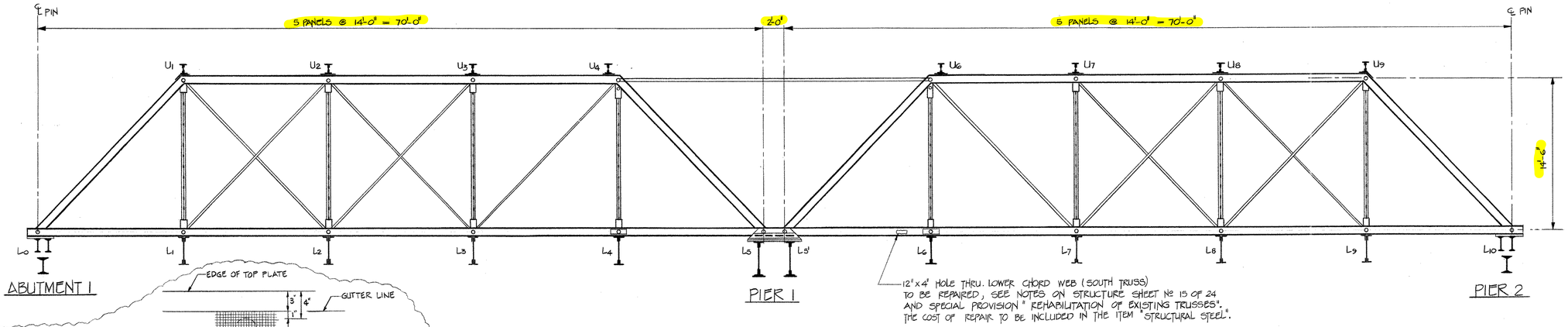
158-150

270-01

38-1

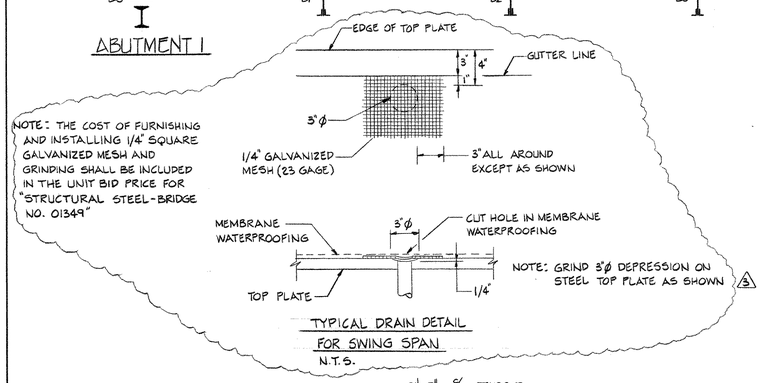
FORM NO. ENG. 158 ED 4-80

F.H.W.A. REGION	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CONN.	WESTPORT	–	158-150	1989	136	39-2	72

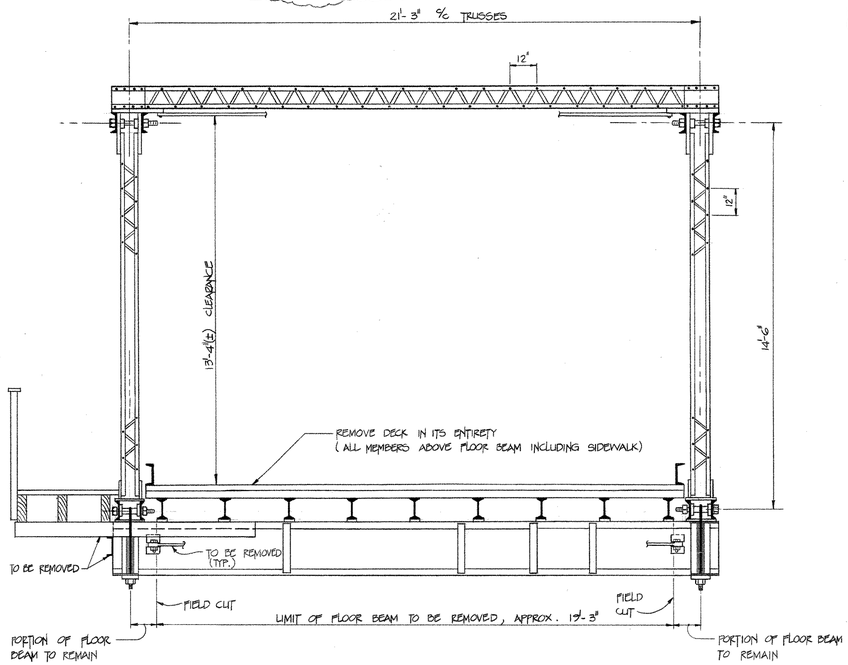


SWING SPAN - ELEVATION

SCALE: 3/16" = 1'-0"

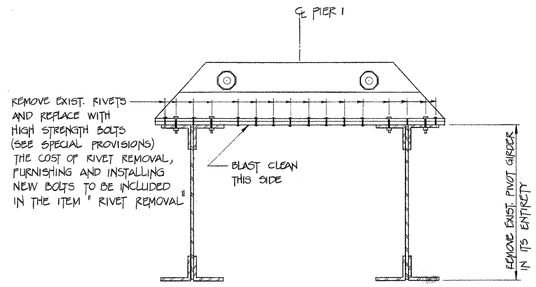


TYPICAL DRAIN DETAIL
FOR SWING SPAN
N.T.S.

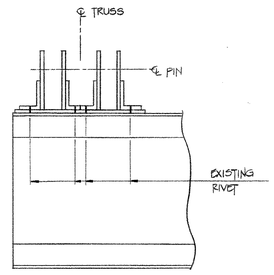


TYPICAL CROSS SECTION

SCALE: 3/8" = 1'-0"

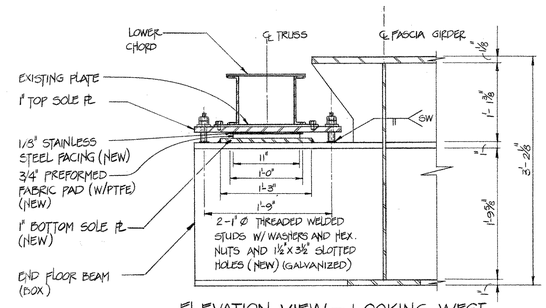


ELEVATION VIEW — LOOKING NORTH
SCALE: 1" = 1'-0"

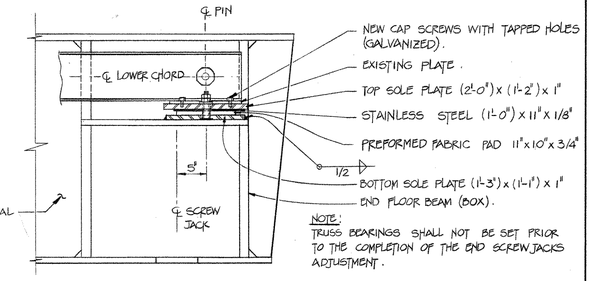


ELEVATION VIEW - LOOKING WEST
SCALE: 1" = 1'-0"

EXISTING TRUSS TO PIVOT GIRDER CONNECTION



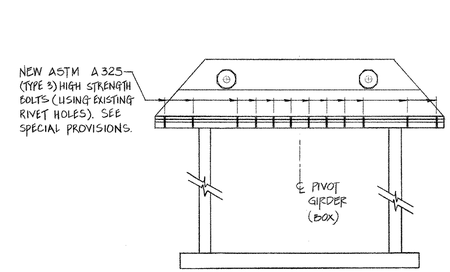
ELEVATION VIEW — LOOKING WEST
SCALE: 1" = 1'-0"



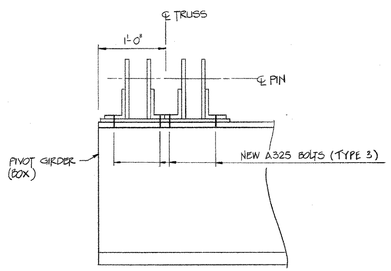
NOTE:
TRUSS BEARINGS SHALL NOT BE SET PRIOR TO THE COMPLETION OF THE END SCREW JACKS ADJUSTMENT.

ELEVATION VIEW — LOOKING NORTH
SCALE: 1" = 1'-0"

MODIFIED TRUSS TO END FLOORBEAM CONNECTION



ELEVATION VIEW — LOOKING NORTH
SCALE: 1" = 1'-0"



ELEVATION VIEW LOOKING WEST
SCALE: 1" = 1'-0"

MODIFIED TRUSS TO PIVOT GIRDER CONNECTION

NO.	DATE	DESCRIPTION
3	6/5/90	REVISED PER DOT COMMENTS (B.A.M.)

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

WESTPORT

BRIDGE REHABILITATION OF U.S. ROUTE 136 OVER SAUGATUCK RIVER

SWING SPAN - EXISTING TRUSS REHABILITATION

ENGINEER H. W. LOCHNER, INC.

DESIGNER LM | DRAFTER Lisa Ann Knapek | CHECKER JP

APPROVED Guo T. Lin | DATE 9-6-89

STRUCTURE NO. 158-150-1 | BRIDGE LOC NO 01349 | STRUCTURE SHEET NO 20 of 24

158-150

270-01

39-2

APPENDIX F

Life Cycle Cost Analysis

Bridge Life Cycle Cost Analysis

$$PV = FVN/(1+DR)^N$$

PV= Present Value
FVN= Future Value at time N

DR= Discount Rate = 2.6%
N= Period (Years)

Alternate A - Major Rehabilitation

Superstructure Strengthening,Seismic Retrofit,Bearing Replacement,Deck Replacement,Substructure Repair&Spot Painting

Item	Present Value	Discount Rate	Period (Years)	Future Value
Major Rehabilitation (25 Year Service Life)	$19,800,000	2.60%	0	$19,800,000
Temporary Bridge				
Mechanical/Electrical Repair/Replacement (Year 10)	$2,707,662	2.60%	10	$3,500,000
Milling and Paving (Year 15)	$74,848	2.60%	15	$110,000
Mechanical/Electrical Repair/Replacement (Year 20)	$2,094,695	2.60%	20	$3,500,000
Rehabilitation Project (Year 25)	$4,527,041	2.60%	25	$8,600,000
Full Structure Painting				
Superstructure Rehab/Repair				
Substructure Patching				
Milling and Paving (Year 30)	$50,930	2.60%	30	$110,000
Mechanical/Electrical Repair/Replacement (Year 30)	$1,620,493	2.60%	30	$3,500,000
Full Structure Replacement (Year 40)	$12,822,969	2.60%	40	$35,800,000
Milling and Paving (Year 55)	$51,182	2.60%	55	$210,000
Full Structure Painting/Minor Repair (Year 65)	$1,131,287	2.60%	65	$6,000,000
Milling and Paving (Year 70)	$34,826	2.60%	70	$210,000
Salvage (Residual Value)	-$3,646,599	2.60%	75	-$25,000,000
Total Cost	**$41,269,335**			

Alternate B - Complete Structure Replacement

Item	Present Value	Discount Rate	Period (Years)	Future Value
Complete Replacement (75 Year Service Life)	$35,800,000	2.60%	0	$35,800,000
Milling and Paving (Year 15)	$142,892	2.60%	15	$210,000
Full Superstructure Painting/Minor Repair (Year 25)	$3,158,401	2.60%	25	$6,000,000
Milling and Paving (Year 30)	$97,230	2.60%	30	$210,000
Milling and Paving (Year 45)	$66,159	2.60%	45	$210,000
Rehabilitation Project (Year 50)	$3,325,165	2.60%	50	$12,000,000
Full Superstructure Painting/Repair				
Substructure Repair/Rehabilitation				
Milling and Paving (Year 60)	$45,017	2.60%	60	$210,000
Salvage (Residual Value)	-$1,203,378	2.60%	75	-$8,250,000
Total Cost	**$41,431,486**			

APPENDIX G

Traffic Analysis

WILLIAM F. CRIBARI MEMORIAL BRIDGE

(BRIDGE NO. 01349)

STATE ROUTE 136 OVER THE SAUGATUCK RIVER

WESTPORT, CONNECTICUT

TRAFFIC STUDY

ANALYSIS OF TRAFFIC DETOUR

Prepared for
Connecticut Department of Transportation

Prepared by:

Close, Jensen and Miller, P.C.

April 2016

WILLIAM F. CRIBARI MEMORIAL BRIDGE
BRIDGE NO. 01349
STATE ROUTE 136 OVER THE SAUGATUCK RIVER
WESTPORT, CONNECTICUT

TRAFFIC STUDY
ANALYSIS OF TRAFFIC DETOUR

APRIL 2016

Contents **Page No.**

Purpose	1
Detour Route	1
Intersection Location Map	2
Detour Map	3
Traffic Data Collection	4
Traffic Analysis	5
Executive Summary	21

Appendices

Appendix G-A	Existing Traffic Volume Diagrams
Appendix G-B	Proposed Detour Traffic Volume Diagrams
Appendix G-C	List of Traffic Volume Assumptions

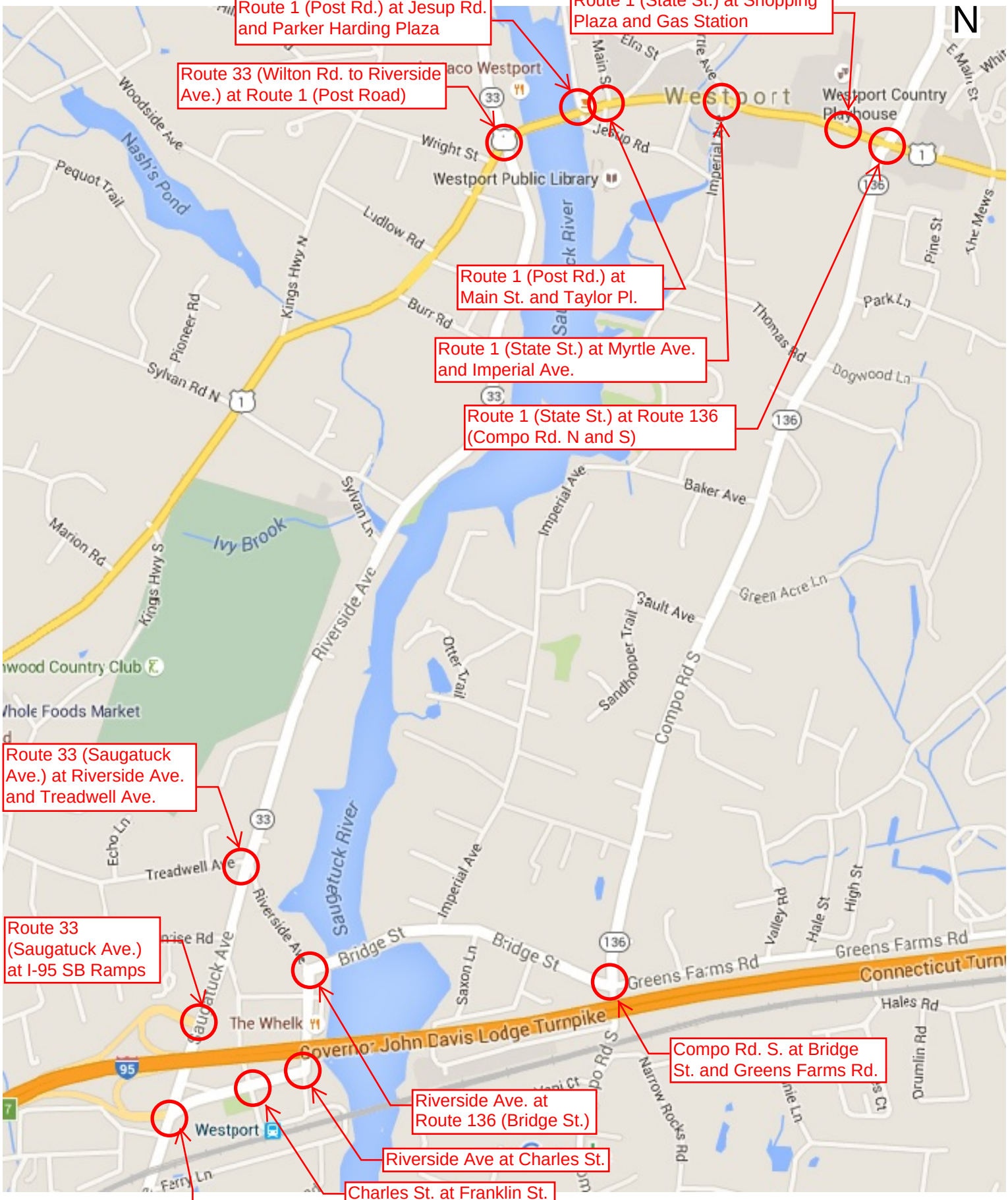
PURPOSE

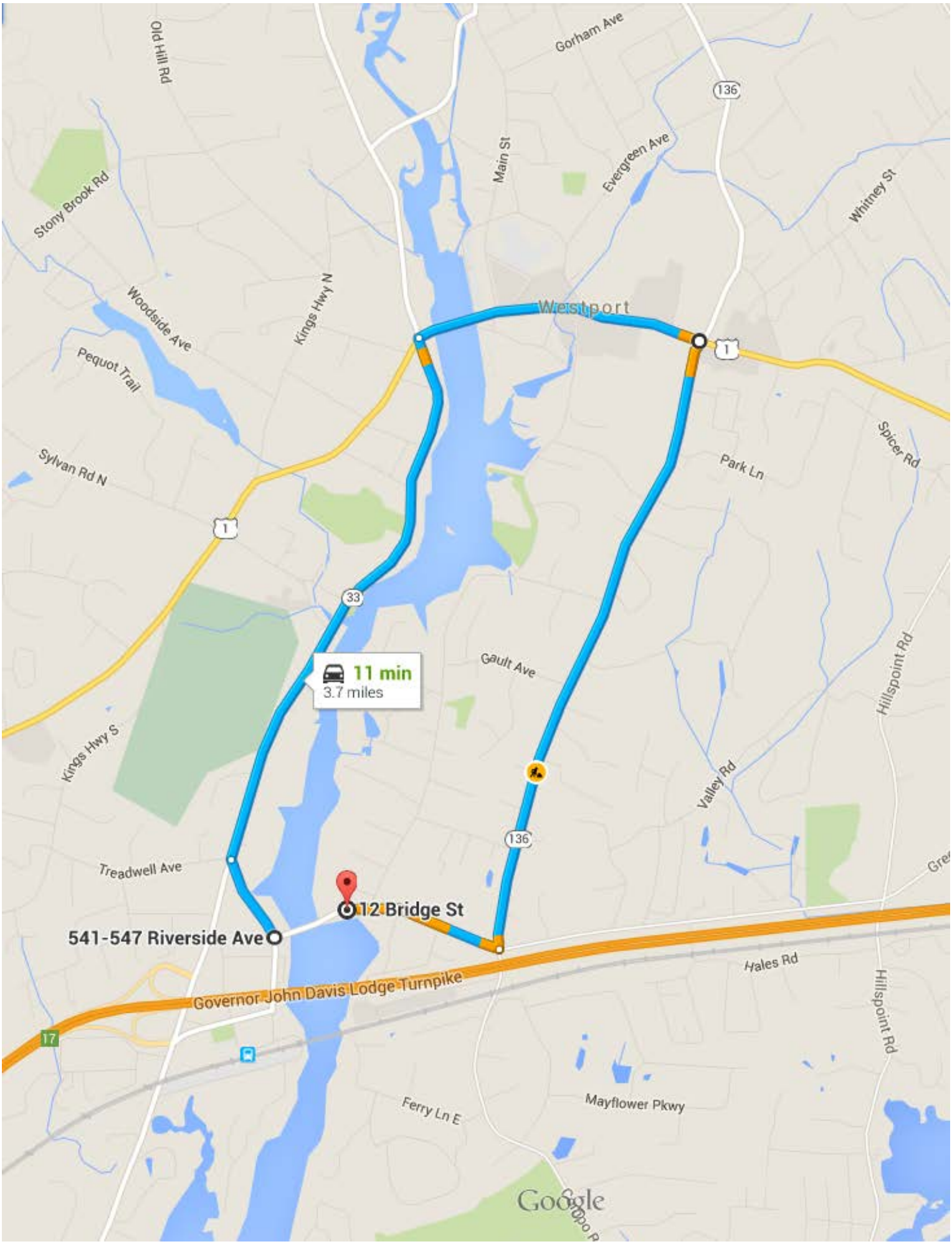
The Connecticut Department of Transportation (CTDOT) has initiated a project for the William F. Cribari Memorial Bridge (Bridge No. 01349), which carries Route 136 (Bridge Street) over the Saugatuck River in the Town of Westport, to review and address the structural and/or functional obsolescence of the bridge. As a part of the review process, a Rehabilitation Study Report has been prepared to investigate different alternatives to address the existing issues. Further review is provided in the report as to the feasibility for how any proposed construction would be carried out for the available options. The purpose of this Traffic Study is to supplement the Rehabilitation Study Report in determining the impacts a temporary closure of the bridge during construction, and the implementation of a detour, would have on the surrounding roadway intersections. An intersection location map is provided in Figure 1.

DETOUR ROUTE

The anticipated detour for traffic travelling eastbound across Bridge Street will utilize Route 33 (Riverside Avenue) to Route 1 (Post Road). Route 1 then continues to Route 136 (Compo Road S), which will carry traffic towards Bridge Street/Greens Farms Road. Westbound traffic traveling across Bridge No. 01349 will be directed in the opposite direction along the same route. A map of the detour is shown in Figure 2.

Intersection Location Map




Old Hill Rd
Gorham Ave
136
Main St
Evergreen Ave
Whitney St
Stony Brook Rd
Kings Hwy N
Woodside Ave
Westport
Pequot Trail
1
Sylvan Rd N
Park Ln
Spicer Rd
33
11 min
3.7 miles
Gault Ave
Hillspoint Rd
Kings Hwy S
Valley Rd
136
Treadwell Ave
12 Bridge St
541-547 Riverside Ave
Hales Rd
Governor John Davis Lodge Turnpike
17
Hillspoint Rd
Ferry Ln E
Mayflower Pkwy
Google

TRAFFIC DATA COLLECTION

Machine counts were obtained at the following locations:

- Route 136 (Compo Road S.), north of Baker Avenue
- Route 33 (Riverside Avenue), south of Sylvan Lane
- Route 136 (Bridge Street), east of Riverside Avenue
- Route 1 (State Street), east of Main Street
- Route 1 (Post Road), east of Wilton Road

Manual turning movement counts during peak hour traffic were conducted at the following 13 intersections:

- Route 33 (Saugatuck Avenue) at I-95 Northbound Ramps and Park Street
- Charles Street at Franklin Street
- Route 136 (Riverside Avenue) at Charles Street
- Route 33 (Saugatuck Avenue) at I-95 Southbound Ramps
- Route 33 (Saugatuck Avenue) at Riverside Avenue and Treadwell Avenue
- Riverside Avenue at Route 136 (Bridge Street)
- Compo Road S. at Bridge Street and Greens Farms Road
- Route 33 (Wilton Road to Riverside Avenue) at Route 1 (Post Road)
- Route 1 (Post Road) at Jesup Road and Parker Harding Plaza
- Route 1 (Post Road to State Street) at Main Street and Taylor Pl.
- Route 1 (State Street) at Myrtle Avenue and Imperial Avenue
- Route 1 (State Street) at shopping plaza and gas station
- Route 1 (State Street) at Route 136 (Compo Road N. to Compo Road S.)

Appendix A contains the traffic volume diagrams (existing conditions) for each movement at the intersections studied.

Appendix B contains the traffic volume diagrams (proposed detour conditions) for each movement at the intersections studied.

Appendix C contains a list of the assumptions made regarding the behavior of traffic for vehicles traveling across Bridge No. 01349. These assumptions include balancing of the traffic counts for input into the simulation program, use percentages of existing condition traffic volumes with their respective turning movements, and transportation judgment in determining the ultimate destination of each vehicle within the traffic model. The results of the assumptions were used to determine the traffic volumes reflected in the Appendix A and B diagrams.

TRAFFIC ANALYSIS

In order to determine the traffic impact of the temporary closure of Bridge No. 01349 on the surrounding intersections, analyses were performed to determine the Level of Service (LOS) for each intersection and their respective approaches as well as the average queue length at each intersection approach.

Evaluation of capacity is expressed in Level-of-Service ratings, a grading system or qualitative analysis. Level-of-Service "A" is considered the highest and best operations level. Level-of-Service "F" is considered the lowest operational level and is an indication of traffic delays and congestion. Level-of-Service "C" is an average operational level and most designs attempt to achieve operations at this level.

In addition to the capacity evaluation, a review of the queue length at each intersection approach was performed to better understand the real-life traffic situation during the AM and PM peak hours. A queue is defined as a line of vehicles waiting to be served by the system in which the flow rate from the front of the queue determines the average speed within the queue. Slowly moving vehicles or people joining the rear of the queue are usually considered part of the queue, and the internal queue dynamics may involve starts and stops. The queue length data allows us to see how far traffic backs up at each intersection throughout the course of the peak hour, which also allows us to identify problem areas where spillback from some intersections cause major congestion in others; information that is not necessarily seen in the LOS data alone. Also, where the LOS grading stops dropping once it reaches "F", the queue length allows us to determine how much worse one "F" compares to another or if conditions of an "F" worsen between traffic models.

The simulation software used to perform the analyses are Synchro 9 and SimTraffic. Synchro 9 was used to determine macro level LOS at each intersection as well as provide optimizations for the traffic signals for the new conditions of the detour and proposed improvements of the Bridge Street/Riverside Avenue intersection. SimTraffic was used to more accurately simulate real-world conditions and determine the average queue length at each of the intersection approaches. A 60-minute record time was used for all SimTraffic runs.

Existing Condition vs. Proposed Detour Condition

Signal Plans providing traffic signal timing and phasing details for each of the studied intersections were provided by the CTDOT Division of Traffic Engineering and input for the existing condition simulations.

For the implementation of the proposed detour, the existing signals required modification to accommodate the new conditions with regards to traffic volumes. Signal phasing and timing for the proposed detour conditions were optimized through Synchro 9, which involves allocating the appropriate green times for each signal phase with respect to the new traffic volumes at each approach.

The following tables in Figure 3 provide a comparison of the LOS and average queue lengths at each of the studied intersections for the existing and proposed detour conditions.

FIGURE 3

Intersection:		Route 33 (Saugatuck Ave.) at I-95 NB Ramps and Park Street			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	L	F (184.5)	E (67.5)	E (61.0)	D (51.9)
	TR	F (119.9)	C (25.3)	E (56.8)	A (8.8)
Westbound	LT	F (58.5)	E (67.4)	E (67.1)	C (33.9)
Northbound	L	C (29.6)	F (89.2)	B (14.9)	C (21.3)
	TR	B (12.6)	D (18.2)	B (13.7)	C (17.8)
Southbound	LT	D (47.0)	F (92.0)	C (29.5)	C (32.1)
	R	A (3.9)	B (13.6)	A (5.5)	A (5.8)
Intersection LOS:		F	E	C	C

Intersection:		Route 33 (Saugatuck Ave.) at I-95 SB Ramps			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	L	D (40.6)	C (31.4)	D (46.1)	C (28.8)
	R	B (13.1)	B (11.7)	A (3.6)	A (2.2)
Northbound	L	A (6.4)	A (3.6)	A (9.2)	A (5.4)
	T	A (4.3)	A (6.1)	A (5.8)	A (8.5)
Southbound	TR	A (9.1)	B (18.9)	A (8.6)	A (8.8)
Intersection LOS:		B	B	B	B

Intersection:		Charles Street at Franklin Street			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	LT	A (3.8)	A (4.6)	A (4.0)	A (4.8)
Westbound	TR	A (4.4)	A (4.0)	A (3.4)	A (4.1)
Northbound	L	C (31.1)	B (13.7)	C (31.1)	B (13.6)
	T	C (30.2)	B (13.4)	C (29.7)	B (13.1)
	R	B (10.8)	A (5.7)	B (10.5)	A (5.6)
Intersection LOS:		A	A	A	A

Intersection:		Riverside Ave at Charles Street			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	LR	C (28.9)	B (10.2)	B (17.3)	A (9.7)
Northbound	LT	A (9.0)	A (6.3)	B (14.8)	A (7.0)
Southbound	TR	D (47.9)	A (7.8)	B (16.3)	A (6.4)
Intersection LOS:		D	A	B	A

Intersection:		Route 33 (Saugatuck Ave.) at Riverside Ave. and Treadwell Ave.			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	LTR	D (49.7)	F (206.7)	E (60.6)	F (234.6)
Westbound	LT	E (64.8)	E (66.1)	E (59.4)	E (66.1)
	R	B (17.8)	F (87.2)	B (19.2)	F (233.5)
Northbound	LTR	E (57.7)	F (193.6)	E (78.5)	D (40.6)
Southbound	L	B (16.5)	B (17.9)	C (22.3)	A (7.6)
	TR	B (16.4)	D (36.4)	B (18.3)	B (17.4)
Intersection LOS:		D	F	D	E

Intersection:		Riverside Ave. at Route 136 (Bridge Street)			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	LTR	A (0.0)	A (0.0)	B (11.5)	A (1.5)
Westbound	LT	F (134.2)	-	C (29.5)	-
	R	A (9.7)	-	A (8.0)	-
Northbound	LT	B (19.9)	A (6.1)	C (21.7)	A (8.7)
	R	A (6.5)	-	A (7.0)	-
Southbound	L	B (16.0)	-	B (15.4)	-
	TR	B (14.0)	A (2.0)	A (9.4)	A (2.7)
Intersection LOS:		E	A	B	A

Intersection:		Route 136 (Compo Road S.) at Route 136 (Bridge Street) and Greens Farms Road			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	L	A (6.4)	-	A (8.6)	-
	TR	A (5.6)	A (7.9)	A (9.6)	B (15.5)
Westbound	LTR	C (26.8)	B (11.7)	B (18.7)	A (8.7)
Northbound	L	E (59.8)	B (11.6)	C (29.8)	A (7.4)
	TR	B (16.2)	B (12.2)	B (16.5)	A (9.0)
Southbound	L	C (25.5)	C (24.1)	B (18.6)	D (37.9)
	TR	B (10.3)	B (12.2)	B (16.3)	A (8.7)
Intersection LOS:		C	B	B	B

Intersection:		Route 33 (Wilton Road to Riverside Ave.) at Route 1 (Post Road)			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	L	B (17.7)	F (95.6)	D (54.2)	F (379.2)
	TR	C (31.5)	F (223.7)	D (49.7)	F (297.9)
Westbound	L	C (33.3)	F (468.1)	D (44.3)	F (548.6)
	TR	F (164.6)	F (100.3)	F (81.0)	F (148.9)
Northbound	LTR	C (26.6)	F (214.4)	E (65.9)	F (344.7)
Southbound	LTR	D (44.3)	F (413.0)	F (231.2)	F (682.3)
Intersection LOS:		E	F	F	F

Intersection:		Route 1 (Post Road) at Jesup Road and Parker Harding Plaza			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	L	A (9.1)	A (6.7)	B (10.2)	A (4.0)
	TR	B (13.4)	C (20.1)	D (53.4)	F (156.3)
Westbound	LTR	D (52.6)	E (56.5)	C (27.0)	F (97.2)
Northbound	LTR	C (23.9)	E (74.5)	C (25.2)	F (228.4)
Southbound	LT	B (18.5)	D (40.2)	B (17.9)	E (68.5)
	R	A (6.1)	C (22.6)	A (5.4)	B (14.7)
Intersection LOS:		C	D	D	F

Intersection:		Route 1 (Post Road to State Street) at Main Street and Taylor Pl.			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	L	A (2.8)	A (3.5)	A (2.6)	A (1.2)
	T	A (3.4)	A (4.5)	A (4.5)	E (53.3)
Westbound	T	B (10.3)	E (17.4)	A (8.8)	F (75.1)
	R	A (2.6)	A (1.7)	A (2.7)	B (14.9)
Northbound	LTR	B (16.2)	C (25.7)	B (20.0)	F (89.9)
Intersection LOS:		A	D	A	F

Intersection:		Route 1 (State Street) at Myrtle Ave. and Imperial Ave.			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	LTR	B (12.1)	B (15.4)	B (19.6)	F (105.5)
Westbound	LT	D (35.1)	E (73.4)	C (25.7)	E (56.8)
	R	A (4.0)	A (2.3)	A (4.3)	A (3.1)
Northbound	LTR	B (19.8)	F (121.8)	C (21.0)	F (122.5)
Southbound	LTR	C (27.5)	F (162.9)	D (45.8)	F (108.9)
Intersection LOS:		C	E	C	F

Intersection:		Route 1 (State Street) at Shopping Plaza and Gas Station			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	LTR	A (3.9)	A (5.3)	A (6.7)	B (10.8)
Westbound	LTR	A (6.3)	C (17.7)	A (5.0)	A (4.9)
Northbound	LTR	A (9.2)	C (27.5)	A (5.2)	A (8.0)
Southbound	LTR	B (11.7)	C (33.3)	B (12.9)	B (19.8)
Intersection LOS:		A	B	A	A

Intersection:		Route 1 (State Street) at Route 136 (Compo Road N. to Compo Road S.)			
		AM		PM	
		Existing	Detour	Existing	Detour
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	**L**	D (52.6)	F (156.6)	E (60.8)	F (85.1)
	TR	C (24.6)	D (40.2)	D (40.9)	F (91.2)
Westbound	**L**	D (51.4)	E (79.9)	D (54.6)	F (136.4)
	TR	E (56.8)	F (193.9)	C (24.5)	D (45.2)
Northbound	**L**	D (51.9)	F (231.3)	D (54.6)	F (107.5)
	TR	C (30.5)	D (51.1)	F (87.5)	F (90.1)
Southbound	**L**	F (83.4)	C (34.5)	F (81.4)	D (45.4)
	TR	E (61.0)	F (231.7)	D (42.1)	F (118.7)
Intersection LOS:		D	F	D	F

Intersection:		Route 33 (Saugatuck Ave.) at I-95 NB Ramps and Park Street			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	**L**	219	232	175	226
	TR	251	259	196	222
Westbound	**LT**	207	7	94	24
Northbound	**L**	76	66	67	65
	TR	74	64	59	95
Southbound	**L**	168	150	60	54
	TR	99	56	56	59

Intersection:		Route 33 (Saugatuck Ave.) at I-95 SB Ramps			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	**L**	80	76	124	231
	R	119	104	66	99
Northbound	**L**	91	45	92	54
	T	85	199	73	279
Southbound	**TR**	121	101	126	84

Intersection:		Charles Street at Franklin Street			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	LT	79	18	92	8
Westbound	TR	76	3	34	6
Northbound	L	35	30	47	25
	T	32	23	31	30
	R	42	40	45	34

Intersection:		Riverside Ave at Charles Street			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	LR	137	44	140	42
Northbound	LT	37	19	78	49
Southbound	TR	183	51	106	14

Intersection:		Route 33 (Saugatuck Ave.) at Riverside Ave. and Treadwell Ave.			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	LTR	87	132	119	415
Westbound	LT	74	147	63	515
	R	61	111	78	161
Northbound	LTR	203	427	370	552
Southbound	L	94	96	102	34
	TR	144	147	150	109

Intersection:		Riverside Ave. at Route 136 (Bridge Street)			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	LTR	3	3	36	36
Westbound	LT	952	-	188	-
	R	74	-	73	-
Northbound	LT	18	-	47	72
	R	126	-	148	-
Southbound	L	68	-	123	-
	TR	48	17	434	7

Intersection:		Route 136 (Compo Road S.) at Route 136 (Bridge Street) and Greens Farms Road			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	L	41	-	60	-
	TR	42	2	88	4
Westbound	LTR	212	350	98	82
Northbound	L	71	1	79	1
	TR	64	194	88	77
Southbound	L	23	89	29	98
	TR	75	39	78	51

Intersection:		Route 33 (Wilton Road to Riverside Ave.) at Route 1 (Post Road)			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	L	58	442	213	495
	TR	141	541	297	559
Westbound	L	482	603	217	581
	TR	571	546	496	544
Northbound	LTR	188	2644	509	2742
Southbound	LTR	679	961	677	736

Intersection:		Route 1 (Post Road) at Jesup Road and Parker Harding Plaza			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	L	31	24	35	23
	TR	131	138	411	204
Westbound	LTR	204	210	205	210
Northbound	LTR	87	273	59	265
Southbound	LT	58	123	32	125
	R	86	117	52	112

Intersection:		Route 1 (Post Road to State Street) at Main Street and Taylor Pl.			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	L	23	22	30	17
	T	37	66	107	102
Westbound	T	78	78	76	83
	R	11	80	18	6
Northbound	LTR	25	30	36	42

Intersection:		Route 1 (State Street) at Myrtle Ave. and Imperial Ave.			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	LTR	68	69	114	149
Westbound	LT	575	611	99	571
	TR	583	614	104	572
Northbound	LTR	65	135	79	156
Southbound	LTR	152	305	134	301

Intersection:		Route 1 (State Street) at Shopping Plaza and Gas Station			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	LTR	65	44	90	109
Westbound	LTR	443	467	83	415
Northbound	LTR	29	35	14	13
Southbound	LTR	40	50	58	129

Intersection:		Route 1 (State Street) at Route 136 (Compo Road N. to Compo Road S.)			
		AM		PM	
		Existing	Detour	Existing	Detour
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	L	37	62	77	124
	TR	117	119	191	274
Westbound	L	123	40	64	80
	TR	566	649	151	460
Northbound	L	72	144	89	144
	TR	97	3131	176	2156
Southbound	L	156	165	82	147
	TR	288	692	107	412

Existing Condition vs. Proposed Improvements at the Riverside Avenue and Route 136 (Bridge Street) Intersection

As noted in the previous tables for the intersection of Riverside Avenue at Route 136 (Bridge Street), the LOS level for the existing condition an "E" for the overall intersection during the AM peak hour. As part of the Rehabilitation Study and this traffic analysis, it was requested that methods of improvement be looked into for the possibility of raising the intersection LOS to an acceptable level.

The proposed improvements reviewed include optimization of the traffic signal and increasing the length of the existing Route 136 (Bridge Street) westbound right turn storage lane. Two different traffic models were created to review the effect these changes would have at the intersection; the difference between the two being the length of the right turn storage lane. Option 1 proposes a 105-foot storage lane, which ultimately results in the lane running from the intersection to just before the bridge. Option 2 was analyzed for the sole purpose in the event a full bridge replacement was decided upon, and proposes a 500-foot storage lane; reviewing the need for whether or not 2 westbound travel lanes would be required across the new bridge.

The proposed signal improvements are consistent for the two proposed AM traffic models and the two proposed PM traffic models. Because the optimization of the intersection would modify the flow of traffic leading towards the other nearby intersections: Riverside Ave. at Charles St., and Riverside Ave. at Treadwell Ave., these intersections were also optimized to reduce the resultant queue length from the smoother traffic flow.

During the AM peak hour, the majority of traffic approaching the intersection comes from Bridge Street. As noted in Figures 3 and 4, the LOS for the left and thru (LT as shown in the tables) movement from Route 136 (Bridge Street) is an "F". Therefore, green time was added to the Route 136 (Bridge Street) phase, and consequently, green time was taken away from the Riverside Avenue approaches.

During the PM peak hour, the majority of traffic approaching the intersection comes from the Route 136 (Bridge Street) LT movement and the southbound Riverside Avenue LT movement, the latter being slightly greater of the two. The resultant optimization therefore allowed for a slight increase in the green time along Riverside Avenue and a slight decrease in the green time for Route 136 (Bridge Street).

Figure 4 shows the comparison tables of the existing condition vs. the two proposed improvements at the Route 136 (Bridge Street) intersection with Riverside Avenue.

Intersection:		Riverside Ave. at Route 136 (Bridge Street) Existing vs. Additional Storage Lane Length and Timing/Phasing Improvements					
		AM			PM		
		Existing (55' Rt. Turn Storage)	105' Rt. Turn Storage Lane	500' Rt. Turn Storage Lane	Existing (55' Rt. Turn Storage)	105' Rt. Turn Storage Lane	500' Rt. Turn Storage Lane
		LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)	LOS (Control Delay)
Eastbound	LTR	A (0.0)	A (0.0)	A (0.0)	B (11.5)	B (11.3)	B (11.3)
Westbound	LT	F (134.2)	D (38.1)	D (38.1)	C (29.5)	D (36.0)	D (36.0)
	R	A (9.7)	A (2.9)	A (1.7)	A (8.0)	A (4.1)	A (4.1)
Northbound	LT	B (19.9)	C (32.6)	C (32.6)	C (21.7)	B (17.8)	B (17.8)
	R	A (6.5)	A (9.2)	A (9.2)	A (7.0)	A (6.3)	A (6.3)
Southbound	L	B (16.0)	C (33.1)	C (33.1)	B (15.4)	B (13.2)	B (13.2)
	TR	B (14.0)	C (27.5)	C (27.5)	A (9.4)	A (7.3)	A (7.3)
Intersection LOS:		E	C	C	B	B	B

Intersection:		Riverside Ave. at Route 136 (Bridge Street) Existing vs. Additional Storage Lane Length and Timing/Phasing Improvements					
		AM			PM		
		Existing (55' Rt. Turn Storage)	105' Rt. Turn Storage Lane	500' Rt. Turn Storage Lane	Existing (55' Rt. Turn Storage)	105' Rt. Turn Storage Lane	500' Rt. Turn Storage Lane
		Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)	Average Queue Length (ft.)
Eastbound	LTR	3	5	6	36	33	29
Westbound	LT	952	256	203	188	110	101
	R	74	106	48	73	69	50
Northbound	LT	18	39	25	47	42	38
	R	126	102	99	148	109	97
Southbound	L	68	94	96	123	116	114
	TR	48	105	100	434	200	142

FIGURE 4

EXECUTIVE SUMMARY

As reflected in the LOS and queue tables in Figure 3, despite improvements to the signal timing and phasing, the proposed detour would result in substantial impacts at the intersections along the studied portion of the Route 1 corridor. The LOS levels show the detour would reduce nearly all intersections within the detour path to a "D" or lower. The queue lengths show that traffic would back up along the entire Route 1 corridor within the detour limits and immediate approaches. This is most evident at the intersections of Route 1 (Post Road) and Route 33 (Riverside Avenue), and Route 1 (State Street) and Route 136 (Compo Road S) where the average queue for the northbound approaches of Routes 33 and 136 are backed up over 2000 feet. It is apparent by this data that the single lane approaches towards Route 1 and not capable of handling the volume demand that the detour would require.

Improvements to make the detour work would, at a minimum, involve providing additional lanes and/or much larger storage and receiving lanes at the Route 33 and 136 northbound approaches towards Route 1. Widening Route 1 to accommodate for the increased volumes would not be a feasible option due to the proximity of buildings and businesses along the corridor. Another option to create additional capacity along Route 1 would be to remove on-street parking in favor of an additional lane; however this is also not recommended due to the negative impacts it would have on the businesses in this area while the detour is in effect. It should be noted that a study of the full extent and impacts of the work required to bring the detour route to an operational level was not made as a part of this analysis, and that the work required may be much more extensive than the options noted here.

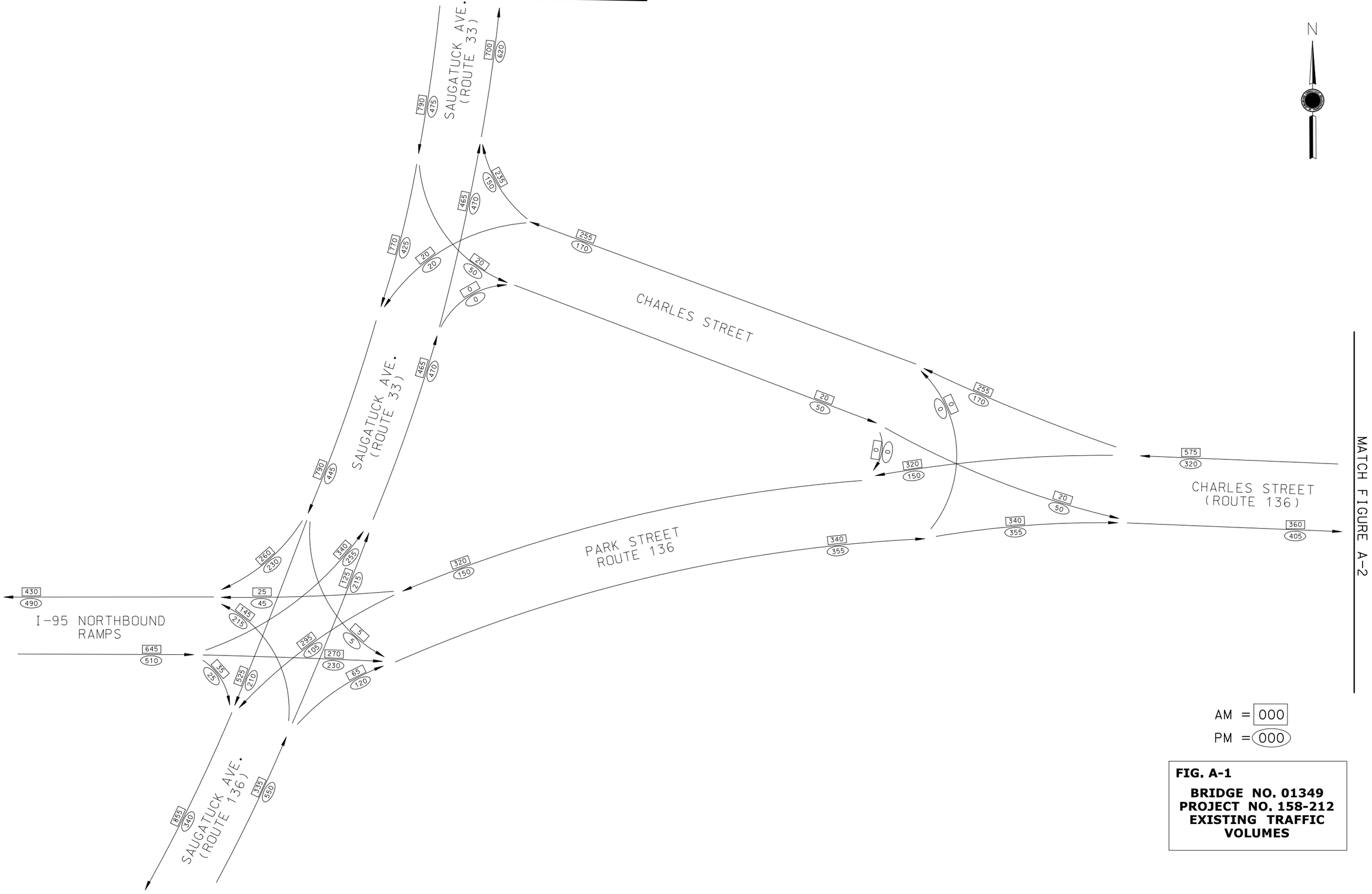
Because of the adverse impacts the redirection of traffic would create along entire proposed detour route, it is recommended that a temporary bridge be constructed to accommodate Route 136 (Bridge Street) traffic while Bridge No. 01349 is closed for construction.

As noted in the comparison tables in Figure 4, the proposed improvements of modifying the existing signal and extending the right turn storage lane along Route 136 (Bridge Street) would bring the intersection to an acceptable operating level of "C" in the AM and maintains a "B" in the PM. In the event that a full structure replacement option is decided upon: by comparing the 105-foot storage lane to the 500-foot storage lane, it is noted that the 500-foot lane results in a minor improvement over 105-foot lane; however, the improvement is not substantial enough to warrant the extra costs that would be required to create an additional lane across the entire length of the bridge. It is therefore recommended that the lengthening of the existing right turn storage lane to 105 feet be considered in the event that improvements to the Riverside Avenue and Route 136 (Bridge Street) intersection are included as part of the bridge project.

APPENDIX G-A

Existing Traffic Volume Diagrams

MATCH FIGURE A-3

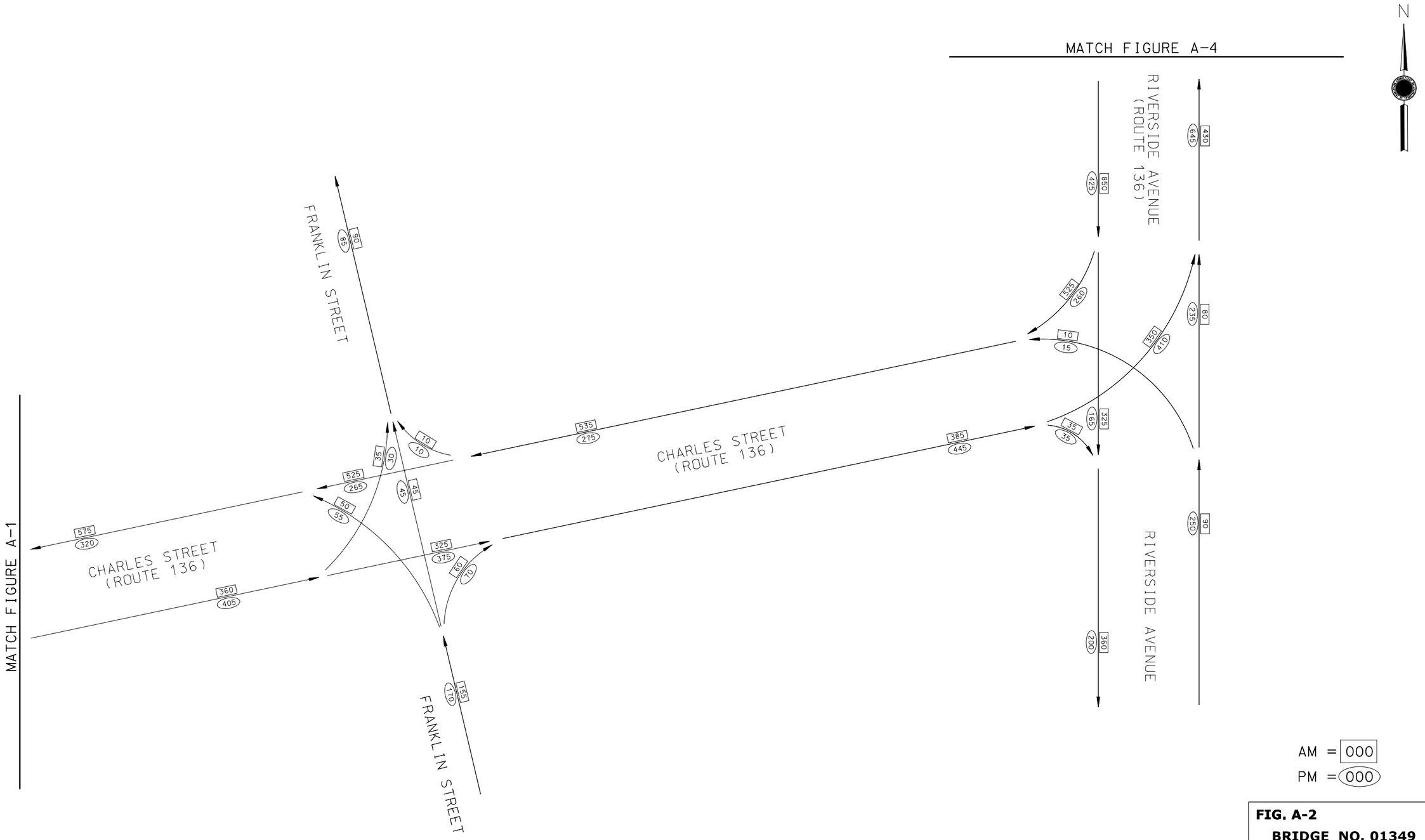


AM = 000

PM = 000

FIG. A-1

BRIDGE NO. 01349
PROJECT NO. 158-212
EXISTING TRAFFIC VOLUMES

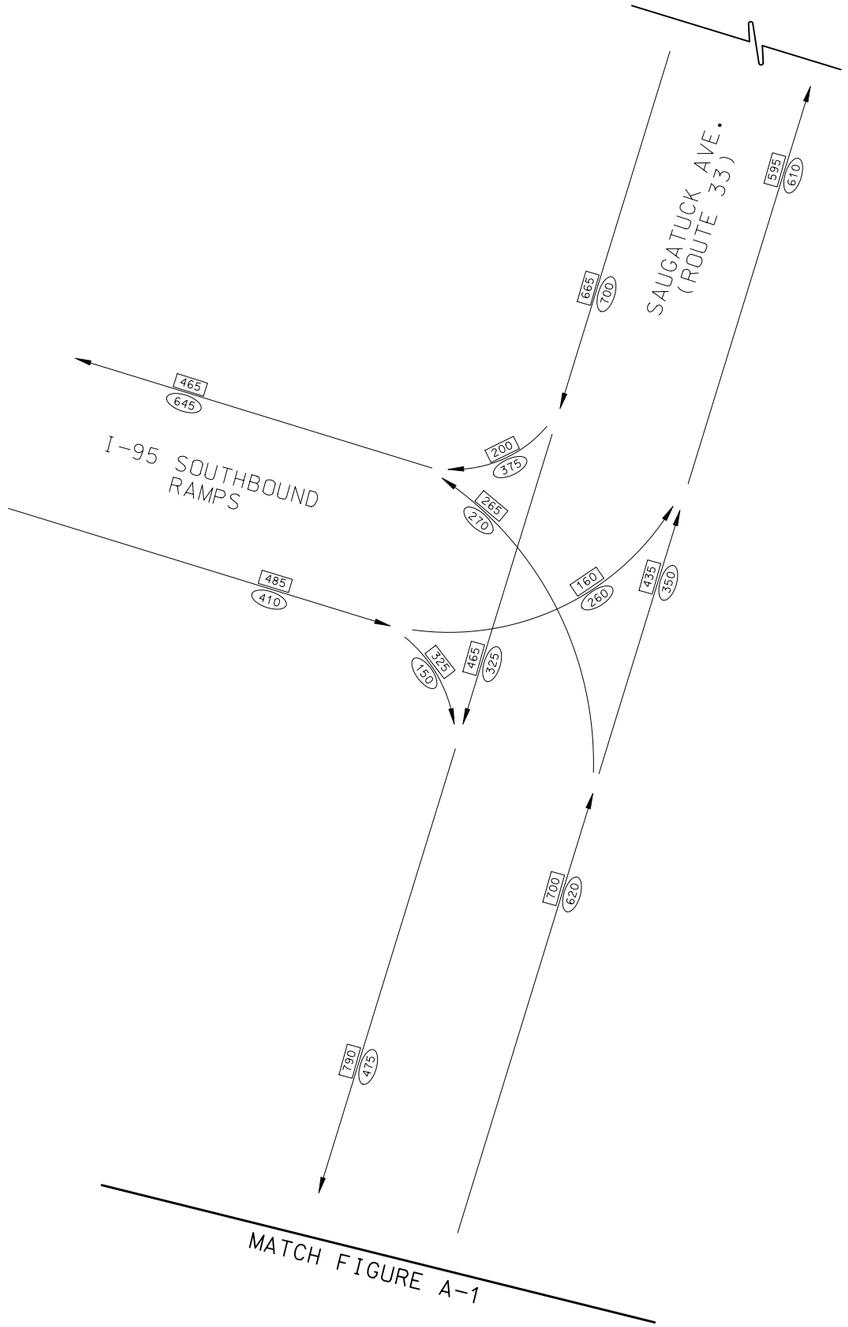


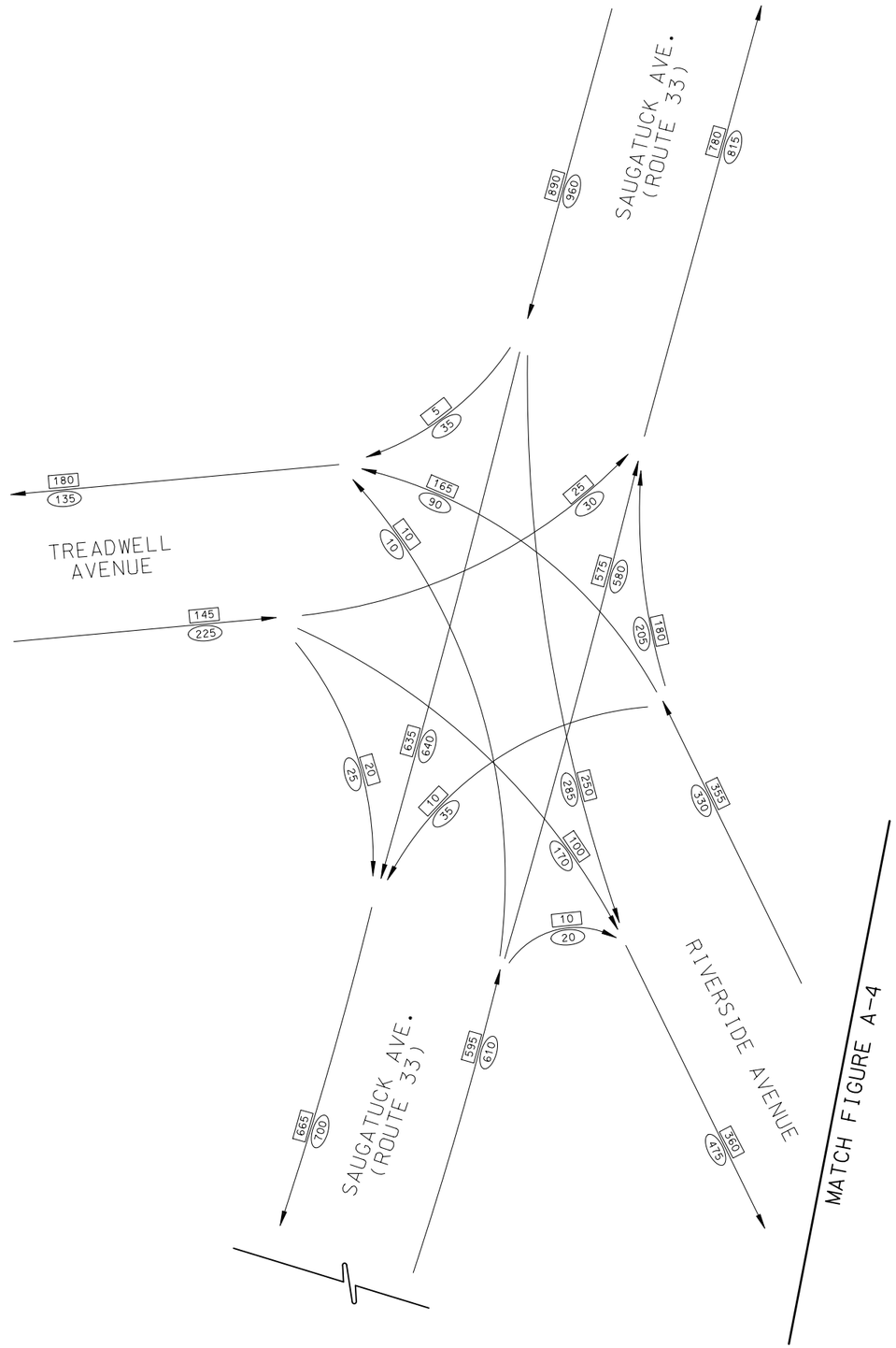
AM = 000

PM = (000)

FIG. A-2

BRIDGE NO. 01349
PROJECT NO. 158-212
EXISTING TRAFFIC VOLUMES





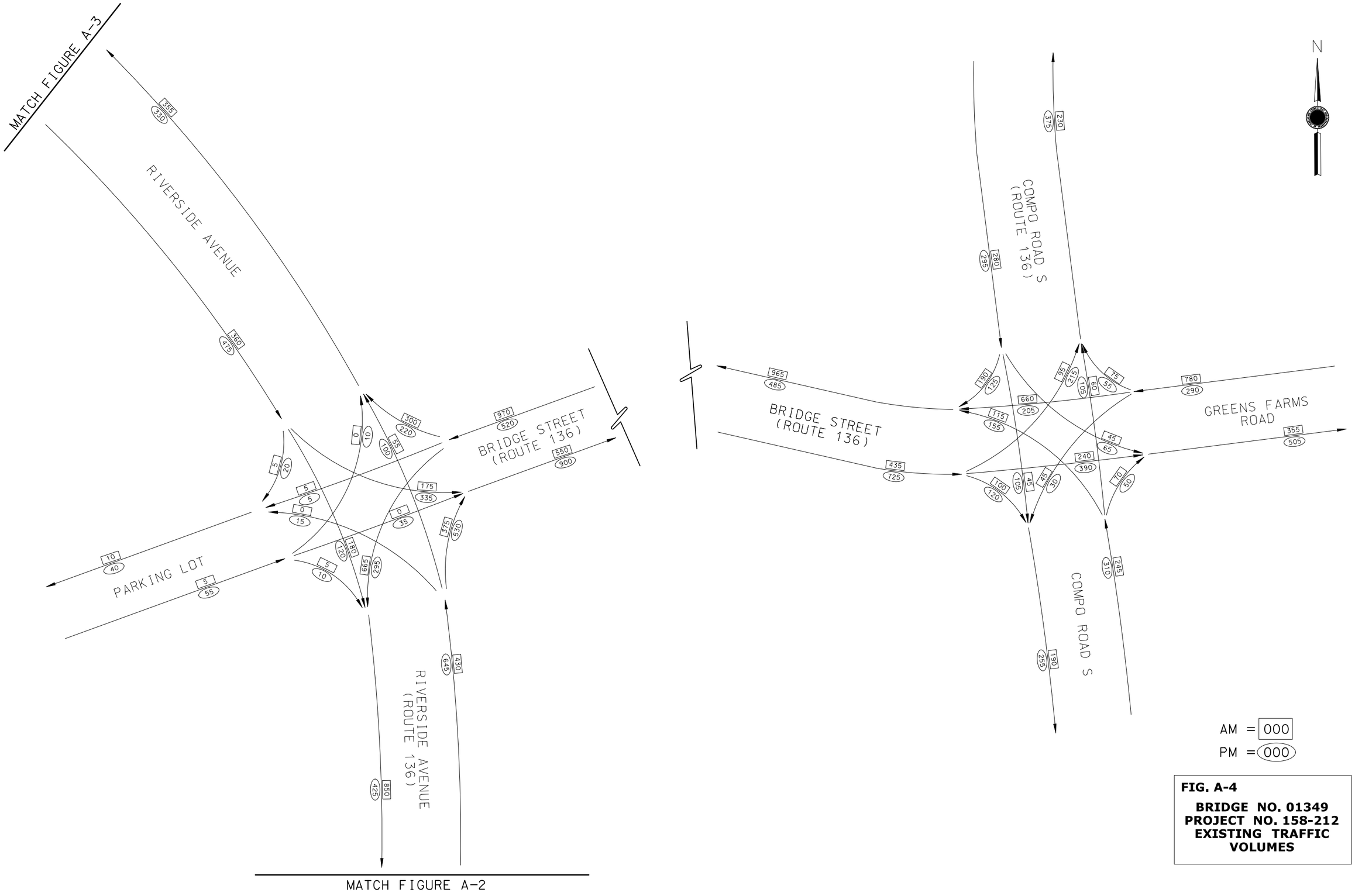


AM = 000

PM = (000)

FIG. A-3

BRIDGE NO. 01349
PROJECT NO. 158-212
EXISTING TRAFFIC VOLUMES

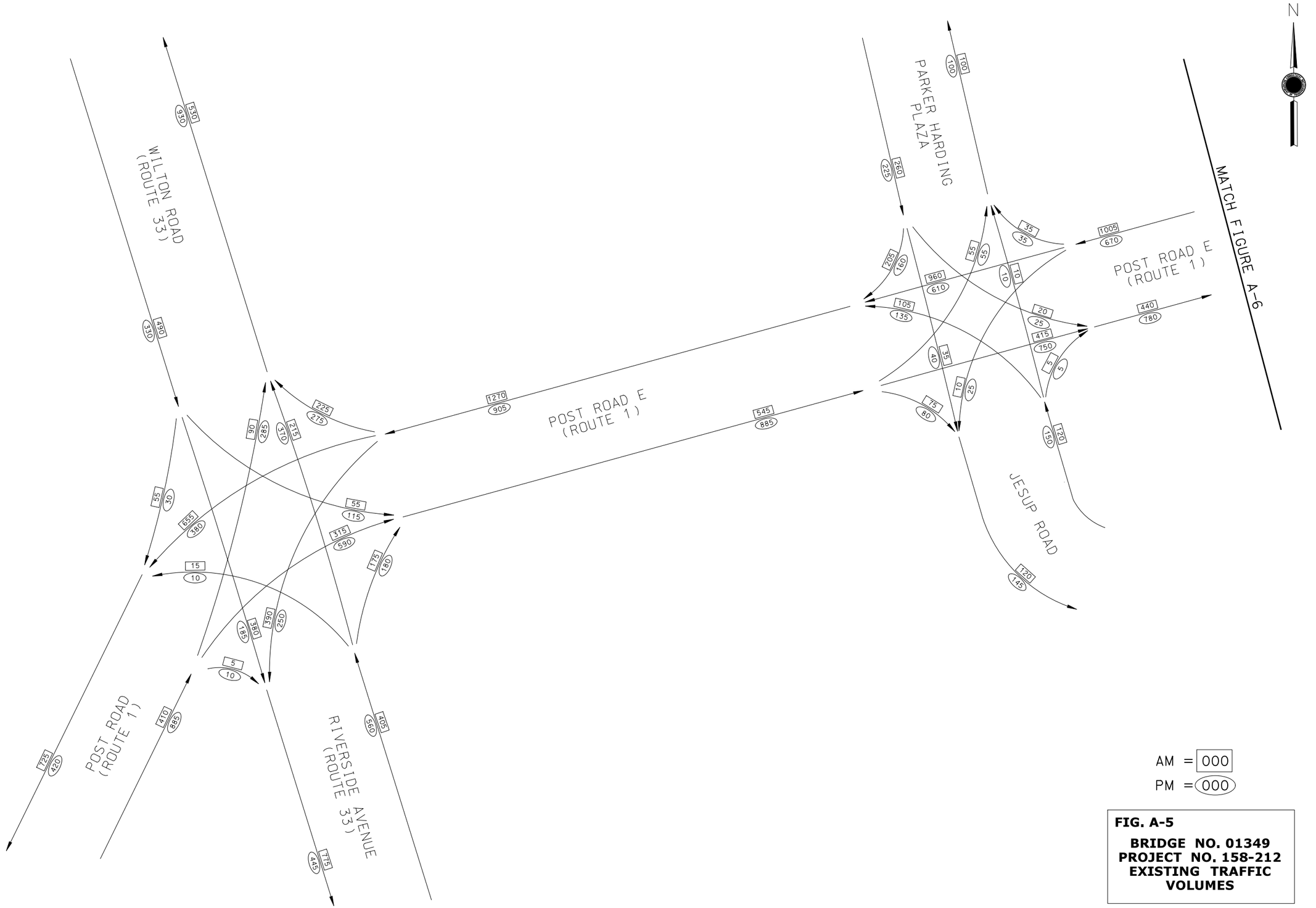


AM = 000

PM = (000)

FIG. A-4

BRIDGE NO. 01349
PROJECT NO. 158-212
EXISTING TRAFFIC VOLUMES

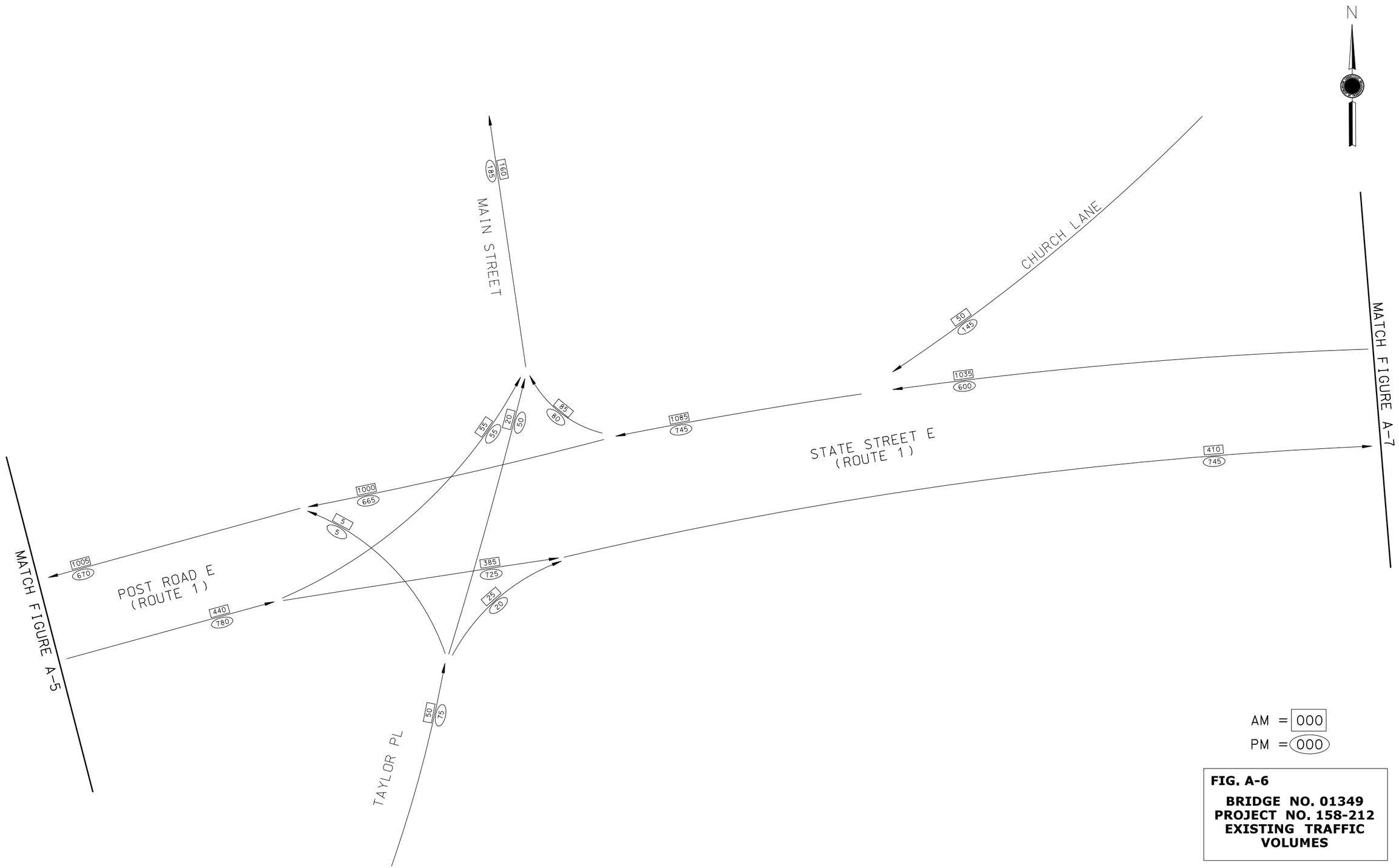


AM = 000

PM = (000)

FIG. A-5

BRIDGE NO. 01349
PROJECT NO. 158-212
EXISTING TRAFFIC VOLUMES



AM = 000

PM = (000)

FIG. A-6

BRIDGE NO. 01349
PROJECT NO. 158-212
EXISTING TRAFFIC VOLUMES

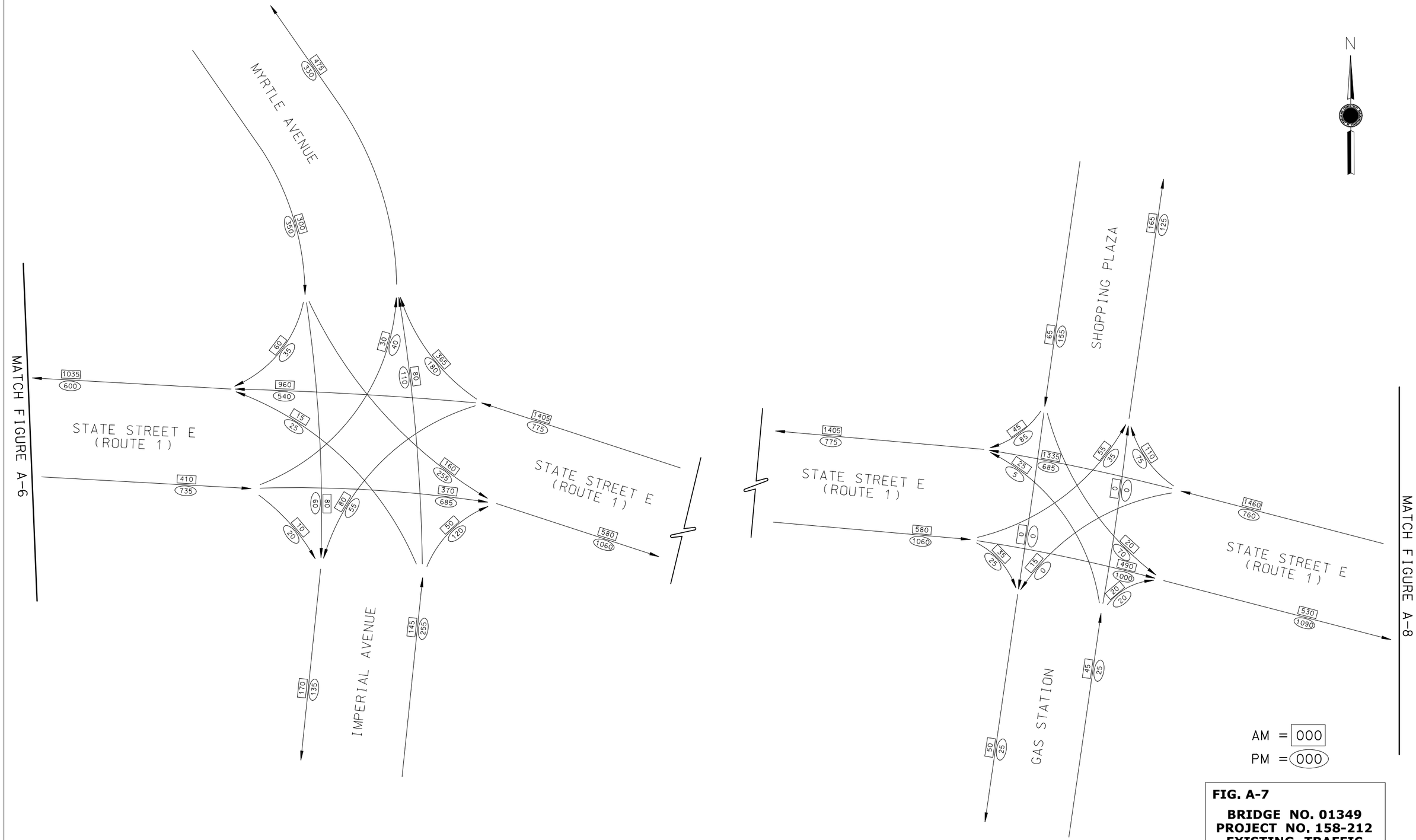
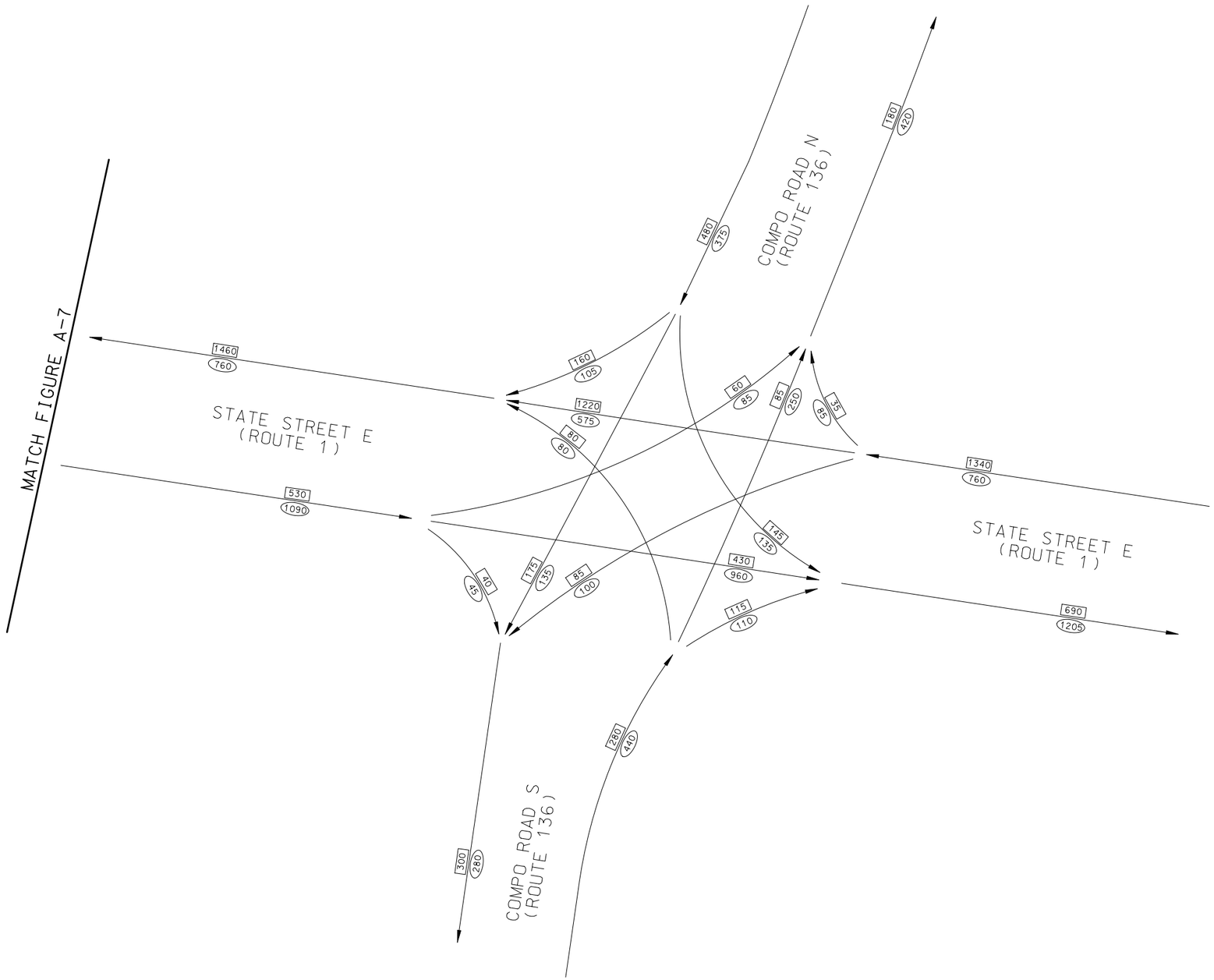


FIG. A-7

BRIDGE NO. 01349
PROJECT NO. 158-212
EXISTING TRAFFIC VOLUMES



AM = 000

PM = (000)

FIG. A-8

BRIDGE NO. 01349
PROJECT NO. 158-212
EXISTING TRAFFIC VOLUMES

APPENDIX G-B

Proposed Detour Traffic Volume Diagrams

MATCH FIGURE B-3

N

SAUGATUCK AVE. (ROUTE 33)

1100 585

790 830

735 810

55 20

1080 535

40 20

20 50

0 0

75 40

CHARLES STREET

20 50

0 0

75 40

MATCH FIGURE B-2

SAUGATUCK AVE. (ROUTE 33)

735 810

1100 555

0 0

10 40

85 80

CHARLES STREET (ROUTE 136)

20 50

PARK STREET ROUTE 136

70 15

70 15

90 65

280 265

560 480

175 330

10 40

430 490

I-95 NORTHBOUND RAMPS

5 10

145 215

5 30

50 5

5 5

645 510

35 25

815 285

15 5

SAUGATUCK AVE. (ROUTE 136)

855 340

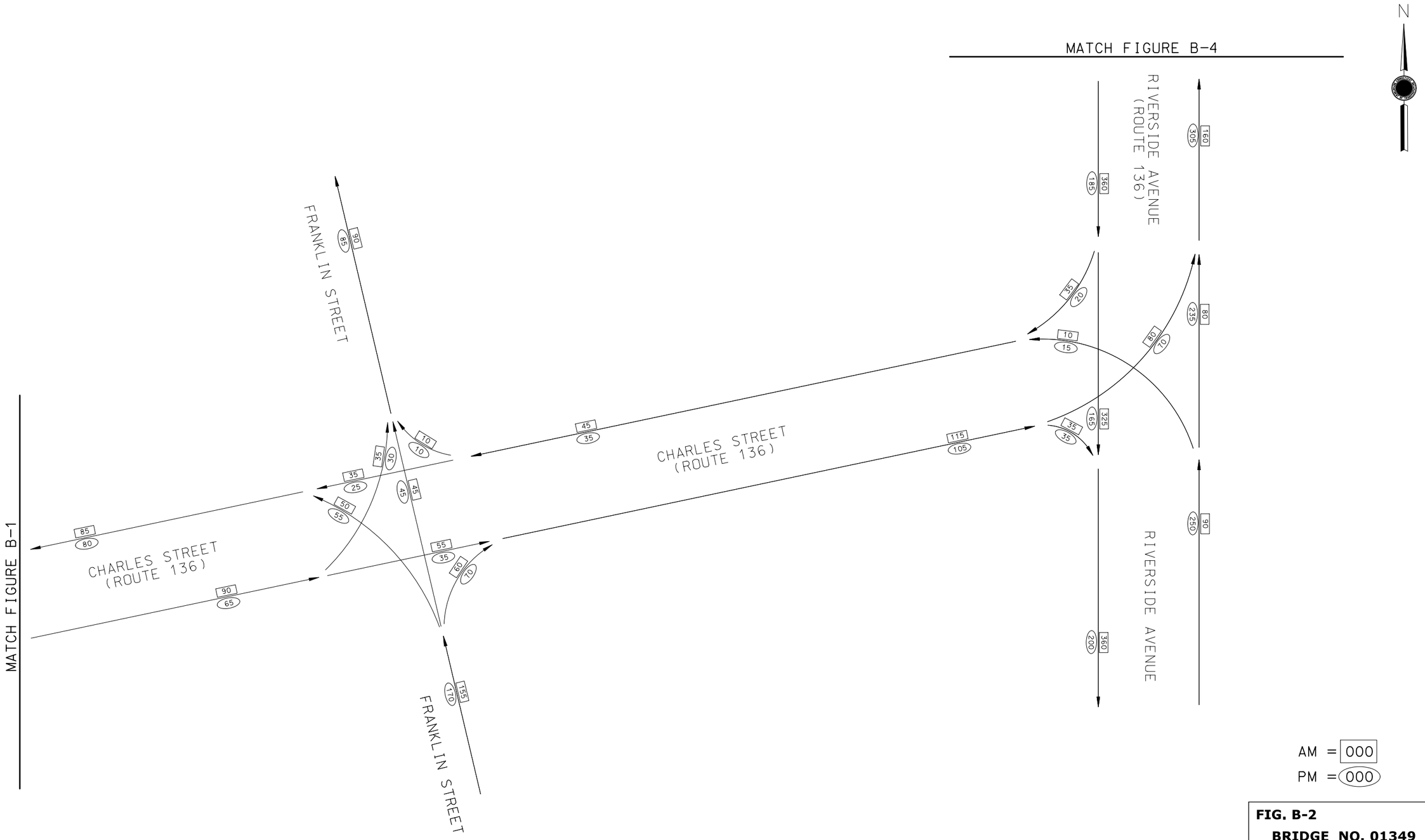
335 350

AM = 000

PM = 000

FIG. B-1

BRIDGE NO. 01349
PROJECT NO. 158-212
PROPOSED DETOUR VOLUMES



AM = 000

PM = 000

FIG. B-2

BRIDGE NO. 01349
PROJECT NO. 158-212
PROPOSED DETOUR VOLUMES

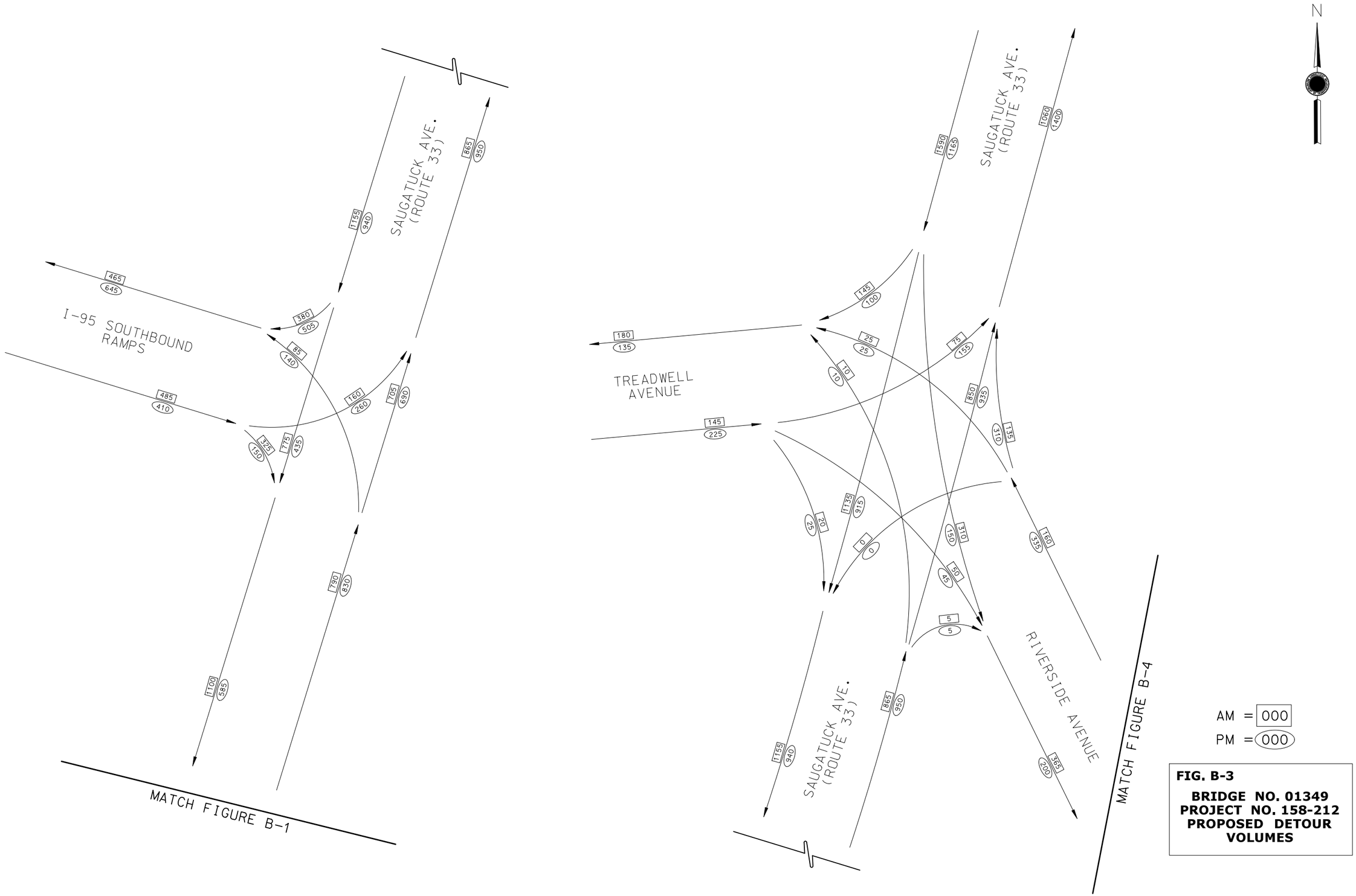


FIG. B-3

BRIDGE NO. 01349
PROJECT NO. 158-212
PROPOSED DETOUR VOLUMES

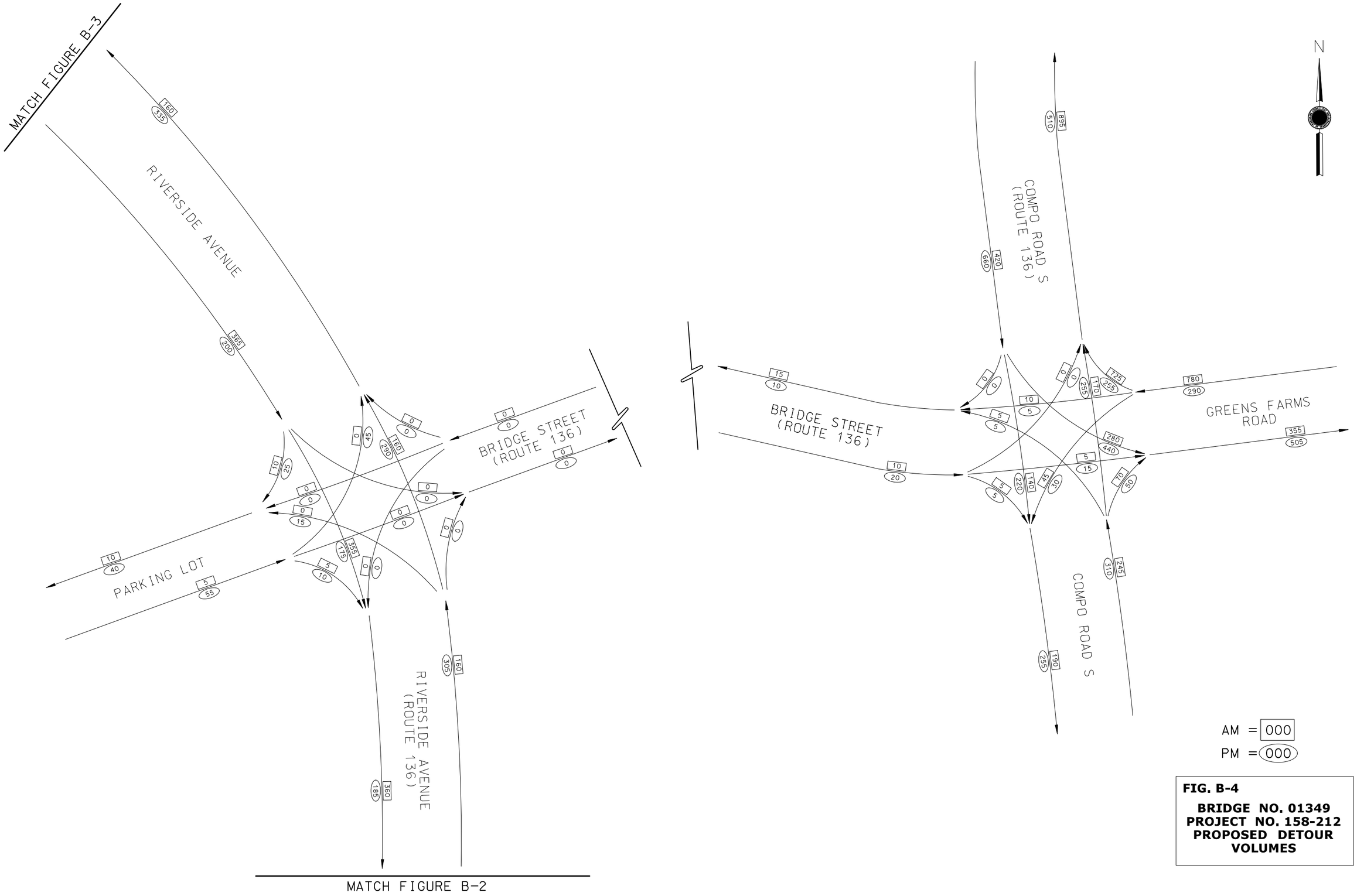


FIG. B-4

BRIDGE NO. 01349
PROJECT NO. 158-212
PROPOSED DETOUR
VOLUMES

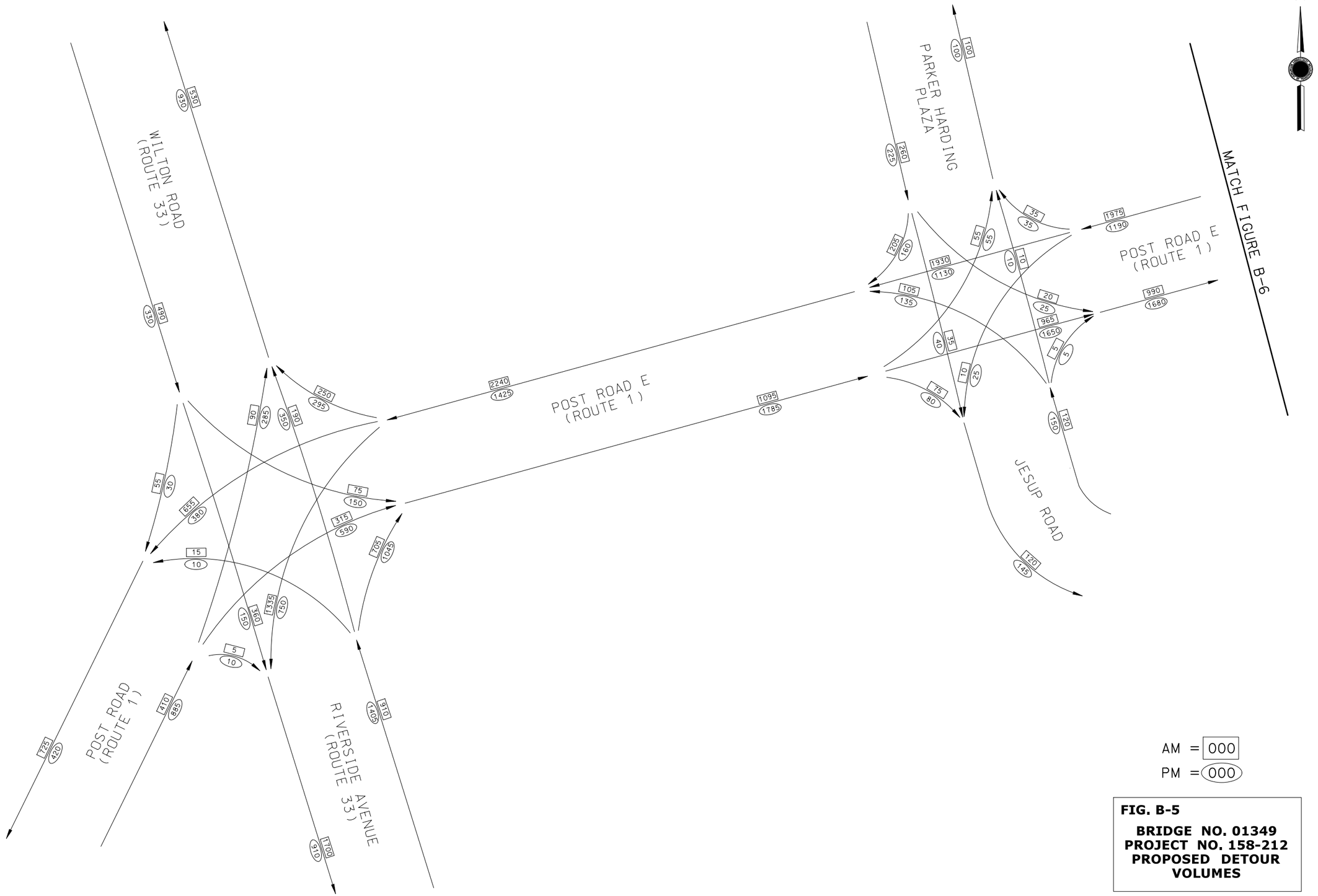
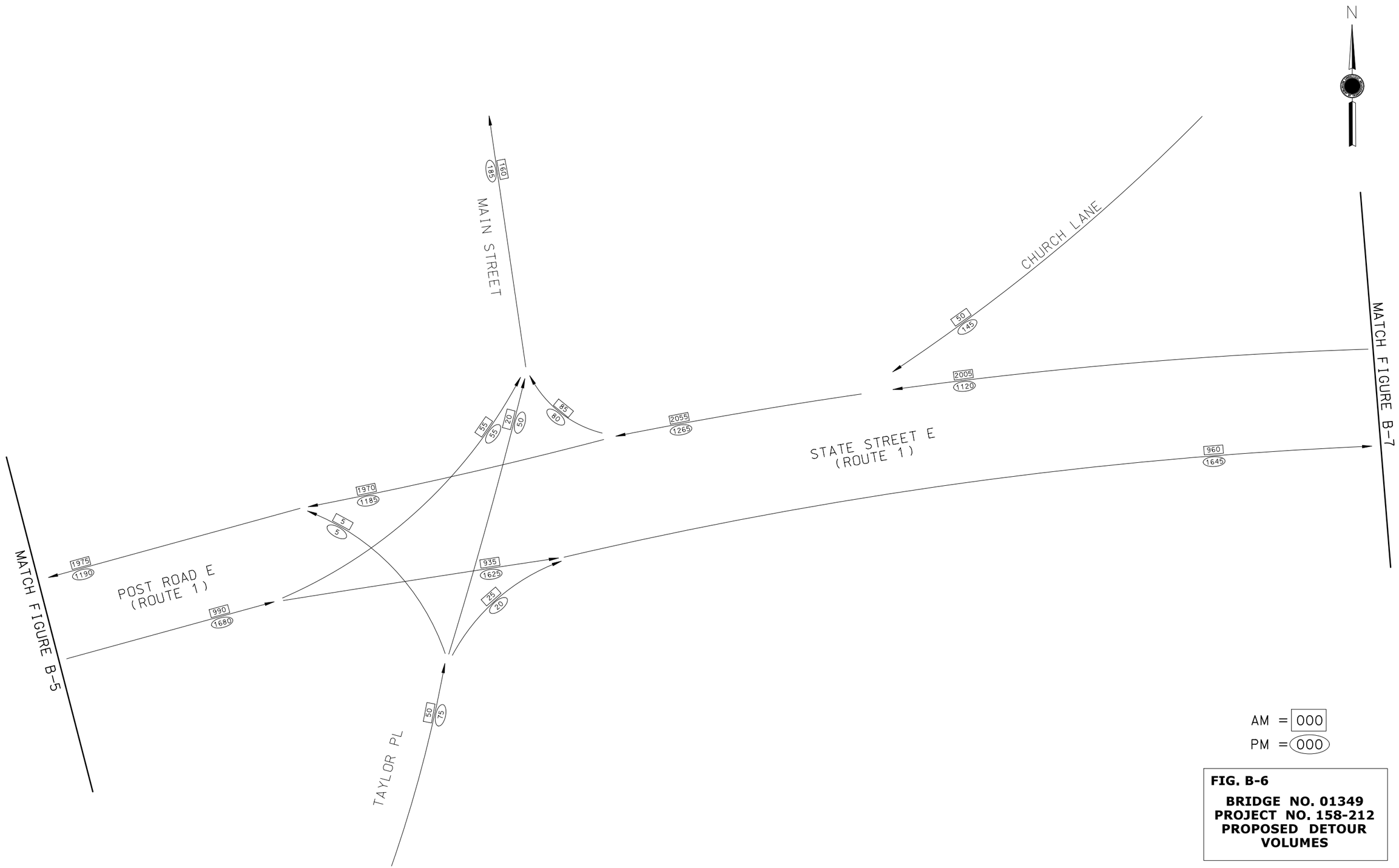


FIG. B-5

BRIDGE NO. 01349
PROJECT NO. 158-212
PROPOSED DETOUR VOLUMES



AM = 000

PM = (000)

FIG. B-6

BRIDGE NO. 01349
PROJECT NO. 158-212
PROPOSED DETOUR VOLUMES

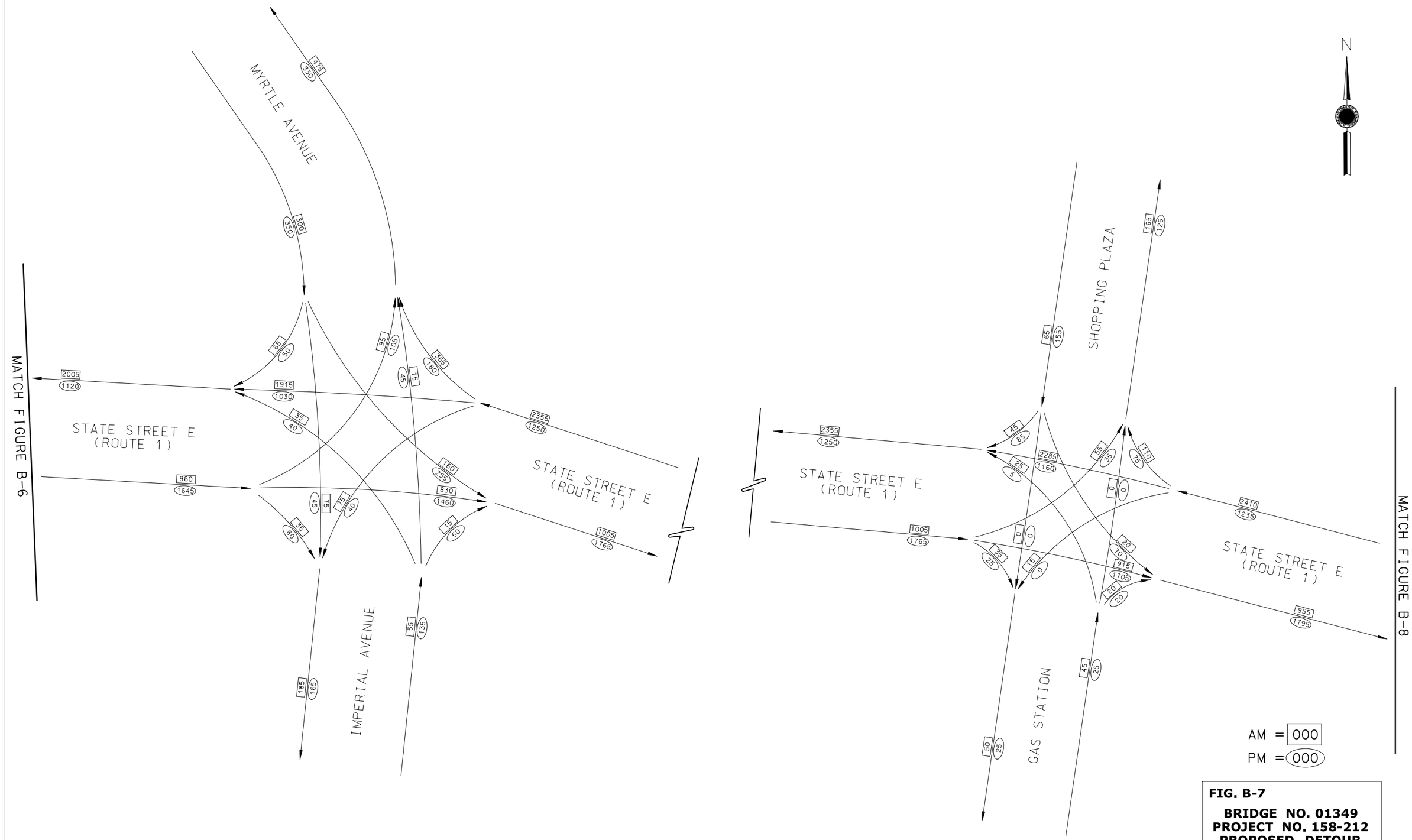
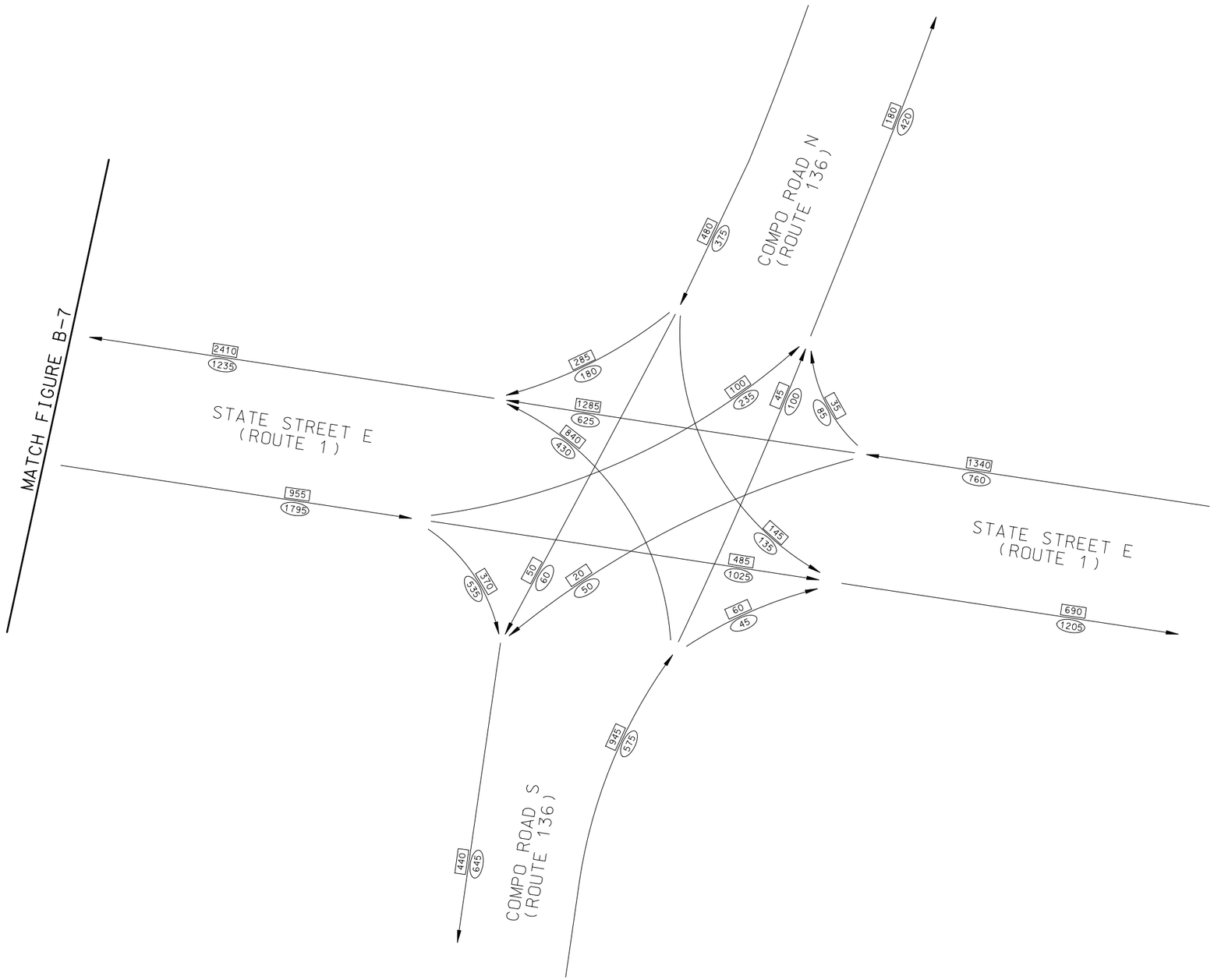


FIG. B-7

BRIDGE NO. 01349
PROJECT NO. 158-212
PROPOSED DETOUR VOLUMES



AM = 000

PM = (000)

FIG. B-8

BRIDGE NO. 01349
PROJECT NO. 158-212
PROPOSED DETOUR VOLUMES

APPENDIX G-C

List of Traffic Volume Assumptions

GENERAL:

The following assumptions were made for all traffic simulation models:

- Volumes shown in the diagrams are based upon +/- 10% of the calculated Design Flow Rate and have been rounded to the nearest multiple of 5
- Turning movements at Route 33, Park St., and Charles St. triangular interchange layout (shown in Figures A-1 and B-1) are based on balancing of the traffic volume counts made at the surrounding intersections
- To balance the traffic volume decrease noted in the traffic counts along Route 1, additional volumes are shown making right turns to account for and simulate vehicles using parking lots or on-street parking between intersections along this corridor
- Incoming traffic from Church Street is determined by balancing the traffic volumes of the nearby intersections
- Traffic entering/exiting Imperial Ave. at Bridge St. is determined by balancing the traffic volumes of the nearby intersections
- Traffic entering/exiting Route 33 between intersections with Route 1 and Treadwell Ave. are assumed based on balancing the traffic model with the counts taken at each respective intersection
- Traffic entering/exiting Route 136 between intersections with Bridge St. and Route 1 are assumed based on balancing the traffic model with the counts taken at each respective intersection
- Traffic entering/exiting Ferry Lane
- Traffic entering/exiting Ketcham St.

PROPOSED DETOUR AM:

- Destination breakdown for the 550 vehicles entering Bridge St. eastbound is as follows:
  - 95 vehicles – final destination is Compo Rd. S. southbound
  - 235 vehicles – final destination is Greens Farms Rd.
  - 95 vehicles will take Compo Rd. S northbound
    - 5 vehicles – final destination is along Compo Rd. S.
    - 35 vehicles – final destination is Compo Rd. N.
    - 55 vehicles – final destination is Route 1 eastbound
  - 125 vehicles will take Imperial Ave.
    - 25 vehicles – final destination is along Imperial Ave.
    - 65 vehicles – final destination is Myrtle Ave.
    - 35 vehicles – take Route 1 eastbound

- Origin breakdown of 175 vehicles entering Bridge St. from Riverside Ave. southbound is as follows:
  - 5 vehicles – from Route 33 northbound, all from I-95 southbound ramps
  - 50 vehicles – from Treadwell Ave.
  - 120 vehicles – from Route 33 southbound
    - 20 vehicles – from Route 33 southbound prior to Route 1
    - 100 vehicles – from various side streets between the intersections of Route 33 with Route 1 and Treadwell Ave.

- Origin breakdown of 375 vehicles entering Bridge St. from Riverside Ave. northbound is as follows:
  - 45 vehicles – from Riverside Ave. northbound
  - 60 vehicles – from Franklin St.
  - 50 vehicles – from Route 33 northbound
  - 220 vehicles – from 1-95 northbound ramps

- Destination breakdown for the 300 vehicles entering Riverside Ave. northbound from Bridge St. is as follows:
  - 10 vehicles – final destination is I-95 southbound ramps
  - 140 vehicles – final destination is Treadwell Ave.
  - 150 vehicles will take Route 33 northbound
    - 25 vehicles – final destination is Route 33 northbound past Route 1
    - 125 vehicles – final destination is various side streets located between the Route 33 intersections with Riverside Ave. and Route 1

- Destination breakdown for the 665 vehicles entering Riverside Ave. southbound from Bridge St. is as follows:
    - 165 vehicles – final destination is Riverside Ave. southbound
    - 10 vehicles – final destination is Franklin Ave.
    - 180 vehicles – final destination is I-95 southbound ramps
    - 20 vehicles – final destination is 1-95 northbound ramps
    - 290 vehicles – final destination is Route 33 southbound

- Origin breakdown of 970 vehicles from Bridge St. westbound is as follows:
    - 20 vehicles – from Imperial Ave.
        - 10 vehicles – Imperial Ave. residences
        - 5 vehicles – from Myrtle Ave.
        - 5 vehicles – from Route 1 westbound
    - 110 vehicles – from Compo Route S. northbound
    - 650 vehicles – from Greens Farms Road
    - 190 vehicles – from Compo Road S. southbound
        - 125 vehicles – from Compo Road N.
        - 65 vehicles – from Route 1 westbound

PROPOSED DETOUR PM:

- Destination breakdown for the 900 vehicles entering Bridge St. eastbound is as follows:
  - 115 vehicles – final destination is Compo Rd. S. southbound
  - 375 vehicles – final destination is Greens Farms Rd.
  - 215 vehicles will take Compo Rd. S northbound
    - 150 vehicles – final destination is Compo Rd. N.
    - 65 vehicles – final destination is Route 1 eastbound
  - 195 vehicles will take Imperial Ave.
    - 60 vehicles – final destination is along Imperial Ave.
    - 65 vehicles – final destination is Myrtle Ave.
    - 70 vehicles – take Route 1 eastbound

- Origin breakdown of 335 vehicles entering Bridge St. from Riverside Ave. southbound is as follows:
  - 15 vehicles – from Route 33 northbound, all from I-95 southbound ramps
  - 125 vehicles – from Treadwell Ave.
  - 195 vehicles – from Route 33 southbound
    - 35 vehicles – from Route 33 southbound prior to Route 1
    - 160 vehicles – from various side streets between the intersections of Route 33 with Route 1 and Treadwell Ave.

- Origin breakdown of 530 vehicles entering Bridge St. from Riverside Ave. northbound is as follows:
  - 120 vehicles – from Riverside Ave. northbound
  - 70 vehicles – from Franklin St.
  - 115 vehicles – from Route 33 northbound
  - 225 vehicles – from 1-95 northbound ramps

- Destination breakdown for the 220 vehicles entering Riverside Ave. northbound from Bridge St. is as follows:
  - 35 vehicles – final destination is I-95 southbound ramps
  - 65 vehicles – final destination is Treadwell Ave.
  - 120 vehicles will take Route 33 northbound
    - 20 vehicles – final destination is Route 33 northbound past Route 1
    - 100 vehicles – final destination is various side streets located between the Route 33 intersections with Riverside Ave. and Route 1

- Destination breakdown for the 295 vehicles entering Riverside Ave. southbound from Bridge St. is as follows:
    - 45 vehicles – final destination is Riverside Ave. southbound
    - 10 vehicles – final destination is Franklin Ave.
    - 130 vehicles – final destination is I-95 southbound ramps
    - 35 vehicles – final destination is 1-95 northbound ramps
    - 75 vehicles – final destination is Route 33 southbound

- Origin breakdown of 520 vehicles from Bridge St. westbound is as follows:
    - 45 vehicles – from Imperial Ave.
        - 15 vehicles – Imperial Ave. residences
        - 15 vehicles – from Myrtle Ave.
        - 15 vehicles – from Route 1 westbound
    - 150 vehicles – from Compo Route S. northbound
    - 200 vehicles – from Greens Farms Road
    - 125 vehicles – from Compo Road S. southbound
        - 75 vehicles – from Compo Road N.
        - 50 vehicles – from Route 1 westbound

APPENDIX H

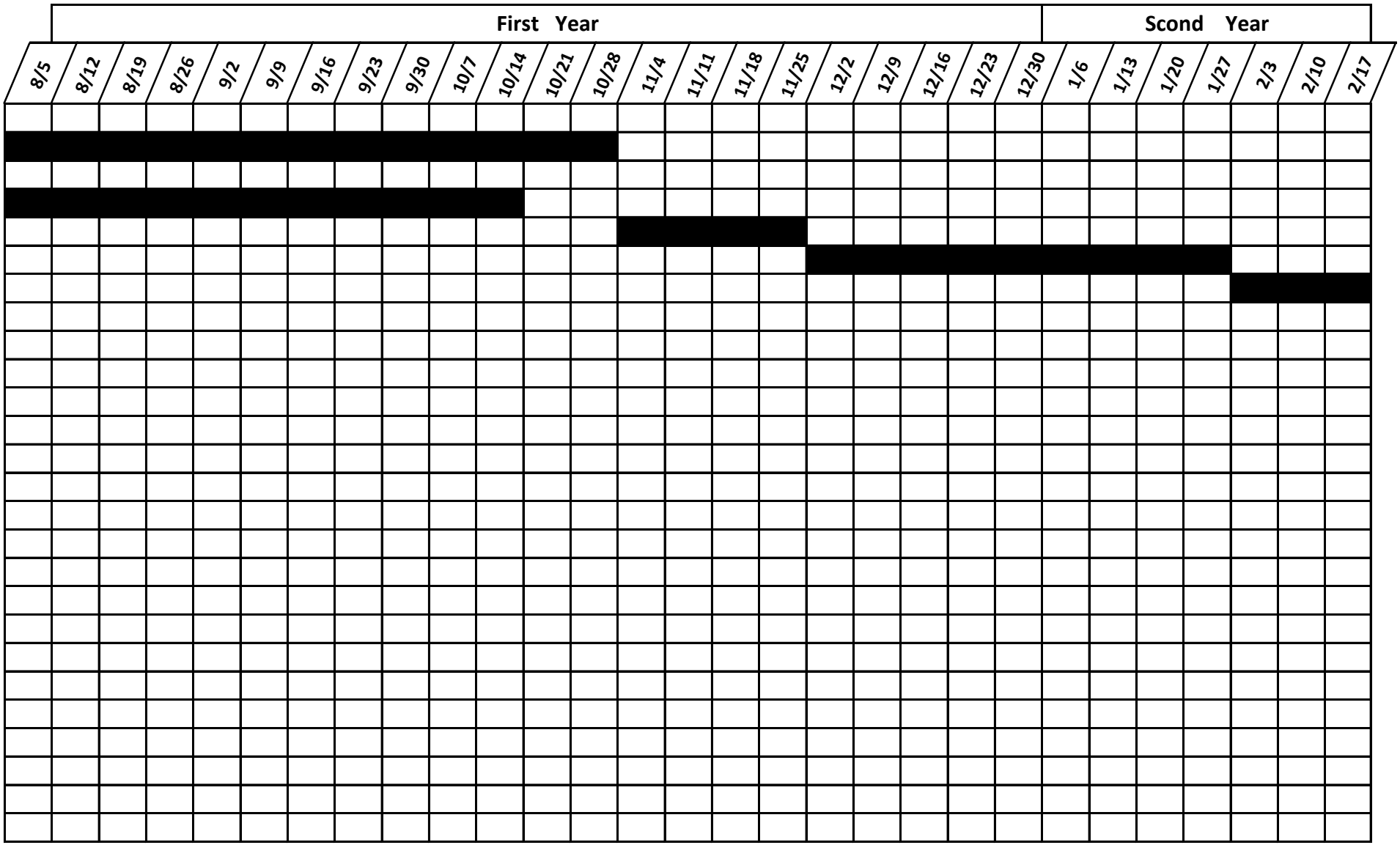
Alternate A: Major Rehabilitation Details

ALTERNATE A- MAJOR REHABILITATION SCHEDULE

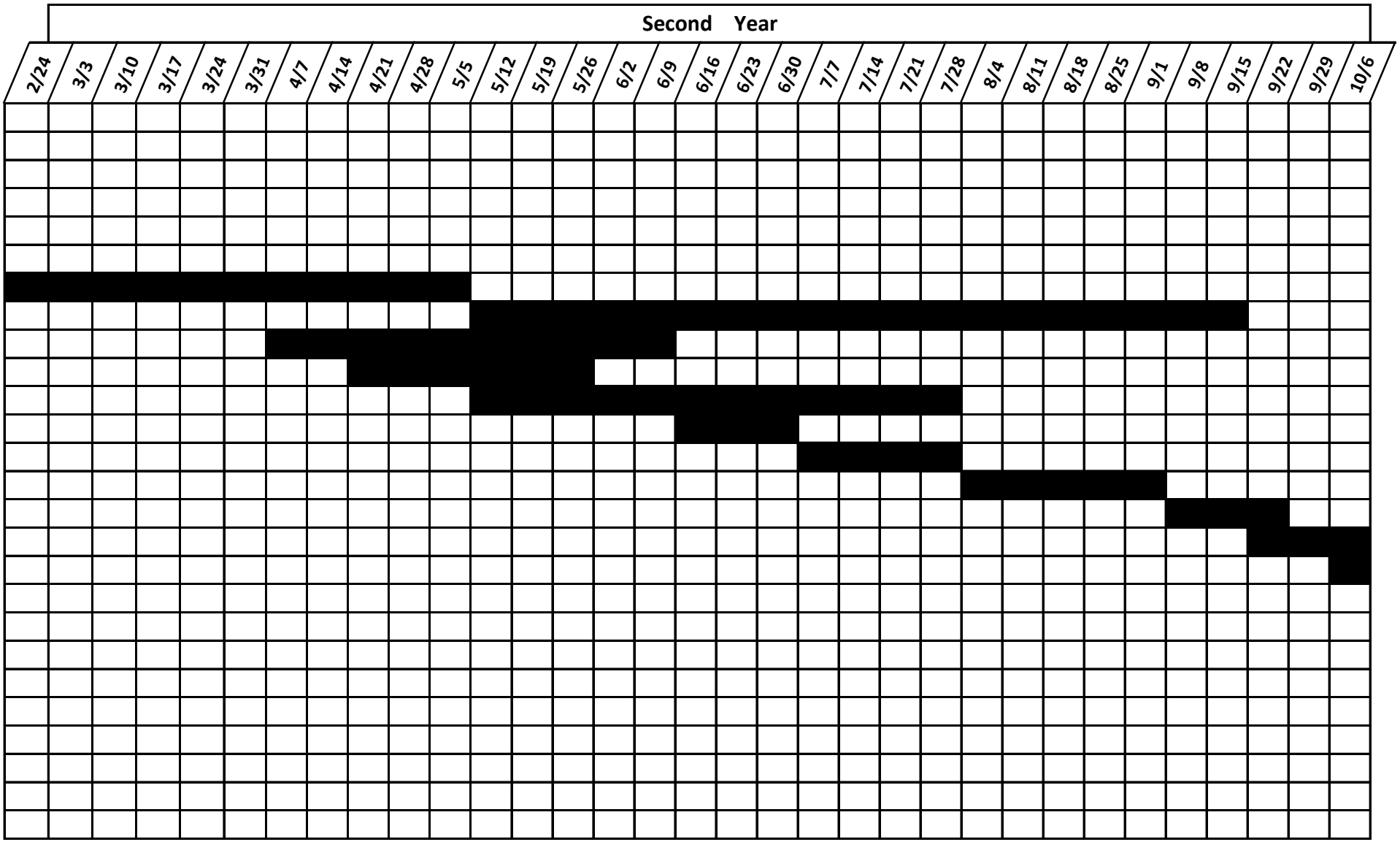
ACTIVITY	First Year																	
	4/1	4/8	4/15	4/22	4/29	5/6	5/13	5/20	5/27	6/3	6/10	6/17	6/24	7/1	7/8	7/15	7/22	7/29
Mobilization	■																	
Construct temporary bridge and roadway		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Substructure patching		■	■	■	■	■	■	■	■	■	■	■	■					
Structural steel repairs														■	■	■	■	■
Remove trusses																		
Inspection of truss damage/drawing development																		
Truss member fabrication																		
Replace/repair and paint trusses																		
Electrical/Mechanical Repairs																		
Remove existing fender systems																		
Install new fender systems																		
Remove deck sections & Pier 2 support system																		
Install new Pier 2 support & replace deck sections																		
Modify truss panel point connections																		
Screw Jack/Limit Switch Modifications																		
Install metal bridge rail support system																		
Install metal bridge rail																		
Install trusses																		
Install barrier gates																		
Removal of bituminous wearing surface																		
Deck Patching																		
Field painting of superstructure																		
Membrane and pave deck																		
Install asphaltic plug joints																		
Remove temporary bridge and roadway																		
Misc. work and clean up																		

Note: shop drawing process and ordering materials may delay construction +/- 2 months. 8 months for construction to be provided.

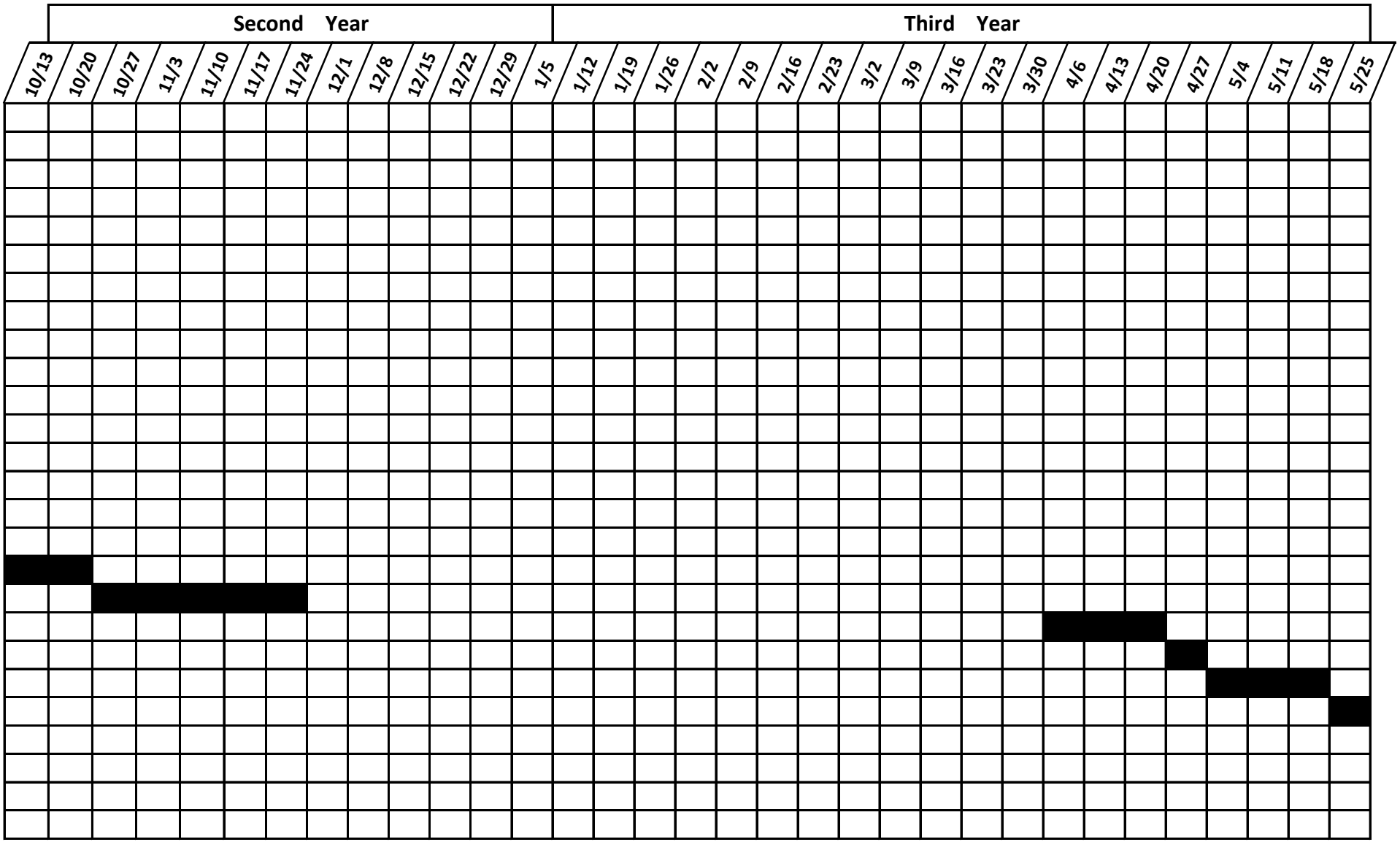
ALTERNATE A- MAJOR REHABILITATION SCHEDULE



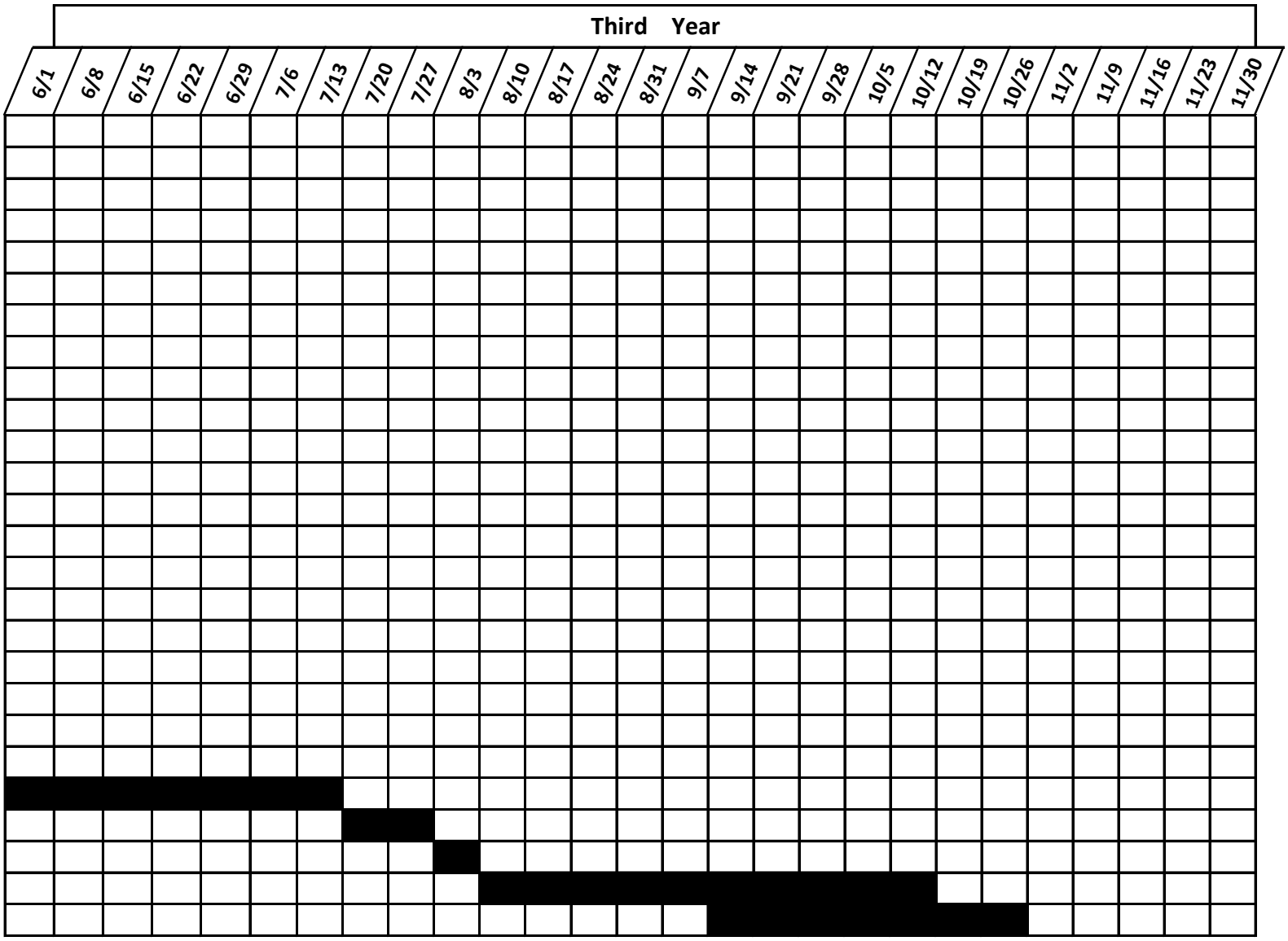
ALTERNATE A- MAJOR REHABILITATION SCHEDULE



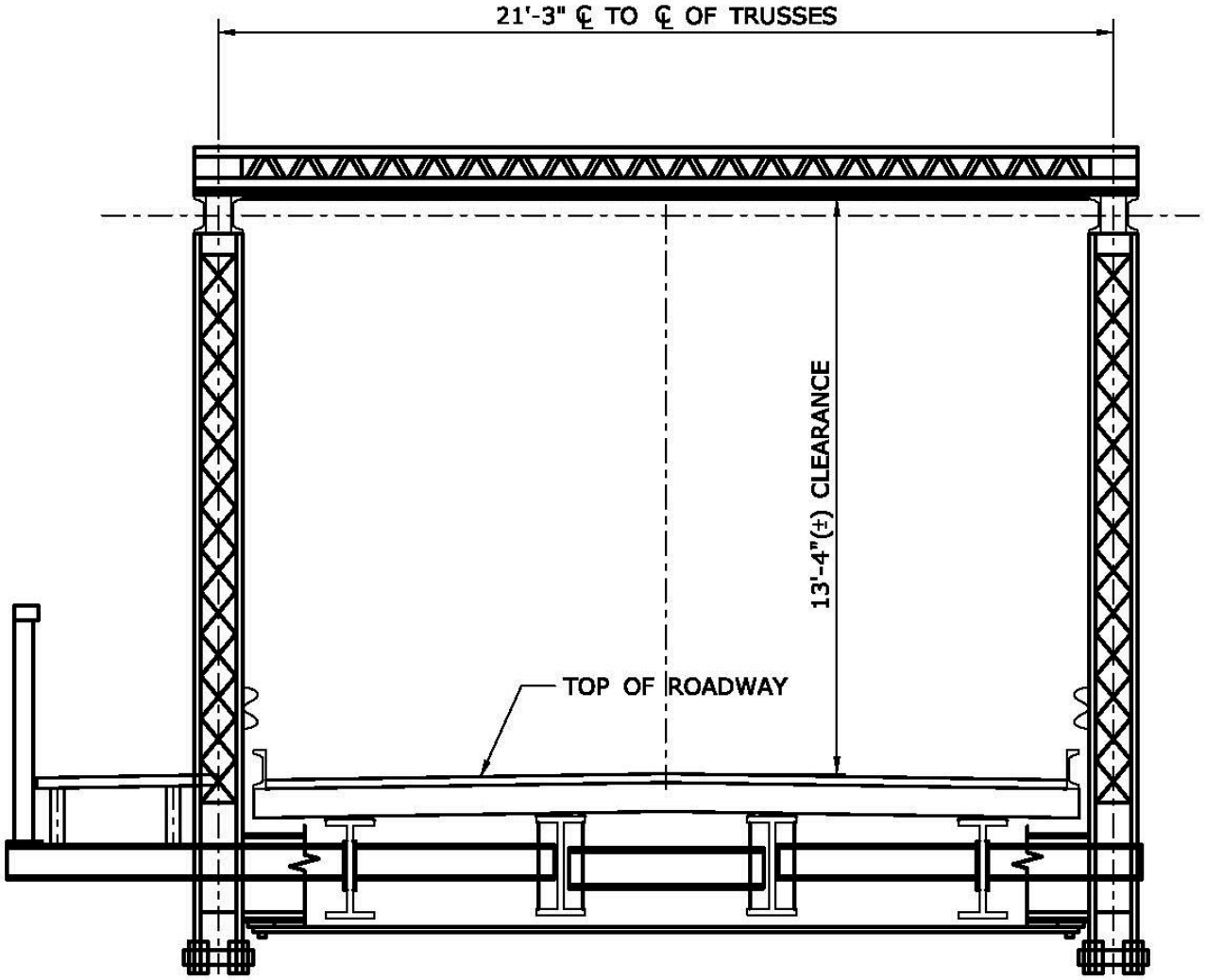
ALTERNATE A- MAJOR REHABILITATION SCHEDULE

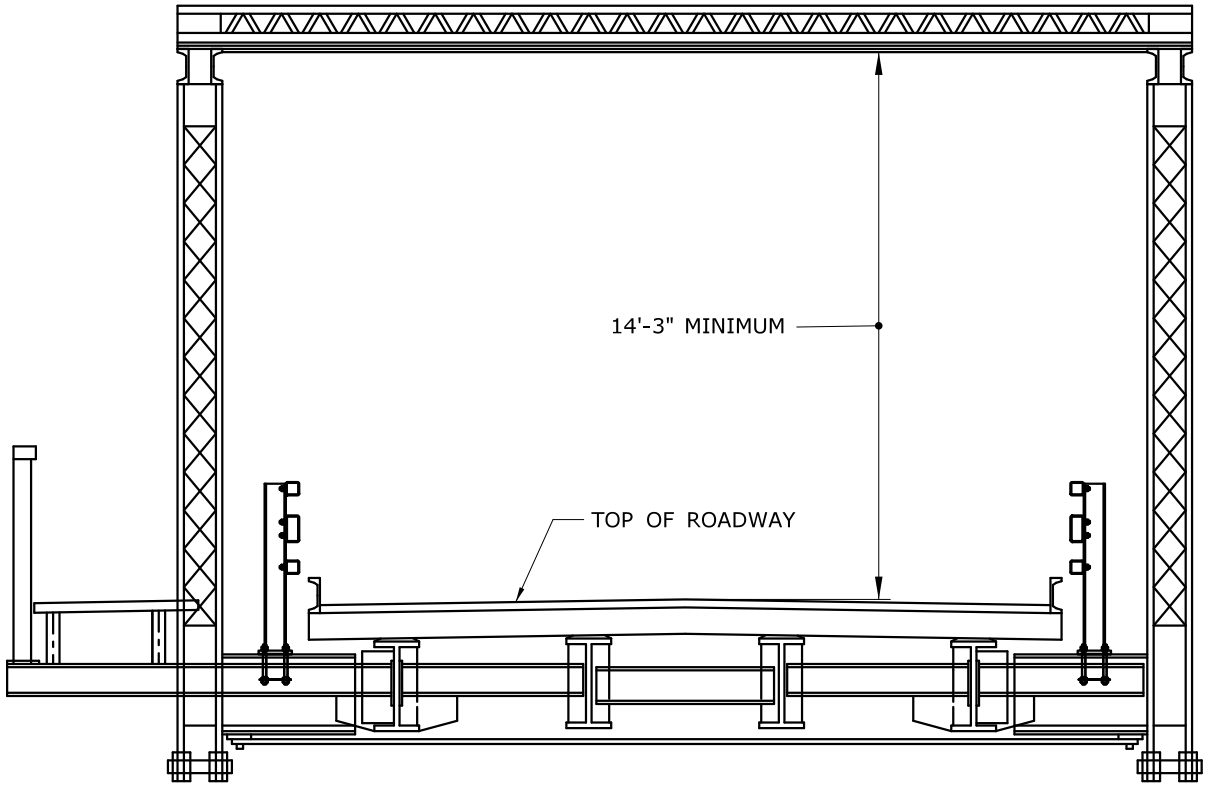


ALTERNATE A- MAJOR REHABILITATION SCHEDULE



Existing Truss Vertical Clearance

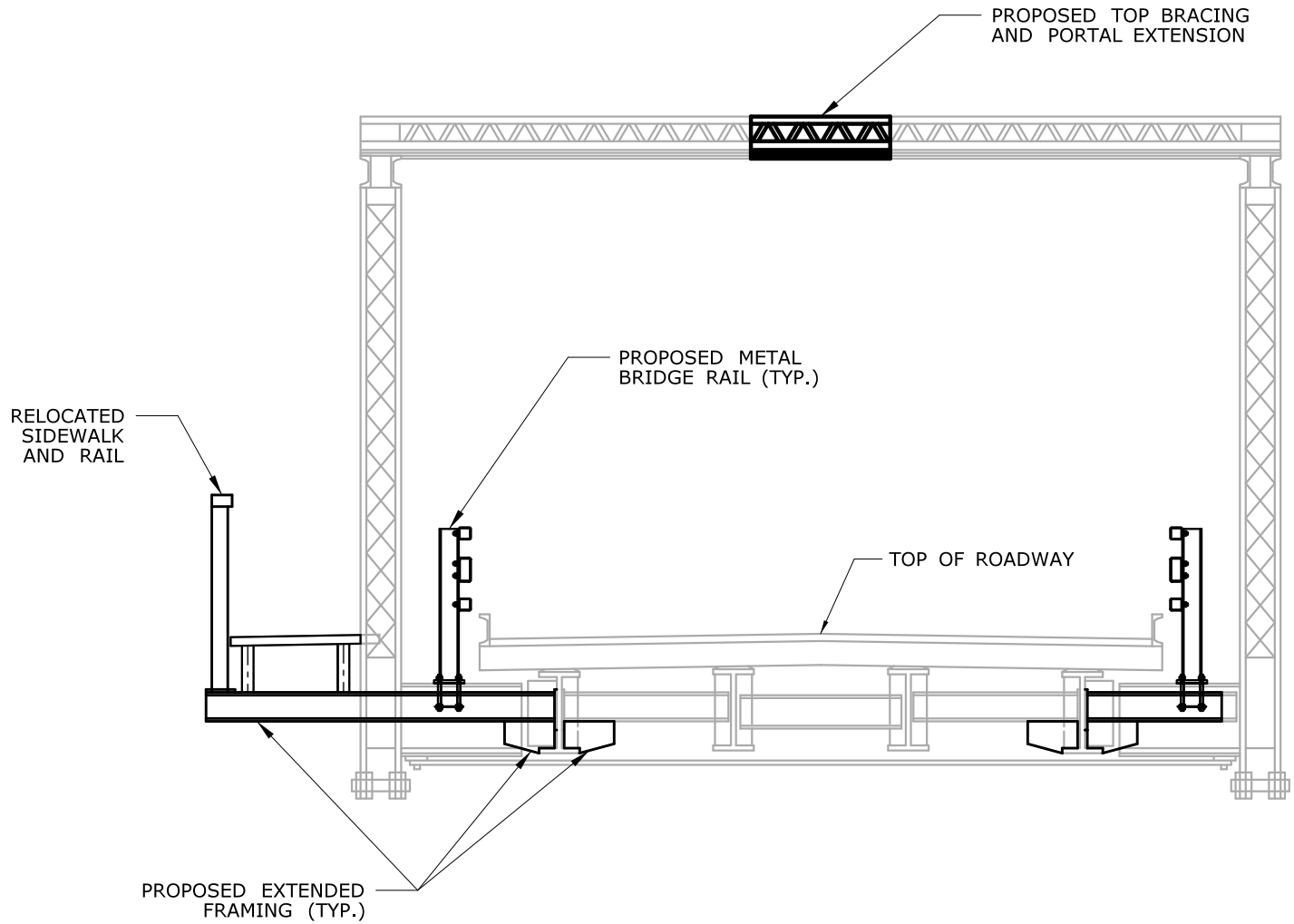




PROPOSED SECTION

SCALE: 1"=40'-0"

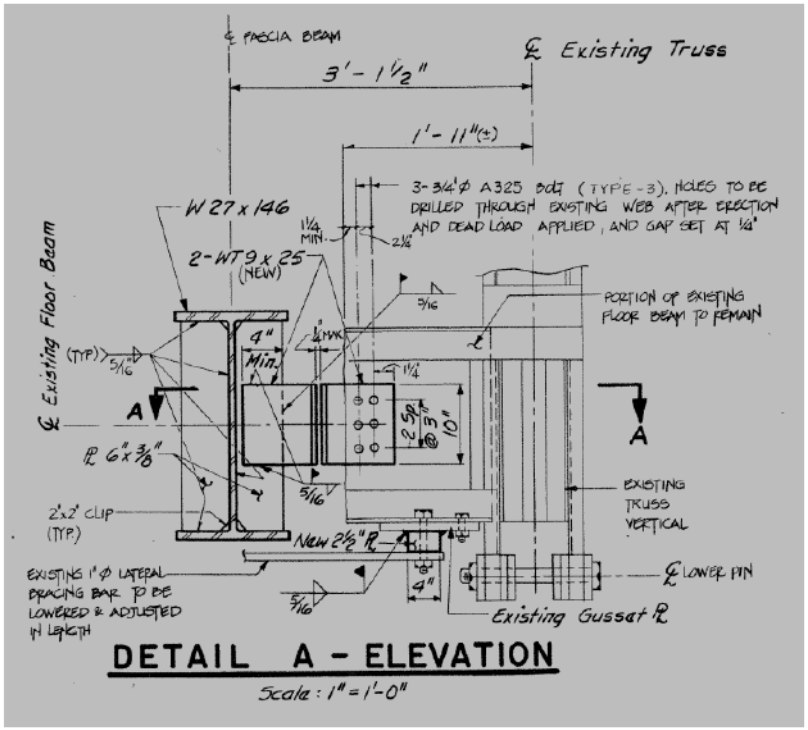
REHABILITATION OF ROUTE 136 OVER SAUGATUCK RIVER	
PROPOSED SECTION - ALTERNATE A	
CITY/TOWN: WESTPORT	BRIDGE NO. 01349
STATE PROJECT NO.: 158-212	DATE: 4/8/2016



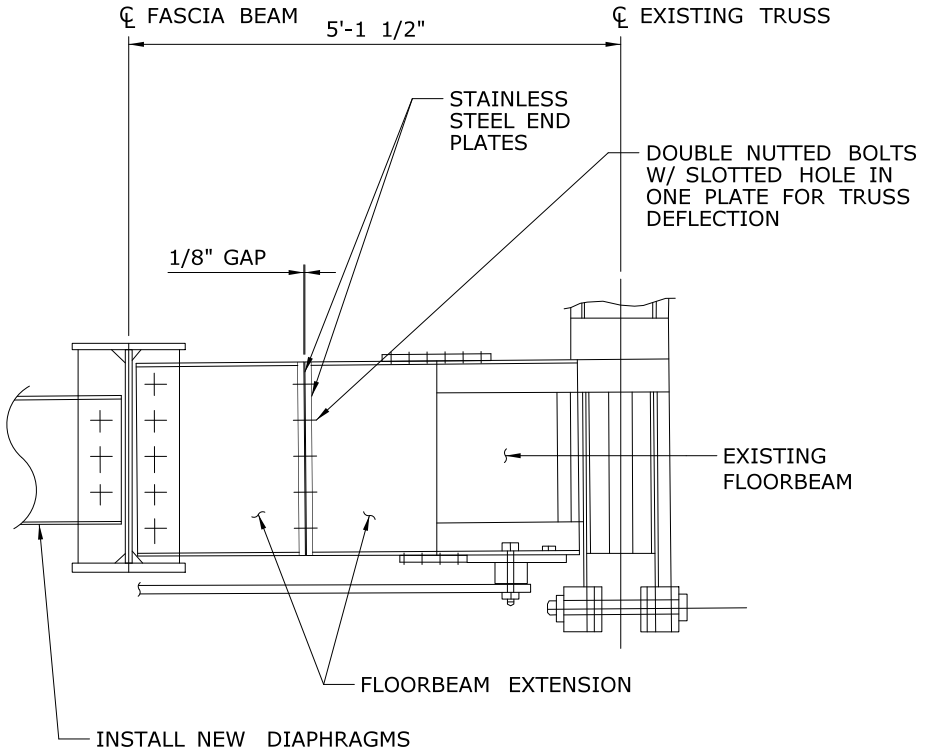
PROPOSED FRAMING AND BRIDGE RAIL

SCALE: 1"=40'-0"

REHABILITATION OF ROUTE 136 OVER SAUGATUCK RIVER	
PROPOSED FRAMING - ALTERNATE A	
CITY/TOWN: WESTPORT	BRIDGE NO. 01349
STATE PROJECT NO.: 158-212	DATE: 12/28/2015

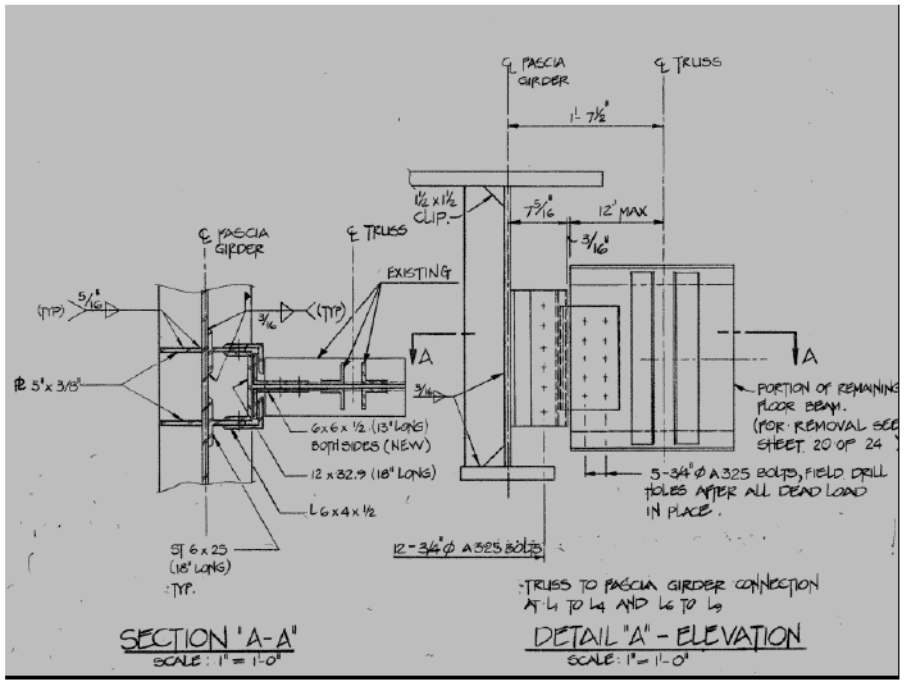


EXISTING ELEVATION

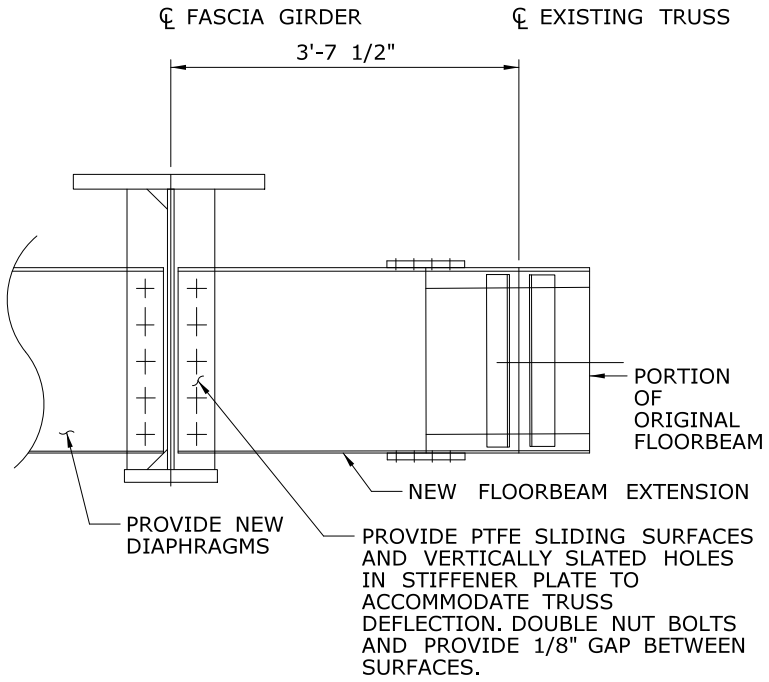


PROPOSED ELEVATION

REHABILITATION OF ROUTE 136 OVER SAUGATUCK RIVER	
FLOORBEAM EXTENSION FIXED SPAN	
CITY/TOWN: WESTPORT	BRIDGE NO. 01349
STATE PROJECT NO.: 158-212	DATE: 3/22/2016



EXISTING SECTION



PROPOSED SECTION

REHABILITATION OF ROUTE 136 OVER SAUGATUCK RIVER

FLOORBEAM EXTENSION SWING SPAN

CITY/TOWN:	BRIDGE NO.
WESTPORT	01349
STATE PROJECT NO.: 158-212	DATE: 3/23/2016

Pier 2 Support System Removal & Replacement
Construction Sequencing

Notes:

1. Construction to be completed during roadway closure.
2. Truss leaves to be removed during crane work from bridge.
3. Crane placement on bridge for fixed span center pile support system removal and installation. Outside piles may be removed and erected from barge mounted cranes or bridge mounted crane (See following Existing Pier 2 Support System).
4. The piles of the swing span side of the support system are assumed to be removed and replaced with a deck mounted or barge mounted crane on the fixed span side, or barge mounted crane; with the swing span open, due to the superstructure configuration (Beam spacing and exodermic deck construction).
5. Due to space restrictions the piles are assumed to be extracted and free driven (no leads).
6. Piles estimated to be HP 14 x 89- 35'long (Pile weight= 3115 lbs).
7. Pile driving hammer estimated to be Vulcan 30 Double Acting steam hammer with rated driving energy of 7260 lbs; hammer weight= 7090 lbs (See following specification sheet).
8. With hook block and ball and rigging (+/- 500 lbs) the system weight 3115 + 7090 + 500 = 10,750 lbs.
9. Crane placement will be at the pier with an operating radius of +/- 15 feet, with outriggers extended (See following crane capacity charts).
10. Crane weights are +/- 28,000 to 41,000 lbs (See following crane capacity charts).
11. Crane weight loaded max. +/- 41,000 + 10,750 = 51,750 lbs. Live load capacity of bridge is in excess of 72,000 lbs at midspan.

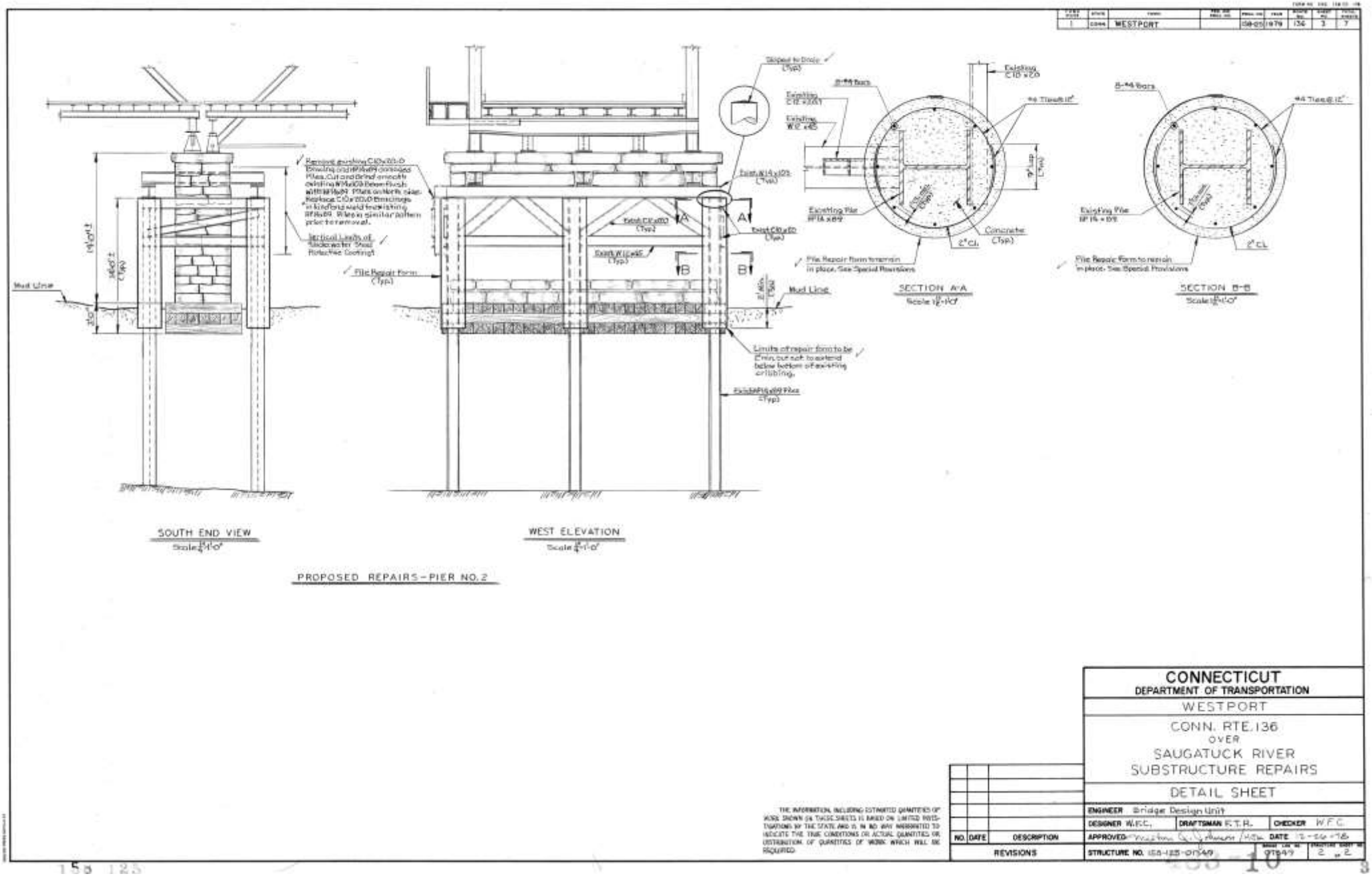
Sequence

1. Remove pier cap concrete areas and cross beams by through drilling or hydro-demolition (see sketch). Note that the superstructure and truss dead loads and construction equipment loads will be supported by the stone pier during removal and replacement of the support system.
2. Remove the existing support system bracing and exterior piles from barge mounted cranes or deck supported crane (4 piles).
3. Cut a hole +/- 4' x 4' in the fixed span deck and extract the center pile from the deck.
4. Extract the center pile of the swing span side of the support system.
5. Install new piles and bracing.
6. Replace deck section and pier cap removal areas.

EXISTING PIER 2 SUPPORT SYSTEM- TO BE REMOVED

SIMILAR SYSTEM NEW TO BE INSTALLED

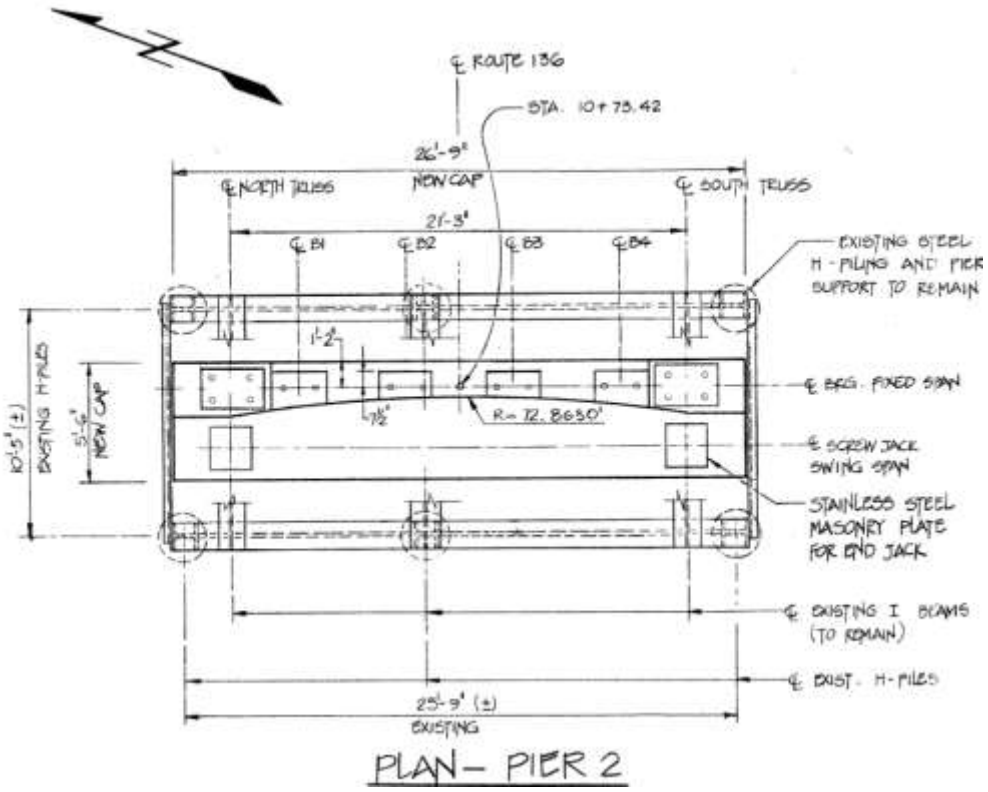
(Note original superstructure and pier cap shown)



EXISTING PIER 2 SUPPORT SYSTEM- TO BE REMOVED

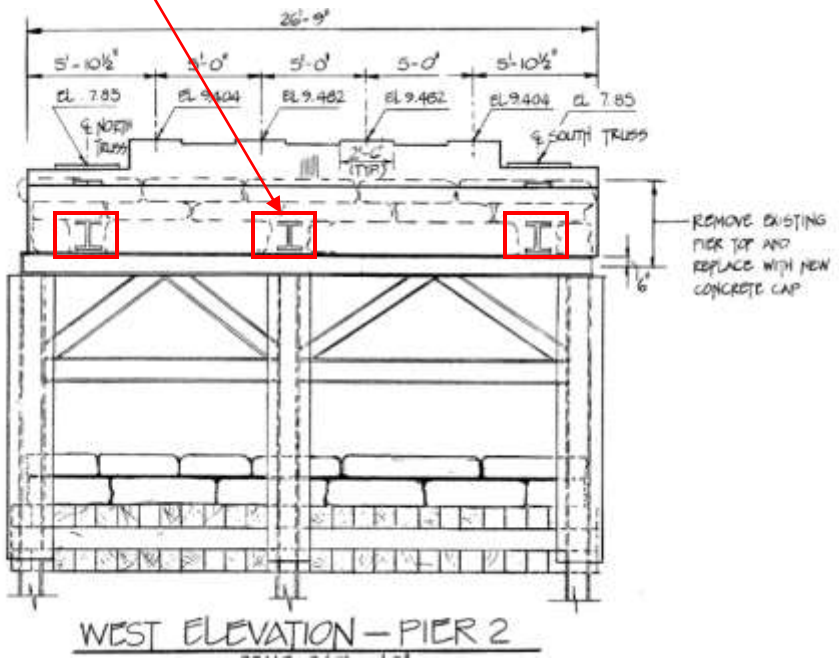
SIMILAR SYSTEM NEW TO BE INSTALLED

(New pier cap shown)



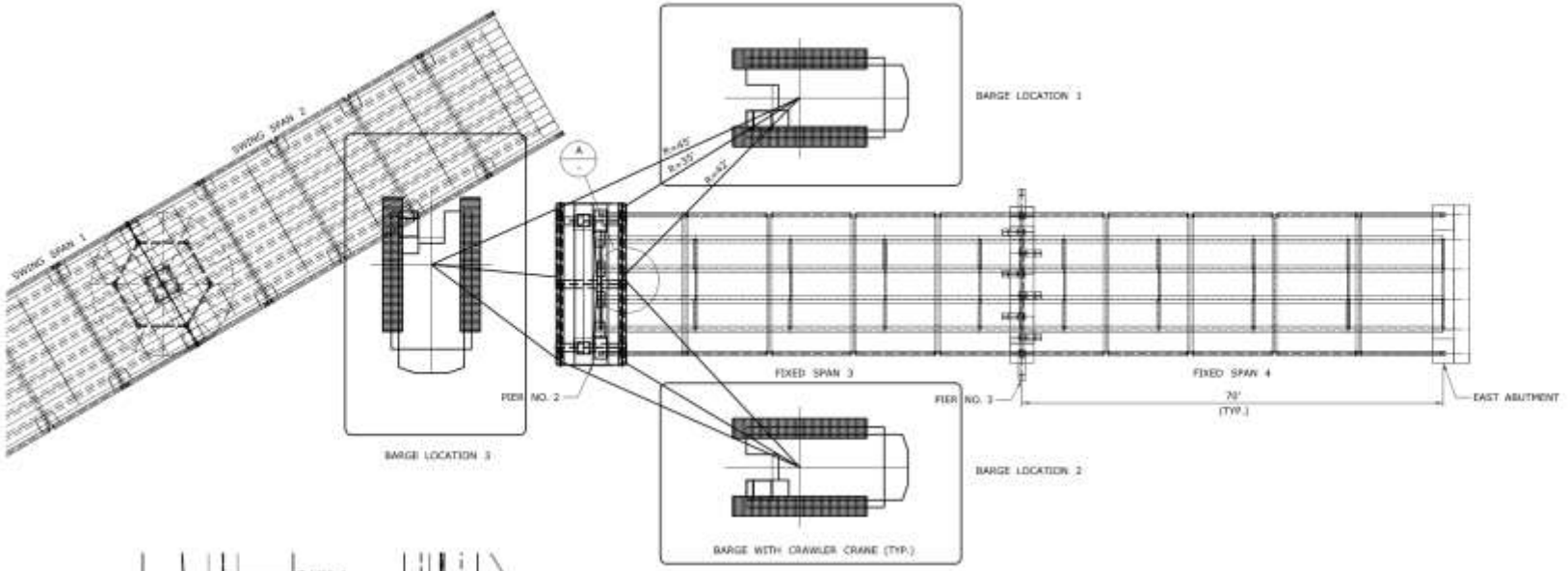
PLAN – PIER 2

Area of concrete to be removed by through drilling or hydro-demolition to facilitate cap beam replacement (Typ.)

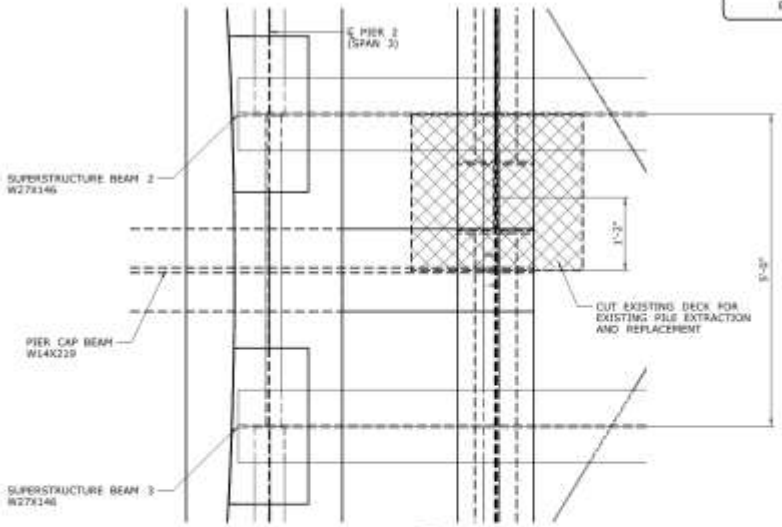


WEST ELEVATION – PIER 2

Note: Dead load and construction equipment loads will be transferred to the existing stone pier through the superstructure and truss during support system removal and replacement.



PLAN



DETAIL A

NO.	DATE	REVISION DESCRIPTION	SHEET NO.	Present Date: 6/11/2018	DESIGNED/DRAWN: B.A. CHECKED BY: T.M.R.	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION	Filename: ...BARGE PLATE 1.dgn

PROJECT TITLE: REHABILITATION OF ROUTE 136 OVER SAUGATUCK RIVER BRIDGE NO. 01349	TOWN: WESTPORT	DRAWING TITLE: PIER 2 SUPPORT SYSTEM REMOVAL AND REPLACEMENT	SHEET NO. 158-212
			DRAWING NO. SK-1

BAY CRANE

www.baycrane.com

15 ton



Grove YB4415 XT
Load Charts

RATED LIFTING CAPACITIES IN POUNDS ON OUTRIGGERS FULLY EXTENDED - 360°

17 FT. - 40 FT. BOOM

Radius in Feet	Main Boom Length in Feet					
	***17** (18.4)	***20** (21.4)	***25** (26.4)	***30** (31.4)	***35** (36.4)	***40** (41.4)
6	30,000	28,950	28,200	27,850	27,650	
8	28,050	28,100	28,150	27,800	26,400	23,750
10	23,000	23,100	23,150	23,200	22,450	20,650
12	18,100	18,250	18,350	18,450	18,500	17,550
14		14,750	14,850	14,900	14,950	14,950
16		12,300	12,450	12,450	12,500	12,500
18			10,600	10,650	10,700	10,700
20			9,070	9,070	9,070	9,070
22				7,760	7,760	7,760
24				6,740	6,740	6,740
26				5,930	5,930	5,930
28					5,260	5,260
30					4,710	4,710
32						4,240
34						3,840
36						3,490
Minimum boom angle (°) for indicated length (no load)						0
Maximum boom length (ft.) at 0 degree boom angle (no load)						40

Lifting Capacity at Zero Degree Boom Angle On Outriggers Fully Extended 360°

Boom Angle	Main Boom Length in Feet					
	***17** (18.4)	***20** (21.4)	***25** (26.4)	***30** (31.4)	***35** (36.4)	***40** (41.4)
0°	9,080 (13.3)	8,100 (16.3)	5,940 (21.3)	4,600 (26.3)	3,720 (31.3)	3,070 (36.3)

Note: ( ) Reference radii in feet. (Applicable to boom nose sheaves in down position only.)

A6-829-100221B

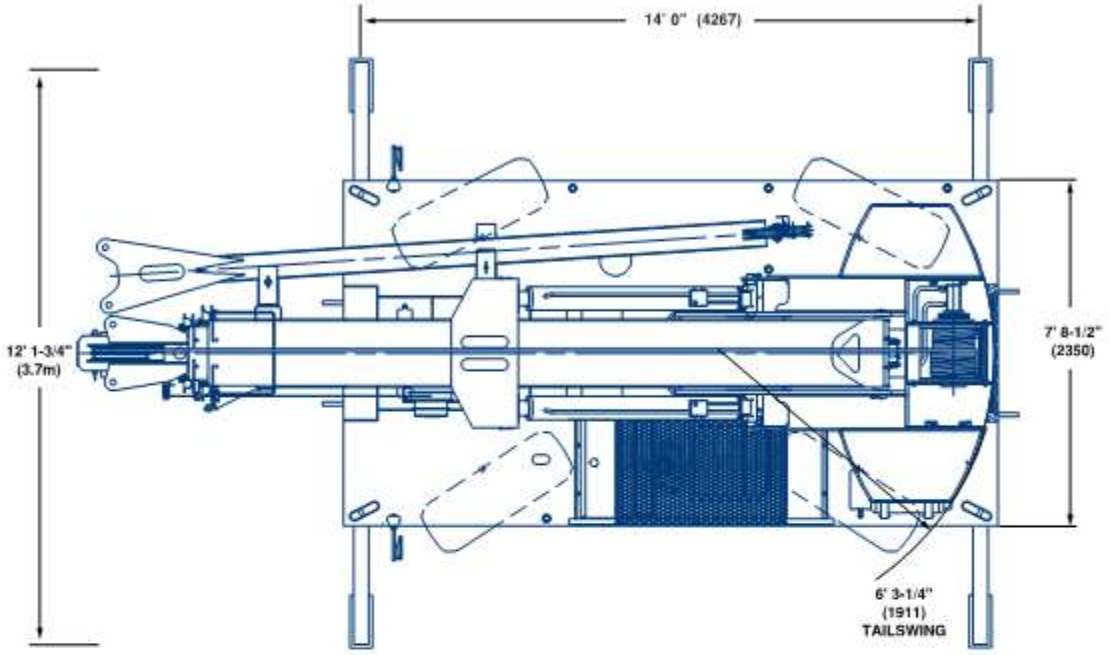
*Boom length varies between boom nose sheaves in down position (in bold), or up & out position (in parenthesis).

1. Capacities do not exceed 85% of tipping loads as determined by test in accordance with SAE J765.
2. Capacities appearing above the bold line are based on structural strength and tipping should not be relied upon as a capacity limitation.
3. With boom nose sheaves down (in lower position), single, 2-part or 4-part line may be used. With boom nose sheaves up and out (low profile position), single or 2-part line may be used, with maximum boom angle limited to 70°.

THIS CHART IS ONLY A GUIDE AND SHOULD NOT BE USED TO OPERATE THE CRANE. The individual crane's load chart, operating instructions and other instructional plates must be read and understood prior to operating the crane.

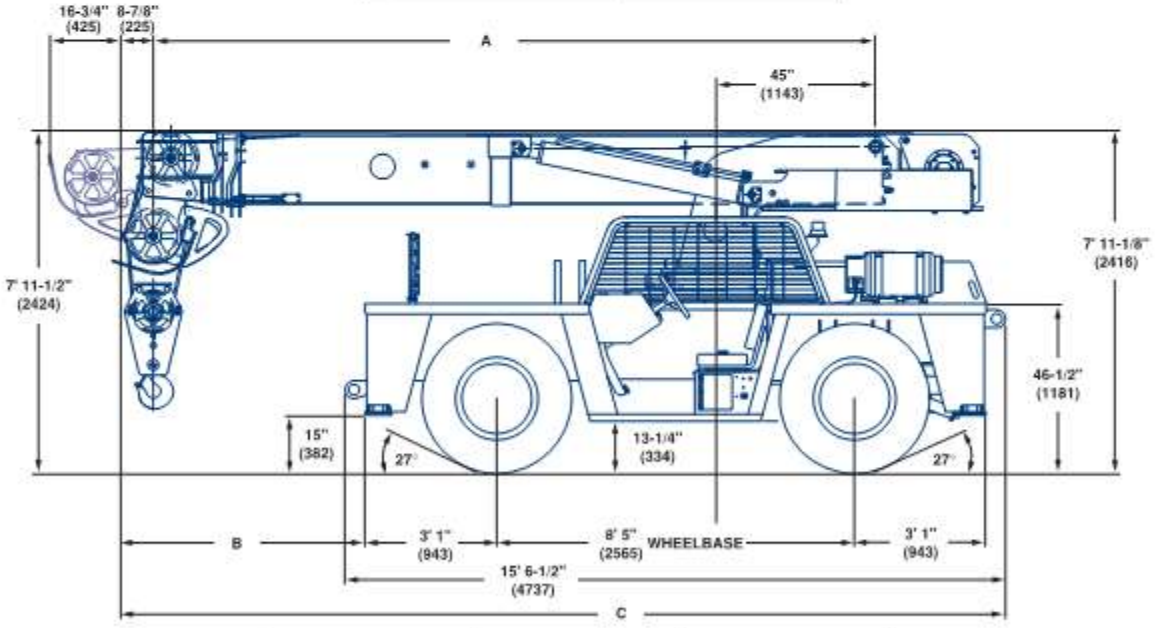
Dimensions

Turning Radius 20' 11" (6.4m) 2 Wheel Steer
11' 10-1/2" (3.6m) 4 Wheel Steer



Note: ( ) Reference dimensions in mm

	40' (12.2m) BOOM	52' (15.6m) BOOM
A	17' 0" (5182)	21' 5" (6528)
B	5' 3" (1603)	10' 2" (3099)
C	20' 9-5/8" (6340)	25' 2-1/2" (7684)



WORKING WEIGHTS	40' (12.2m) Boom	52' (15.6m) Boom
Front Axle	11,900, (5398)	13,900 (6305)
Rear Axle	15,600 (7076)	14,850 (6736)
GVW	27,500 (12,474)	28,750 (13,041)

BAY CRANE

www.baycrane.com

28 ton



Tadano TR280XL
Load Charts

TR-280XL TOTAL RATED LOAD CHART (IN POUNDS)

ON OUTRIGGERS FULLY EXTENDED 360° ROTATION

Load Radius in Feet	Boom Length in Feet							
	29.5 (9.0m)	36 (11.0m)	42 (12.8m)	48 (14.6m)	54 (16.5m)	60 (18.3m)	66 (20.1m)	72.2 (22.0m)
10	56,000 (60°)	36,000 (66°)	36,000 (70°)	35,000 (73°)	29,750 (75°)	29,150 (76°)	22,250 (77°)	20,850 (80°)
12	40,000 (56°)	36,000 (62°)	36,000 (67°)	35,000 (70°)	29,750 (72°)	29,150 (74°)	22,250 (76°)	20,850 (77°)
15	31,700 (48°)	31,500 (57°)	31,500 (62°)	31,200 (66°)	29,750 (69°)	29,150 (71°)	22,250 (73°)	20,850 (74°)
20	24,000 (32°)	24,000 (47°)	24,000 (54°)	24,000 (59°)	24,000 (63°)	23,100 (66°)	22,250 (68°)	20,850 (70°)
25		18,800 (34°)	18,800 (45°)	18,800 (52°)	18,800 (57°)	18,800 (61°)	18,300 (64°)	17,650 (66°)
30		15,900 (9°)	15,900 (34°)	15,900 (44°)	15,900 (50°)	15,900 (55°)	15,300 (58°)	14,950 (61°)
35			12,900 (16°)	12,900 (34°)	12,900 (43°)	12,900 (49°)	12,900 (53°)	12,700 (57°)
40				10,800 (19°)	10,800 (34°)	10,800 (42°)	10,800 (47°)	10,800 (52°)
45					9,020 (21°)	9,020 (34°)	9,020 (41°)	9,020 (46°)
50						7,420 (23°)	7,420 (34°)(	7,420 (41°)
55							6,200 (24°)	6,200 (34°)
60							5,200 (6°)	5,200 (25°)
65								4,400 (12°)

Boom Angle in Degree	Boom Length in Feet		
	72.2(22m)Boom + 24.6(7.5m)Jib		
	5° tilt	25° tilt	45° tilt
80°	8,800	4,410	3,300
75°	8,260	4,410	3,300
70°	6,920	4,410	3,100
65°	5,920	4,000	2,960
60°	5,190	3,750	2,860
55°	4,590	3,560	2,760
50°	4,090	3,400	2,660
45°	3,710	3,290	2,550
40°	3,420	3,180	
35°	3,190	3,100	
30°	2,820	2,800	
25°	2,530	2,500	
20°	2,300		
15°	2,100		
10°	1,900		
5°	1,800		

1,650 lbs. (750 kg) shall be subtracted from the total rated load of the main boom when jib is attached to the main boom head.

WARNING AND OPERATING INSTRUCTIONS FOR LIFTING CAPACITIES

GENERAL

1. Total rated loads shown on the TOTAL RATED LOAD CHART apply only to the machine as originally manufactured and normally equipped by TADANO LTD. Modifications to the machine or use of optional equipment other than that specified can result in a reduction of capacity.
2. Construction equipment can be dangerous if improperly operated or maintained. Operation and maintenance of this machine must be in compliance with the information in the operation, safety and maintenance manual supplied with machine. If this manual is missing, order replacement through the distributor.
3 The operator and other personnel associated with this machine shall fully acquaint themselves with the latest applicable American National Standards Institute (ANSI) safety standards for cranes.

SET UP

1. Total rated loads shown on the chart are the maximum allowable crane capacities and are based on the machine standing level on firm supporting surface under ideal job conditions. Depending on the nature of the supporting surface, it may be necessary to have structural supports under the outrigger floats or tires to spread the load to a larger bearing surface.
2. For outrigger operation, outriggers shall be fully extended with tires free of supporting surface before operating crane.

OPERATION

1. Total rated loads with outriggers fully extended do not exceed 85% of the tipping loads as determined by SAE Crane Stability Test Code J-765.
2. Total rated loads above bold lines in the chart are based on crane strength and those below, on its stability. They are based on actual load radius increased by boom deflection.
3. Total rated loads include the weight of main hook block (600 lbs for 30 tons capacity), auxiliary hook ball (220 lbs for 4.4 tons capacity), sling and auxiliary lifting devices and their weights shall be subtracted from the listed capacities to obtain the net load to be lifted.
4. Total rated loads are based on freely suspended loads and make no allowance for such factors as the effect of wind, sudden stopping of loads, supporting surface conditions, inflation of tires, operating speeds, side loads, etc. Side pull on boom or jib is extremely dangerous.
5. Total rated loads do not account for wind on lifted load or boom. Total rated loads and boom length shall be appropriately reduced, when wind velocity is above 20 mph (9m/sec.).
6. Total rated loads at load radius shall not be exceeded. Do not tip the crane to determine allowable loads.
7. Do not operate at boom lengths beyond radii or boom angle, where no capacities are shown. Crane may overturn without any load on the hook.
8. When boom length is between values listed, refer to the total rated loads of the next longer and next shorter booms for the same radius. The lesser of the two total rated loads shall be used.
9. When making lifts at a load radius not shown, use the next longer radius to determine allowable capacity.
10. Single line operation should not exceed 8,800 lbs (4000 kg).
11. Loaded boom angles are approximate. The boom angle before loading should be greater to account for deflection.
12. The 29.5' (9.0 m) boom length capacities are based on boom fully retracted. If not fully retracted [less than 36' (11.0 m)boom length], use the total rated loads for the 36' (11.0 m) boom length.
13. Extension or retraction of the boom with loads may be attempted within the limits of the TOTAL RATED LOAD CHART. The ability to telescope loads is limited by hydraulic pressure, boom angle, boom length, crane maintenance, etc.
14. For lifting capacity of single top, reduce the total rated loads of relevant boom by 550 lbs (250 kg). Capacities of single top shall not exceed 6,610 lbs (3000 kgs) including main hook.
15. When erecting and stowing jib, be sure to retain it by hand or by other means to prevent its free movement.
16. 1650 lbs (750 kgs) shall be subtracted form the total rated loads of the main boom, when jib is attached to main boom head. Jib weight is 770 lbs (350 kgs).
17. Use Anti-Two Block (OVERWIND CUTOUT) disable switch when erecting and stowing the jib and stowing the hook block. While the switch is pushed, the hoist does not stop, even when overwind condition occurs.
18. For boom lengths with 24.6' (7.5 m) Jib, total rated loads are determined by loaded boom angle only in the column headed "72.2' (22 m) Boom + 24.6' (7.5m) Jib". For boom angles not shown, use the next lower loaded boom angle to determine allowable capacity.
19. When lifting a load by using jib (auxiliary hoist) and boom (main hoist) simultaneously, do the following:
    - Illuminate the jib indicator lamps and make the jib offset display screen indicate the same value as the actual offset by repeatedly pushing the boom state register switch.
    - Before starting operation, make sure that the weight of load is within the total rated load for jib.

DEFINITIONS

1. *Load Radius:* Horizontal distance from a projection of the axis of rotation to supporting surface before loading to the center of the vertical hoist line or tackle with load applied.
2. *Loaded Boom Angle:* The angle between the boom base section and the horizontal, after lifting the total rated load at the load radius.
3. *Working Area:* Area measured in a circular arc about the centerline of rotation.
4. *Freely Suspended Load:* Load hanging free with no direct external force applied except by the hoist line.
5. *Side Load:* Horizontal side force applied to the lifted load either on the ground or in the air.

TADANO

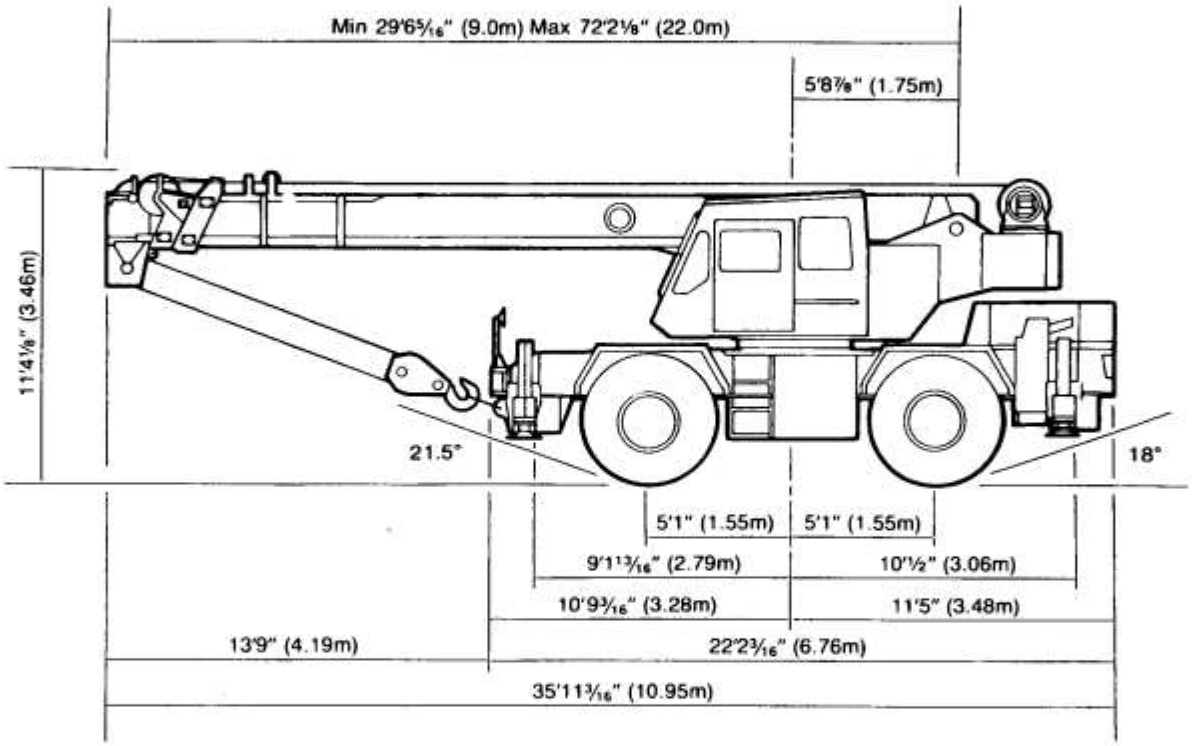
TR-280XL

28 Ton Capacity (25.4 Metric Tons)

HYDRAULIC ROUGH TERRAIN CRANE

DIMENSIONS

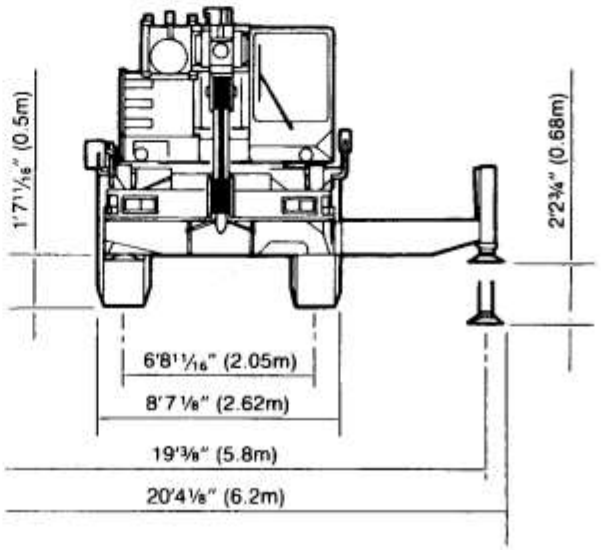
(20.5 X 25 Tires)



GENERAL DIMENSIONS

(20.5 X 25 Tires)

	Feet	Meters
Tail swing counterweight	9' 8 1/8"	2.95
Turning Radius:		
4 wheel steer	20' 11 3/4"	6.4
2 wheel steer	35' 9 1/8"	10.9



BAY CRANE



11-02 43rd Avenue Long Island City, NY 11101
Tel: 718-392-0800 Fax: 718-392-2353

n

← 530 (http://vulcanhammer.com/specifications/530-2/)
50C → (http://vulcanhammer.com/specifications/50c/)



Rated Strike Energy, ft-lbs (kJ):	7260
Blows per Minute, Normal Stroke, No Set:	133
Nominal Stroke, ft-in (mm):	12 1/2
Steam Consumption, lb/hr (Kg/hr):	2412
Size of Hose, Inches:	1-1/2"
Steam Pressure, LBS. per Sq. Inch - At Hammer:	120
Air Pressure, LBS. per Sq. Inch - At Hammer:	120
Boiler Heating Surface, Sq. Ft.:	480
Volume Free Air, Cu. Ft. Per Min. - Adiabatic:	488
Volume Free Air, Cu. Ft. Per Min. - Isothermal:	930
Equivalent Stroke, Ft:	2.42
Boiler Horse Power, Nominal Rating:	40
Boiler Horse Power, A.S.M.E. Rating:	70
**&sqrt;EW Rating:	4666
Diameter of Small Piston, Inches:	6 1/2
Area Small Piston - Sq Inches:	33.18
Length of Hammer with Standard Base:	9' 8-1/8"
Length of Hammer with McDermid Base:	9' 10-3/8"
Diameter of opening in Standard base, Inches:	16
Diameter of opening in McDermid base, Inches:	12
Distance Between Jaws, Inches	19
Width of Jaws, Inches	7-1/4"
*Largest Dimensions of Concrete Pile, Inches:	15-1/5"
No. of Sheaves:	1
Size of Wire Hoisting Rope, Inches:	5/8"
No. Parts of Hoisting Rope:	2
Weight of Striking Parts, Lbs:	3000
Net Weight with Standard Base, Lbs:	7036
Net Weight with McDermid Base, Lbs:	7090
Shipping Weight with Standard Base, Lbs:	7281
Shipping weight with McDermid Base:	7335

APPENDIX I

Accident Data

Record	Town	Date Of Crash	Time Of Crash	Severity	Number of Vehicles	Route or Local Road Number	Cumulative Route Mileage	Name of Road that Crash Occurred On	Name or Route Number of Road at which Crash Occurred	Collision Type	Weather Condition	Road Surface Condition	Light Condition	Crash Occurred On	Other Roadway Feature	Construction or Maintenance Related	Contributing Factor
1	Westport	2/17/2010	7:51:00	Property Damage Only	3	136	8.7	CONN ROUTE (CT route 136	null	Sideswipe-Opposite Direction	Snow	Ice	Daylight	Main Roadway	On Bridge	No	Following Too Closely
2	Westport	3/4/2010	13:34:00	Property Damage Only	2	136	8.7	CONN ROUTE (CT route 136	null	Sideswipe-Opposite Direction	No Adverse Condition	Dry	Daylight	Main Roadway	On Bridge	No	Roadway Width Restricted
3	Westport	4/19/2010	8:30:00	Property Damage Only	2	136	8.65	CONN ROUTE (CT route 136	null	Sideswipe-Opposite Direction	No Adverse Condition	Dry	Daylight	Main Roadway	None	No	Driver Illness
4	Westport	4/15/2010	22:38:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Sideswipe-Same Direction	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	Int. Public Road	No	Improper Passing Maneuver
5	Westport	5/4/2010	9:26:00	Property Damage Only	2	136	8.7	CONN ROUTE (CT route 136	null	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	On Bridge	No	Following Too Closely
6	Westport	6/6/2010	21:28:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	ON RIVERSIDE AVE #2	Backing	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	Int. Public Road	No	Unsafe Backing
7	Westport	8/14/2010	16:11:00	Injury (No fatality)	2	136	8.69	CONN ROUTE (CT route 136	null	Sideswipe-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	On Bridge	No	Improper Passing Maneuver
8	Westport	10/26/2010	19:31:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Turning-Intersecting Paths	Rain	Wet	Dark-Lighted	Main Roadway	Int. Public Road	No	Violated Traffic Control
9	Westport	11/19/2010	15:55:00	Property Damage Only	2	136	8.63	CONN ROUTE (CT route 136	null	Sideswipe-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	None	Yes	Roadway Width Restricted
10	Westport	1/7/2011	13:30:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Turning-Intersecting Paths	Snow	Snow/Slush	Daylight	Main Roadway	Int. Public Road	No	Speed Too Fast for Conditions
11	Westport	1/8/2011	13:47:00	Property Damage Only	2	136	8.69	CONN ROUTE (CT route 136	null	Sideswipe-Opposite Direction	No Adverse Condition	Wet	Daylight	Main Roadway	On Bridge	No	Roadway Width Restricted
12	Westport	2/25/2011	19:55:00	Property Damage Only	2	136	8.63	CONN ROUTE (CT route 136	null	Sideswipe-Same Direction	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	None	No	Improper Lane Change
13	Westport	3/22/2011	14:01:00	Property Damage Only	2	136	8.69	CONN ROUTE (CT route 136	null	Sideswipe-Opposite Direction	No Adverse Condition	Dry	Daylight	Main Roadway	On Bridge	No	Roadway Width Restricted
14	Westport	5/12/2011	9:18:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Turning-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Violated Traffic Control
15	Westport	5/6/2011	18:48:00	Property Damage Only	2	136	8.66	CONN ROUTE (CT route 136	100 feet N of RIVERSIDE A	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Following Too Closely
16	Westport	6/23/2011	9:14:00	Property Damage Only	2	136	8.73	CONN ROUTE (CT route 136	null	Sideswipe-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Commercial Dr.	No	Failed to Grant Right of Way
17	Westport	9/9/2011	8:40:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at RIVERSIDE AVE #2	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Following Too Closely
18	Westport	10/28/2011	17:22:00	Injury (No fatality)	2	136	8.71	CONN ROUTE (CT route 136	null	Sideswipe-Opposite Direction	No Adverse Condition	Dry	Daylight	Main Roadway	On Bridge	No	Driver Lost Control
19	Westport	10/3/2011	21:10:00	Property Damage Only	2	136	8.7	CONN ROUTE (CT route 136	null	Sideswipe-Opposite Direction	Rain	Wet	Dark-Lighted	Main Roadway	On Bridge	No	Driver Lost Control
20	Westport	7/13/2011	18:10:00	Property Damage Only	2	136	8.65	CONN ROUTE (CT route 136	null	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	None	No	Following Too Closely
21	Westport	7/18/2011	9:03:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at RIVERSIDE AVE #2	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Following Too Closely
22	Westport	7/4/2011	16:31:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Turning-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Failed to Grant Right of Way
23	Westport	8/22/2011	9:15:00	Property Damage Only	2	136	8.63	CONN ROUTE (CT route 136	null	Sideswipe-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	None	No	Improper Passing Maneuver
24	Westport	12/16/2011	8:10:00	Property Damage Only	2	136	8.63	CONN ROUTE (CT route 136	null	Turning-Intersecting Paths	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Commercial Dr.	No	Failed to Grant Right of Way
25	Westport	1/31/2012	16:44:00	Property Damage Only	2	136	8.63	CONN ROUTE (CT route 136	null	Sideswipe-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	None	No	Improper Lane Change
26	Westport	2/22/2012	12:39:00	Property Damage Only	2	136	8.69	CONN ROUTE (CT route 136	null	Sideswipe-Opposite Direction	No Adverse Condition	Dry	Daylight	Main Roadway	On Bridge	No	Driver Lost Control
27	Westport	4/25/2012	17:12:00	Property Damage Only	2	136	8.65	CONN ROUTE (CT route 136	null	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	None	No	Following Too Closely
28	Westport	4/2/2012	23:17:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at RIVERSIDE AVE #2	Rear-end	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	Int. Public Road	No	Following Too Closely
29	Westport	4/11/2012	16:38:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Turning-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Improper Passing Maneuver
30	Westport	5/20/2012	16:50:00	Injury (No fatality)	2	136	8.64	CONN ROUTE (CT route 136	null	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Following Too Closely
31	Westport	5/4/2012	10:33:00	Property Damage Only	2	136	8.7	CONN ROUTE (CT route 136	null	Sideswipe-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	None	No	Failed to Grant Right of Way
32	Westport	5/30/2012	17:05:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at RIVERSIDE AVE #2	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Following Too Closely
33	Westport	5/31/2012	11:37:00	Injury (No fatality)	3	136	8.64	CONN ROUTE (CT route 136	at RIVERSIDE AVE #2	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Following Too Closely
34	Westport	7/10/2012	9:33:00	Property Damage Only	2	136	8.63	CONN ROUTE (CT route 136	null	Turning-Intersecting Paths	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Commercial Dr.	No	Failed to Grant Right of Way

35	Westport	7/30/2012	12:14:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Following Too Closely
36	Westport	7/24/2012	18:53:00	Injury (No fatality)	3	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Rear-end	No Adverse Condition	Wet	Daylight	Main Roadway	Int. Public Road	No	Following Too Closely
37	Westport	8/11/2012	11:14:00	Injury (No fatality)	2	136	8.64	CONN ROUTE (CT route 136	at RIVERSIDE AVE #2	Turning-Intersecting Paths	Rain	Wet	Daylight	Main Roadway	Int. Public Road	No	Improper Turning Maneuver
38	Westport	11/11/2012	14:15:00	Injury (No fatality)	2	136	8.68	CONN ROUTE (CT route 136	200 feet North of (RTE 13	Sideswipe-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Driver Lost Control
39	Westport	11/29/2012	22:08:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Turning-Same Direction	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	Int. Public Road	No	Improper Turning Maneuver
40	Westport	12/6/2012	11:04:00	Property Damage Only	2	136	8.7	CONN ROUTE (CT route 136	null	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	On Bridge	No	Following Too Closely
41	Westport	4/5/2013	20:00:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Turning-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Improper Turning Maneuver
42	Westport	5/18/2013	1:00:00	Property Damage Only	2	136	8.65	CONN ROUTE (CT route 136	null	Rear-end	No Adverse Condition	Dry	Unknown	Main Roadway	Int. Commercial Dr.	No	Following Too Closely
43	Westport	5/18/2013	13:00:00	Property Damage Only	2	136	8.65	CONN ROUTE (CT route 136	null	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Commercial Dr.	No	Following Too Closely
44	Westport	5/23/2013	21:15:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at RIVERSIDE AVE #2	Turning-Same Direction	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	Int. Public Road	No	Improper Turning Maneuver
45	Westport	6/13/2013	9:14:00	Property Damage Only	2	136	8.63	CONN ROUTE (CT route 136	null	Angle	No Adverse Condition	Wet	Daylight	Main Roadway	Int. Commercial Dr.	No	Failed to Grant Right of Way
46	Westport	8/27/2013	13:55:00	Property Damage Only	2	136	8.65	CONN ROUTE (CT route 136	null	Turning-Intersecting Paths	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Commercial Dr.	No	Failed to Grant Right of Way
47	Westport	11/7/2013	8:48:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Turning-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Improper Turning Maneuver
48	Westport	11/9/2013	9:59:00	Injury (No fatality)	1	136	8.71	CONN ROUTE (CT route 136	null	Fixed Object	Rain	Wet	Daylight	Main Roadway	None	No	Driver Lost Control
49	Westport	1/12/2014	21:28:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at RIVERSIDE AVE #2 90 de	Turning-Opposite Direction	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	Int. Public Road	No	Failed to Grant Right of Way
50	Westport	1/17/2014	19:25:00	Injury (No fatality)	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Turning-Intersecting Paths	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	Int. Commercial Dr.	No	Unknown
51	Westport	2/28/2014	18:36:00	Property Damage Only	2	136	8.67	CONN ROUTE (CT route 136	? At 530 Rte 136	Turning-Intersecting Paths	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	Int. Commercial Dr.	No	Unknown
52	Westport	3/31/2014	11:57:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Angle	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Improper Turning Maneuver
53	Westport	5/4/2014	14:48:00	Property Damage Only	2	136	8.67	CONN ROUTE (CT route 136	150 feet North of RIVERSI	Sideswipe-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	On Bridge	No	Improper Passing Maneuver
54	Westport	5/19/2014	10:10:00	Property Damage Only	2	136	8.63	CONN ROUTE (CT route 136	null	Turning-Intersecting Paths	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Commercial Dr.	No	Failed to Grant Right of Way
55	Westport	6/24/2014	19:08:00	Property Damage Only	2	136	8.63	CONN ROUTE (CT route 136	null	Turning-Intersecting Paths	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Commercial Dr.	No	Failed to Grant Right of Way
56	Westport	7/25/2014	15:39:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Turning-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Improper Turning Maneuver
57	Westport	11/22/2014	16:00:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	on RIVERSIDE AVE #2	Sideswipe-Same Direction	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Improper Lane Change
58	Westport	12/1/2014	7:22:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Following Too Closely
59	Westport	12/19/2014	15:07:00	Property Damage Only	2	136	8.64	CONN ROUTE (CT route 136	at (RTE 136 - BRIDGE ST)	Angle	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Residential	No	Failed to Grant Right of Way

Bridge 01659
Shelton



Record	Town	Date Of Crash	Time Of Crash	Severity	Number Of Vehicles	Route or Local Road Number	Cumulative Route Mileage	Name of Road that Crash Occurred On	Name or Route Number of Road at which Crash Occurred	Collision Type	Weather Condition	Road Surface Condition	Light Condition	Crash Occurred On	Other Roadway Feature	Construction or Maintenance Related	Contributing Factor
1	Shelton	9/12/2011	11:33:00	Injury (No fatality)	1	712	0.13	CONN ROUTE (CT route 712	at BRIDGE ST SOUTHEAST(ON	Pedestrian	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Public Road	No	Failed to Grant Right of Way

Bridge 02928
Trumbull



Record	Town	Date Of Crash	Time Of Crash	Severity	Number Of Vehicles	Route or Local Road Number	Cumulative Route Mileage	Name of Road that Crash Occurred On	Name or Route Number of Road at which Crash Occurred	Collision Type	Weather Condition	Road Surface Condition	Light Condition	Crash Occurred On	Other Roadway Feature	Construction or Maintenance Related	Contributing Factor
1	Trumbull	3/18/2013	7:10:00	Injury (No fatality)	2	734	0.49	CONN ROUTE (CT route 734		Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	On Bridge	No	Following Too Closely
2	Trumbull	11/18/2013	8:25:00	Property Damage Only	2	734	0.56	CONN ROUTE (CT route 734		Rear-end	No Adverse Condition	Wet	Daylight	Main Roadway	None	No	Following Too Closely

Bridge 05643
Lisbon/Griswold



Bridge 05643
Route 12 Milepost 20.48 to 20.62
Town of Lisbon/Town of Griswold
Years 2010-2014

Record	Town	Date Of Crash	Time Of Crash	Severity	Number Of Vehicles	Route or Local Road Number	Cumulative Route Mileage	Name of Road that Crash Occurred On	Name or Route Number of Road at which Crash Occurred	Collision Type	Weather Condition	Road Surface Condition	Light Condition	Crash Occurred On	Other Roadway Feature	Construction or Maintenance Related	Contributing Factor
1	Griswold	7/30/2010	17:45:00	Property Damage Only	2	12	20.62	CONN ROUTE (CT route 012		Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	None	No	Following Too Closely
2	Lisbon	2/5/2011	9:58:00	Injury (No fatality)	2	12	20.53	CONN ROUTE (CT route 012		Angle	No Adverse Condition	Dry	Daylight	Main Roadway	Int. Commercial Dr.	No	Driver View Obstructed
3	Lisbon	4/8/2011	21:15:00	Property Damage Only	2	12	20.53	CONN ROUTE (CT route 012		Rear-end	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	None	No	Following Too Closely
4	Griswold	1/20/2013	20:08:00	Injury (No fatality)	2	12	20.58	CONN ROUTE (CT route 012	at (RTE 12 - MAIN ST)	Turning-Opposite Direction	No Adverse Condition	Dry	Dark-Lighted	Main Roadway	Int. Public Road	No	Under the Influence
5	Griswold	6/16/2013	11:26:00	Property Damage Only	2	12	20.61	CONN ROUTE (CT route 012		Rear-end	No Adverse Condition	Dry	Daylight	Main Roadway	On Bridge	No	Following Too Closely

APPENDIX J

Definitions

DEFINITIONS

AASHTO

Acronym for American Association of State Highway and Transportation Officals. AASHTO is a standards setting body which publishes specifications, test protocols, and guidelines which are used in highway design and construction throughout the United States.

Axial Capacity

The ability of a structure or member to resist a force passing through the centroid of a particular section perpendicular to the plane of the section.

Bottom Chord

The lowest longitudinal member of a structure. The horizontal bottom member of a truss.

Continuous spans

A rigid span extending over three or more supports so that bending movements are transmitted from one segment to the next.

Dead Load

The weight of materials which form a permanent part of the structure.

Exodermic Deck

A bridge deck which is comprised of a concrete slab integral with, a steel bar grid.

Fender System

A bumper used to absorb kinetic energy of a boat or vessel to prevent damage to boats, vessels, or structures.

FEMA

Acronym for Federal Emergency Management Agency. An independent agency of the United States government that provides a single point of accountability for all federal emergency preparedness and mitigation and response activities. Estimates and publishes storm elevations and limits of water bodies.

FHWA

Acronym for Federal Highway Administration. A branch of the US Department of Transportation that administers the federal-aid Highway Program, providing financial assistance to states to construct and improve highways, urban and rural roads, and bridges.

Flange

The top and bottom plates of an I- or H-beam. The top and bottom flanges of a beam are usually in compression and tension respectively.

Floor Beam

Any beam that supports the floor of a building or deck of a bridge. In truss construction they are referred to as the beams transverse to the truss members that the roadway beams frame into.

Flexure

The act of bending or curving, or the condition of being bent or curved.

Fracture Critical

A steel member in tension, or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse.

Functional Adequacy

The quality of a roadway or structure being able to meet the needs intended for its purpose and use.

Galvanized

Coated with a protective layer of zinc.

HS-20

Represented by a thee-axle semitrailer combination weighing 72,000 pounds with 8,000 pounds on its steering axle, 32,000 pounds on its drive axle, and 32,000 pounds on the semitrailer axle. The “20” in HS-20 stands for 20 tons, and the “S” stands for semi-trailer combination, which adds in the additional 16 tons for the third axle to give a total of 36 tons.

HL-93

Highway Loading adopted in 1993, which includes variations and combinations of truck, tandem, and lane loading. The design truck is a 3-axle truck with variable rear axle spacing and a total weight of 72,000 pounds. The design tandem is a two-axle vehicle, 25,000 pounds per axle, spaced 4 feet apart.

Inventory Stress

A load which can be safely maintained by a bridge for an indefinite period of time.

Live Load

The weight of non-permanent loads on a structure, i.e., vehicles, people, etc.

Moment

The bending force which acts on, for example, a beam, and is resisted by an equal internal resistance moment within the beam. Units of bending moment are those of force x distance.

Operating Stress

The absolute maximum permissible load to which a structure should be subjected.

Permit Loads

Oversized or overweight vehicles that must be permitted.

Scupper

An inlet structure for draining water.

Substructure

The underlying or supporting portion of the bridge, typically consisting of abutments, piers, and other support structures.

Superstructure

The portion of the bridge that includes the span and directly receives the live load.

Structural Component Rating System

1- FAILURE CONDITION – major deterioration or section loss present in critical structural components, or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic, but corrective action may put bridge back into light service
2- CRITICAL CONDITION – advanced deterioration of primary elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored, it may be necessary to close the bridge until corrective action is taken
3- SERIOUS CONDITION – loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present
4- POOR CONDITION – advanced section loss, deterioration, spalling, or scour
5- FAIR CONDITION – all primary structural elements are sound but may have minor section loss, cracking, spalling, or scour
6- SATISFACTORY CONDITION – structural elements show some minor deterioration
7- GOOD CONDITION – some minor problems
8- VERY GOOD CONDITION – no problems noted
9- EXCELLENT CONDITION

Top Chord

An inclined or horizontal member that establishes the upper edge of a structure. This member is subjected to compressive and bending stresses. In truss construction; the top horizontal member.

Wale

Horizontal timber or steel member in a fender system or retaining structure.

Web

The middle plate of an I-beam or H-beam. The web connects the two flanges, and resists shear forces.

Wing Wall

A short section of wall usually at an angle to a bridge abutment, used to stabilize the abutment as well as act as a retaining wall along the nearby slopes.

APPENDIX I: PAC Reports of Meeting



Connecticut Department of Transportation

Meeting Minutes

Project Advisory Committee Introductory Meeting
Project No. 158-214
Bridge 01349 (William F. Cribari Memorial Bridge)
Route 136 (Bridge Street) over the Saugatuck River
Town of Westport

Wednesday, July 18, 2018, 6:30 p.m.
Town Hall Auditorium
110 Myrtle Avenue
Westport, Connecticut

Present:
See attached Sign-in Sheets.

Presentation:
The meeting began at approximately 6:40 p.m. with a presentation by the Connecticut Department of Transportation (Department) regarding the forming of the Project Advisory Committee (PAC), and the purpose and role the PAC would have in the development of the Environmental Assessment (EA) and Environmental Impact Evaluation (EIE). The presentation was given by Mr. Theodore Nezames, Ms. Priti Bhardwaj, and Mr. Mark McMillan of the Department; and Ms. Stephanie Brooks of Fitzgerald & Halliday, Inc. (FHI), a consulting firm hired to head the public involvement process for development of the EA/EIE. Mr. Arnold Bloch, of FHI, facilitated the meeting.

The presentation consisted mainly of an overview of the project and the PAC's objectives, roles, and future steps. The overview included the purpose and need for the project; the Department's findings with regards to the existing conditions of the bridge; and a way forward with stakeholder involvement.

The Department explained that it is currently developing the EA/EIE as part of the National Environmental Protection Act (NEPA) and Connecticut Environmental

Protection Act (CEPA), which will determine the cultural/historic, socio-economic and natural/environmental impacts of various design alternatives. The purpose of the EA/EIE is to explore options that accommodate safe vehicular, bicycle, pedestrian, and marine travel; are resilient to the changing shoreline climate and environmental conditions; and consider the historic character of the bridge.

The Department explained that the development of the EA/EIE requires a review from several different perspectives to ensure all impacts are properly evaluated so that the best possible solution can be reached. The Department is creating a PAC as part of the public outreach to obtain critical input in arriving at that solution. The PAC is being formed to assist the Department in its decision-making process. Its role will be to provide critical input to be considered in this process. The PAC will serve as one of many forums the Department will be using to gather as much information as possible to be analyzed within the EA/EIE.

The Department asked that each of the organizations invited to the PAC to name one representative to attend the meetings if they wish to be included in the PAC, and that they bring input from their groups and inform them of the PAC discussions. Because this meeting is to serve as an introduction to the PAC, it is understood that each of the entities to be represented may not yet have chosen their representative. It was requested that each group notify the Department of who their representative on the PAC will be by August 15, 2018 so that the Department can coordinate the next PAC meeting. Also, as other stakeholder groups are identified or submitted for consideration, they can be brought into the PAC.

Attendees were reminded that if they are not members of the PAC, they may still be involved in the EA/EIE process by participating in several other public outreach opportunities provided during the EA/EIE process. Anyone with questions may contact the Department or view information available on the Department website.

Upon the completion of the presentation, the meeting was then opened up for questions related to the development of the PAC.

Public Comments and Questions (with Department responses in italics):

First Selectman James Marpe mentioned the Town's appreciation for the development of the PAC and the issues the community faces involving the bridge and the project; He asked that the Department be inclusive and provide a "big tent" in terms of representation on the PAC, noting that the historic resources are important to the community, as is safety. He noted the level of disruption opening the bridge causes to the traffic in the surrounding area. The Town of Westport is aware that repair work will be occurring in the near future to strengthen damaged sections of the ornamental truss. Based on discussions between the Town and Department, work will be performed during nighttime hours to avoid severe impacts to commuters and other users of the bridge during the day. Overnight work would be safer and should allow for construction to be completed

quicker than if work were performed during the day. Additional clarification regarding what the project involved was requested.

The repair work for the trusses will be undertaken to address impact damage and deterioration of the trusses. While it is noted that the trusses do not support traffic loads along the bridge, they are self-supporting, and need to support loads applied to them, such as their own weight and wind. The repairs would be performed by the Department's Bridge Maintenance Unit during nighttime hours. Repair work would include methods for strengthening the truss members, including installation of plates over damaged sections. It is noted that the work <u>will not</u> involve removal of any truss members, or installing additional members.

Some attendees complained about the Department's use of terms such as "functionally obsolete" and "intolerable bridge geometry" in describing the bridge. They felt these terms condition future discussions about solutions and steer the project into replacement of the bridge.

The Department's use of these engineering terms is done to describe the bridge in comparison to today's standards but the terms do not determine the best solution for the project. The terminology shown in the presentation is taken from official guidelines for classification from the Federal Highway Administration's national bridge inspection guidelines for recording inspection findings by Department bridge inspectors. These terms and their meanings will be topics of discussion for understanding of their meaning at future PAC meetings.

Some attendees asked how the EA was being funded after the project was removed from the Transportation Improvement Plan (TIP). Also, questions were raised regarding the "shelf life" of the EA and what it means for the project once the EA is complete. Would the funding for the project consist of 20% State share after completion of the EA? Would the Town be required to contribute towards the funding of the project?

The "shelf life" of the EA is approximately 2-3 years, after which, a re-evaluation would be required to determine any changes in the surrounding environments. Once the EA is complete, a recommendation would be made to determine the alternative that best serves the purpose and need while having the least impacts on <u>all</u> environmental aspects. The Department would proceed to request funding for the project once the EA is complete. Clarification was made that funds for projects in the TIP are not actual funds, but are placeholders in a five-year constrained Capital Plan. In order to be fiscally responsible, the State requested a placeholder based on the highest estimate. This was not an indication that the highest cost alternative was selected, only that there would be funds budgeted for all of the alternatives being considered. The State would be responsible for 20 percent of the costs for the project, supplemented by 80 percent federal funding, while the Town of Westport would not be responsible for any funding for the project.

Several PAC-related questions were brought up by attendees including: "How can a person become a member of the PAC?"; "Is a certain organization represented in the

PAC?"; "Where can people find out what groups and representatives are included in the PAC?" and "Where can I find information regarding the PAC if I am not a member?"

Any requests to be included in the PAC should be sent directly to the Department for consideration. Contact information at the Department was provided during the presentation. A list of PAC organizations and members will be made available on the project website. Information regarding the PAC meetings: topics of discussion, presentations, and meeting minutes will be available on the website as they are developed. Additional questions or requests involving the PAC should also be sent to the Department.

What are the future meeting dates for the PAC meetings?

Exact dates for the future PAC meetings have not yet been determined; however, the intent is for the first meeting to be held in early fall, 2018. Organizations are asked to notify the Department of the representative they plan to send as a member of the PAC by August 15, 2018, so that an official list of members can be available by Labor Day. Additional meetings will be held over the course of the next year, and a total of 3-4 meetings are anticipated; however, additional meetings can be held as deemed necessary.

The PAC Introductory meeting was referenced by some as simply repeating information that had already been presented at the past meetings held for the project. Some questioned if opinions expressed prior to the PAC were still being considered.

The Department is aware of opinions expressed at previous meetings and consideration will be given to them. The PAC is not a clean slate for obtaining opinions, but a forum for gathering <u>additional</u> information as to how different alternatives will affect the surrounding environments. The Department wants to ensure as much information is gathered and evaluated within the EA/EIE so that the best possible solution can be determined.

Some agreed the PAC is necessary in the development of the project. There are several concerns by many regarding multiple issues, such as the concern of truck traffic moving across the bridge, but also the difficulty for local vehicles, such as emergency services, crossing the existing structure. The representatives look forward to discussing and understanding all the possible alternates through the PAC.

The comment was noted.

There were a number of comments and questions regarding the recently announced repairs that are scheduled for the bridge. Individuals had concerns for possible noise and lights bothering nearby neighbors, as well as the hours of operations.

Specifics were not available but the concerns will be discussed with the Department's unit scheduling maintenance work.

A resident expressed concern regarding one of the slides shown in the slideshow after the official presentation slides, which depicted a shape showing Department land encroaching onto his property.

The graphic in question was part of a series of slides showing potential environmental impacts and abutting properties. These slides were included after the official PowerPoint presentation to be used as quick references to help answer questions from attendees. The slide of concern to the attendee was a depiction of the properties and owners closest to the bridge. However, the slide was erroneous, as each of the shapes outlining the immediate properties surrounding the bridge were accidentally shifted to the right along the map overlay, causing state property on the northeast corner of the bridge to appear on the adjacent private residence. The Department apologized for the error and any confusion caused.

Concerns were raised regarding how the impending repairs to the truss would impact the historic integrity of the bridge.

The upcoming work is considered temporary repair work. Namely, it will maintain the existing structure until such a time that a solution is selected for the project. It is work that can be performed to fix the truss without requiring that the truss be removed and repaired off-site. The proposed work neither involves the removal of existing elements nor the addition of new members to the trusses. Methods for strengthening the truss, such as installation of plates, will be limited to the damaged sections of the truss.

Several attendees questioned the reason for the organization of the PAC, wondering what it's ultimate purpose would be, what the Department is looking to get from the PAC, and in what way the PAC will influence the decision for the project.

Part of the NEPA/CEPA process is the identification and analysis of alternatives. The PAC will provide input about alternatives and help evaluate how each alternative may affect each environment. The Department is searching for input from each of the interest groups represented in the PAC. The Department wants to hear many voices and identify potential impacts and benefits that the alternatives present, and the PAC will help in the accumulation of this information.

Is refurbishment of the existing bridge still an alternative under review?

Yes, refurbishment is an alternative that will be reviewed in the development of the EA/EIE.

A resident questioned the possibility of a new bridge restricting access to large vehicles.

Rehabilitation alternatives may result in maintaining the existing vertical clearance. However, for all <u>new</u> structure options, the Department must provide a structure that can best accommodates users of the facility and carry legal loads.

Is the Section 106 process underway, and how will it interact with the PAC?

The Section 106 process specifically considers the historic impacts of the project. The PAC includes the Section 106 Consulting Parties, as the historic aspects are one of the impacts being looked at in the EA/EIE. Therefore, there will be some overlap; however, the processes are distinct.

Several questions were asked regarding what the decision of the Department would be in the event the PAC came to a consensus regarding the various aspects of the project (e.g. truck access, funding, etc.).

Attendees were reminded that the role of the PAC is to advise the Department of issues and impacts to the various alternatives. Ultimately, the preferred alternative needs to meet the project's purpose and need.

Will the press will be allowed in future PAC meetings and will the meetings be recorded?

The press will be allowed to observe future PAC meetings. The Department is not opposed to the idea of recording meetings.

Adjournment:
The meeting was adjourned at approximately 8:40 p.m.

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Project Advisory Committee Meeting
July 18, 2018
Westport Town Hall Auditorium

NAME	ORGANIZATION	ADDRESS	EMAIL ADDRESS	PHONE NUMBER	RECEIVED PAC INVITATION? (Y/N)
Kurt Salmoiraghi	FHWA	626 Hebron Ave Glastonbury, CT	kurt.salmoiraghi@dot.gov	860-494-7561	Y
E. Barnhart	—	WSPT CO 28 Tomac Rd	lallc@optonline.net		I
Jennifer Johnson	Coalition for WPT	WPT	jbarrjohnson@gmail.com	917 886 0020	
Robert					
Kristin Hadjstylianos	WestCOG	1 Riverside Rd. Sandy Hook, CT	khadjstylianos@westcog.org		Y
Tina Green		188 Imperial Ave	~~pte~~ petermgreen@hotmail.com		N
Cathy Walsh	P&Z Comm	6 Wilcox Lane Westport CT	cawalsh6@optonline.net		N
Mozley Boyd	WSPT Preservation Alliance				Y
Werner Liepolt	Bridge St Neighbors	27 Bridge St	wliepolt@optonline.net 2032264842		Y
Roberta Liepolt	"	"	BLiepolt@optonline.Net 203 247-5100		Y

CONNECTICUT DEPARTMENT OF TRANSPORTATION

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Project Advisory Committee Meeting
July 18, 2018
Westport Town Hall Auditorium

NAME	ORGANIZATION	ADDRESS	EMAIL ADDRESS	PHONE NUMBER	RECEIVED PAC INVITATION? (Y/N)
JIM DESTEFANO		192 So Compo	JIMD@DCSTRUCTURAL.COM	203 259 7131	Y
PETER RATKIEWICH	WESTPORT DPW	110 MYRTLE AVE	pratkiewich@westportct.gov	203 341 1125	Y
DOUGLAS ODELL		3 Imperial Landing	buddodell@gmail.com	203 221-0329	
Stephen Edwards	Westport DPW	110 Myrtle Ave	sedwards@westportct.gov	203-515-2560	N
Melissa Kane	Selectwoman	33 Riceds Ln, Westport	mkane@westportct.gov		Y
Ellie Lowenstein		372 Greens Farms Rd	le lowensteindgmail.com	203.255-5379	N
Richard Lowenstein	GREENS FARMS ASSOCIATION	" " "	DICKLOWENSTEIN @GMAIL.COM		Y
Ron Corwin	COALITION FOR WSPT		RON@RONCORWIN.COM	203. 557. 3541	Y
Fotis Koskinas	Westport Police				
Vera DeStefano	resident	192 Compo Rd. S	VERA@DCSTRUCTURAL.COM	(203) 227-0199	Y

CONNECTICUT DEPARTMENT OF TRANSPORTATION

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Project Advisory Committee Meeting
July 18, 2018
Westport Town Hall Auditorium

NAME	ORGANIZATION	ADDRESS	EMAIL ADDRESS	PHONE NUMBER	RECEIVED PAC INVITATION? (Y/N)
MARY YOUNG	WESTPORT P&Z DEPT		MARYYOUNG@WESTPORTCT.GOV	203 341-1078	NO
FRANCIS HENKELS	WESTPORT HISTORIC DISTRICT COMMISSION		fhhenkels@gmail.com		YES
DEWEY LOSELLE	Downtown PLAN Implementation		deweyloselle@gmail.com		YES
Sam Arcola	Westport Police		sarcola@westportct.gov		yes
ANDREW CARBELLA	RTM #4		ACOLABELGARTM4@Gmail.com		
Clayton Hughes		2 Imperial Lndg	cjhughes9973@gmail.com	203-222-0433	No.
Sarah Connolly	Saugatuck Rowing Club		sconnolly719@gmail.com		Yes
Kyi Irwin	MPF				
Sherry Jagersen	Town	Westport			
Toni Boucher	State Senator #26	Westport	toni.boucher@aol.com	203-858-9950	/

CONNECTICUT DEPARTMENT OF TRANSPORTATION

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Project Advisory Committee Meeting
July 18, 2018
Westport Town Hall Auditorium

NAME	ORGANIZATION	ADDRESS	EMAIL ADDRESS	PHONE NUMBER	RECEIVED PAC INVITATION? (Y/N)
Clarinda Higgins	Westport Shellfish Comm, Chair				Y ✓
Gail Lavielle	State Representative 143rd district	109 Hickory Hill Wilton	gail.lavielle@cga.ct.gov		?
Robert Yost	WFD	515 P.R.E	ryost@westportct.gov		
Valerie Seiling Jacobs	Save Westport Now	11 Compo Pkwy	valerieseilingjacobs@gmail.com		Yes ✓
JOHN SIRMONS		1 SAXON LANE	JSIRMONS@OPTONLINE.NET		✓
Robbie Guimond	Bridgebrook Marina	471 Riverside Ave		203-858-4596	✓
Nora Caporale		5 Imperial Landing	noracaporale@gmail.com		
BOB CAPORALE		5 IMPERIAL LANDING	bobcaporale@gmail.com		✓
Jane Montanaro	CT TRUST FOR HISTORIC PRESERVATION	940 Whitney Ave Hamden CT	jmontanaro@cttrust.org	203 562 6312	✓

CONNECTICUT DEPARTMENT OF TRANSPORTATION

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Project Advisory Committee Meeting
July 18, 2018
Westport Town Hall Auditorium

NAME	ORGANIZATION	ADDRESS	EMAIL ADDRESS	PHONE NUMBER	RECEIVED PAC INVITATION? (Y/N)
Bill Kiedaisch	Boating Advisory Committee	12 Rivard Crescent Westport, CT 06880	Bill Kiedaisch @ gmail.com	203-858-2238	Y
John Suggs	WPA	64 Center	John Suggs@gmail.com	203-273 2774	Y
Helen Garten	WPA	4 River Ln	oaktope optonline.net	203 227 7711	Y
Wendy Crowther	WPA	38 E Main St.	wcrowther@optonline.net	203 222 8425	Y
Don Bergmann	-	32 Sherwood Dr	donlbergmann@sbcglobal.net		
D. Weller		16 Bridge St	deejaydubya@ct-nopi.com		✓
Mike Schroeder		575 Riverside Ave	mstw@aol.com	203 292 6583	
Jennifer Tooker	Selectwoman	56 Sylvan Rd N	jtooker@westportct.gov		N

CONNECTICUT DEPARTMENT OF TRANSPORTATION

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Project Advisory Committee Meeting
July 18, 2018
Westport Town Hall Auditorium

NAME	ORGANIZATION	ADDRESS	EMAIL ADDRESS	PHONE NUMBER	RECEIVED PAC INVITATION? (Y/N)
NANCY LW	SAUGATUCK ROWING	52[illegible] RIVERSIDE DR			N
PAT TORRACO		82 Riverside			

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Project Advisory Committee Meeting
September 26, 2018
Westport Town Hall, Auditorium

Report of Meeting

Present: See attached sign-in sheets.

Welcome, Introduction & Ground Rules: Following welcome & introductions, Stephanie Brooks (Fitzgerald & Halliday, Inc.), Meeting Facilitator, reviewed the Project Advisory Committee (PAC) ground rules for continued membership and participation on the PAC and commitments of the project team. Ms. Brooks requested permission to make member contact information available to other members (email addresses only), to which no one was opposed.

Binders: Binders for PAC meeting materials were distributed, and the contents explained. Included in the package were a report of PAC meeting #1, provided to assist the PAC, but not subject to PAC vote/approval. The purpose of the project was reviewed with the PAC.

Update: Theodore Nezames (Connecticut Department of Transportation [CTDOT]) provided an update on recent reports and activities associated with the bridge and the proposed project and discussed concerns that have been circulating through public meetings, blogs, and other public forums. It was explained that each alternative would be weighed regarding how it best fits with the project Purpose and Need statement. The CTDOT clarified that they are not increasing capacity on the bridge. Any alternative presented in the Environmental Assessment/Environmental Impact Evaluation (EA/EIE) would be consistent with the bridge as it is now. For example: one lane currently crosses the bridge in each direction, therefore the alternatives will reflect one lane across the bridge in each direction.

Existing Conditions: Steve Harlacker (Hardesty & Hanover) explained the existing bridge conditions, structural condition rating, and detailed key concerns about truss condition and stability, pier condition, and bridge geometry as it relates to safety and truss damage. The “current condition" is the condition that is currently documented in the latest Bridge Safety Inspection Report. He also discussed the base flood elevation at the bridge and concerns related to roadway inundation and impacts of flooding on the operating system.

No-Build Alternative: Mark McMillan (CTDOT) presented the No-Build Alternative, explaining it is ‘no change’ from existing management practices or level of management intensity. The No-Build Alternative is a real alternative, and consideration of the No-Build is required by the National Environmental Policy Act/Connecticut Environmental Policy Act (NEPA/CEPA) process. Under the No-Build Alternative, CTDOT is obligated to continue maintaining a safe and operable bridge at this location. The frequency of maintenance projects to provide a safe bridge would likely increase over time, resulting in increased frequency of bridge closures to perform said maintenance. Further deterioration to the load carrying capacity of the structure may result in further restrictions to the larger vehicles crossing the bridge, such as buses and emergency response vehicles. Further explanation was given that this information, as with any given for each of the other alternates, is being provided not to sway opinion of any PAC members, but to paint a very real picture of what each alternative would involve and the likely impacts that would result.

Workshop: Stephanie Brooks asked participants to respond to two questions (see bullets below). Each participant was provided a sticky note to provide one response to each question. Responses are provided in the tables (attached) and were summarized and reported by Laurel Stegina (Fitzgerald & Halliday, Inc.) during the workshop.

- Given the information you have about the existing conditions of the bridge, what is your greatest concern about the bridge *as it exists now?*
- Given the information you have about the "no-build" alternative, what is your greatest concern? *How will this alternative affect the group you represent?*

Next Meeting: The next PAC meeting is anticipated to take place in mid-November. Additional alternatives will be discussed at future PAC meetings. The workshop activity will be replicated for each alternative, with PAC member input requested. Alternatives will be evaluated according to how they meet the project Purpose & Need, and for impacts on the built, natural, and social environment. NEPA/CEPA requires that all reasonable alternatives are considered; a preferred alternative is not selected until after impacts from each are examined. Mitigation of adverse impacts will also be considered as part of the NEPA/CEPA process. PAC members were requested to coordinate with others involved in the groups they represent between meetings and provide any feedback not already discussed at the meetings, and that any additional questions or comments can be sent directly to the project team.

PAC Representative	Existing Conditions Greatest Concern	No-Build Greatest Concern
Bridgebrook Marina	Marine traffic Pedestrian safety	Weight rating or de-rating Marine travel still deficient
Connecticut Trust for Historic Preservation	Historic character of bridge & surroundings	Maintenance/repairs may not maintain historic character
DeStefano & Chamberlain, Inc.	Not in attendance	Not in attendance
Imperial Landing Homeowner's Association	Traffic and impact on properties	Frequency of repairs and closures required
Saugatuck Rowing & Fitness Club, LLC	Not in attendance	Not in attendance
Westport Boating Advisory Committee	Limited times to get a boat under the bridge	Limited ability to navigate under the bridge
Westport Board of Selectmen	Safe and effective traffic flow	Bridge deterioration would result in even greater load restriction or complete closure
Westport Chamber of Commerce	That its character is maintained	Loss of the bridge's character & purpose
Westport Fire Department	Weight restrictions	Reduced rating depriving fire truck use and extended response time
Westport Flood and Erosion Control Board	No comments	No comments
Westport Planning and Zoning	Traffic safety	Proper maintenance schedule
WestCOG	Vehicular safety Historic character	Impact to transportation network
Westport Police Department	Increased traffic, pedestrian/bike safety, commercial traffic	
Westport Public Works Department	Safety; structural integrity and safe traffic flow	Eventual deterioration to the point where the bridge will be closed or restricted; this will impact the public
Westport Representative Town Meeting	Aesthetic look; historical aspect; type of structure; traffic	Loss of historic preservation; "band-aid" effect; weight restrictions
Westport Shellfish Commission	Not in attendance	Not in attendance

PAC Representative		Existing Conditions Greatest Concern	No-Build Greatest Concern
Section 106 Consulting Parties	Bridge Street Neighborhood	No concern; should be maintained	My group prefers No Build; wants history maintained
	Green's Farms Association	Safety; State DOT has not repaired bridge deficiencies	No Build is our preferred alternative with commitment to maintain
	Historic Bridge Foundation	No comments	Cataclysmic failure; boat passage on river inhibited (affects downtown development)
	HistoricBridges.org	No comments	The importance of avoiding destruction of the ornamental trusses
	Historic District Commission	No comments	No comments
	Save Westport Now	Protection of residential neighborhood & small-town historic character & charm	No comments
	Westport Preservation Alliance	Conserving the original geometry of the bridge	Nothing! No adverse effect w/No Build – That is what we want! No Build!

SIGN-IN SHEETS



WESTPORT SIGN IN SHEET
SEPTEMBER 26, 2018

Attended	First	Last	Title	Organization
X	Sam	Arciola		Westport Police Department
X	Priti	Bhardwaj		CTDOT
X	Bob	Caporale		Imperial Landing Homeowner's Association
X	Andrew	Colabella	Member	Westport Representative Town Meeting
	Sarah	Connolly	General Manager	Saugatuck Rowing & Fitness Club, LLC
	Jim	DeStefano, P.E.	Resident	DeStefano & Chamberlain, Inc.
X	Steven	Edwards	Consultant	Board of Selectmen
	Francisco	Fadul		CTDOT
X	Tim	Fields		CTDOT
	Kevin	Fleming		CTDOT
X	Jeff	Fontaine		CMJ
X	Robbie	Guimond	Owner	Bridgebrook Marina
X	Kristen	Hadjstylianos		WestCOG
X	Steven	Harlacker		H & H
VIA EMAIL	Kitty	Henderson	Executive Director	Historic Bridge Foundation
	Randy	Henkels	Chair	Historic District Commission (HDC)
	Clarinda	Higgins	Chair	Westport Shellfish Commission
VIA EMAIL	Nathan	Holth		HistoricBridges.org
X	Bill	Kiedaisch	Chairman	Town of Westport Boating Advisory Committee
	Foti	Koskinas		Westport Police Department
X	Norman	Kramer		Green's Farms Association

X	Paul	Lebowitz	Chair, Planning and Zoning Commission	Town of Westport
X	Kim	Lesay		CTDOT
	Mark	Levesque		CJM
X	Werner	Liepolt		Bridge Street Neighborhood
X	Dick	Lowenstein	Vice President	Green's Farms Association
X	Matthew	Mandell	Executive Director and President	Westport Chamber of Commerce
X	James S.	Marpe	Selectman	Westport Board of Selectmen
X	Mark	McMillan		CTDOT
X	Ted	Nezames		CTDOT
X	Peter	Ratkiewich, P.E.	Director of Public Works Flood and Erosion Control Board	Town of Westport
	Tom	Ryan		CJM
X	Kurt	Salmoiraghi		FHWA
	Art	Schoeller		Green's Farms Association
SUB ATTENDED	Valerie	Seiling Jacobs	Co-Chairman	Save Westport Now
X	John	Suggs		Westport Preservation Alliance
X	Christopher	Wigren	Deputy Director	Connecticut Trust for Historic Preservation
X	Robert	Yost	Fire Chief	Westport Fire Department
X	Mary	Young	Director, Planning & Zoning	Town of Westport
	Name		**Organization**	**Notes**
X	L. Schine			
X	Morley Boyd		Westport Preservation Alliance	Alternate to John Suggs
X	Doug Odell			
X	Ian Warburg		Save Westport Now	Subbed for Valerie Seiling Jacobs

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Project 158-214
Project Advisory Committee Meeting
November 28, 2018
Westport Town Hall, Rooms 201/201A

Report of Meeting #3

Present: See attached sign-in sheets.

Welcome, Introduction & Ground Rules: Following the welcome and introductions, the Department of Transportation (DOT) reviewed the Project Advisory Committee (PAC) ground rules for continued membership and participation on the PAC and commitments of the project team.

Meeting Purpose: The DOT reviewed the purpose of the meeting: to solicit input from PAC members on alternatives as part of the National Environmental Policy Act/Connecticut Environmental Policy Act (NEPA/CEPA) process. The DOT explained that the alternatives that had been discussed last meeting, and that were being discussed this meeting and the next meeting, were options previously developed. They are being used as drafts or starting points for discussion to determine impacts of possible solutions to the environment. The final alternatives that will be carried forward in the EA may be a combination of the draft alternatives or others that come out of discussions with PAC member groups.

Binders: The new distributed binder materials for PAC members were reviewed including: updated PAC member roster, summary report of PAC meeting #2, PAC meeting #3 presentation slides, and draft concepts of alternatives (for discussion purposes only).

ALTERNATIVES

The focus of PAC Meeting #3 was On-Alignment Alternatives including a rehabilitation option, a new construction option and two possibilities for traffic control during construction. These included a detour using Route 1 and a temporary bypass bridge. PAC members were asked to provide feedback on each of the presented alternatives, as well as suggestions for how to lessen the impacts of each alternative, referred to in NEPA/CEPA as "mitigation." Furthermore, PAC members were asked to share their thoughts on other alternatives or "hybrids" or "mash-ups" of the presented alternatives – in other words, taking desirable elements from one or more of the presented alternatives and combining them to create a potential new or modified alternative. Input from PAC members is presented below and attached.

Rehabilitation

Feedback on Concerns

- Visual impacts from height
- Additional truck use and commercial traffic if the clearance is raised
- Doesn't address issue of vehicle mirrors crashing
- Doesn't address issue of improving bridge opening and closing time
- Bridge still vulnerable to flooding and projected sea level rise under this alternative
- Bridge must be designed to safety allow for fire truck passage across the river
- During construction on I-95, concerns about routing traffic off the interstate and onto local roads and across the bridge

CONNECTICUT DEPARTMENT OF TRANSPORTATION

- If the roadway is widened, concerned bridge will be used as a cut-through

Ideas for Lessening of Impacts

- Widen sidewalks
- Improve right-turn lane onto Riverside Avenue to improve traffic flow
- Town can pursue restriction on truck traffic on municipal roads like Greens Farms Road, east of Bridge Street (example: Croaton)
- Is a historic "restoration" alternative a possibility? (See discussion below under General Comments; this will be called the "conservation" alternative.)

New Bridge On-Alignment

Feedback on Concerns

- Congestion is a safety issue for bicycle/pedestrian travel on west side of the river; need better accommodations on south side of the intersection to eliminate need to cross the street
- Sidewalk configuration (revisions and addition) to improve pedestrian access and safety
- Loss of existing trusses
- Greater clearance to improve mobility for marine vessels trade-off with visual impact/scale of new bridge; adapt to clearance of Metro North railroad bridge (to the south)
- Widened bridge may invite higher speeds
- Maintain/improve water quality for shellfish habitat through roadway design (open structure vs. solid roadway)

Ideas for Lessening of Impacts

- Lengthen and create a better right-turn lane
- Improve passage for marine traffic and limit times of navigation channel closure/restrictions during construction
- Add bikeway/sidewalk to both sides; trade-off is that this improvement would have an adverse impact on property and character of the area
- Re-attached trusses as decorative element of new bridge

Detour

- The detour is not tenable due to congestion on Route 1 and poor level of service on its intersections; along with very limited opportunity for improvement
- Detour would require major intersection improvements on Route 1

Temporary Bridge

- Construction details (i.e., type of equipment used, construction staging areas) will be looked at later in the design process; conceptual only at this time
- Need temporary roadside barrier for roadway protection
- Potential right of way to be looked at by CTDOT Rights-of-Way (ROW)
- Stone walls: reconstruct to existing conditions after construction is completed
- Permanent easement purportedly protects wetlands associated with Imperial Landing development (Town may need to be involved in release)
- Visual impact of height on adjacent properties
- Intersection improvements needed in advance of constructing temporary bridge (or else drivers will avoid the area); improve alignment and right-turn onto Riverside Avenue
- Install sidewalk on south side of temporary bridge
- Pedestrian safety concern with temporary bridge crossing; it is a longer river crossing than under existing conditions
- Include pedestrian walkway on both sides of the bridge

General Comments

- One PAC member noted that when the PAC discusses “restoration”, this term has a very specific definition that requires detailed and official historic action to restore a structure to its original state (in case of the Cribari Bridge, that is 100+ years ago). To clarify, the term “Conservation” will be used to distinguish and discuss this type of alternative requested by the PAC. The CTDOT recognizes the importance of creating a Conservation Alternative.
- Regardless of the alternative selected, the Town of Westport can move forward now with its own efforts to control truck traffic on town-owned roads leading to the Cribari Bridge. To this end, the Town might also consider following the lead taken by other towns to petition the state to eliminate trucks on certain stretches of state roads.
- As a refresher, review alternatives previously discussed at the start of future PAC meetings
- Develop a matrix comparing features associated with each alternative (i.e., height, lane width, truck accommodations, bicycle lanes, pedestrian accommodations, speed of bridge opening/closing, maintenance cost)
- Compare/contrast alternatives in Environmental Assessment/Environmental Impact Evaluation (EA/EIE)
- Consider a No Build/Rehabilitation hybrid alternative which fixes what is broken, makes the bridge usable, and maintains historic truss as a decorative element
- Consider a Full Rehabilitation alternative without widening the roadway or spreading the trusses
- Look at lengthening right-turn lane onto Riverside Ave to increase storage capacity for each alternative considered

- PAC members prefer scanning of their original workshop sheets and attaching to summary report of meeting (rather than entering in matrix format - like Meeting #2)

Next Meeting: The next PAC meeting is anticipated to take place in late January. The focus will be Off-Alignment Alternatives. The workshop activity will be replicated, with PAC member input requested. Alternatives will be evaluated according to how they meet the project Purpose and Need, and for impacts on the built, natural, and social environment. NEPA/CEPA requires that all reasonable alternatives be considered; a preferred alternative is not selected until after impacts from each are examined. Mitigation of adverse impacts will also be considered as part of the NEPA/CEPA process. PAC members were asked to continue to coordinate with others involved in the groups they represent between meetings and provide any feedback not already discussed at the meetings, and that any additional questions or comments can be sent directly to the project team.

PAC Representative	Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
					Detour	Temporary Bridge
Bridgebrook Marina	I'm concerned no change in marine access No bike path No thru traffic by Town	[no input]	Scale of structure Concerns of shoulders Default height of the Metro North bridge	[no input]	[no input]	[no input]
Connecticut Trust for Historic Preservation	Design is very schematic. It is hard to judge its effect no historic character. How will repairs to stone abutments be done? Repair in-kind is preferable.	[no input]	Loss of historic bridge. Scale appropriate to surroundings incl. National Register district.	Consider reusing historic truss Scale modifications discussed in mtg. e.g. sidewalk outside truss, narrower shoulders	[no input]	Stone walls on Bridge Street – resources in historic district could be damaged by construction
DeStefano & Chamberlain, Inc.	Limited service life Roadway width not adequate No improvement to intersection No improvement to boat traffic	[no input]	Loss of historic fabric Wide lanes great Scale too large Shoulders not needed Improves navigation	[no input]	Unacceptable	Good idea
Imperial Landing	As trusses are repaired – length of time of bridge closure a major issue!	[no input]	Three years bridge closure! Scale could be huge	[no input]		Impact on private property No limit on temp. bridge means heavy traffic in neighborhood

PAC Representative	Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
					Detour	Temporary Bridge
Homeowner's Association	Maintain posted bridge height restriction to limit truck traffic. Historic nature of bridge appears to be compromised. Will the changing of town laws to restrict traffic suffice?		Wider road means faster traffic What is the change in elevation of the bridge? Must limit truck traffic across bridge Noise Environmental Mitigation			Where does the construction equipment sit? Bridge height is very high – effects aesthetics for Imperial Landing
Saugatuck Rowing & Fitness Club, LLC	7 ft. clearance from high tide to steel, boats must go under, more height would help Children walk to club & sidewalk isn't being widened We like that bridge will have same look Roadway hasn't been widened	[no input]	Huge bridge, could be scaled off in the neighborhood 3-year project is very long Wider lanes means faster cars, dangerous for pedestrians Great that bridge is high above water line		Traffic Improve intersections	Additional construction Designed for highway traffic Keep restrictions on temporary bridge

PAC Representative	Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
					Detour	Temporary Bridge
	Can't increase speed of the opening Removal of electrical box, which will increase height & posted allowance -> truck friendly		2 bike lanes & 1 sidewalk would be helpful 5 ft. shoulders are too wide & put sidewalk outside of trusses			
Westport Boating Advisory Committee	Maintaining current height limits marine traffic (high mean water to bottom of bridge) Roadway approach does not change still dangerous for vehicles Vehicles (larger) will still face potential accident causing further bridge damage Maintaining the current motor placement will add expense due to frequent flooding	[no input]	Better sidewalks and wider better flow for cars & pedestrians Increased height above water allows more traffic w/o having to open bridge Allows for emergency equip to cross bridge Electrical components now further away from water (flooding) is better for maintenance	[no input]	Increased downtown traffic	Maintains current flow of traffic around town Consider the pedestrian traffic flow options on the west side

PAC Representative	Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
					Detour	Temporary Bridge
	Money not well spend on this bridge configuration Investment will only last 25-30 years					
Westport Board of Selectmen	Need to widen sidewalks No improvement to width of travel path – 9'9" not desirable Lengthen right turn lane Limited sidewalk width Upgrade resiliency of bridge opening mechanism No improvement to flooding of mechnicals Consider improving turning radius on S.E. corner of Bridge St. & Riverside – includes	[no input]	Proportionality of bridge to surroundings Like the elevation to protect mechanicals and improve boat traffic Reduce operations costs – need for fewer personnel (or none) to open/close bridge Modern mechanicals will speed up open/close Pedestrian safety may require re-think of	[no input]	Not for consideration Not feasible with Rt 1 intersections	Compensation for business disruption Maximize que space approaching intersection – right hand lane

PAC Representative	Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
					Detour	Temporary Bridge
	taking of small Bridge Square corner Only a 25-year life cycle projection Remove overhead electrical box – install marine cable		sidewalks/bikeway location Scale is too large – sidewalk outside of truss and reduced shoulder will help Land could be reduced to 10'6"			
Westport Chamber of Commerce	Concern trucks will use bridge Rather see increase in road than sidewalk if at all. Support retaining character & use of existing bridge Don't want increase in height – not 13 to 14, not 14'1" -14'3" Would have liked to have seen [?] right turn in this proposal Would have liked to have seen better turn	[no input]	Not an option No need for it Too big Out of character Some off-bridge improvements should have been on rehab proposal	[no input]		$ to business [?] / property owner Temp bridge west side last, the west side first [?]

PAC Representative	Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
					Detour	Temporary Bridge
	options on west side in this proposal Like to see a hybrid no build/rehab Like to see chart will all options compared Bikes can walk over bridge, if that preserves character					
Westport Fire Department	Ability to drive all fire apparatus over the bridge Still doing damage to fire engines due to narrow roadway Have to seize the bridge with emergency signage to cross over	[no input]	Ability to drive all fire apparatus over the bridge Bridge would not flood during storms giving access to apparatus No damage to fire apparatus with wider road Do not need to seize bridge for emergency response over it	[no input]	[no input]	[no input]

PAC Representative	Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
					Detour	Temporary Bridge
Westport Flood and Erosion Control Board	No input provided					
Westport Planning and Zoning	Can a header board be installed which has a lower "max height" indicated than is standard? How similar will a replacement structural member be to the original it replaces? In the No Build, what would the maintenance be like (compared to what we have now)? Fix but don't change	Want the least impact on existing social fabric Want to enhance usage of bridge by bikers, walkers, and commuters	Want variables and ranges for each proposed change Least vs. most Smallest vs. largest Lowest vs. highest	Idea: create a riverfront walkway for social and commercial use which also creates circulation on and off the bridge	Level if intersections would be negative impacted Business on Post Rd negative impact, big concern	Where does the construction equipment go?
WestCOG	Impact to travel patterns Safety for vehicles passing under bridge (accidents) Sidewalks that are ADA compliant	[no input]	Intersection traffic flow Ped/bike access	[no input]	Concern – level of service at the intersections	Ped/bike access -> safe crosswalk locations Temporary bridge may accommodate most traffic, but construction will still impact the surrounding roadway network.

PAC Representative	Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
					Detour	Temporary Bridge
Westport Police Department	Concerns: Traffic congestion, bike traffic, pedestrian traffic & walkways				Oppose the detouring concept	Temporary bridge a plus to properly manage traffic Needs to address marine traffic How to lessen impacts: proper signage, informational posting with digital sign, social media
Westport Public Works Department	No input provided					
Westport Representative Town Meeting	Height of bridge Signage to prevent oversized vehicles from crossing 4 ft. width expansion but same road length Height of bridge to rising sea level rise Use of black shell rust inhibitors on point and joints	[no input]	Width increase Same height Bike lane	[no input]		

PAC Representative	Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
					Detour	Temporary Bridge
Westport Shellfish Commission	No mention of remediation of runoff or road debris entering river – this is serious Limit height to existing	[no input]	Runoff remediation As presented, seems too large a scale Like the bike lanes – prefer one though Like broader access	[no input]		Prefer temporary bridge to detour Need walkway on temporary road

PAC Representative		Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
						Detour	Temporary Bridge
Section 106 Consulting Parties	Bridge Street Neighborhood	Restore historical authentic We need a conservation alternative	Marine traffic cannot be interrupted Limit traffic? Cannot pollute either during construction Temporary bridge cannot pollute river	Unacceptable destroys historic dist.	Forget this Too much impact on environment Consider noise & air quality Find out what construct will do to river?		Forget south side sidewalk Minimize taking property Noise & light pollution necessary
	Green's Farms Association	Stop signs, speed bumps, to make it difficult to <u>any</u> vehicle Passive traffic control Reminds me of [?] teeth being replaced by implants. Looks	[no input]	[no input]	[no input]	Route 1 + 136 & 1 + 33 intersections [?] need improvement regardless & before the temporary bridge is built	Restrict commercial traffic to what would eventually be permitted on the rehab'd bridge Permanent traffic light at Imperial /

PAC Representative		Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
						Detour	Temporary Bridge
		the same, but it is not the original <u>Anything</u> that makes access to Greens Farms Road easier must be countered by local traffic control Calculate the number of "swings" then and now					Bridge St. intersection
	Historic Bridge Foundation						
	HistoricBridges.org	Not in attendance					
	Historic District Commission	Solution should be a reasonable compromise between retaining as much of existing bridge while correcting	[no input]	Initially do not see sufficient benefit to replacement versus rehabilitation of existing bridge	[no input]	Too problematic	Rehab. Existing bridge with process that does not require a

PAC Representative		Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
						Detour	Temporary Bridge
		serious structural deterioration Concern that as much of existing character of bridge is retained. Retain as much of existing structure as possible. No modification or replacement of bridge must not encourage increased large truck traffic. Careful study should be made to determine if rehab. Could be done		Scheme presented seems larger than necessary with too little in added amenity			temporary bridge

PAC Representative		Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
						Detour	Temporary Bridge
		without requiring by-pass temporary bridge.					
	Save Westport Now	Slow traffic Need a <u>pure restoration</u> alternative (so it doesn't disappear) Don't raise height it will allow larger trucks Concerned about making it easier for 18-wheelers Need to maintain historical authenticity	[no input]	Danger of cars going faster if widen lanes Danger of bridge being out of scale with neighborhood Don't use commuter lot for staging Too big a structure – will encourage truck traffic Too tall – will encourage more traffic	[no input]	[no input]	[no input]

PAC Representative		Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
						Detour	Temporary Bridge
		Concerned about changing appearance of bridge Would like wider sidewalk Please review previous comments provided in other process Need to measure traffic during evening rush Need to improve 2 intersections		Put sidewalk on south side to ease RR access Environmental issues! Shellfish need to be protected Sidewalk on south side of temp. bridge Need a turn lane on temp bridge			

PAC Representative		Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
						Detour	Temporary Bridge
		Extend the right turn lane so fewer back-ups					
	Westport Coalition	Bike & ped both east & west Future water level rise Higher ongoing maintenance costs Slow rate of opening & closing – impact on Westport & river Maybe preserve current bridge by moving it and build sate of art new	[no input]	[no input]	Emphasis on bike & pedestrian flow Both sides of bridge	Too hard	Pedestrian access on both sides Impact on local business

PAC Representative		Rehabilitation Alternative Feedback	Rehabilitation Alternative Mitigation	On-Alignment Replacement Alternative Feedback	On-Alignment Replacement Alternative Mitigation	Detour or Temporary Bridge Feedback	
						Detour	Temporary Bridge
		Town should actively work to manage traffic calming on local roads Doesn't help traffic problem					
	Westport Preservation Alliance	No input provided					

SIGN-IN SHEETS



SIGN IN SHEET

NOVEMBER 28,2018

Note: PAC members shaded in pink.

Attended	First	Last	Title	Organization	EMAIL	PAC Member	Alt.
X	Sam	Arciola		Westport Police Department	sarciola@westportct.gov	X	
X	Priti	Bhardwaj		CTDOT	Priti.Bhardwaj@ct.gov		
X	Morley	Boyd		Westport Preservation Alliance	boyd.cthh@gmail.com		X
X	Bob	Caporale		Imperial Landing Homeowner's Association	bobcaporale@gmail.com	X	
X	Andrew	Colabella	Member	Westport Representative Town Meeting	acolabellartm4@gmail.com	X	
X	Sarah	Connolly	General Manager	Saugatuck Rowing & Fitness Club, LLC	sconnolly@saugatuckrowing.com	X	
X	Ron	Corwin		Westport Coalition	ron@roncorwin.com	X	
X	Jim	DeStefano, P.E.	Resident	DeStefano & Chamberlain, Inc.	jimd@dcstructural.com	X	
X	Steven	Edwards	Consultant	Westport Board of Selectmen	sedwards@westportct.gov	X	
X	Francisco	Fadul		CTDOT	Francisco.Fadul@ct.gov		
	Tim	Fields		CTDOT	Timothy.Fields@ct.gov		
	Kevin	Fleming		CTDOT	Kevin.fleming@ct.gov		
X	Jeff	Fontaine		CJM	JFontaine@cjmpc.com		

X	Robbie	Guimond	Owner	Bridgebrook Marina	robbieguimond@gmail.com	X	
X	Kristen	Hadjstylianos		WestCOG	khadjstylianos@westcog.org	X	
X	Steven	Harlacker		H & H	sharlacker@hardestyhanover.com		
PHONE	Kitty	Henderson	Executive Director	Historic Bridge Foundation	kitty@historicbridgefoundation.com	X	
X	Randy	Henkels	Chair	Historic District Commission (HDC)	hdc@westportct.gov	X	
X	Clarinda	Higgins	Chair	Westport Shellfish Commission	rindyhiggins@gmail.com	X	
	Nathan	Holth		HistoricBridges.org	nathan@historicbridges.org	X	
X	Jennifer	Johnson		Westport Coalition	jbarrjohnson@gmail.com	X	
X	Bill	Kiedaisch	Chairman	Town of Westport Boating Advisory Committee	billkiedaisch@gmail.com	X	
	Foti	Koskinas		Westport Police Department	fkoskinas@westportct.gov	X	
X	Norman	Kramer		Green's Farms Association	normankramer@yahoo.com	X	
X	Paul	Lebowitz	Chair, Planning and Zoning Commission	Town of Westport	paul4pandz@gmail.com	X	
X	Kim	Lesay		CTDOT	Kimberly.Lesay@ct.gov		
X	Mark	Levesque		CJM	mlevesque@cjmpc.com		
X	Werner	Liepolt		Bridge Street Neighborhood	wliepolt@mac.com	X	
	Dick	Lowenstein	Vice President	Green's Farms Association	dick.lowenstein@gmail.com	X	
X	Matthew	Mandell	Executive Director and President	Westport Chamber of Commerce	matthew@westportwestonchamber.com	X	
X	James S.	Marpe	Selectman	Westport Board of Selectmen	Jmarpe@westportct.gov	X	

X	Mark	McMillan		CTDOT	mark.mcmillan@ct.gov		
X	Ted	Nezames		CTDOT	Theodore.Nezames@ct.gov		
X	Peter	Ratkiewich, P.E.	Director of Public Works Flood and Erosion Control Board	Town of Westport	pratkiewich@westportct.gov	X	
X	Tom	Ryan		CJM	tryan@cjmpc.com		
X	Kurt	Salmoiraghi		FHWA	Kurt.Salmoiraghi@dot.gov		
	Art	Schoeller		Green's Farms Association	art@optonline.net	X	
X	Valerie	Seiling Jacobs	Co-Chairman	Save Westport Now	valerieseilingjacobs@gmail.com	X	
X	David	Shorrock		Imperial Landing Homeowner's Association	dwshorrock@yahoo.com		X
X	John	Suggs		Westport Preservation Alliance	johnsuggs@gmail.com	X	
X	Christopher	Wigren	Deputy Director	Connecticut Trust for Historic Preservation	CWigren@cttrust.org	X	
X	Robert	Yost	Fire Chief	Westport Fire Department	ryost@westportct.gov	X	
	Mary	Young	Director, Planning & Zoning	Town of Westport	maryyoung@westportct.gov	X	

Public Sign In							
	First Name	**Last Name**			**Email Address**		
	Martin	Bell			Martyb@prescients.com		
	Anthony	Rossi			Arossi06880@gmail.com		
	Jim	Ardrey			jamesardrey@gmail.com		
	Sal	Liccione			Salliccione2001@yahoo.com		
	Dana & Rob	Moorman			rob@remoorman.com		
	Barbara	Linardvies			blinardvies@yahoo.com		
	Douglas	O'Dell			buddodell@hotmail.com		
	Richard	Anzalone			testmankit@aol.com		
	Pete	Hughes			Peta06855@gmail.com		
	Ed	Barnhart			erbarnhart@yahoo.com		
	Len & Shelly	Sherman					
	Jim	Mullen			Jimd.mullen@gmail.com		
	Saranda	Berisa			saranberi@icloud.com		
	Will	Haskell			Willhaskell96@gmail.com		
	Rhea	Ruggien					
	Erica	Muniz			emuniz@gpinet.com		
	Alexander	Chingas			alex@alexchingas.com		
	Jennifer	Kleiner			Jb9797@aol.com		
	Ian	Warburg			iwarburg@me.com		
	Rima	Demarais			sethel@optonline.net		
	Ben	Meyer		Owner Bridge Square	Bendict101@yahoo.com		
	Nicholas	Eisenberger			Nicholas.eisenberger@gmail.com		
	Marisa	Manley			marisamanley@optonline.net		
	Jim	Powell			Powell3@optonline.net		
	Steven	Chin			Stevenchin13@yahoo.com		
	Jay	Walshon			Netmd50@gmail.com		

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Project 158-214
Project Advisory Committee Meeting
January 30, 2019
Westport Town Hall, Rooms 201/201A

Report of Meeting #4

Present: See attached sign-in sheets.

Welcome, Introduction & Ground Rules: Following the welcome and introductions, the Connecticut Department of Transportation (CTDOT) reviewed the Project Advisory Committee (PAC) ground rules for continued membership and participation on the PAC and commitments of the project team.

Meeting Purpose: The CTDOT reviewed the purpose of the meeting: to solicit input from PAC members on the Conservation Alternative and two Off-Alignment Alternatives as part of the National Environmental Policy Act/Connecticut Environmental Policy Act (NEPA/CEPA) process. These, along with the previously discussed No–Build, Rehabilitation, and On-alignment Replacement alternatives, are being used as drafts or starting points for discussion to determine their impacts on the various environments. The final alternatives that will be carried forward in the EA may be a combination of the draft alternatives or others that come out of discussions with PAC member groups.

Binders: The new distributed binder materials for PAC members were reviewed including: summary report of PAC meeting #3, PAC meeting #4 presentation slides, draft concepts of alternatives (for discussion purposes only), and alternatives comparison matrix.

Comments on Comparison Matrix

- Add costs. CTDOT will use estimates from the Rehabilitation Study Report previously completed under Project 158-212, dated June 2016.
- Add new row to note possible construction disruption to local area, such as parking space loss and business disruption.
- Include the controlling (lowest) vertical clearance for each alternative.
- Add another row for Rights-of-Way impacts, such as the number of properties affected by each alternative (i.e., full, partial takings).
- Reference previous study of amount of traffic that backs up from half a mile away from bridge

ALTERNATIVES

The focus of PAC Meeting #4 was the Conservation Alternative and two Off-Alignment Alternatives. PAC members were asked to provide concerns about each of the presented alternatives, as well as suggestions for how to address any concerns PAC members identified for each alternative. Input from PAC members is summarized below and attached.

Conservation Alternative

- Interested in design considerations for new truss steel to resemble original steel, plus inclusion of a possible rail system (Baker two rail).
- What will be the height of bridge (highest and lowest points) once the electrical box is raised? Concerned about clearance for trucks.
- Would like to know about staging for construction, especially regarding properties in the north.

- Concerns about impacts to stone walls (northeast); reconstruct if affected.
- 1990s marine clearance a concern (less than 4 feet at mean high water).

Off-Alignment Replacement Alternative

- Maintain traffic lights on roads to the bridge, calm traffic; traffic congestion a concern at the intersection (west side).
- Strong preference to keep swing bridge by majority of PAC members; rolling bridge concept doesn't fit into character of community, unless it can be built with a truss.
- Would like to know more about "marketing" the bridge, reusing the old truss, would like to know more about design exceptions.
- If bridge is removed along causeway and shifted to the north, there is interest in a returning causeway to town for public use (i.e., fishing pier) as part of mitigation.
- Concerns as to how many property takes are needed.
- Want to understand elevation of approach roadway, especially with regards to lights from vehicles affecting nearby houses and overall character of the area. Inquired about a light analysis.
- Marine concerns with navigation restrictions during peak season.

Parallel Off-Alignment Replacement Alternative

- Superimpose existing bridge on top of the other alignment alternatives, Should also superimpose the alternatives so that the scale/street-level image can be compared.
- Preference for this off-alignment alternative when comparing the two, since it requires less permanent impacts on northern properties.
- Would like to see the new truss look as much like the old one as possible.
- Would not recommend south sidewalks on any alternative due to lack of continuity on east approach and challenges/safety issues of a potential crosswalk located on the east side of the bridge.

Next Meeting: The final PAC meeting is anticipated to take place in spring of 2019. The CTDOT will revisit each of the alternatives under consideration for discussion, and review the remaining steps in the process and schedule. PAC members were asked to go back to the groups they represent, communicate the concepts, and gather feedback for all reviewed alternates before the final meeting. Following the final PAC meeting, the Department will proceed towards drafting the Environmental Assessment. Documentation will be released to the public for review in advance of a Public Hearing. Questions and comments can be sent throughout the process directly to the Department, via:

Priti S. Bhardwaj, P.E.
Transportation Supervising Engineer
Connecticut Department of Transportation
2800 Berlin Turnpike, Newington, CT 06131
Phone: 860-594-3311
E-Mail: Priti.Bhardwaj@ct.gov

PAC Representative	Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement: Concerns	Off-Alignment Replacement: Solving Concerns You Identified	Parallel Off-Alignment Replacement: Concerns	Parallel Off-Alignment Replacement: Solving Concerns You Identified
Bridgebrook Marina	Existing bridge height too low No improved sidewalk No access for mooring police & fire No increase in width of roadway Environmental impact in a positive way – north of bridge for business – bridge to downtown	[no input]	Scale Bridge opening issues Enviro disturbance Land take that are permanent	[no input]	Same	[no input]
Connecticut Trust for Historic Preservation	Not in attendance					
DeStefano & Chamberlain, Inc.	Not in attendance					
Imperial Landing Homeowner's Association	It would be helpful to know the exact vertical clearances for this option.	Request that staging happens away from the residential properties	Will any "full takes" of property be required on the northeast side of the bridge? Need a definitive answer on this.	If any full land takes are ever a possibility, we would not be at all in favor of this option.	This off-alignment option appears to have a far lower impact on land takes and gives more flexibility on the type of bridge that can be built. Not sure why	Suggest removing the non-parallel off-alignment option based on all of the concerns that were raised.

PAC Representative	Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement: Concerns	Off-Alignment Replacement: Solving Concerns You Identified	Parallel Off-Alignment Replacement: Concerns	Parallel Off-Alignment Replacement: Solving Concerns You Identified
	Are there any differences in the temporary bridge (ROW, temporary easements, etc.) between this and other options. Environmental impacts of construction (i.e., noise, pollution, staging areas)? Will staging areas affect our neighborhood or require access through our neighborhood?	abutting the bridge.	What will the roadway elevations be at the rear of the residential properties at the northeast side of the bridge? Will it be different than it is today? Aesthetics of a new bridge is of major concern. Would like this to be vetted more fully. Traffic on the northwest side due to new driveway for Parkers [Mansion, sic]. Any additional street lights required that will affect residential properties to the north? Why would we ever consider a south-side sidewalk? There is no	This does not appear to be a favorable option based on all of these concerns.	we would even want to consider the other off-alignment option. Still want to ensure that no "full land takes" would be required due to properties begin rendered out of code.	

PAC Representative	Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement: Concerns	Off-Alignment Replacement: Solving Concerns You Identified	Parallel Off-Alignment Replacement: Concerns	Parallel Off-Alignment Replacement: Solving Concerns You Identified
			safe crossing on the east side of the bridge! Without a continued south side sidewalk on Bridge St., this does not appear to be a viable design.			
Saugatuck Rowing & Fitness Club, LLC	Not in attendance					
Westport Boating Advisory Committee	Clearance at mean high water is limited and very low (approx.. 4'-5') further hampering boat traffic. Roadway is still very narrow, no real change. No real investment benefit. No real benefit to traffic flow. Repairs will continue due to vehicle traffic hitting the guardrails, truss members	New bridge with shoulders and sidewalks • Ample clearance for boat traffic • Straight approach from roadway to bridge	Impact to traffic attempting to get in and out of businesses on west side could create backup. Needs a traffic study. Loose the low profile of a swing bridge. Draw bridge is very high at the counter weight section.	None. Design is not desirable.	Same concerns as noted in off-alignment notes. Minimal difference between the two.	None.

PAC Representative	Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement: Concerns	Off-Alignment Replacement: Solving Concerns You Identified	Parallel Off-Alignment Replacement: Concerns	Parallel Off-Alignment Replacement: Solving Concerns You Identified
	reducing the life span of the bridge at a faster rate than a modern bridge roadway system. Flooding will impact electrical and motor components					
Westport Board of Selectmen	Would the existing bridge be closed during the construction of this alternative? • Temporary bridge? • Alternating one-way? (traffic back up result) Economic impact on area businesses (immediate Saugatuck area and further up-river) • Short-term (construction) • Long-term (post-construction). Likely the up-river businesses	Pursue the temporary bridge; the traffic impact of the alternating one-way would be terrible Pursue a broader economic impact study as part of the EA	Need to limit bridge openings of existing bridge during construction (impact on marine traffic) What type of bridge opening capability? (bascule vs. rolling lift vs. vertical lift) Eastbound headlight impact on Imperial Landing neighborhood	[no input]	Speed of bridge opening/closing (bascule vs. rolling vs. swing)	Speed of bridge opening/closing – estimated times for various alternatives

PAC Representative	Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement: Concerns	Off-Alignment Replacement: Solving Concerns You Identified	Parallel Off-Alignment Replacement: Concerns	Parallel Off-Alignment Replacement: Solving Concerns You Identified
	• This needs analysis for all alternatives that are being seriously considered (short list)					
Westport Chamber of Commerce	Appreciate seeing this option The height remains the primary reason to do this vs. rehab. If rehab., then what about the railings? It's really the only difference other than waterproofing items.	Railings – cannot be 3 rail – huge and ugly. Something that keeps the bridge safe and cars from being destroyed in a crash is an issue.	Height, character, intersection / on west side with 2 driveways. No need for 2 sidewalks; not enough pedestrians.	Not doing it. No way to keep height nor keep character. Intersection with new driveways, maybe lights, but won't work.	[no input]	[no input]
Westport Fire Department	Ability to cross the bridge with fire apparatus due to size and weight restriction. Cannot cross bridge during flooding conditions. Hurricane Irene & Sandy – could not cross.	Increase weight rating and size clearance so we can drive fire apparatus across the bridge	Ability to drive fire apparatus across the bridge.	It is a new bridge with wider opening so I can drive the fire apparatus over it. Raised up so it could still be used in a flooding condition.	New modern bridge that gives me the ability to drive fire apparatus across the bridge. Higher bridge out of flooding. Wider so less damage to apparatus striking bridge components.	Ability to cross with a fire engine.

PAC Representative	Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement: Concerns	Off-Alignment Replacement: Solving Concerns You Identified	Parallel Off-Alignment Replacement: Concerns	Parallel Off-Alignment Replacement: Solving Concerns You Identified
	Damage to fire apparatus striking bridge components.			Lessen damage to apparatus striking bridge components.		
Westport Flood and Erosion Control Board	Bridge will still be an impediment to traffic and dangerous for vehicles because of limited horizontal clearance between vehicles 2 school buses in different directions will still hit.	There is nothing possible in this scenario because this bridge won't be any wider than the existing.	This would change the aesthetic of the area significantly (the bridge depicted). Significant impact to mansion clam house access is a concern as to how it would impact traffic. Cannot be open (old bridge) for periods during construction. This would impact boat traffic.	Truss from end to end with pony truss or bascule type in between (sort of solves aesthetics).	Closure of swing bridge during construction.	Rolling bridge could possibly swing old bridge during construction.
Westport Planning and Zoning	Exact vertical height of finished bridge? Who owns the bulkhead on the east side after the existing bridge is removed? Can it be given to town as green space?	Replace "guide rail" with same size, style and strength as existing.	Need estimate of time when bridge is closed. Would substitute an "open bridge" during construction for a bridge which starts and finishes same spot.	[no input]	[no input]	[no input]

PAC Representative	Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement: Concerns	Off-Alignment Replacement: Solving Concerns You Identified	Parallel Off-Alignment Replacement: Concerns	Parallel Off-Alignment Replacement: Solving Concerns You Identified
WestCOG	Not in attendance					
Westport Police Department	Pedestrian and bike safety Vehicle congestion Width of road and lanes Boating safety – bridge height at high tide Marine traffic	Wider bike and pedestrian walkways and lanes Increase the height of bridge for increased marine traffic use and public safety vessels Increase width of lanes to avoid vehicle side by side contacts	Clearance for boating traffic at high tide No bridge openings during a period of construction	Addresses pedestrian and bike safety concerns Addresses width of roadway concerns Increase height of bridge for boating traffic	Not in favor of a southern sidewalk – public safety issue Concern about bridge openings during construction	[no input]
Westport Public Works Department (former Director)	Safety concern without increase in lane width Would push for inclusion of water resistant mechanical equipment Would maintain existing appearance	Rehab option allows for increased width to address safety concern while still providing for appearance of truss system	Scale/size not appropriate for area Maintenance of truss system desirable for neighborhood No advantage to replacement on-line with significant	[no input]	Preferred to non-parallel option but still out of scale for neighborhood No need for southern sidewalk.	Reduce scale of bridge by reducing width of shoulder

PAC Representative	Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement: Concerns	Off-Alignment Replacement: Solving Concerns You Identified	Parallel Off-Alignment Replacement: Concerns	Parallel Off-Alignment Replacement: Solving Concerns You Identified
	Repetitive damage to truss system is a disadvantage		disadvantages in appearance			
Westport Representative Town Meeting	Still historical Still the same bridge Still the same aesthetic looks and remains in its original structure [illegible] Would suggest enamel, turtle shell paint to prevent rust/rot and some wear repairs if bridge is hit again.	[no input]	Old bridge is completely removed Historical factor is gone Wider Taller (16'3") Built over wetlands, abandoning existing roadway Damages to ecosystem, noise pollution Still flooding possible on west side	Access to lot will invite vehicles to "beat" the light in traffic Crossing bridge and immediate entrance/exit to flow dangerous Entrance/exit to lot will be too close to river wall/seawall is precarious, not sturdy, well maintained Removal of trees and property to Parker Mansion is disastrous and changes the look of our historic area	Sidewalk/footpath safety Electric building house added next to Peters Bridge Square Loss of property to Parker Higher elevation by 3-foot and 6-foot higher bridge = more visual intrusion to neighbors Loss of buffer land to homes	[no input]
Westport Shellfish Commission	Any work must include a sediment trap basin to capture all heavy metals and any required or additional prevention, corrective or remediation of	Assumes part of EA Ensure sediment trap basin to capture all	Same concern for all issues related to Westport Shellfish Commission	Same concern as outlined previously by Westport Shellfish Commission	Any work must include a sediment trap basin to capture all heavy metals and any additional prevention corrective or remediation of existing roadway run off should be	Same as previously stated

PAC Representative	Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement: Concerns	Off-Alignment Replacement: Solving Concerns You Identified	Parallel Off-Alignment Replacement: Concerns	Parallel Off-Alignment Replacement: Solving Concerns You Identified
	existing roadway runoff should be included as part of any work.	heavy metals and construction equipment & material and remediate area (surrounding) directly impacted by all road traffic			included as part of any work.	

PAC Representative		Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement Alternative: Concerns	Off-Alignment Replacement Alternative: Solving Concerns You Identified	Parallel Off-Alignment Replacement Alternative: Concerns	Parallel Off-Alignment Replacement Alternative: Solving Concerns You Identified
Section 106 Consulting Parties	Bridge Street Neighborhood	We need a baseline study of how traffic, pollution (diesel, asbestos, etc.) affects the environment Further studies should provide specific, data driven explanations	Will conserve the historic integrity of the district Will minimize the already troublesome level of traffic	This will create problems & solve NONE Limits marine use Kills one commercial property Takes too much wetlands DESTROYS THE HISTORIC BRIDGE	This solution destroys the residential character of the east side of the river. There would have to be massive light shields Historical mitigation – I doubt	Completely out of character of Westport. Destroys historic integrity, hostile to the economic vitality of the Saugatuck business neighborhood.	This creates a million concerns. It solves nothing.

PAC Representative		Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement Alternative: Concerns	Off-Alignment Replacement Alternative: Solving Concerns You Identified	Parallel Off-Alignment Replacement Alternative: Concerns	Parallel Off-Alignment Replacement Alternative: Solving Concerns You Identified
		Sediment pollution? Construction debris Concern about staging area		Unacceptable A southern sidewalk is nonsense & unsafe			
	Green's Farms Association	Not clearly stated what the final roadway vehicle clearances will be.	[no input]	If we build a better bridge, "they" will come & demand changes in west-side street alignment	Need "exception" ruling to state & federal standards & guidelines to ensure local control of neighborhood traffic	See non-parallel comments & concerns	See non-parallel General question: using the No-Build option as a baseline with a cost of $100, it would help to assign a relative cost for all the other options; e.g., if the No Build cost is $100, then the "on line rebuild" would cost $100,000. General cost ratios.
	Historic Bridge Foundation	*May receive input from Kitty Henderson*					
	HistoricBridges.org	*May receive input from Nathan Holth*					
	Historic District Commission	Concern that if the commitment is to conserving the existing bridge, that modifications will truly retain as	CTDOT could engage with historic bridge authorities such as the Historic Bridge	It would destroy the existing bridge completely and replace it with one of completely different character.	Keeping existing bridge where it is and pursue the rehabilitation solution.	Same as Off-Alignment Replacement Scale and character would be drastically	Same solution as Off-Alignment, work to rehabilitate the existing bridge, don't replace it in it's entirety.

PAC Representative		Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement Alternative: Concerns	Off-Alignment Replacement Alternative: Solving Concerns You Identified	Parallel Off-Alignment Replacement Alternative: Concerns	Parallel Off-Alignment Replacement Alternative: Solving Concerns You Identified
		much of the structure as possible while incorporating new construction that reflects its current features and character.	Foundation to contribute to the design and preservation effort.			different from existing bridge	
	Save Westport Now	Increase in height will allow larger trucks Rights of way required Disruption period (2-3 years) Potential use of commuter lot for staging (a disaster for commuters)	Post the height so it matches the existing actual clearance (i.e., with elec. box) Stage elsewhere (not commuter lot)	Use of commuter lot for staging disruptive The entrance to Parker House property will create traffic issues Aesthetics: too modern? Not consistent with historic neighborhood The roadway on east side will be higher elevation and more intrusive for neighboring houses Wide lanes will encourage faster	Build a truss bridge – so it "looks like" what we have Can't really address other concerns Use a staging area outside of immed. area (not the commuter lot)	Same problem with Parker House entrance Large and tall structure (scale is off for the neighborhood) The wide shoulders will encourage speed (rather than calming) Aesthetics (may lose truss appearance) Possible use of commuter lot as staging area	Reduce scale of bridge Use truss design (can't solve speed issue) Use a staging site outside of Saugatuck

PAC Representative		Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement Alternative: Concerns	Off-Alignment Replacement Alternative: Solving Concerns You Identified	Parallel Off-Alignment Replacement Alternative: Concerns	Parallel Off-Alignment Replacement Alternative: Solving Concerns You Identified
				speeds (reverse of our goal) Light spillage to neighbors Right of way (takings) a problem			
	Westport Coalition	Given the demands on our community now and in the future, the conservation alternative does not make sense. The bridge needs to open and close efficiently and be resilient given anticipated rising water levels. The town needs to create more safe alternative modes of transportation to and from the train station. The current bridge is not safe for cyclists and safe pedestrian access	This alternative should only be pursued if the bridge is re-located upstream, maybe as a pedestrian bridge closer to downtown – link downtown commercial / retail on both sides of river.	Thank you for adding sidewalk on south side. If possible, please provide recommendations for pedestrian movement once a person crosses the bridge (east side). What happens to the old bridge under this alternative? Can separate bike lanes be added on both sides?	Is funding available for relocating the bridge upstream? Can the parking lot access be moved/enhanced to the northern currently narrow access maybe by removing / replanting trees and obtaining a few feet from parking lot at the Saugatuck Rowing Club?	Please add south sidewalk!	[no input]

PAC Representative		Conservation Alternative: Concerns	Conservation Alternative: Solving Concerns You Identified	Off-Alignment Replacement Alternative: Concerns	Off-Alignment Replacement Alternative: Solving Concerns You Identified	Parallel Off-Alignment Replacement Alternative: Concerns	Parallel Off-Alignment Replacement Alternative: Solving Concerns You Identified
		to the train station is limited. If costs are added to the matrix, then the present value of the maintenance costs & police time associated with open and closing					
	Westport Preservation Alliance	We appreciate this approach as it preserves the key character defining aspects of the span and is consistent with the original MOU from the '90s. Further, it leaves in place the traffic calming geometry which the majority of Westporters have indicated is critical.	Consider seeking design waiver (bridge is NR Listed) to allow for narrow section crash rails.	Creates problematic traffic conflicts on west side approach (Parker). Opens span to all legal loads (e.g., 18 wheelers). Appears to possibly involve permanent taking which presents a hardship for residents. Destroys historic bridge.	Avoid the Off-Alignment Replacement to mitigate negative impacts to property and traffic flow.	West side traffic conflicts appear to be problematic. Scale appears out of sync with prevailing streetscape. Loss of NR Listed bridge.	Avoid Parallel Off-Alignment to mitigate negative impacts to historic span, traffic flow and private property.

SIGN-IN SHEETS



SIGN IN SHEET

January 30, 2019

Attended	First	Last	Title	Organization	EMAIL	PAC Member	Alt.
X	Sam	Arciola		Westport Police Department	sarciola@westportct.gov		X
	Priti	Bhardwaj		CTDOT	Priti.Bhardwaj@ct.gov		
X	Morley	Boyd		Westport Preservation Alliance	boyd.cthh@gmail.com	X	
X	Bob	Caporale		Imperial Landing Homeowner's Association	bobcaporale@gmail.com	X	
X	Andrew	Colabella	Member	Westport Representative Town Meeting – Selectmans Office	acolabellartm4@gmail.com	X	
	Sarah	Connolly	General Manager	Saugatuck Rowing & Fitness Club, LLC	sconnolly@saugatuckrowing.com	X	
X	Ron	Corwin		Coalition for Westport	ron@roncorwin.com		X
	Jim	DeStefano, P.E.	Resident	DeStefano & Chamberlain, Inc.	jimd@dcstructural.com	X	
X	Steven	Edwards	Consultant	Westport Board of Selectmen & Public Works Consultant	sedwards@westportct.gov	X	
X	Francisco	Fadul		CTDOT	Francisco.Fadul@ct.gov		
X	Tim	Fields		CTDOT	Timothy.Fields@ct.gov		

Attended	First	Last	Title	Organization	EMAIL	PAC Member	Alt.
	Kevin	Fleming		CTDOT	Kevin.fleming@ct.gov		
X	Jeff	Fontaine		CJM	JFontaine@cjmpc.com		
X	Robbie	Guimond	Owner	Bridgebrook Marina	robbieguimond@gmail.com	X	
	Kristen	Hadjstylianos		WestCOG	khadjstylianos@westcog.org	X	
X	Steven	Harlacker		H & H	sharlacker@hardestyhanover.com		
PHONE	Kitty	Henderson	Executive Director	Historic Bridge Foundation	kitty@historicbridgefoundation.com	X	
X	Randy	Henkels	Chair	Westport Historic District Commission (HDC)	fhhenkels@gmail.com	X	
	Clarinda	Higgins	Chair	Westport Shellfish Commission	rindyhiggins@gmail.com	X	
	Nathan	Holth		HistoricBridges.org	nathan@historicbridges.org	X	
X	Jennifer	Johnson		Coalition for Westport	jbarrjohnson@gmail.com	X	
X	Bill	Kiedaisch	Chairman	Town of Westport Boating Advisory Committee	billkiedaisch@gmail.com	X	
X	Foti	Koskinas		Westport Police Department	fkoskinas@westportct.gov	X	
	Norman	Kramer		Green's Farms Association	normankramer@yahoo.com	X	
X	Paul	Lebowitz	Chair, Planning and Zoning Commission	Town of Westport	paul4pandz@gmail.com	X	
	Kim	Lesay		CTDOT	Kimberly.Lesay@ct.gov		
	Mark	Levesque		CJM	mlevesque@cjmpc.com		
X	Werner	Liepolt		Residents of the Bridge Street Neighborhood	wliepolt@mac.com	X	

Attended	First	Last	Title	Organization	EMAIL	PAC Member	Alt.
X	Dick	Lowenstein	Vice President	Green's Farms Association	dick.lowenstein@gmail.com		X
X	Matthew	Mandell	Executive Director and President	Westport Chamber of Commerce	matthew@westportwestonchamber.com	X	
X	James S.	Marpe	Selectman	Westport Board of Selectmen	Jmarpe@westportct.gov	X	
X	Mark	McMillan		CTDOT	mark.mcmillan@ct.gov		
X	Lynn	Murphy		CTDOT	Lynn.murphy@ct.gov		
X	Ted	Nezames		CTDOT	Theodore.Nezames@ct.gov		
X	Peter	Ratkiewich, P.E.	Director of Public Works Flood and Erosion Control Board	Town of Westport	pratkiewich@westportct.gov	X	
X	Tom	Ryan		CJM	tryan@cjmpc.com		
X	Kurt	Salmoiraghi		FHWA	Kurt.Salmoiraghi@dot.gov		
	Art	Schoeller		Green's Farms Association	art@optonline.net		X
X	Valerie	Seiling Jacobs	Co-Chairman	Save Westport Now	valerieseilingjacobs@gmail.com	X	
	David	Shorrock		Imperial Landing Homeowner's Association	dwshorrock@yahoo.com		X
X	James	Walsh		Westport Shellfish Commission			X
	Christopher	Wigren	Deputy Director	Connecticut Trust for Historic Preservation	CWigren@cttrust.org	X	
X	Robert	Yost	Fire Chief	Westport Fire Department	ryost@westportct.gov	X	

Attended	First	Last	Title	Organization	EMAIL	PAC Member	Alt.
Took materials home	Mary	Young	Director, Planning & Zoning	Westport Planning and Zoning	maryyoung@westportct.gov	X	
	PUBLIC SIGN IN						
	First Name	**Last Name**			**Email Address**		
	Robert	Meyer			millpondfarms@aol.com		
	Amy & Michael	Greenberg			Amygreen912@yahoo.com		
	Sara	Harris			sharris@westportct.gov		
	Gerald	Romano			Gromano1@optonline.net		
	Ward	French			wardfrench@gmail.com		
	Annette	French			annetteffrench@msn.com		
	Pete	Hughes			Peha06855@gmail.com		
	Jennifer	Johnson			jbarrjohnson@gmail.com		
	Anthony	Rossi			Arossi06880@gmail.com		

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Project 158-214
Project Advisory Committee Meeting
May 8, 2019
Westport Town Hall, Rooms 201/201A

Report of Meeting #5

Present: See attached sign-in sheets.

Meeting Purpose: At the last PAC meeting, PAC members were asked to go back to the groups they represent, communicate the alternatives concepts, and gather feedback before the fifth and final PAC meeting. The purpose of this wrap-up meeting: to solicit input from PAC members on all of the alternatives presented at previous meetings, consider additional screening criteria and key environments to be evaluated as part of the impacts analysis, and review next steps in the National Environmental Policy Act/Connecticut Environmental Policy Act (NEPA/CEPA) process.

Binders: The new distributed binder materials for PAC members were reviewed including: summary report of PAC meeting #4, PAC meeting #5 presentation slides, updated alternatives comparison matrix, bridge opening information, and vehicular and navigational clearance diagrams.

Review of Updates to Alternatives Comparison Matrix

- Added row with cost range information at PAC's request
- Added row for construction disruption to local area, such as parking space loss and business disruption at PAC's request
- Added information to clarify vertical clearance

PAC members requested four action alternatives superimposed on existing Cribari Bridge, to be provided via the project website. It had also been requested that crash data within the vicinity of the bridge be made available.

Alternatives: PAC members were reminded that the No Build and previously discussed conservation, rehabilitation, and on- and off-alignment replacement alternatives will be carried forward in the Environmental Assessment (EA)/Environmental Impact Evaluation (EIE). A final PAC workshop was conducted to solicit comments (see attached for input received).

PAC members were reminded that the concepts previously presented for each alternate were drafts or starting points to give members an overall idea of what the alternate may look like, so that they can focus on and provide valuable input regarding the resulting impacts. It was noted during the meeting that the time for discussing specific design considerations (i.e. structure type, lane width, shoulder width, etc.) would be after the development of a Structure Type Study, which would only occur if a replacement alternate were to be recommended in the EA/EIE process. The final alternatives that will be carried forward in the EA/EIE may be a combination of the draft alternatives or others.

The Department will evaluate the benefits and impacts of all alternatives discussed and prepare an EA/EIE report, that will be distributed for public comment, showing a preferred alternative.

Key Issues Discussed:

- Scale and perceptual changes to the landscape/viewshed for various user groups (i.e., drivers, bicyclists, pedestrians, patrons of businesses/restaurants with view of the bridge).

CONNECTICUT DEPARTMENT OF TRANSPORTATION

- Vehicular safety. Driver perception of the bridge being too narrow; balance widening for safety with keeping scale consistent with the surrounding landscape.
- Resiliency. Design taking sea level rise into account; mechanical elements and roadway out of water in flood events.
- Conduct cost-benefit analysis.
- Consider high-school rowers as a river user group.
- Cribari Bridge important to Bridge Street Historic District.
- Adding a second sidewalk to the project would usually be at the request of the Town, which would consider its existing pedestrian network, or any plans for future improvements for pedestrians in the general area. At this point, the Town has not made such a request or commitment that a plan to extend any sidewalks beyond the existing layout for the project area.

N**ext Steps in the NEPA/CEPA Process:** Reminder that the PAC has been providing input for the Alternatives Analysis. Next steps include Documentation and Impacts Analysis, which is anticipated to run through the Fall of 2019. The Section 106 process will take place concurrently; however, it was noted that the Section 106 process must conclude prior to the completion of the EA. Although this is the final PAC meeting, there will be additional opportunities for public involvement. Once the EA/EIE has been prepared, the public will be notified of its availability for review, tentatively in early 2020. There will be a formal comment period and a public hearing anticipated in early 2020. Finally, the Department will respond to comments and revise the document. It's anticipated that the Department will prepare a Finding Decision Document under NEPA and a Record of Decision under CEPA by Spring 2020. The project website will be maintained by CTDOT throughout the process.

Questions and comments can be sent throughout the process, directly to the Department via:

Priti S. Bhardwaj, P.E.
Transportation Supervising Engineer
Connecticut Department of Transportation
2800 Berlin Turnpike, Newington, CT 06131
Phone: 860-594-3311
E-Mail: Priti.Bhardwaj@ct.gov

WORKSHOP SHEETS

Submitted by Alicia Mozian,
Conservation Director
obo
The Westport Shellfish Commission
May 8, 2019

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Alternatives Comparison Chart

	No Build	Conservation	Rehabilitation	Replacement (On-Alignment)	Replacement (Off-Alignment)
PAC Member Name/ Organization: Shellfish Commission Wetlands/ Water Quality	Any work must include a sediment trap basin to capture all heavy metals and any required or additional prevention, corrective or remediation of existing roadway runoff should be included as part of any work.				

If possible ←

2 ft of freeboard should be allotted to prepare for Sea Level Rise.
If possible/practical

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Alternatives Comparison Chart

	No Build	Conservation	Rehabilitation	Replacement (On-Alignment)	Replacement (Off-Alignment)
PAC Member Name/ Organization: Bridge Street Neighborhood		Every member of the Bridge Street Neighborhood prefers this or the No Build option. The Cribari Historic Bridge is an integral part of the Nationally Registered Neighborhood setting & historical context is vital	Distruption of the Neighborhood would be intolerable & completely unwelcome.		

Are you aware of the existence of the Elderly Housing complex in the former Saugatuck Elementary School?

CRIBARI BRIDGE
BTF 136 OVER SAUGATUCK RIVER
WESTPORT

Alternatives Comparison Chart

	No Build	Conservation	Rehabilitation	Replacement (On-Alignment)	Replacement (Off-Alignment)
PAC Member Name/ Organization: Matthew Mandell Chamber of Commerce	Not an option	Possible Bottom line - This is an historic bridge and represents the Character of the community keep the bridge and making it safe and useful is the goal	keep it 13' 11" water resistant equipment is a positive. Sayers cadway is a benefit Don't like ugly guard rail - Alternative Should be designed to accomplish same	Not in best interest in the long term health + Character of the Town. New bridge is not an option.	

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Alternatives Comparison Chart

	No Build	Conservation	Rehabilitation	Replacement (On-Alignment)	Replacement (Off-Alignment)
PAC Member Name/ Organization: Save Westport Now	Prob. the 2nd Best Alt. – But load limits are a concern	Probably the Preferred alternative However great concern about the potential disruption and delays in Saugatuck esp. for commuters given need for temp. bridge	Too little gain and too expensive	outrageous cost for little gain (except for Robbie Guimond) not in best interests of town to build such a large structure concerns about scale	outrageous cost for little gain (except for Robbie Guimond) ⟷

CRIBARI BRIDGE
RTE. 136 OVER SAUGATUCK RIVER
WESTPORT

Alternatives Comparison Chart

	No Build	Conservation	Rehabilitation	Replacement (On-Alignment)	Replacement (Off-Alignment)
PAC Member Name/ Organization: WESTPORT PRESERVATION ALLIANCE		PREFERRED ALTERNATIVE BY OUR ORGANIZATION TO MAINTAIN HISTORIC INTEGRITY OF NR STRUCTURE AND PRESERVE CHARACTER + NATURE OF BRIDGE ST. NAT. REG. DIST.			

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Alternatives Comparison Chart

	No Build	Conservation	Rehabilitation	Replacement (On-Alignment)	Replacement (Off-Alignment)
PAC Member Name/ Organization: BOB CARBONALE IMPERIAL LANDING ASSOC.				MAJOR CONCERNS ABOUT AESTHETICS AND TRAFFIC - INCLUDING NOISE AND LIGHT POLLUTION	NOT IN FAVOR OF ANY PERMANENT ACQUISITIONS OF LAND OR PROPERTY

GENERALLY NOT IN FAVOR OF REPLACEMENT OPTIONS

CRIBARI BRIDGE
RTE 136 OVER SAUGATUCK RIVER
WESTPORT

Alternatives Comparison Chart

	No Build	Conservation	Rehabilitation	Replacement (On-Alignment)	Replacement (Off-Alignment)
PAC Member Name/ Organization: Sarah Connolly Saugatuck Rowing Club	Roadway is still narrow		Does not increase the width of the roadways		Visually we do not want a huge, out of character bridge

In the conservation, rehabilitation, replacement both on & off alignment the amount of time ~~the~~ ~~a~~ under the bridge is closed should be considered. We have over 200 children depending on rowing ~~access~~ for college scholarships. We need full access from March to April.

SIGN-IN SHEETS



SIGN IN SHEET

MAY 8, 2019

Attended	First	Last	Title	Organization	EMAIL
	Ted J.	Aldieri	Div. Structural Engineer/Bridge Program Manager	FHWA	Ted.aldieri@dot.gov
X	Sam	Arciola	Deputy Chief, Operations Division	Westport Police Department	sarciola@westportct.gov
X	Priti	Bhardwaj		CTDOT	Priti.Bhardwaj@ct.gov
X	Morley	Boyd	Member	Westport Preservation Alliance	boyd.cthh@gmail.com
X	Stephanie	Brooks		FHI	sbrooks@fhiplan.com
X	Bob	Caporale	Member	Imperial Landing Homeowner's Association	bobcaporale@gmail.com
X	Andrew	Colabella	Member	Westport Representative Town Meeting	acolabellartm4@gmail.com
X	Sarah	Connolly	General Manager	Saugatuck Rowing & Fitness Club, LLC	sconnolly@saugatuckrowing.com
X	Ron	Corwin	Member	Coalition for Westport	ron@roncorwin.com
X	Jim	DeStefano, P.E.	Resident	DeStefano & Chamberlain, Inc.	jimd@dcstructural.com
X	Steven	Edwards	Retired, Former Dir. Public Works	Westport Board of Selectmen	sedwards@westportct.gov
X	Francisco	Fadul		CTDOT	Francisco.Fadul@ct.gov
X	Tim	Fields		CTDOT	Timothy.Fields@ct.gov

	Kevin	Fleming		CTDOT	Kevin.fleming@ct.gov
X	Jeff	Fontaine		CJM	JFontaine@cjmpc.com
X	Robbie	Guimond	Owner	Bridgebrook Marina	robbieguimond@gmail.com
X	Kristin	Hadjstylianos	Senior Planner	WestCOG	khadjstylianos@westcog.org
X	Steven	Harlacker		H & H	sharlacker@hardestyhanover.com
	Benjamin	Hawthorne		H & H	bhawthorne@hardestyhanover.com
	Kitty	Henderson	Executive Director	Historic Bridge Foundation	kitty@historicbridgefoundation.com
X	Randy	Henkels	Chair	Westport Historic District Commission (HDC)	hdc@westportct.gov
	Clarinda	Higgins	Chair	Westport Shellfish Commission	rindyhiggins@gmail.com
X	Debbie	Hoffman		FHI	dhofman@fhiplan.com
	Nathan	Holth	Author/Webmaster	HistoricBridges.org	nathan@historicbridges.org
X	Jennifer	Johnson	Member	Coalition for Westport	jbarrjohnson@gmail.com
X	Bill	Kiedaisch	Chairman	Town of Westport Boating Advisory Committee	billkiedaisch@gmail.com
	Foti	Koskinas	Chief	Westport Police Department	fkoskinas@westportct.gov
	Norman	Kramer	Vice President	Green's Farms Association	normankramer@yahoo.com
X	Michael	Kronick	Taking Robert Yost place	Westport Fire Department	
X	Paul	Lebowitz	Chair, Planning and Zoning Commission	Town of Westport	paul4pandz@gmail.com
	Kim	Lesay		CTDOT	Kimberly.Lesay@ct.gov
	Mark	Levesque		CJM	mlevesque@cjmpc.com

X	Werner	Liepolt	Member	Residents of the Bridge Street Neighborhood	wliepolt@mac.com
X	Dick	Lowenstein	Vice President	Green's Farms Association	dick.lowenstein@gmail.com
X	Matthew	Mandell	Executive Director and President	Westport Chamber of Commerce	matthew@westportwestonchamber.com
X	James S.	Marpe	Selectman	Westport Board of Selectmen	Jmarpe@westportct.gov
X	Mark	McMillan		CTDOT	mark.mcmillan@ct.gov
X	Robert	Meyer	Owner	Mill Pond Farm, Inc.	millpondfarms@aol.com
X	Lynn	Murphy		CTDOT	Lynn.murphy@ct.gov
X	Ted	Nezames		CTDOT	Theodore.Nezames@ct.gov
X	Peter	Ratkiewich, P.E.	Director of Public Works Flood and Erosion Control Board	Town of Westport	pratkiewich@westportct.gov
X	Tom	Ryan		CJM	tryan@cjmpc.com
	Kurt	Salmoiraghi		FHWA	Kurt.Salmoiraghi@dot.gov
	Art	Schoeller	President	Green's Farms Association	art@optonline.net
X	Valerie	Seiling Jacobs	Co-Chairman	Save Westport Now	valerieseilingjacobs@gmail.com
	David	Shorrock	Member	Imperial Landing Homeowner's Association	dwshorrock@yahoo.com
X	Laura	Stegina		FHI	lstegina@fhiplan.com
X	Christopher	Wigren	Deputy Director	Connecticut Trust for Historic Preservation	CWigren@cttrust.org
	Robert	Yost	Fire Chief	Westport Fire Department	ryost@westportct.gov

	Mary	Young	Director, Planning & Zoning	Westport Planning and Zoning	maryyoung@westportct.gov
Other Attendees					
X	Anthony	Rossi			Arossi0688@gmail.com
X	Emilie	Holland			Emilie.holland@dot.gov
X	Alicia	Mozian			amozian@westportct.gov
X	Clayton	Hughes			Cjhughes9973@gmail.com
X	Peter	Hughs			Peha06855@gmail.com

APPENDIX J: Bridge Inspection Reports

Inspection Type: Fracture Critical and Routine and Underwater

BRIDGE NO. 01349

83500 - WESTPORT

ROUTE 136

over

SAUGATUCK RIVER

Fracture Critical and Routine and
Underwater Inspection

9/27/2018

Inspected by: Prime



TABLE OF CONTENTS

Section	Page Number
Report Title Page	1
Location Map	3
Structure Inventory and Appraisal (BRI-19)	4
Inspection Data (BRI-18)	10
National Bridge Elements	21
Fracture Critical Data (BRI-12)	23
Underwater Inspection (BRI-58)	26
Underwater Inspection (BRI-59)	29
Sketches	30
Pictures	68
Movable Bridge - Mechanical Report	118
Movable Bridge - Electrical Report	195
Highway Bridge Work Items	261

Report Title Page

Bridge No. 01349, Route 136 over Saugatuck River, Westport

Inspected By: PRIME AE Group, Inc. Date: 09/27/2018



Professional Certification: I hereby certify that this report (structure), including all of its contents, has been approved by me, and that I am a duly licensed professional engineer under the laws of the State of Connecticut. Please note that Underwater including Channel and Channel Protection Inspection and Report were performed and stamped by A.DiCesare Associates. Movable bridge inspections and reports (Mechanical and Electrical) were performed and stamped by Modjeski and Masters.

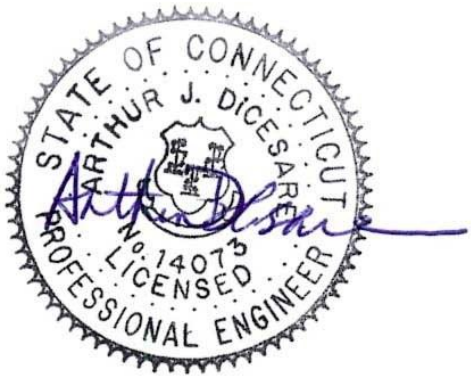
Signature:

License No.: 20458 Date: 11/30/2018

Bridge No. 01349, Route 136 over Saugatuck River, Westport

Underwater Inspection including Channel and Channel Protection

Inspected By: A.DiCesare Associates Date: 10/18/2018



Professional Certification: I hereby certify that this report, including all of its contents, has been approved by me, and that I am a duly licensed professional engineer under the laws of the State of Connecticut.

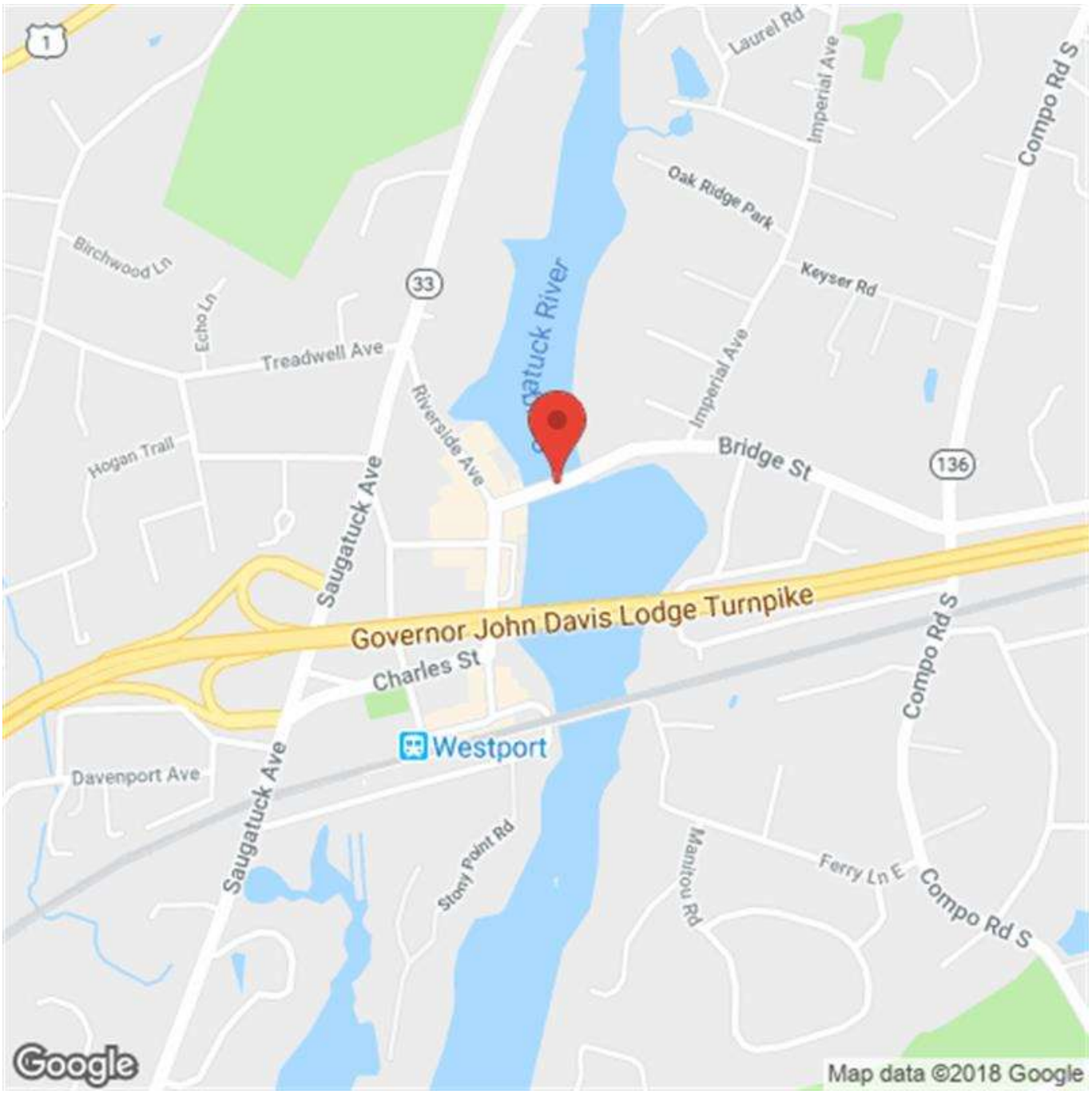
Signature:

License No.: 14073 Date: 11/08/2018

Form: Location
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



Location Map # 1

Bridge No. 01349
Route 136 over Saugatuck River
Westport, CT

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

STRUCTURE INVENTORY & APPRAISAL

INSPECTION

Structurally Deficient: Y
Functionally Obsolete: N
Sufficiency Rating: 4.0
(90) Inspection Date: 09/27/2018
(91) Frequency: 24
Indepth Insp: No
Proposed next Indepth Year:
Deck Survey Date:
Class: 03
Access: 40 - Boat or raft (other than inflatable boats issued to inspection teams)
Flagman: 0

	Frequency	Date	Type
Fracture	24	09/27/2018	J Steel Pier Caps, welded box or plate girders
Underwater	24	09/27/2018	B Underwater Only
Special			

IDENTIFICATION

Bridge Name: WILLIAM F. CRIBARI MEMORIAL BRIDGE
Town Code - Name: 83500 - WESTPORT
(5) Inventory Route
(A) Record Type: 1: Route carried "on" the structure
(B) Signing Prefix: 3 - STATE HIGHWAY
(C) Level of Service: 1 - MAINLINE
(D) Route Number.: 00136
(E) Dir Suffix: 0 - NOT APPLICABLE
(6A) Featured Intersected: SAUGATUCK RIVER
(6B) Critical Facility Indicator:
(7) Facility Carried: ROUTE 136
(9) Location: BETWEEN I-95 EXIT 17 & 18
(11) Mile Post: 8.65 Miles
(16) Latitude: 41 Deg. 7 Min. 21.94 Sec.
(17) Longitude: -73 Deg. 22 Min. 8.77 Sec.
(98) Border Bridge
(A) State Code: (B) Percent Responsibility: %
(C) Border Town Name:
(99) Border Bridge Structure No.:

STRUCTURE TYPE & MATERIALS

(43) Structure Type, Main
A) Material: 4 - Steel continuous
B) Design Type: 17 - Movable - Swing
(44) Structure Type, Approach
A) Material: 4 - Steel continuous
B) Design Type: 02 - Stringer/Multi-beam or Girder
(45) Number of Spans, Main Unit: 002
(46) Number of Approach Spans: 0002
(107) Deck Structure Type: 5 - Steel Plate (inclues orthotropic)
(108) Wearing Surface/Protection Systems
A) Type of Wearing Surface: 6 - Bituminous
B) Type of Membrane: 1 - Built-up
C) Type of Deck Protection: 0 - None
Substructure
A) Material: 1 - STONE
B) Design Type: 1 - FULL HEIGHT STEM
Paint
Type:
Year:
Comment:

GEOMETRIC DATA

(48) Length of Maximum Span: 70 ft.
(49) Structure Length: 287 ft.
(50) Curb or Sidewalk Widths
A) Left: 3 ft. 8 in. B) Right: 0 ft. 0 in.
(51) Bridge Roadway Width Curb to Curb: 19 ft. 6 in.
(52) Deck Width, Out to Out: 20 ft. 0 in.
(32) Approach Roadway Width: 21 ft.

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

(33) Bridge Median: 0 - No median

Deck Area: 7653 sq. ft.

(34) Skew Angle: 00 deg.

(35) Structure Flared: 0 - No flare

(10) Inv. Rte. Min. Vert. Clearance: 13 ft. 10 in.

(47) Inv. Rte. Total Horiz. Clr.: 19 ft. 6 in.

Log Inv. Rte. Total Horiz. Clr.: 19 ft. 6 in.

RLog Inv. Rte. Total Horiz. Clr.: 0 ft. 0 in.

(53) Min. Vert. Clearence Over Bridge: 12 ft. 10 in.

(54) Log-Min. Vert. Underclearance: N ref. 0 ft. 0 in.

(55) Min. Lat Underclearance on Right: N ref. 0 ft. 0 in.

(56) Min. Lat Underclearance on Left: 0 ft. 0 in.

AGE AND SERVICE

Year Built: 1870

(106) Year Reconstructed: 1993

(42) Type of Service

A) On: 1 - Highway

B) Under: 5 - Waterway

(28) Number of Lanes

A) On: 02 B) Under: 00

(29) Average Daily Traffic: 13200

Is Above Half ADT?: No

(109) Precent Truck: 5 %

(30) Years of ADT: 2015

(19) Bypass, Detour Length: 1 Miles

CONDITION

(58) Deck: 5

(59) Superstructure: 5

(60) Substructure: 4

(61) Channel & Channel Protections: 5

(62) Culverts: N

(36) Traffic Safety Features

A) Bridge Railings: 0

B) Transitions: 0

C) Approach Guardrail: 0

D) Approach Guardrail Ends: 0

APPRAISALS

(67) Structural Evaluation: 2

(68) Deck Geometry: 2

(69) Underclearances, Vert. & Horiz.: N

(71) Waterway Adequacy: 8

(72) Approach Roadway Alignment: 6

(113) Scour Critical: 8

COMMENTS

Item 27 = 1870(Do Not Change): Oldest Swing Span in United States. (KMR per RCVA 10/6/14). Machinery disabled by Storm Sandy, Oct 2012. Repair by Emergency Declaration Proj 158-210. reopened for river traffic May 2013. RDJ 5/19/14

WATERWAY

Drainage Basin Waterway: 7200 - Saugatuck River

(38) Navigation Control: 1 - Navigation control on waterway (bridge permit required)

(39) Navigation Vertical Clearance: 7 ft.

(40) Navigation Horiz. Clr.: 50 ft.

(111) Pier/Abutment Navigation: 2 - In place and functioning

(116) Vert-Lift Brg Nav Min: ft. In.

CLASSIFICATION

(112) NBIS Bridge Length: Yes

(104) Highway System: 0 - Structure/Route is NOT on NHS

(26) Functional Class: 16 - Urban - Minor Arterial

(100) Defense Highway: 0 - Not a STRAHNET route

(101) Parallel Structure: N - No parallel structure

(102) Direction of Traffic: 2 - 2-way traffic

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

(103) Temporary Structure	
(110) Designated National Network	0 - Inventory route not on network
(20) Toll	3 - On Free Road
(21) Maintain	01 - State Highway Agency
(22) Owner	01 - State Highway Agency
Report Class	S - STATE
(37) Historical Significance	1 - On National Register

POSTED SIGNS

Other Posted Sign 1	8 - Other warning signs
Other Posted Sign 2	

	Actual	Recomended	
Posted Load Single Unit Truck			tons
Posted Load Semi-Trailer Truck			tons
Posted Load 4 Axle Truck			tons
Posted Load 3S2 Truck			tons
All Vehicles	20	20	tons

Posted Vert. Clearance on Bridge	12	ft. 7	in.
Posted Vert. Underclearance		ft.	in.
Posted Speed Limit on Bridge	25	m.p.h.	

OTHER FEATURES

Fence Required	No
Fence Present	Yes
Fence Type	2 - Chain Link
Fence Height	4.3
Fence Material	2 - Steel
Fence Top Type	1 - Vertical
Barrel Ladders	No
Stand Pipes	No
Catwalks	No

PROPOSED IMPROVEMENTS

(75A) Type of Work Proposed	31 - Replacement - Load/Geometry
(75B) Work Done By	1 - Work to be done by contract
(76) Length of Structure Improvement	ft.
(94) Bridge Improvement Cost	$
(95) Roadway Improvement Cost	$
(96) Total Project Cost	$ 40000
(97) Year of Improvement Estimate	2016
(114) Future ADT	19614
(115) Year of Future ADT	2035
DOT Bridge Program List No	28
Project No	0158-0214
Advertised Date	02/10/2021

LOAD RATING & POSTING

(31) Design Load	5 - HS 20
(63) Operating Rating Type	8 - Load and Resistance Factor (LRFR) rating reported by rating factor (RF) method using HL93 loading
(64) Operating Rating	0.40
(65) Inventory Rating Type	8 - Load and Resistance Factor (LRFR) rating reported by rating factor (RF) method using HL93 loading
(66) Inventory Rating	0.31
Evaluation Code	F - Load & Resistance Factor Rating
Year of Evaluation	2017
(70) Bridge Posting	0 - More than 39.9% below legal loads
(41) Structure Status	P - Posted for Load

Moveable Inspection System	No
Haunches Present over Roadway	NO
Utilities	U | Unknown Duct

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

INSPECTOR'S SIGNATURES:

1) Date: 10/31/2018

2) Date: 11/16/2018

3) Date: 11/28/2018

4) Date: 11/13/2018

P.E. SIGNATURE: Date: 11/30/2018

P.E. # PEN.0020458

Reviewed By: Adam Taddonio Date: 12/24/2018

FIELD INSPECTION REPORT

Location:	BETWEEN I-95 EXIT 17 & 18	Year Built:	1870	Snooper Required:	☐
Main Material:	4 - Steel continuous	Year Rebuilt	1993	Snooper Used:	☐
Main Design:	17 - Movable - Swing				

Inspectors:

Lead Inspector:	Naveen Bitla
Inspector:	Task:
Agolli, Elvis	BSE - Inspector
Area, 14	BSE - Inspector
Begolli, Eriol	BSE - Inspector
Bitla, Naveen	BSE - Inspector
Carlson, Clay	BSE - Inspector Rail - Inspector
DiCesare, Underwater	BSE - Inspector
Mahalingam, Balaji	BSE - Inspector
Nixdorf, Steven	BSE - Inspector
Spahiu, Igli	BSE - Inspector
Zehr, Ryan	BSE - Inspector

Visits:

Visit Date:	Temp:	Start Time:	End Time:
09/27/2018	70	08:30 AM	03:30 PM
10/12/2018	45	08:30 AM	02:30 PM
10/18/2018	45	07:30 AM	04:00 PM

58. DECK:

Overall Rating: 5

	Rating	
Overlay:	5	Bituminous Concrete Overlay: - Overlay has heaving throughout up to 2" high and random isolated longitudinal cracks up to 3/8" wide. - Span 3 near Pier 2 joint has potholes up to 6" long x 2" wide x 1" deep. - There are areas of raveling along the curb plates and armored joints up to 1" deep. See Top of Deck Sketch and Photos 8-9.
Deck - Str. Condition:	5	Welded Steel Plate Deck in Spans 1 and 2 (Swing Spans) that Functions as a Top Flange for the Girders: - See "Superstructure - Girders" item below. Exodermic Deck in Spans 3 and 4 (Fixed Spans): - Random areas of heavy laminated rust with perforations up to 2' long x 1' wide at the deck overhangs and around weep drains. See Underside of Deck and Framing Plan Sketches and Photos 10-12.
Curbs:	6	Steel Channel Bridge Curbs: - Curbs have moderate rust with isolated areas of laminated rust and minor scrapes. - Average curb reveal at both north and south curbs is 7". See Top of Deck Sketch and Photo 13.
Median:	N	
Sidewalks:	6	Timber Plank Sidewalk Along the North Fascia of the Bridge:

		- At Pier 2, there is vertical misalignment between adjacent sidewalk planks up to 1" deep. - Random planks are misaligned and bent up at the ends up to 1/2" high. - Minor checks and wear. Timber Sidewalk Stringers: - Stringers have checks up to 1/4" wide along the bottom. - Span 1, north fascia of Stringer S2 has one (1) loose bolt at the first support connection from Abutment 1. - Span 3, both stringers have one (1) out of two (2) missing bolts and one (1) out of two (2) loose nuts backed off at the first support connection from Pier 2. - Span 4, both stringers have two (2) out of four (4) nuts backed off 1/4" at the first support connection from Abutment 2 (not loose). - There is an extra timber stringer between Stringers S1 and S2 over Abutment 1, Pier 1 and Pier 2. Stringer Support Members: - Connection angles and channels have moderate to heavy rust and areas of laminated rust. - The support beams in the swing span have flame cut flanges over the substructure units. Concrete Approach Sidewalk at Northwest Approach: - There is a 4' long x 3/8" wide transverse crack at the northwest approach sidewalk. Bituminous Approach Sidewalk at Northeast Approach: - Northeast approach sidewalk has up to 1" deep settlement. See Top of Deck Sketch, Underside of Deck and Framing Plan Sketches and Photos 14-17.
Parapet:	N	
Railing:	6	Metal W-beam Rails Along both Curbs for Full Length of the Bridge: - There is minor impact damage to the south railing at the west end and the north railing at the east end. - The north railing at Pier 2 has minor impact damage and the "boxing glove" ends on each side of the joint are nearly touching and have a gap of only 1/16" wide between them, which may interfere with the bridge operation. - Span 3, south railing between members U3 and U4 is disconnected from the post. - Guide rail post base plates have heavy laminated rust. - There is an extra 20 feet of guide rail attached directly to the truss members above the north rail to protect the electrical box at Pier 1. Sidewalk Railing with Chain Link Fence: - See "Fence" item below. See Top of Deck Sketch and Photos 18-19.
Paint:	7	See "Fence" item below.
Fence:	6	Chain Link Fence/Rail Along the North Sidewalk: - In Span 1 at Pier 1, there are three (3) missing connection bolt nuts at the fence connection to the base rail and the fence is disconnected at the bottom for 18" long. See Top of Deck Sketch and Photos 20-21.
Drains:	6	Scupper Grates:

		- Each span has three (3) scupper grates at both north and south elevations of the bridge. - Most scupper grates are 50% clogged, however all down pipes appear to be clear. - Some of the grates have settled up to 1" deep relative to the overlay. PVC weeps: - Around several weeps, there are areas of heavy laminated rust with perforations in the exodermic deck. See "Deck-Structural Condition" item above. See Top of Deck Sketch, Underside of Deck and Framing Plan Sketches and Photo 22.
Lighting Standard:	N	

Overall Utility Condition Rating: 7 - Good

Utility Type/Size

U | Unknown Duct	- There are several utility conduits attached to the underside of the superstructure with no notable deficiencies. See Underside of Deck and Framing Plan Sketches.

Construction Joints:	N	
Expansion Joint:	7	Steel-Armored Open Deck Joints at Abutment 1 and Pier 2: - There are minor nicks and gouges in the steel armor. Strip Seal Deck Joint at Abutment 2: - Deck joint is partially filled with sand. The bridge is continuous over Piers 1 and 3 with no deck joints above. See Top of Deck Sketch and Photos 23-25.

Haunches Present over travelway? NO

APPROACH CONDITION:

Overall Rating: 6

	Rating	
Approach Slab:	N	
Relief Joints:	N	
Approach Guide Rail:	6	Approach Metal Beam Rails: - Approach metal beam rails are not continuous onto the bridge and have impact scrapes and dents. - Terminal end at northeast approach metal beam rail near Abutment 2 joint is missing and there is minor impact damage on the rail. - Northwest approach metal beam rail has a missing terminal end at west end. See Top of Deck Sketch and Photos 26-27.
Approach Pavement:	6	Bituminous Concrete Approach Pavement: - East approach pavement has settlement/potholes up to full width x 4" long x 4" deep adjacent to Abutment 2 concrete header. - The east approach pavement has an area of mapcracking up to 20' long x 2' wide x open up to 1/4" wide in eastbound lane.

		See Top of Deck Sketch and Photos 28-29.
Approach Embankment:	8	No significant deficiencies.

Trafic Safety Features

Bridge Railings:	0	Guide rail attached to trusses and girders. No block-outs and rail is not continuous.
Transitions:	0	Does not meet current standards, metal block-outs and not continuous.
Approach Guardrails:	0	Does not meet current standards, metal block-outs.
Approach Guardrail Ends:	0	Does not meet current standards, metal block-outs and blunt ends at the west approach.

59. SUPERSTRUCTURE:

Note that the trusses are ornamental only and do not carry live load, only self-weight. Overall Rating: 5

Rating

Bearing Devices:	6	Elastomeric Bearings under the Trusses and under the Girders in Spans 3 and 4: - Elastomeric bearings are in neutral position and have slight tilts up to 1/4" at 70 degrees Fahrenheit. - Sole plates are typically bowed/dished up to 1/2" (appears as-built) with areas of light to moderate rust. - Truss 1 bearing on box girder at Abutment 1 has a 4" long x 6" wide x 1/4" gap under bearing pad at the south end and is bulging at the north end. Original Truss Bearings: - Bearings have areas of laminated rust and the rivet heads/bolts have minor to moderate surface rust. - Both truss bearings at Pier 2 in Span 3 have anchor bolt spacers with up to 100% section loss, missing washers on three (3) of the four (4) anchor bolts and moderate rust on the bearing plates. - Both truss bearings at Pier 2 in Span 3 have double anchor bolt nuts and are backed off up to 3/4". - Truss 1 bearing at Abutment 2 has moderate surface rust on anchor bolts, spacers with 100% section loss and moderate debris on bearing. - Truss 2 bearing at Abutment 2 has heavy sand/debris accumulation with light vegetation growth. Swing Span Screw Jack Bearings at Abutment 1 and Piers 1 and 2: - See Mechanical Inspection Report. See Underside of Deck and Framing Plan Sketches, Truss Sketches and Photos 30-33.
Stringers:	N	
Girders:	6	Welded Steel Plate Girders: - The top and bottom of the webs and flanges at weep drains have heavy laminated rust with negligible section loss. - Span 1, south elevation of Girder G7 has section loss up to 10" long x 8" high x 1/16" deep at the first stringer support beam. - Span 1, north elevation of Girder G7 has 19" long x 4" wide x 1/16" deep section loss at top flange at Abutment 1. - Span 2, Girder G7 bottom flange near mid-span has scrapes with light rust. - Span 3, south elevation of Girder G1 has rolling defects in the web up to 8" high x less than 1/16" deep. - There are areas of peeling paint (less than 15%) and light to moderate rust. Swing Span Girders with a common Top Plate (Flange) that is Continuous across all Girders and across Pier 1: - See "Welds-Cracks" item below. See Underside of Deck and Framing Plan Sketches and Photos 11 and 34-35.

Floor Beams:	5	Fracture Critical End Floorbeams (Box Girders) at Abutment 1 and Pier 2: - Floorbeam exterior has moderate to heavy rust on the bottom flange and bottom 2" of the web. - Interior of floorbeams has moderate to heavy rust on the bottom flange, at the bottom of a few diaphragms and web plates. - There are 10" diameter holes cut in both end diaphragms of the floorbeams allowing pigeon access. - There is a heavy accumulation of pigeon debris up to 3" deep inside the floorbeams (Pier 2 worst case). Fracture Critical Box Girder at Pier 1 (Pivot Girder for Swing Span): - Exterior has isolated areas of light to moderate rust and debris accumulation under the trusses. - Pivot girder interior has heavy laminated rust on the top of bottom flange for the full length x full width, and at the base of stiffeners and web up to 6" high with isolated section loss up to 1/16" deep. See Underside of Deck and Framing Plan Sketches, Pivot Girder Sketch and Photos 36-38.
Trusses - General:	2	Trusses were retained during the 1993 rehabilitation for ornamental purposes only and carry no live load, only their self-weight. Therefore, trusses are no longer considered fracture critical. - Bottom chord bottom flange plates have several areas of moderate to heavy rust and section loss up to full length x full width x 3/16" remaining section (Truss 1 in Spans 1-4). Plates also have areas of as little as knife edge thickness remaining x up to 1" wide and perforations up to 8" diameter (Span 1, Truss 1 between L4 and L5). - Bottom flange plates have pack rust up to 1/8" thick. - Interior sides of the bottom chord channel webs have section loss up to 6" high x 1/8" deep. - Span 2, Truss 2 at member U7-L8 connection to member L7-U8 is loose and the square bars have as little as 5/8" remaining. - Span 3, Truss 2 at member L0-U1 with 1/4" thick pack rust between channel leg and top plate. - Eyebars have pack rust up to 1/2" thick between adjacent eyebar heads and between eyebar heads and adjacent members. - Also eyebars are bent up to 4" over full length length (Span 3, Truss 2 north bar of member U4-L5). - Span 3, Truss 2 at member U5-L4, south eyebar is broken at bottom. - Eyebar heads have up to 50% section loss (Span 1, Truss 1 at member U3-L3) and are loose at random locations. - There are gaps between bottom chord eyebars and pin nuts. - The top chord member U4-U6 of both trusses at Pier 1 is bent vertically and laterally up to 10". - Span 4, Truss 2 top chord with up to 3/8" pack rust between top cover plate and top chord at random locations. - Isolated members have been removed due to heavy impact damage. - Impact damage to truss members have been repaired at several locations and painted since last inspection, however there are still random locations of lattice bars that are disconnected/severed. - Approximately 5% of the truss surfaces are rusted. See "Rivets & Bolts" and "Welds-Cracks" items below. See Truss and Lateral Bracing Sketches and Photos 39-49.
Trusses - Portals:	6	Strut with Sway Bracing: - Isolated members with bent flanges and dented angle legs up to 1/2" due to vehicle impacts. - Span 3, Truss 1 at members U1-U2 and U3-U4, there is 3/8" thick pack rust between the portal brace connection plate and top plate of the top chord. See Truss and Lateral Bracing Sketches and Photo 50.
Trusses - Bracing:	6	Lateral Bracing: - Three top chord lateral bracing members have been previously removed in Span 1 and one in Span 2. - The transverse sway braces and lateral bracing members have random members with bent flanges

		and dented angle legs up to 1/2" due to vehicle impacts. - Span 2, top lateral brace U8-U9 has section loss up to 50% x 4" long with a 1" long crack around the circumference near Truss 1. See Truss and Lateral Bracing Sketches.
Paint:	5	- Less than 25% of painted surfaces are rusted. See Underside of Deck and Framing Plan Sketches, Pivot Girder Sketches, Truss Sketches and Lateral Bracing Sketches.
Rust:	6	See items above.
Machinery Movable Span:	7	The overall condition of the mechanical systems is 7. The overall condition of the electrical systems is 7. See the attached 2018 Mechanical/Electrical Inspection Report.
Rivets & Bolts:	6	- Span 1, at 2nd interior diaphragm from Abutment 1 near Girder G7, there is a missing bolt nut at the truss retrofit. - Span 2 has two (2) missing bolts at the deck plate near Pier 1 between Girders G4 and G5. - Truss 1 in Span 1, member U4-L5 has three (3) missing rivets at the bottom. - Truss 1 in Span 1 has a bent connection bolt at the intersection between eyebars U2-L3 and U3-L2. - Truss 2 in Span 1, there are loose connection bolts at the intersection of members U1-L2 and U2-L1. - Truss 2 in Span 2, there are loose connection bolts at the intersection of members U7-L8 and L7-U8. - Span 2, marine sign attached to vertical members U7-L7 and U8-L8 at Truss 2 has two (2) missing screws and one (1) out of five (5) loose nuts. - Bottom chord bottom flange cover plate bolts have up to 50% section loss at random locations. See "Bearing Devices" item above. See Underside of Deck and Framing Plan Sketches and Truss Sketches.
Welds - Cracks:	2	The field welded connections listed below are typically uneven, poor quality and not ground smooth: - Spans 1 and 2, longitudinal field welded splice at top flange deck plate between Girders G4 and G5 is not ground smooth. - Spans 1 and 2 at the top flange deck plate, transverse field welded splices at Abutment 1, both sides of Pier 1 and west side of Pier 2 are not ground smooth. - Vertical field welded splices at both the east and west ends of Spans 1 and 2 and near Pier 3 in Span 3 have weld access holes. Also, at these locations there are eight (8) erection bolts left in place. - Vertical field welds at girder web connections to the floorbeams in Spans 1 and 2 still have backer bars remaining. - Transverse welds at girder flange to floorbeam web connections at Abutment 1, Pier 1 and Pier 2 still have backer bars remaining. - Interior of pivot girder at the south end has two (2) tack welds at the top flange up to 3" long. - Truss 2 in Span 4, members L6-U7, L7-U8 and L8-U9 have an extra I-beam welded to eyebars. Although not assigned an AASHTO fatigue category, intersecting welds are considered problematic details equivalent to category E. There are intersecting welds at the following locations: - Transverse beam connection at fascia girders. - Girder to pivot girder welded connections. Bottom flange transition welds in Spans 1 and 2 near Pier 1 have no noted deficiencies at this inspection. - Truss vertical and diagonal members have several cracks/tears up to 20" long through the channel webs and flanges, and areas of impact damage with bent flanges and webs at random locations. - There are cracks at eyebar head forge lines up to 2-1/4" long (Truss 2 over Pier 3, eyebar U4-L5).

		- Truss 2 in Span 3, south eyebar of member L4-U5 is disconnected/fractured at bottom below the deck. - Span 2, top lateral brace U8-U9 has a 1" long crack around the circumference near Truss 1. - Span 3, bottom lateral bracing rod at L3 has a crack half the circumference of the rod x 1/16" wide and rod is slightly bent. - There are random cracked lacing bars. See Underside of Deck and Framing Plan Sketches, Truss Sketches, BRI-12 From and Photos 51-55.
Timber Decay:	N	
Concrete Cracking:	N	
Collision Damage:	2	See items above.
Member Alignment:	2	- Girders G2-G5 webs at the splice near Abutment 1 are bowed up to 1/8" over the full height of web. - Truss 2 at Pier 3, member L5-L6 bottom chord north eyebar is in contact with the L5 spacer block and the eyebar shaft has abrasion rust and less than 1/16" deep section loss. See Underside of Deck and Framing Plan Sketches, Lateral Bracing Sketches and Photo 56.
Deflection Under Load:	N	'N' - Normal 'E'- Excessive
Vibration Under Load:	N	'N' - Normal 'E'- Excessive
Stand Pipes:	N	
Catwalks:	N	
Movable Inspection System:	N	
Barrel Ladders:	N	

Are Barrel Ladders OSHA Compliant? NA

60. SUBSTRUCTURE:

Overall Rating: 4

	Rating	
Abutments - Stem:	6	Stone Masonry Abutment Stems: - Abutment stems have voids between the stones up to 4' deep. - There is up to 50% missing mortar and deteriorated patches at random locations. - Abutment 1 stem has a 10" long crack through a stone near the swing machinery pedestal. - North face of Abutment 1 has a 5' diameter x 2.5' deep area of missing stones and cracks up to 1/8" wide in stones. Reinforced Concrete Bridge Seats: - Bridge seats have horizontal and vertical hairline cracks and hairline mapcracking with and without efflorescence. - There is light debris accumulation along the top of the bridge seat. Reinforced Concrete Pedestals: - Pedestals have random areas of hairline mapcracking with efflorescence and rust stains. - Truss 1 pedestal at Abutment 1 has an 8" long x 6" wide x 1-1/2" deep spall at southwest corner. - Girder G4 pedestal at Abutment 2 has a 4" diameter x 1/2" deep spall at the top. See Abutment Sketches, 2018 Underwater Inspection Report and Photo 57.
Abutments - Backwall:	7	Reinforced Concrete Abutment Backwalls: - Abutment backwalls have vertical hairline cracks and hairline mapcracking up to full height. - Abutment 1 backwall has an 8" wide x 3" high x 3" deep void between Truss 1 pedestal and swing machinery pedestal. - Abutment 1 skim coat is beginning to peel.

		- Abutment 2 backwall has evidence of previous leakage through the deck joint. See Abutment Sketches and Photo 57.
Abutments - Footings:	N	Not visible.
Abutments - Settlement:	7	Per the 2018 Underwater Inspection Report, Abutment 1 stone blocks appear to be slightly tilted to the north.
Abutments - Wingwalls:	N	
Piers/Bents - Caps:	6	Reinforced Concrete Pier Caps at Piers 2 and 3: - Pier caps have random vertical and diagonal hairline cracks and hairline mapcracking up to full height x full width (east elevation of Pier 2 cap) with and without efflorescence and rust stains. - There are random popouts up to 2" diameter x 1/4" deep. - The north and south faces of Pier 3 cap have spalls up to 18" long x 1' high x 2" deep (north face of Pier 3 near Truss 1 pedestal). - East elevation of Pier 3 cap has a 1' wide x 6" high hollow area with an adjacent 1' high x 1/16" wide crack in Bay 3. - The skim coats are beginning to peel. Cap Beam at Pier 2: - Cap beam has moderate to heavy rust with perforations up to 5" long x 1" high in the web (west elevation of Pier 2 at north end). Carrier Beams at East Elevation of Pier 2: - Shim plates on top flanges of steel carrier beams have areas of laminated rust. - Shim plates have areas of section loss up to full width x 11" long x as little as knife edge remaining (south beam at east end). See Pier Sketches and Photos 58-62.
Piers/Bents - Pile Bent:	4	Concrete Encased H-piles with Fiberglass Jackets at Piers 2 and 3: - The fiberglass jackets at Pier 2 are loose/missing and the exposed concrete piles have heavy scaling up to full circumference x 3' high x up to 4" deep with exposed rebar. - Exposed concrete piles have spalls up to 3.5' wide x 3' high x 10" deep with exposed rebar with up to 3/8" diameter remaining (north pile, east elevation). Steel Diagonal and Horizontal Cross Bracing Members Between the Pier 2 Piles: - There is heavy rust with section loss and several perforations up to 3' wide x full height and the bracing is disconnected at the connections to the piles. The horizontal and diagonal bracings only are considered in condition state 2 (critical condition). See Pier Sketches, 2018 Underwater Inspection Report and Photos 58, 61 and 63.
Piers/Bents - Columns:	5	Pier 1 Steel Jackets: - Steel jackets have heavy laminated rust up to full perimeter x 3' high with perforations below the high water line - Per the 2018 Underwater Inspection Report, the exposed concrete below the water line has moderate to severe scale and spalls up to 27' long x 1.8' high x 1.8' deep. - Above the water line, the exposed concrete has minor spalls. Top of Concrete Column: - Concrete column has longitudinal and transverse hairline cracks and hairline mapcracking. - There are random spalls up to 10" long x 3" wide x 1/2" deep.

		- There is 1/2" pack rust between the steel jacket and concrete at top north corner. See Pier Sketches and 2018 Underwater Inspection Report.
Piers/Bents - Footings:	4	Per the 2018 Underwater Inspection Report, Pier 2 footing is exposed up to full height and undermined up to 4.5' long x 1.3' high x 4' deep penetration at southwest corner. See Pier Sketches, 2018 Underwater Inspection Report and Photo 58.
Piers/Bents - Settlement:	7	No significant settlement observed. See 2018 Underwater Inspection Report.
Erosion - Scour:	5	Scour: Rated 5. Per the 2018 Underwater Inspection Report, the mudline elevations remained relatively unchanged since the 2016 inspection. At Pier 2, there is a localized area of degradation up to 3.2' high at Pile 6. Erosion: Rated 7. See 2018 Underwater Inspection Report.
Concrete Crack - Spall:	5	See items above.
Steel Corrosion:	2	See items above. Condition rating controlled by cross bracing deterioration at Pier 2.
Paint:	N	
Timber Decay:	5	Per the 2018 Underwater Inspection Report, there are several piles that are part of the old abandoned fender system along the channel bottom but do not impede the navigable channel which has marine borer activity. See 2018 Underwater Inspection Report.
Collision Damage:	8	
Debris:	7	- Abutment seats and pier caps have minor accumulation of sand and debris. See Abutment and Pier Sketches and Photo 64.

61. CHANNEL AND CHANNEL PROTECTION:

For channel and channel protection please see 2018 Underwater Inspection Report (BRI-58). Overall Rating: 5

	Rating	
Channel - Scour:	5	See Underwater Inspection Report (BRI-58) section "Channel Scour" under item 61.
Embankment - Erosion:	7	See Underwater Inspection Report (BRI-58) section "Embankment Erosion" under item 61.
Debris:	7	See Underwater Inspection Report (BRI-58) section "Debris" under item 61.
Vegetation:	8	
Channel Change:	7	See the Underwater Inspection Report (BRI-58) section "Channel Change" under item 61.
Fender - System:	5	See the Underwater Inspection Report (BRI-58) section "Fender System" under item 61. - At the southeast corner of Pier 1, the top horizontal wale has two missing bolts. - At Pier 2, below Truss 1, there is a missing walkway plank. There are navigation lights attached to the fender system (6 total) that were functional during this inspection. However, there are navigation lights attached to the trusses (3 total) that were not on during this inspection. Per Connecticut DOT, the lights should only be on when the bridge is open and therefore were not on at the time of inspection. See Photos 68 and 69.
Spur Dikes and Jetties:	N	
Rip Rap:	7	See the Underwater Inspection Report (BRI-58) section "Rip Rap" under item 61.

Form: BRI-18, Rev. 1/14
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

62. CULVERTS AND RETAINING WALLS:

Overall Rating: N

Rating		
Barrel:	N	
Concrete:	N	
Steel:	N	
Timber:	N	
Headwall:	N	
Cutoff Wall:	N	
Debris:	N	
Retaining Wall System:	N	
Footing:	N	

LOAD POSTING:

Rating		
Single Unit (Tons):		
Semi Trailer (Tons):		
4 Axle (Tons):		
3S2 (Tons):		
All Vechicles:	20	
Advanced Warning:	All Approaches	- There is an advance warning load posting sign at the east approach.
Warning At Bridge:	None	
Legibility:	Adequate	
Visibility:	Adequate	

VERTICAL CLEARANCE POSTING

Min. Vert Under Clearance:	12	Ft	10	In	See Clearance Diagram Sketches. The min. vertical clearance was modified by S. Keedy to be the vertical dimension taken vertically at the face of the MBR to the bottom of the electrical supply bracket.
Posted Clearence Under Bridge:		Ft		In	
Posted Clearence On Bridge:	12	Ft	7	In	- Advance vertical clearance is posted as 12'-7" at both approaches.
Advanced Warning:	Some Approaches				
Warning At Bridge:	None				
Legibility:	Adequate				
Visibility:	Adequate				

NOTES / COMMENTS:

Character of Traffic: Heavy / Mixed traffic.

Additional Notes:

- Bridge identification number is clear and legible.
- Bridge is logged from west to east with Girder G1 and Truss 1 at the north fascia which is consistent with the previous inspection reports and bridge plans.
- Safety boat with scaffolding, 45' lift truck, local police, traffic control and double lane closures were used to complete inspection.
- The interior of the end floorbeams at Abutment 1, Pier 2 and the pivot girder at Pier 1 are considered to be confined spaces. An air meter was used during inspection and the air quality was found to be acceptable and no ventilation was required.
- An underwater inspection was performed as part of this assignment and the report is attached.

Form: BRI-18, Rev. 1/14
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Additional Comments:

- There are work items associated with this report.

National Bridge Elements
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
30 - Steel Deck Corrugated/Orthotropic/Etc.	Mod.	2840	sq. ft.	2680	135	25	0
1000 - Corrosion		160		0	135	25	0
510 - Wearing Surfaces		5554	sq. ft.	5478	1	75	0
3210 - Delamination/Spall/Patched Area/Pothole (Wearing Surfaces)		1		0	1	0	0
3220 - Crack (Wearing Surface)		75		0	0	75	0
515 - Steel Protective Coating		2840	sq. ft.	2680	0	0	160
3440 - Effectiveness (Steel Protective Coatings)		160		0	0	0	160
107 - Steel Open Girder/Beam	Mod.	1554	ft.	1494	57	3	0
1000 - Corrosion		58		0	55	3	0
1900 - Distortion		1		0	1	0	0
7000 - Damage		1		0	1	0	0
515 - Steel Protective Coating		13761	sq. ft.	12385	0	0	1376
3440 - Effectiveness (Steel Protective Coatings)		1376		0	0	0	1376
111 - Timber Open Girder/Beam	Mod.	574	ft.	469	103	2	0
1020 - Connection		5		0	3	2	0
1170 - Split/Delamination (Timber)		100		0	100	0	0
120 - Steel Truss	Mod.	574	ft.	406	90	75	3
1000 - Corrosion		60		0	30	30	0
1010 - Cracking		18		0	0	15	3
1020 - Connection		40		0	40	0	0
1900 - Distortion		20		0	20	0	0
7000 - Damage		30		0	0	30	0
515 - Steel Protective Coating		7825	sq. ft.	7433	0	0	392
3440 - Effectiveness (Steel Protective Coatings)		392		0	0	0	392
152 - Steel Floor Beam	Mod.	47	ft.	0	47	0	0
1000 - Corrosion		47		0	47	0	0
515 - Steel Protective Coating		866	sq. ft.	693	0	0	173
3440 - Effectiveness (Steel Protective Coatings)		173		0	0	0	173
161 - Steel Pin and Pin & Hanger Assembly or both	Mod.	76	each	61	15	0	0
1020 - Connection		15		0	15	0	0
515 - Steel Protective Coating		76	sq. ft.	72	0	0	4
3440 - Effectiveness (Steel Protective Coatings)		4		0	0	0	4
205 - Reinforced Concrete Column	Mod.	6	each	0	0	6	0
1080 - Delamination/Spall/Patched Area		4		0	0	4	0
1130 - Cracking (RC and Other)		2		0	0	2	0
210 - Reinforced Concrete Pier Wall	Mod.	26	ft.	0	26	0	0
1130 - Cracking (RC and Other)		26		0	26	0	0
213 - Masonry Pier Wall	Mod.	26	ft.	11	0	15	0
1610 - Mortar Breakdown (Masonry)		13		0	0	13	0

National Bridge Elements
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

1620 - Split/Spall (Masonry)		2		0	0	2	0
217 - Masonry Abutment	Mod.	52	ft.	26	0	26	0
1610 - Mortar Breakdown (Masonry)		26		0	0	26	0
220 - Reinforced Concrete Pile Cap/Footing	Mod.	26	ft.	0	26	0	0
1130 - Cracking (RC and Other)		26		0	26	0	0
225 - Steel Pile	Mod.	8	each	7	0	1	0
231 - Steel Pier Cap	Mod.	23	ft.	0	21	2	0
1000 - Corrosion		23		0	21	2	0
515 - Steel Protective Coating		556	sq. ft.	446	0	0	110
3440 - Effectiveness (Steel Protective Coatings)		110		0	0	0	110
300 - Strip Seal Expansion Joint	Mod.	20	ft.	12	8	0	0
2350 - Debris Impaction		8		0	8	0	0
304 - Open Expansion Joint	Mod.	39	ft.	37	2	0	0
7000 - Damage		2		0	2	0	0
310 - Elastomeric Bearing	Mod.	16	each	15	1	0	0
2230 - Bulging, Splitting, or Tearing		1		0	1	0	0
316 - Other Bearing	Mod.	7	each	3	4	0	0
1020 - Connection		4		0	4	0	0
330 - Metal Bridge Railing	Mod.	287	ft.	287	0	0	0
515 - Steel Protective Coating		287	sq. ft.	287	0	0	0

FRACTURE CRITICAL MEMBERS / FRACTURE PRONE DETAILS

Inspectors:

Lead Inspector:	Naveen Bitla
Inspector:	Task:
Agolli, Elvis	BSE - Inspector
Area, 14	BSE - Inspector
Begolli, Eriol	BSE - Inspector
Bitla, Naveen	BSE - Inspector
Carlson, Clay	BSE - Inspector Rail - Inspector
DiCesare, Underwater	BSE - Inspector
Mahalingam, Balaji	BSE - Inspector
Nixdorf, Steven	BSE - Inspector
Spahiu, Igli	BSE - Inspector
Zehr, Ryan	BSE - Inspector

Visits:

Visit Date:	Temp:	Start Time:	End Time:
09/27/2018	70	08:30 AM	03:30 PM
10/12/2018	45	08:30 AM	02:30 PM
10/18/2018	45	07:30 AM	04:00 PM

Fracture Critical Inspection Frequency: 24 Months

Fracture Critical Type Code: J Steel Pier Caps, welded box or plate girders

Structure Type: Highway Bridges Year Built: 1870 ADT: 13200 Year of ADT: 2015 % Truck: 5

Access Equipment Needed: Raft and scaffolding.

Traffic Control Required: None.

Reference to Plans: Project #158-150 (1989)

MEMBER/DETAIL TYPE # 1

Member/Details Type: G Single and multiple cell steel box girders Fracture Critical: Yes

Fatigue Category: C Steel Type: A-588 Fatigue Prone: Yes

Description: Transverse box girders and Abutment 1, Pier 1 (pivot girder) and Pier 2.

Inspection Procedure: 100% hands-on.

Condition Comments: End floorbeams (box girders) at Abutment 1 and Pier 2:
- Exterior (joint side) has moderate to heavy rust on the bottom flange, bottom of the web and bottom of stiffeners with minor accumulation of sand/debris.
- Interior has moderate to heavy rust on the bottom flange and at the bottom of a few diaphragms and web plates.
- There are 10" diameter holes cut in both end diaphragms of the floorbeams allowing pigeon access.

There is a heavy accumulation of pigeon debris up to 3" deep inside the floorbeams (worst at Pier 2).

Box girder at Pier 1 (pivot girder for swing span):
- Interior has heavy laminated rust on the bottom flange for the full length x full width and on the base of diaphragms and web up to 6" high with isolated section loss up to 1/16" deep.
- Exterior has isolated areas of light to moderate rust and debris accumulation under the trusses.
- There is evidence of moisture throughout, but no water ponding present.

Procedure Followed This Inspection? Yes If No please explain:

MEMBER/DETAIL TYPE # 2

Member/Details Type: H Highly fatique prone details in tension areas Fracture Critical: No

Fatigue Category: E' Steel Type: A-588 Fatigue Prone: Yes

Description: Girders 1-7 bottom flange welded attachment to the bottom flange/web of box girders at Abutment 1, Pier 1 and Pier 2.

Inspection Procedure: 100% hands-on.

Condition Comments: No significant deficiencies. See BRI-18.

Procedure Followed This Inspection? Yes If No please explain:

MEMBER/DETAIL TYPE # 3

Member/Details Type: H Highly fatique prone details in tension areas Fracture Critical: No

Fatigue Category: D Steel Type: A-588 Fatigue Prone: Yes

Description: Open holes in girder webs and truss members in tension areas.

Inspection Procedure: 100% hands-on.

Condition Comments: No significant deficiencies. See BRI-18.

Procedure Followed This Inspection? Yes If No please explain:

MEMBER/DETAIL TYPE # 4

Form: BRI-12, Rev. 1/14
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Member/Details Type: H Highly fatique prone details in tension areas

Fracture Critical: No

Fatigue Category: E

Steel Type: A-588

Fatigue Prone: Yes

Description: Intersecting/nearly intersecting welds at fascia girder to transverse truss retrofit girder connections and at girder to pivot girder welded connections. Although not assigned a fatigue category by AASHTO, these are problematic details that were treated as fatigue category "E"

Inspection Procedure: 100% hands-on. See BRI-18.

Condition Comments: No significant deficiencies.

Procedure Followed This Inspection? Yes

If No please explain:

UNDERWATER INSPECTION

ITEM	*RATING*	*REMARKS*
60. SUBSTRUCTURE	4	
ABUTMENT 1:	6	Abutment 1: Stone masonry stem with reinforced concrete cap.
STEM	6	The stone masonry stem exhibits 75% deteriorated/missing mortar with penetrations up to 3' between stones, and grout repair/epoxy coating on stone masonry has failed up to 90% in the tidal zone. There is a 1' wide x 10" high broken stone at the south end of the abutment.
FOOTING	N	Not visible.
EROSION	7	
SETTLEMENT	7	The stone blocks appear to be slightly tilted to the east.
SCOUR	7	Channel bottom elevations along the abutment have remained relatively unchanged (less than 0.4' variations) as compared to the 2016 inspection.
WINGWALLS	5	The stone masonry return walls exhibit 80% deteriorated/missing mortar with penetrations up to 3' between stones. See Abutment 1 sheet.
General Remarks:		
ABUTMENT 2:	6	Abutment 2: Stone masonry stem with reinforced concrete cap.
STEM	6	The stone masonry stem exhibits 80% deteriorated/missing mortar with penetrations up to 4' between stones (no change since previous inspection), and grout repair/epoxy coating on stone masonry has failed up to 90% in the tidal zone.
FOOTING	N	Not visible.
EROSION	8	
SETTLEMENT	8	No evidence of settlement observed.
SCOUR	7	Channel bottom elevations along the abutment have remained relatively unchanged (less than 0.5' variations) as compared to the 2016 inspection.
WINGWALLS	5	The stone masonry return walls exhibits 80% deteriorated/missing mortar with penetrations up to 4' between stones, with voids up to 3.0' high x 4' wide x 2' deep. See Abutment 2 sheet and photo 77.
General Remarks:		
PIER NO. 1	5	Reinforced concrete pier with a steel jacket.
PILES	N	
STEM	5	The steel jacket has moderate to severe corrosion with intermittent areas of section loss up to 100%. There is a 4' high band of missing steel from 0.5' above the water surface to 3.5' below the water surface. The areas of exposed concrete have moderate to severe scaling with exposed / loose aggregate, and spalls up to 27' long x 1.8' high x 1.8' deep. See Pier 1 sheets and photos 80 and 81.
FOOTING	N	Not visible.

SCOUR	7	Channel bottom elevations around the perimeter of the pier have remained relatively unchanged (less than 0.7' variations) as compared to the 2016 inspection.
SETTLEMENT	8	No evidence of settlement observed.
General Remarks:		

PIER NO. 2	5	Stone masonry pier stem on stone masonry footing. Retrofit repairs has been made on the masonry pier including: a reinforced concrete cap encasing steel beams / framing which is supported by six (6) reinforced concrete encased steel H-piles (HP12x74) with fiberglass forms and steel C-shape bracing.
PILES	5	Piles: The fiberglass forms on the piles are loose / missing throughout. The reinforced concrete encasement has scaling up to 1/2" deep with exposed aggregate. Pile 3W at the southwest corner of the pier has a spall at the top of the encasement up to 5.0' high x full perimeter x 7" deep with exposed steel reinforcement that has moderate to heavy corrosion. Pile 3E at the southeast corner of the pier has a 4' wide x 2.3' high x 5" deep spall with exposed steel reinforcement that has corrosion and section loss up to 100%. The northeast and southeast flanges are exposed 14" high and exhibit moderate to heavy corrosion and pitting up to 1/8" deep. Pile 1E at the northeast corner of the pier has spalls / delaminations up to 3.5' wide x 3.5' high x 1.0' deep (previously noted as 10" deep) with exposed steel reinforcement that has up to 100% section loss. This deterioration has exposed the flanges of the steel H-pile up to 2.2' high x 7" wide. The flange tips exhibit rounding, knife edging and 9" high x 3" deep pitting and section loss up to 3/16" deep. The exposed H-pile has moderate corrosion and minor pitting. Pile 1W at the northeast corner of the pier has a full perimeter spall 4.0' high x 4" deep with exposed reinforcement that has section loss up to 100% at the top of the pile. The southeast flange is exposed at the top, 2.5' high with moderate to heavy corrosion and 1/16" deep pitting. Pile 1W has a void 7" diameter x 1" deep near the channel bottom. Steel Bracing: The steel cross-bracing between piles has severe corrosion with up to 5.0' long of 100% section loss adjacent to the piles. The lower cross-braces around the pier are missing. Steel Beams: The steel beams bearing on the piles have moderate to heavy corrosion with up to 1/8" section loss on the bottom flanges. The steel beams bearing on the above steel beams have areas of laminated rust on the top flange. See Pier 2 sheets and photos 84 - 89.
STEM	5	The stone masonry stem has approximately up to 70% deteriorated / missing mortar with penetrations up to 2.5' between stones. The masonry stem has missing chinking stones and intermittent cracked stones within the tidal zone. There is a 3' long x 2' high x 10" deep broken stone on the east face of the pier between Piles 1E and 2E. See Pier 2 sheets and photo 90.
FOOTING	4	The pier stem is founded on a stone masonry footing on timber cribbing. The footing is exposed up to full-height (1.5' high). The footing is undermined at the southwest corner 4.5' long x 1.1' high x 2.2' penetration with the timber cribbing exposed. The footing is undermined at the northwest corner 4.5' long x 1.3' high x 4' penetration with the timber cribbing exposed. The timber cribbing is split and exhibits evidence of marine borer activity. The previously noted statement "The footing is no longer bearing the live load since the installation of the concrete encased H piles" cannot be confirmed. See Pier 2 sheets and photos 91 and 92.
SCOUR	5	Channel bottom elevations around the perimeter of the pier have remained relatively unchanged (less than 1.0' variations) with a localized area of degradation up to 3.2' high at pile 2W as compared to the 2016 inspection. At Pier 2, the previously observed scour has exposed the footing up to full-height (1.5' high). The footing is undermined at the southwest corner 4.5' long x 1.1' high x 2.2' penetration with the timber cribbing exposed. The footing is undermined at the northwest corner 4.5' long x 1.3' high x 4'

		penetration with the timber cribbing exposed. See Plan, Upstream Profile and Pier 2 sheets and photos 82 and 83.
SETTLEMENT	7	No significant settlement observed.
General Remarks:		

PIER NO. 3	7	Reinforced concrete cap supported by eight (8) reinforced concrete encased steel H-piles with fiberglass forms.
PILES	7	The reinforced concrete encasements are covered by fiberglass forms and do not have any significant deficiencies.
STEM	N	
FOOTING	N	
SCOUR	7	Channel bottom elevations have remained relatively unchanged (less than 1.1' variations) around the perimeter of the piles as compared to the 2016 inspection.
SETTLEMENT	8	No evidence of settlement observed.
General Remarks:		

---

61. CHANNEL & CHANNEL PROTECTION:

	5	Saugatuck River is a saltwater (tidal) body of water.
CHANNEL SCOUR	5	As compared to the 2016 inspection, channel bottom elevations along the upstream (north) fascia, the abutments, Pier 1 and Pier 3 have remained relatively unchanged (variations up to 1.1') with areas of localized degradation up to 3.2' high at pile 2W of pier 2. See Plan, Upstream Profile and Pier sheets.
EMBANKMENT EROSION	7	There are dry-laid stone channel walls in place along the west side of the channel, and dry-laid stone retaining wallls at the ends of abutment 2. Channel Embankments: There is no significant erosion observed. Retaining / Channel Walls: The channel walls along the west side of the channel have penetrations up to 3' between stones. The northwest channel wall has a 3.0' wide x 2.0' high x 2.5' deep stone void. The southeast retaining wall has stone voids up to 4' wide x 3.0' high x 2' deep.
DEBRIS	7	There is scattered debris throughout the channel including an old pier in span 3 and a tank located northwest of pier 1. The debris does not impede the navigable channel.
VEGETATION	8	
CHANNEL CHANGE	7	No notable channel change was observed.
FENDER SYSTEM	5	There is a timber fender system in place around pier 1 and the north side of pier 2. The fender piles and wales have splits and checks up to 1/2" wide. The wales have areas of minor abrasion/collision damage. The hardware has heavy corrosion within the tidal zone. There are several piles that are part of the old abandoned fender system along the channel bottom but do not impede the navigable channel which has marine borer activity. See Plan sheet and photos 99 and 100.
SPUR DIKES & JETTIES	N	
RIP RAP	7	There is rip rap up to 3' diameter at abutment 2, and large rocks/riprap at the northeast corner of pier 3.
General Remarks:		

UNDERWATER INSPECTION (BRI-59)

Bridge: 01349 Town: 83500 - WESTPORT Carried: ROUTE 136 Crossed: SAUGATUCK RIVER

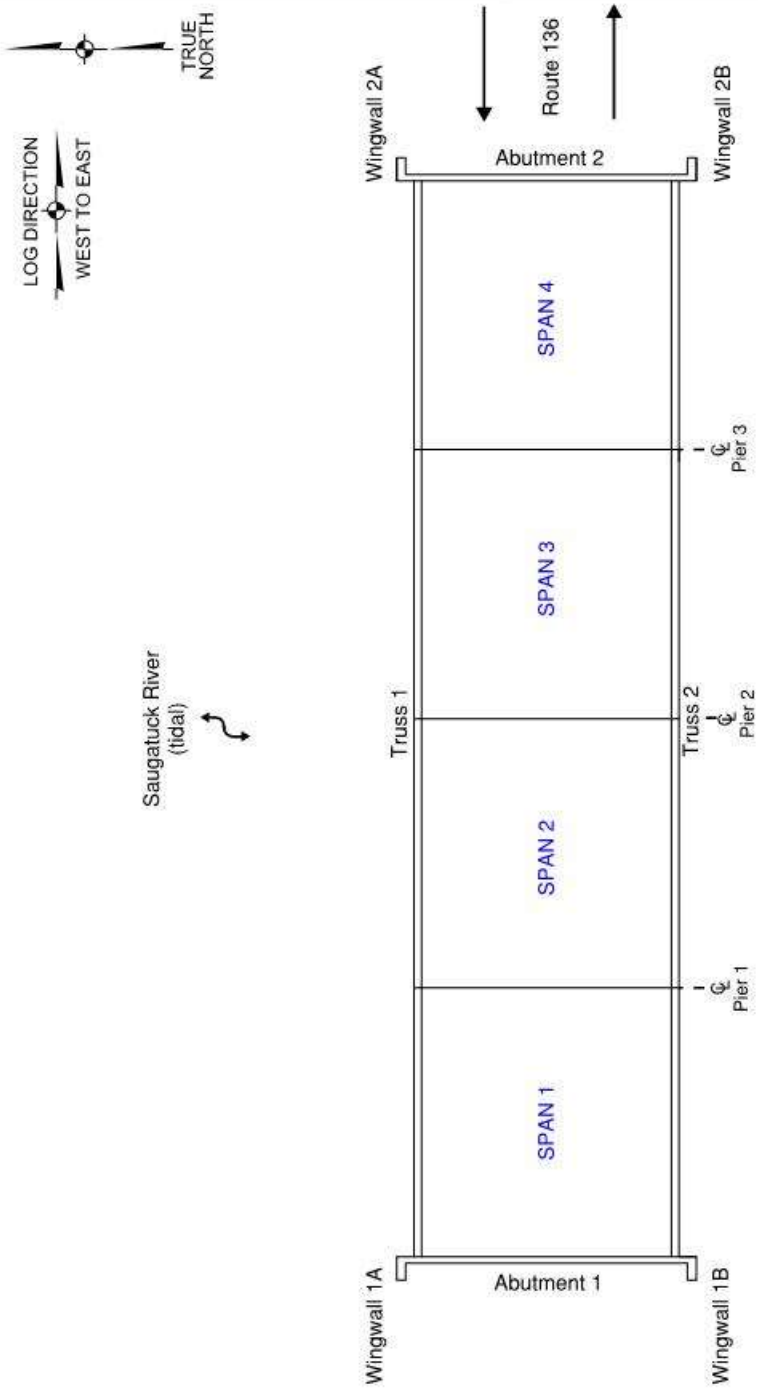
Total Number of Piers:	3
Piers in the Water:	3
Boat Used?	Yes
Boat Size:	14'
Dive Station Used?	Yes
Access to Bridge:	Boat
Access/ Equipment Comments U/W:	Dive Station
Type of water:	Salt (tidal)
Marine Growth:	Barnacles and oysters up to 1" thick
Max Water Depth:	9.4' (at low tide)
Max Water Depth at Pier Or Abutment:	8.0' (at low tide)
Current Strength:	1 fps
U/W Visibility:	1'
Bottom Composition:	Intermittent rip rap up to 3' diameter, sand, silt and natural debris with penetrations up to 1.5' deep into the channel bottom.

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: KHI, MMB (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



KEY PLAN

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

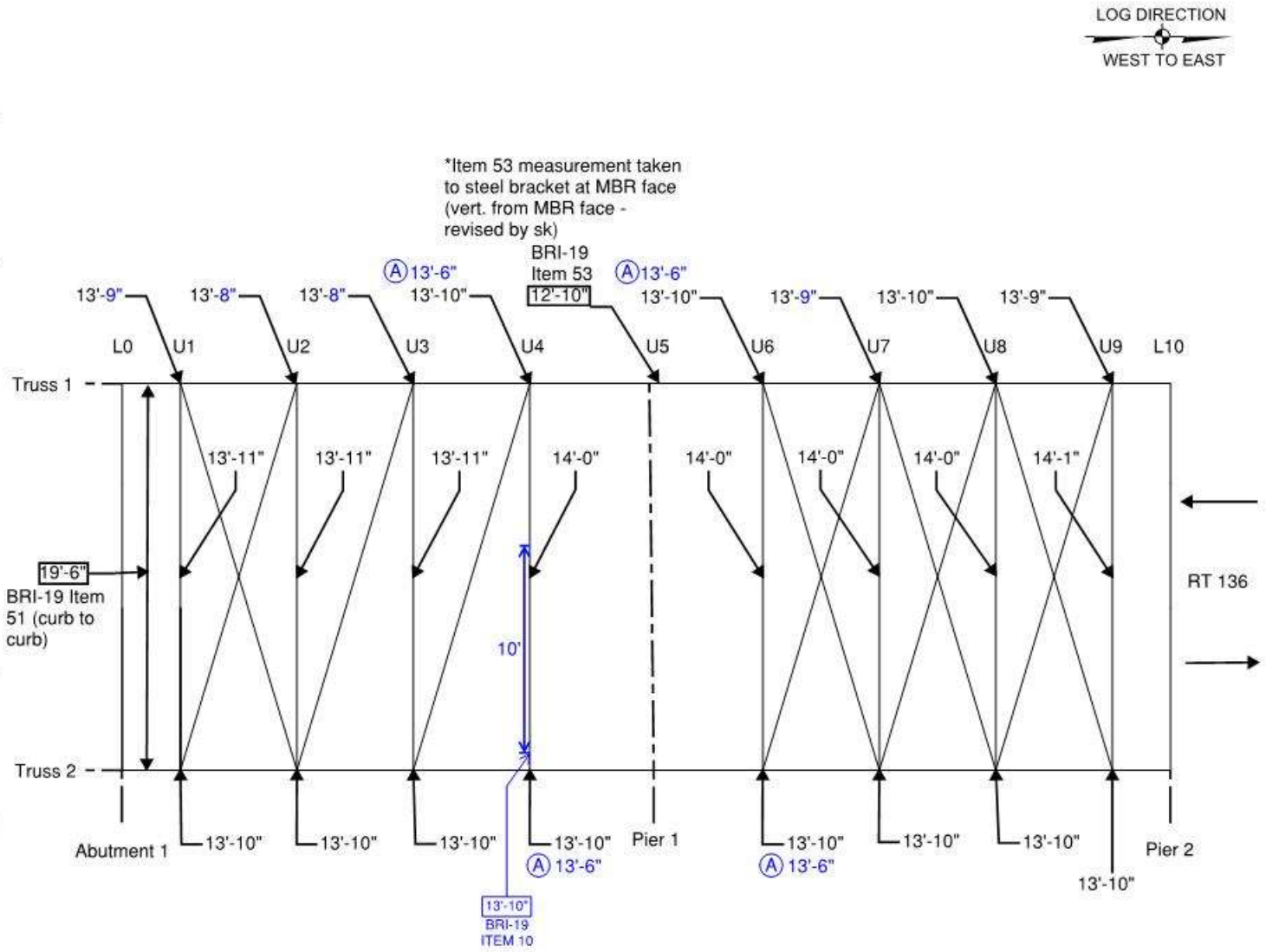
:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

REVISION 2 | DATE: | CREW: | REVISION 4 | DATE: | CREW:

REVISION 1 | DATE: 09/27/2018 | CREW: PRIME: NB, BM, EA, EB, IS | REVISION 3 | DATE: | CREW:

CREW: WEA, KHI (TSC)
DATE: 11/16/16
BRIDGE NO.: 01349



General Notes:
-All truss measurements are from pavement to bolt at the top chord web
-Vertical clearance posted 12'-7" at both ends (150'± from bridge)
-Changes to clearances appear due to pavement heaving/rutting and impact damage on several truss members (continue to monitor)

Ⓐ MEASURED AT TOP PIN CONNECTION

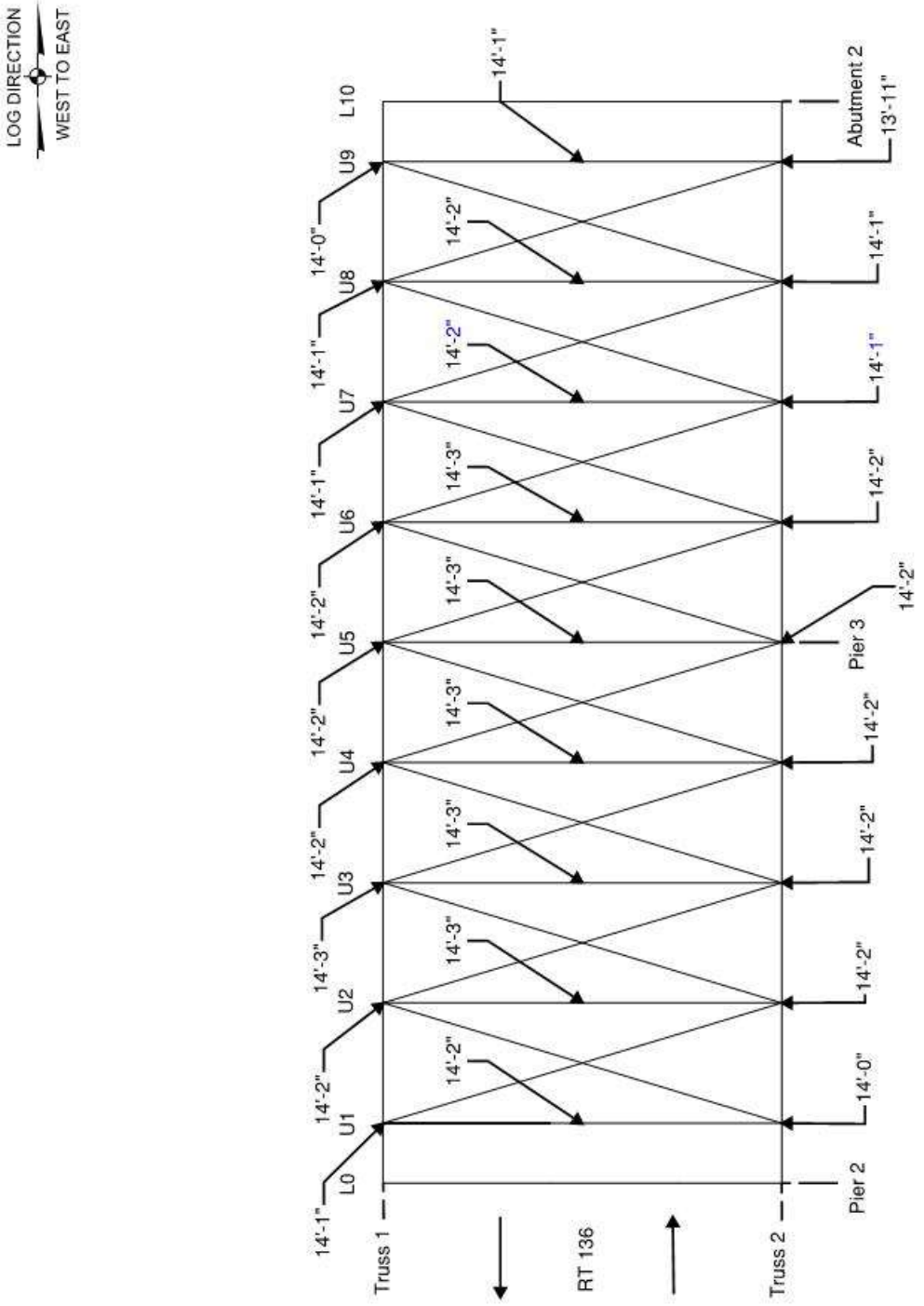
CLEARANCE DIAGRAM SPANS 1-2

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:
See clearance diagram for spans 1-2 for general notes

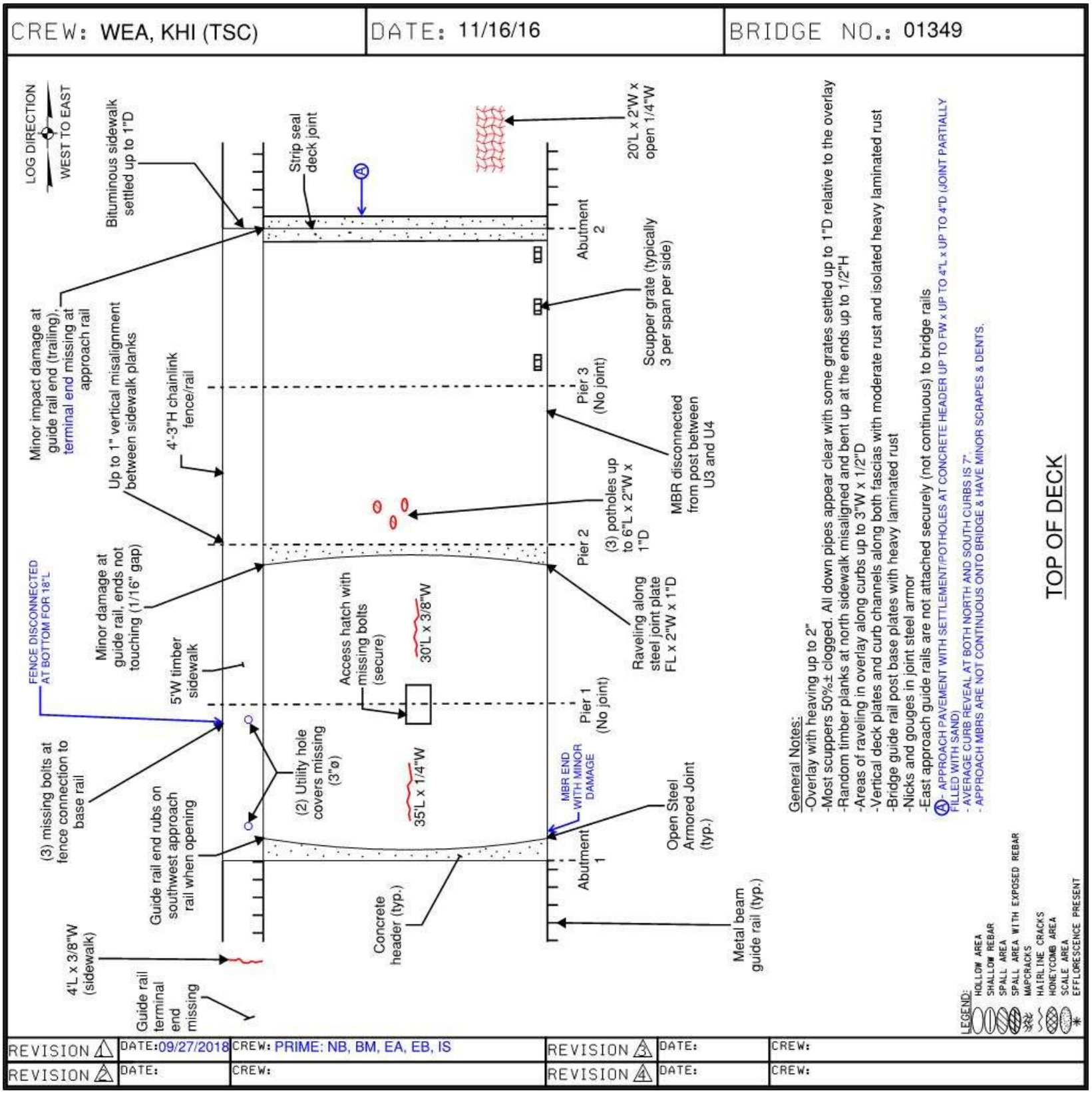
CLEARANCE DIAGRAM SPANS 3-4

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

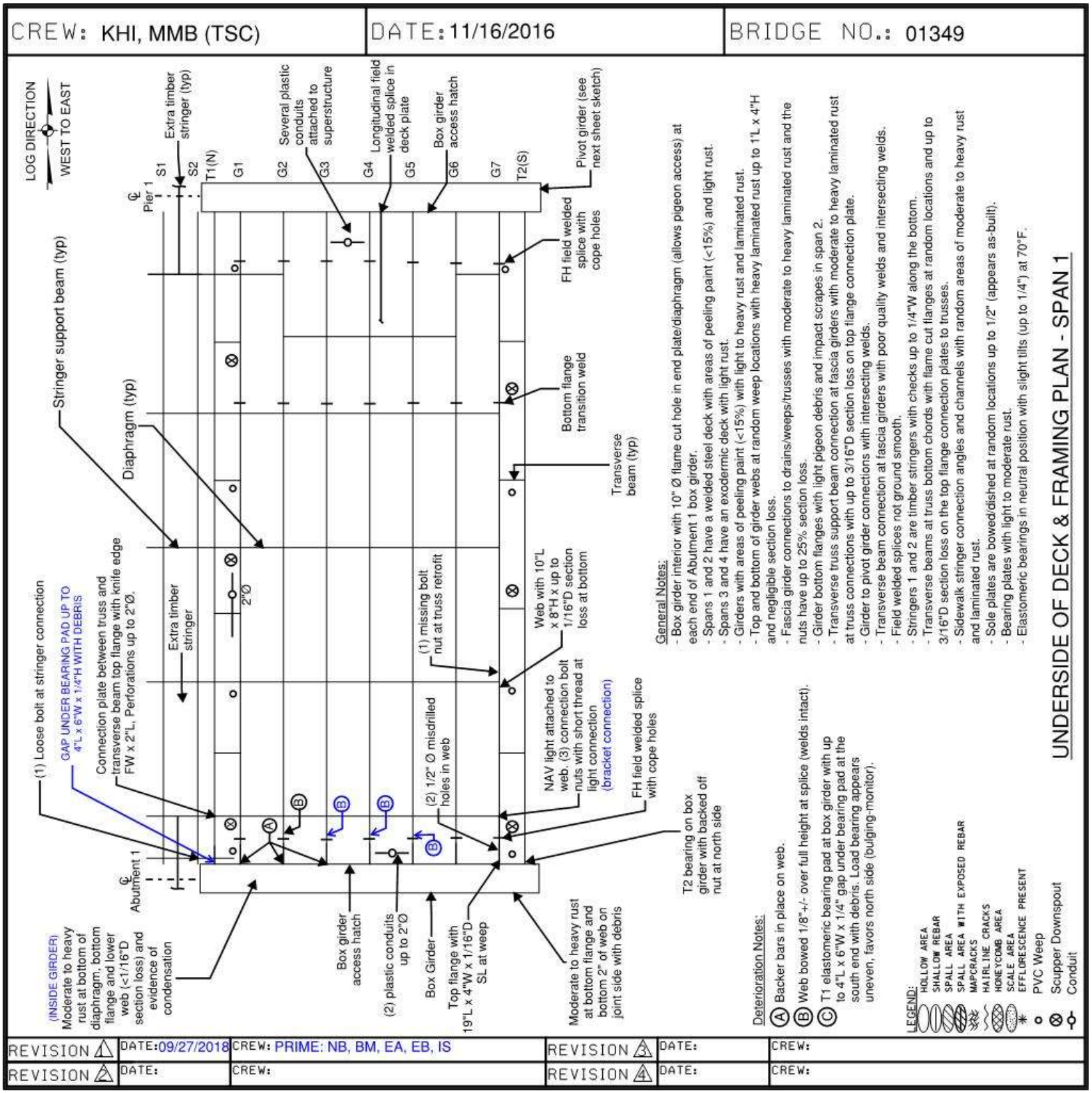
Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



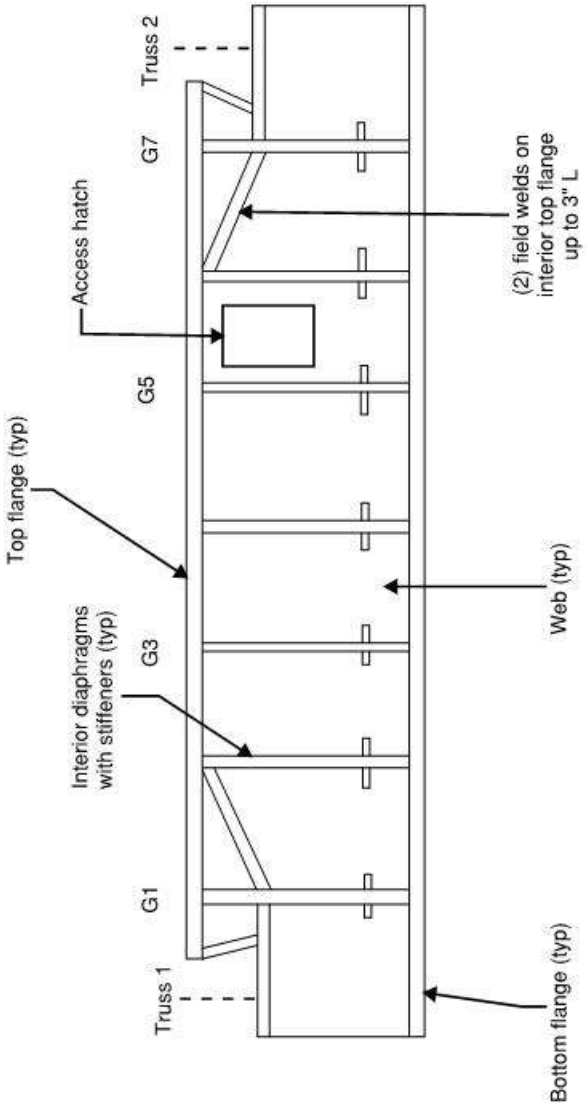
Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:
- Interior bottom flange with evidence of moisture throughout
- Heavy laminated rust on interior bottom flange FL x FW and at base of stiffeners and web with 6" H laminated rust (isolated section loss up to 1/16" D)
- Only one opening, no drains/ventilation inside
- Welds not ground smooth/uneven, backer bars remain in place with heavy laminated rust at bottom flange to web welds
- Swing machinery not shown for clarity
- Exterior with isolated light to moderate rust
- Poor quality welds at interior stiffeners with undercutting up to 1/16" D
- Debris accumulation under trusses

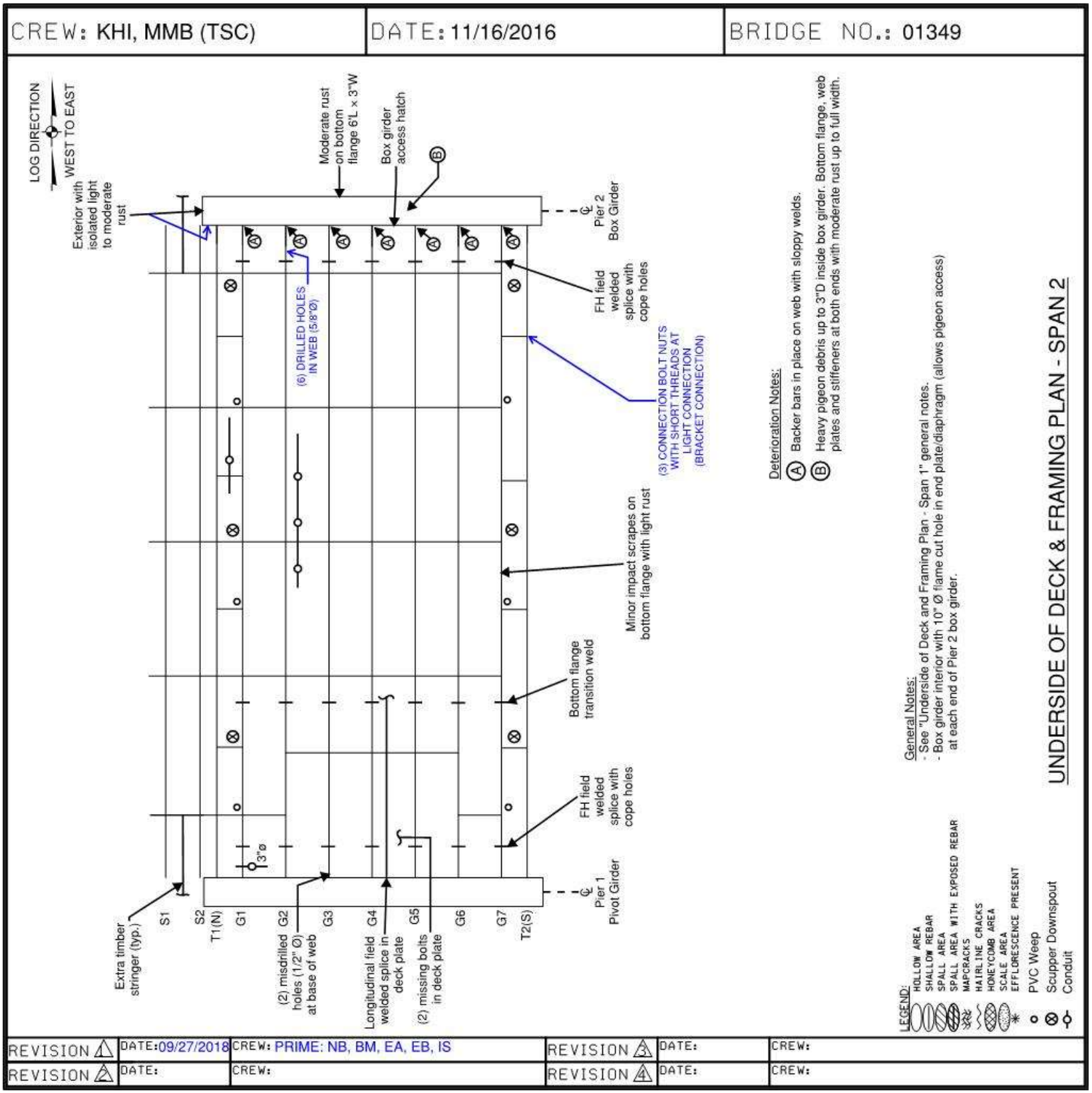
PIVOT GIRDER AT PIER 1 - WEST ELEVATION

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

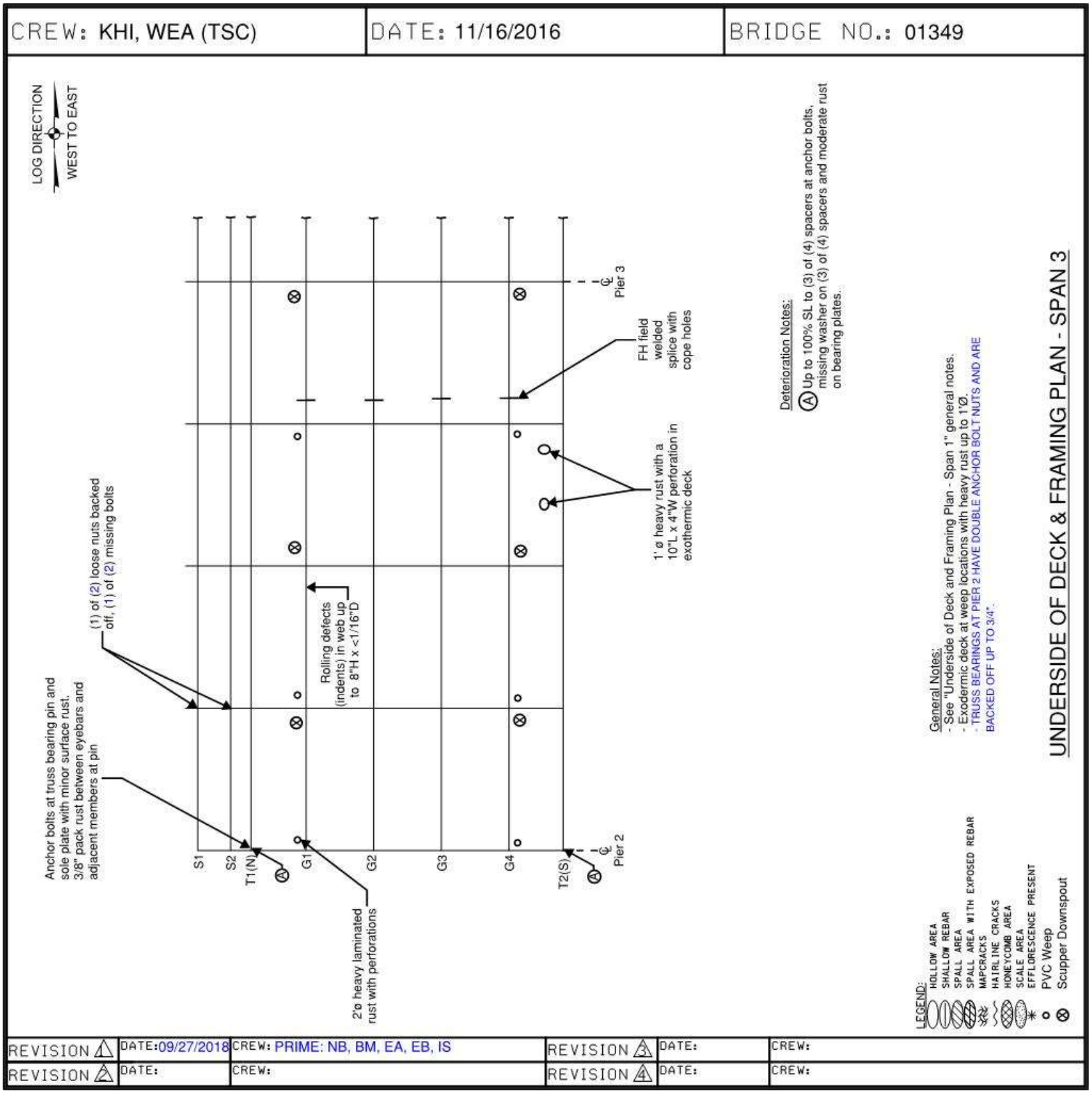
Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

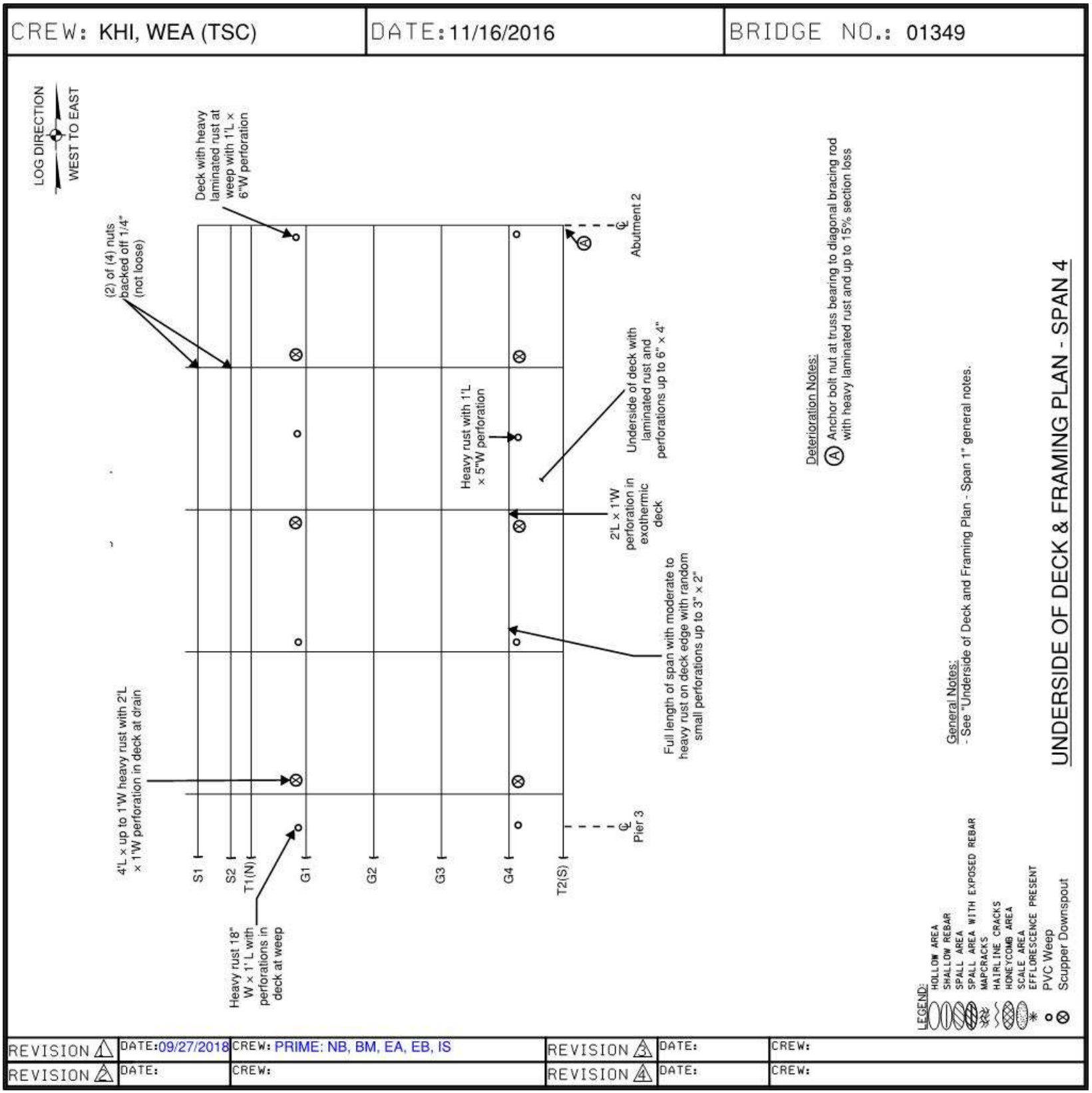
Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



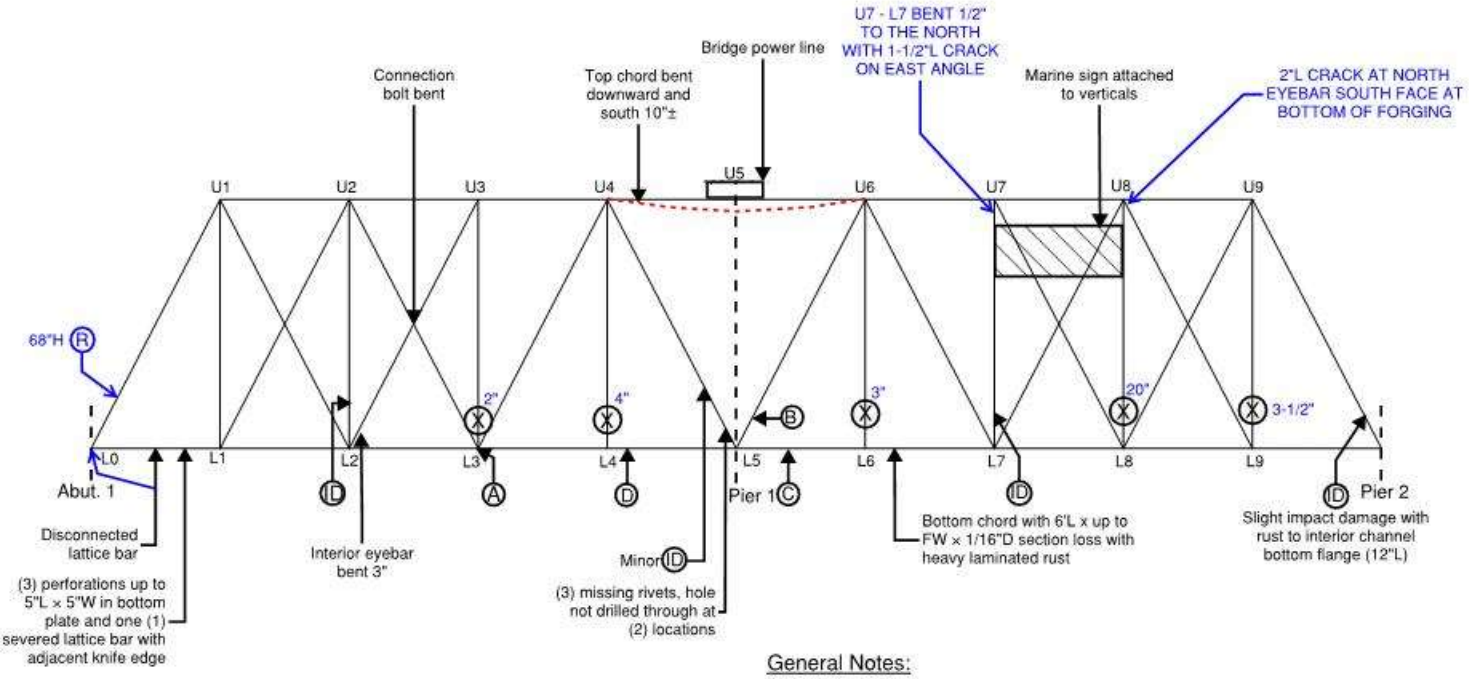
Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

- (A) 8"L × 3"W perforation in bottom plate of bottom chord, up to 1/2" thick pack rust between eyebars and vertical members, 50% section loss in (1) of (4) diagonal eyebar heads, 30% section loss in another and remaining (2) with random pitting up to 3/16"D
- (B) Heavy impact damage to interior channel with crack to top flange (6"), (2) cracks on the web - top crack (8") and bottom crack (20")
- (C) Bottom flange plate with FL × FW × as little as 3/16" thick minimum remaining and up to 1/2"W knife edge around hole (4" ø); bolts with up to 50% section loss, 1/8"± pack rust between bottom flange plates and entire section with heavy laminated rust at web channels (interior side) with up to 6"H × 1/8"D section loss
- (D) Bottom flange plate with laminated rust and 8"Ø perforation with adjacent areas of knife edge
- (X) Impact damage with cracks in steel member (total length of cracks)
- (ID) Impact damage with bent angle legs up to 1" over 2'L and no cracks
- (R) BOLTED REPAIR PLATES UP TO 12-1/2"W x 1/2"T AT THE NOTED LOCATIONS

LEGEND:
HOLLOW AREA
SHALLOW REBAR
SPALL AREA
SPALL AREA WITH EXPOSED REBAR
MAPCRACKS
HAIRLINE CRACKS
HONEYCOMB AREA
SCALE AREA
EFFLORESCENCE PRESENT

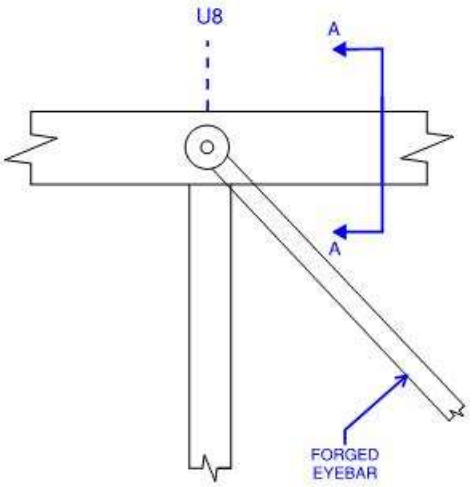
General Notes:

- Abutment 1 bearings with light rust.
- Pier 1 bearing plates with heavy laminated rust and rivet heads with up to 25% SL.
- Trusses are ornamental and support no live loads, only self weight.
- Rust on 5%± of surface of truss.
- Bottom chord with localized moderate to heavy rust with laminated rust up to 1' Ø.
- Bottom chord batten plates and lattice bars with random heavy laminated rust with up to 3/16"D section loss and up to 1/4" thick pack rust between lattice bars and bottom chord channel horizontal legs.
- Bottom chord top lattice bars cut out at MBR locations.
- Eyebar heads with light to moderate rust and random areas of pitting up to 1/8"D.
- Bottom chord eyebars with pack rust up to 3/8" thick between adjacent eyebar heads and between eyebar heads and adjacent members.
- Bottom chord eyebars are bowed up to 1".
- Vertical plates at base of vertical members with full height poor quality welds with porosity and undercutting up to 1/16" deep.
- Light debris along bottom chord.
- Most truss verticals with minor bends and shifts due to impact damage.
- Areas with impact damage on trusses have bent angle legs up to 1" over 2'L with tears along the edges up to 1"L.
- Isolated 1/2" Ø misdrilled holes in bottom chord channel horizontal legs.
- Transverse portal braces at truss ends have bent flanges and angle legs.
- TYPICAL UP TO 1/2" GAP BETWEEN PIN CAP AND UPPER CHORD WEB AT ISOLATED LOCATIONS.

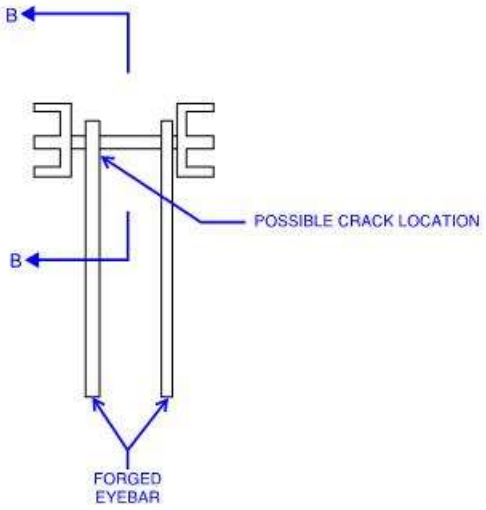
TRUSS 1 SOUTH ELEVATION - SPANS 1 & 2

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

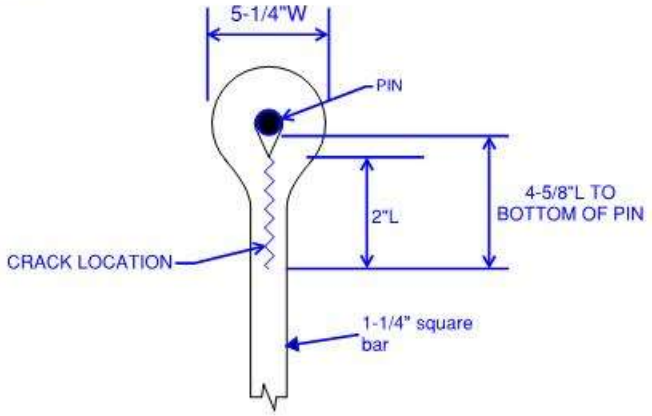
CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



SPAN 2, NORTH TRUSS, NORTH ELEVATION



SECTION A-A



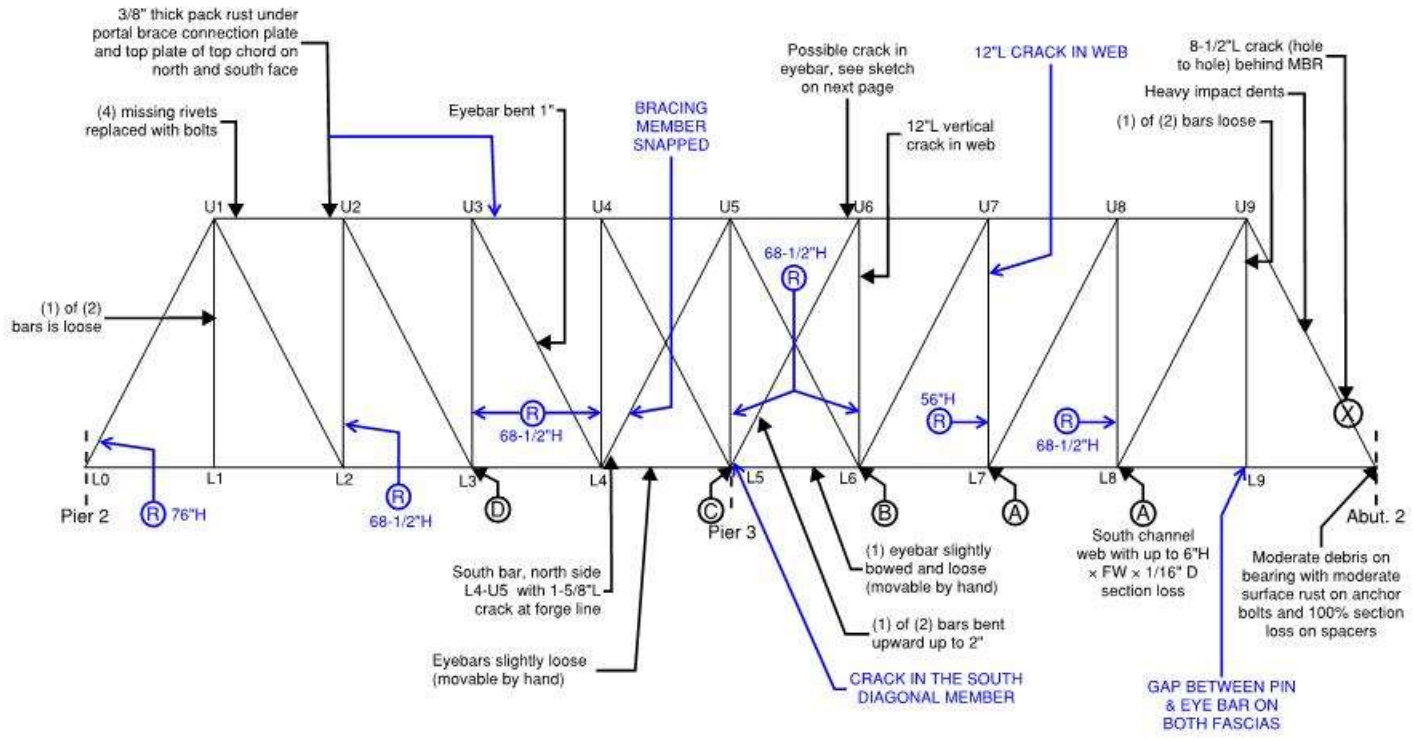
SECTION B-B (NORTH EYEBAR)

NOTE: EYEBAR DOES NOT CARRY LIVE LOAD, ONLY HAS TO SUPPORT ITS OWN WEIGHT.

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

(A) Bottom flange plate with FL × FW × as little as 3/16" thick remaining and up to 1/2"W knife edge around hole (4" ø); bolts with up to 50% section loss, 1/8"± thick pack rust between bottom flange plates and web channels (interior side) with up to 6"H × 1/8"D section loss

(B) North U5-L6 with 1-7/8"L crack at forge line (south face), south U5-L6 (north face) with 1"L crack; bars with 2"W x 1/16"D section loss along shank

(C) U4-L5 and L5-U6, north and south eyebars with cracks up to 2-1/16"L along forge line (4 cracks total)

(D) 1/16" gap at bottom chord truss pin (south side) between nut and eyebar (nuts typically not loose)

(X) Vertical cracks to interior members of verticals from impact damage (typically members are bent up to 1" over 2'L) and cracks at lacing bar ends.

(R) BOLTED REPAIR PLATES UP TO 12-1/2"W x 1/2"T AT THE NOTED LOCATIONS

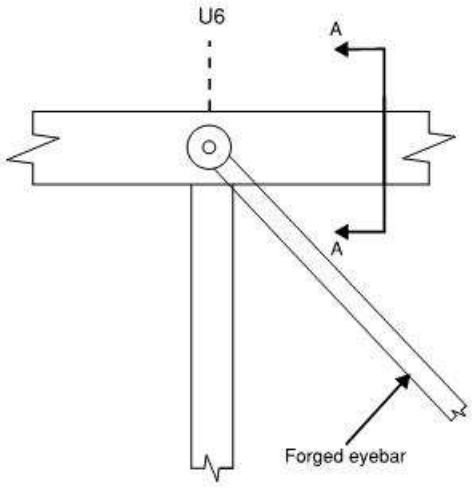
LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

General Notes:
- See "Truss 1 South Elevation - Spans 1 & 2" general notes.

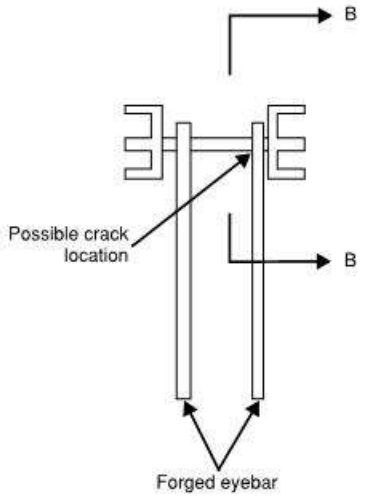
TRUSS 1 SOUTH ELEVATION - SPANS 3 & 4

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

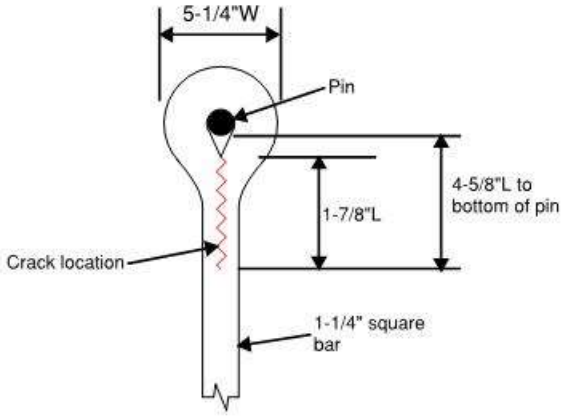
CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



SPAN 4, NORTH TRUSS, NORTH ELEVATION



SECTION A-A



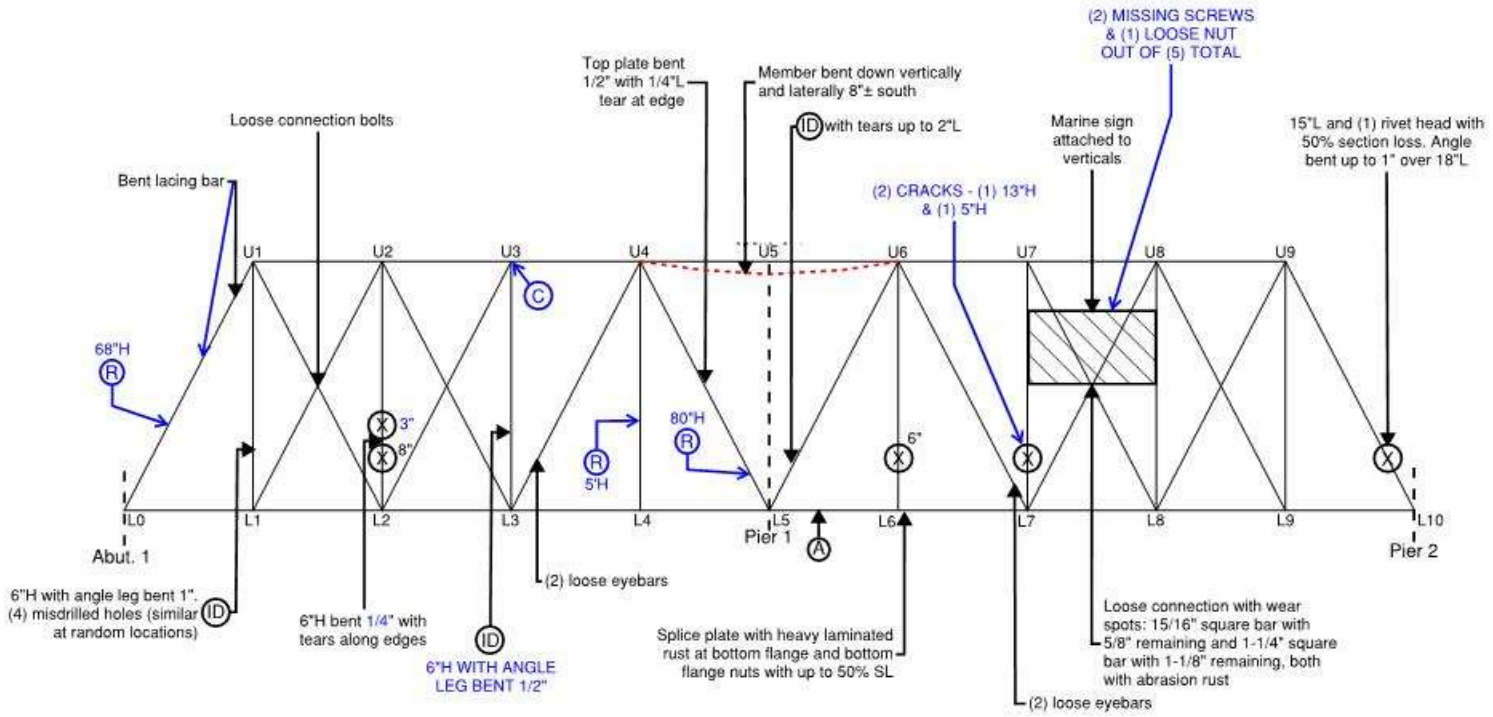
Note: Eyebar does not carry live load, only has to support its own weight.

SECTION B-B (SOUTH EYEBAR)

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

(A) Bottom chord flange plate with heavy laminated rust and 3/16" thick remaining × FW, knife edge and perforations along hole cutouts up to 1"W and bolt nuts with up to 30% SL and web channels (interior side) with up to 3"H × 1/8"D section loss

(X) Impact damage with cracks in steel member (total length of cracks)

(ID) Impact damage with bent angle legs up to 1" over 2'L and no cracks

(C) 1/2" GAP BETWEEN PIN CONNECTION

(R) BOLTED REPAIR PLATES UP TO 12-1/2"W x 1/2"T AT THE NOTED LOCATIONS

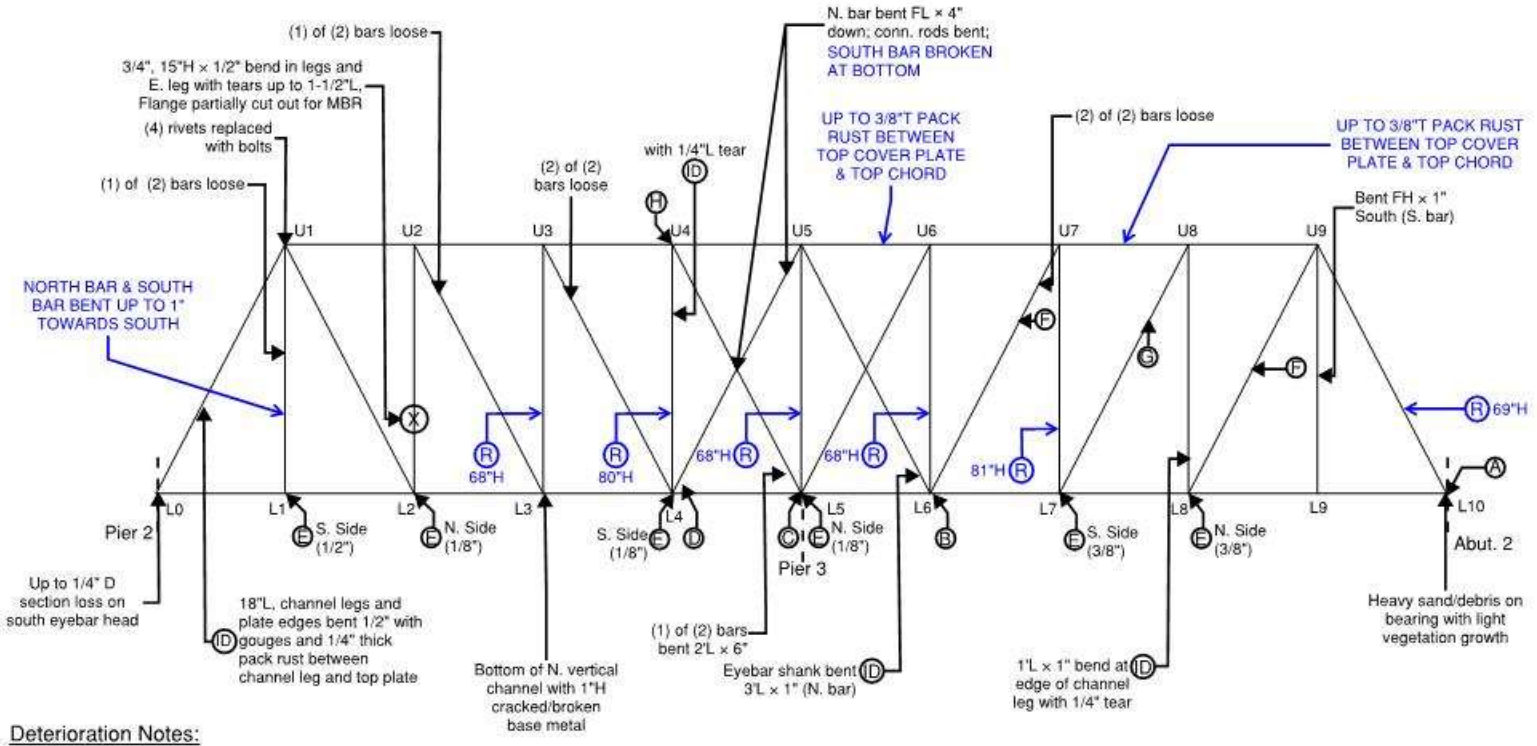
LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

General Notes:
- See "Truss 1 South Elevation - Spans 1 & 2" general notes.

TRUSS 2 SOUTH ELEVATION - SPANS 1 & 2

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

- (A) Anchor bolt with laminated rust
- (B) North bar, south face of U5-L6 with 1-1/4"L crack. South bar, south face of U5-L6 with 3/4"L crack along forge line and up to 1/4"D SL on eyebar heads at forge
- (C) North bar, south face of U4-L5 with 2-1/4"L crack at forge line and up to 1/8"D pitting on eyebar heads. South bar, north face of U4-L5 with 1"L crack at forge line
- (D) South bar, north face of L4-U5 with 1-1/16"L crack at forge line (Bar Sheared). North bar, south face of L4-U5 with 15/16"L crack at eyebar head forge
- (E) Gap between pin nut and eyebar head (nuts typically not loose)
- (F) I-Beam section welded (longitudinal and transverse) to eyebars
- (G) (2) plates welded to eyebars (longitudinal)
- (H) North bar, south face of U4-L5 with 1"L crack along forge line
- (X) Impact damage with cracks (total length of cracks)
- (ID) Impact damage with bent angle legs up to 1" over 2'L and no cracks
- (R) BOLTED REPAIR PLATES UP TO 12-1/2"W x 1/2"T AT THE NOTED LOCATIONS

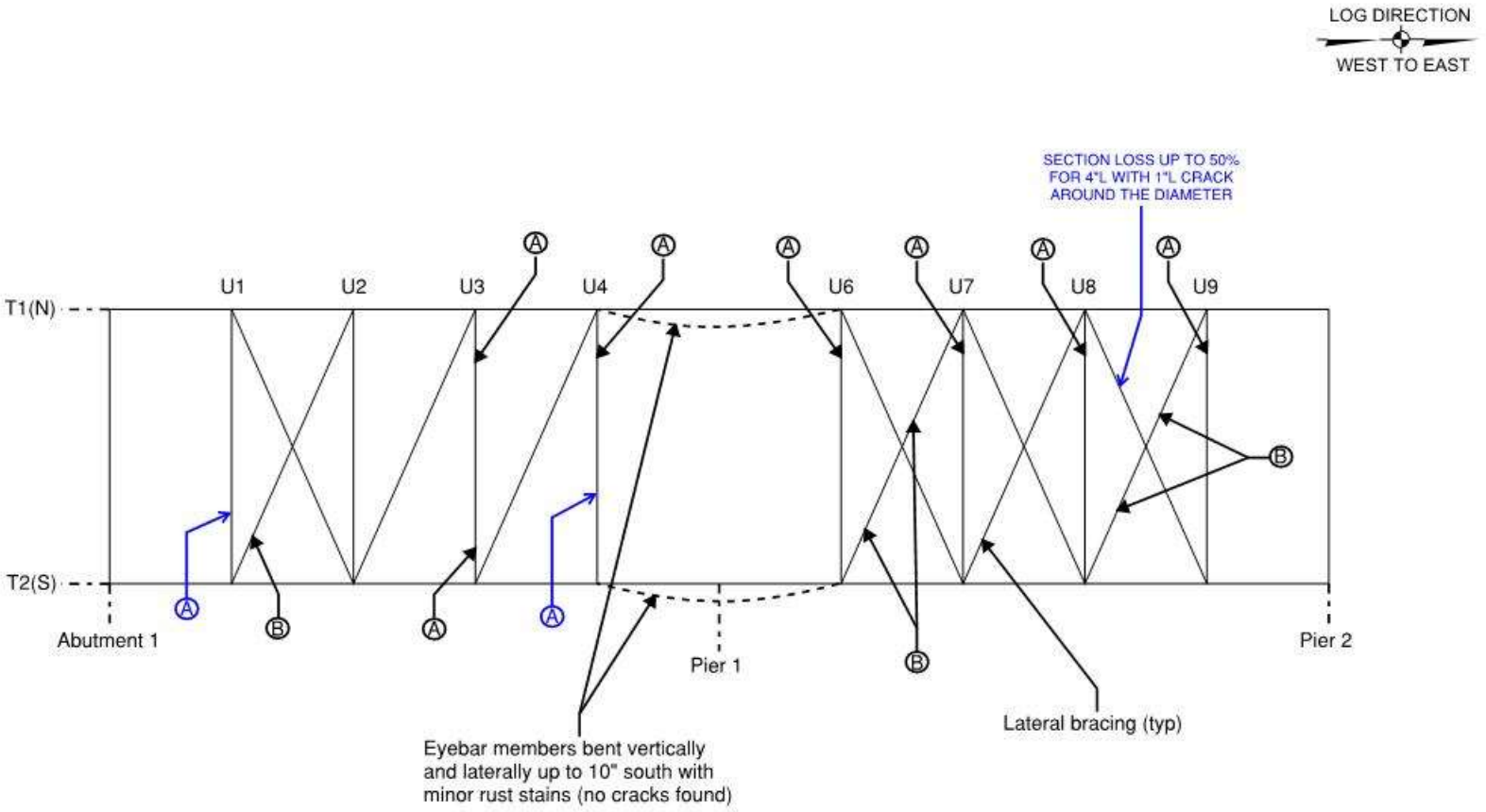
LEGEND:
HOLLOW AREA
SHALLOW REBAR
SPALL AREA
SPALL AREA WITH EXPOSED REBAR
MAPCRACKS
HAIRLINE CRACKS
HONEYCOMB AREA
SCALE AREA
EFFLORESCENCE PRESENT

General Notes:
- See "Truss 1 South Elevation - Spans 1 & 2" general notes.

TRUSS 2 SOUTH ELEVATION - SPANS 3 & 4

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes
Ⓐ- Impact damage to horizontal members (angle legs dented up to 1/2"
Ⓑ- Lateral bracing rod slightly bent

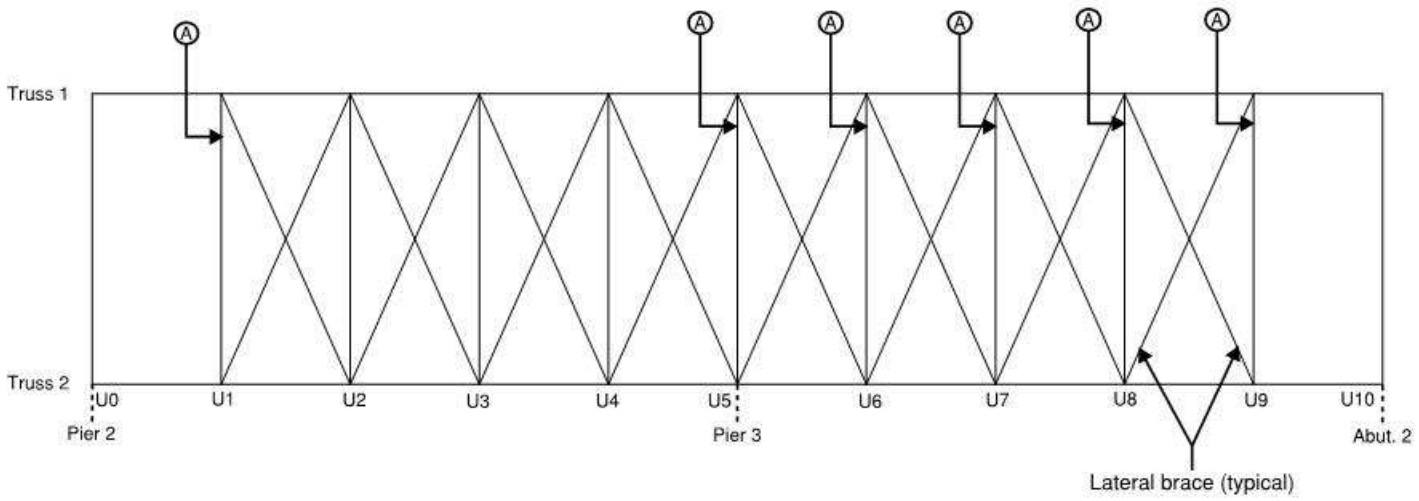
General Notes:
- See "Truss 1 South Elevation - Spans 1 & 2" general notes.

TOP CHORD LATERAL BRACING - SPANS 1 & 2

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349

LOG DIRECTION
WEST TO EAST



Deterioration Notes:

Ⓐ Impact damage to horizontal members (angle legs dented up to 1/2")

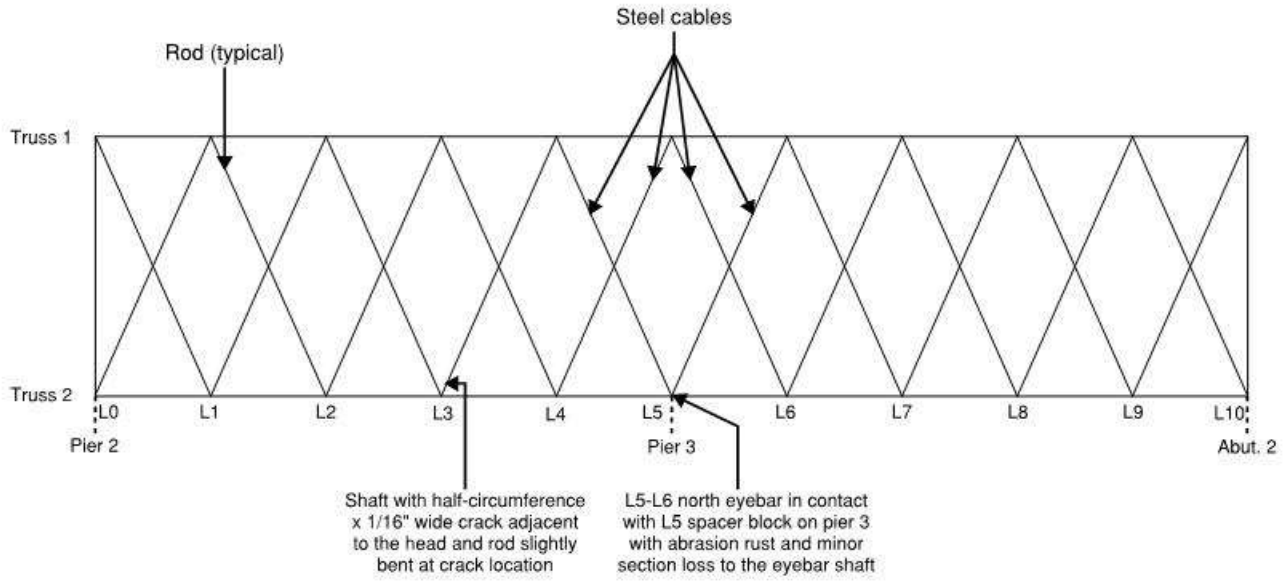
General Notes:
- See "Truss 1 South Elevation - Spans 1 & 2" general notes.

TOP CHORD LATERAL BRACING - SPANS 3 & 4

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: KHI, WEA (TSC)	DATE: 11/17/16	BRIDGE NO.: 01349

LOG DIRECTION
WEST TO EAST

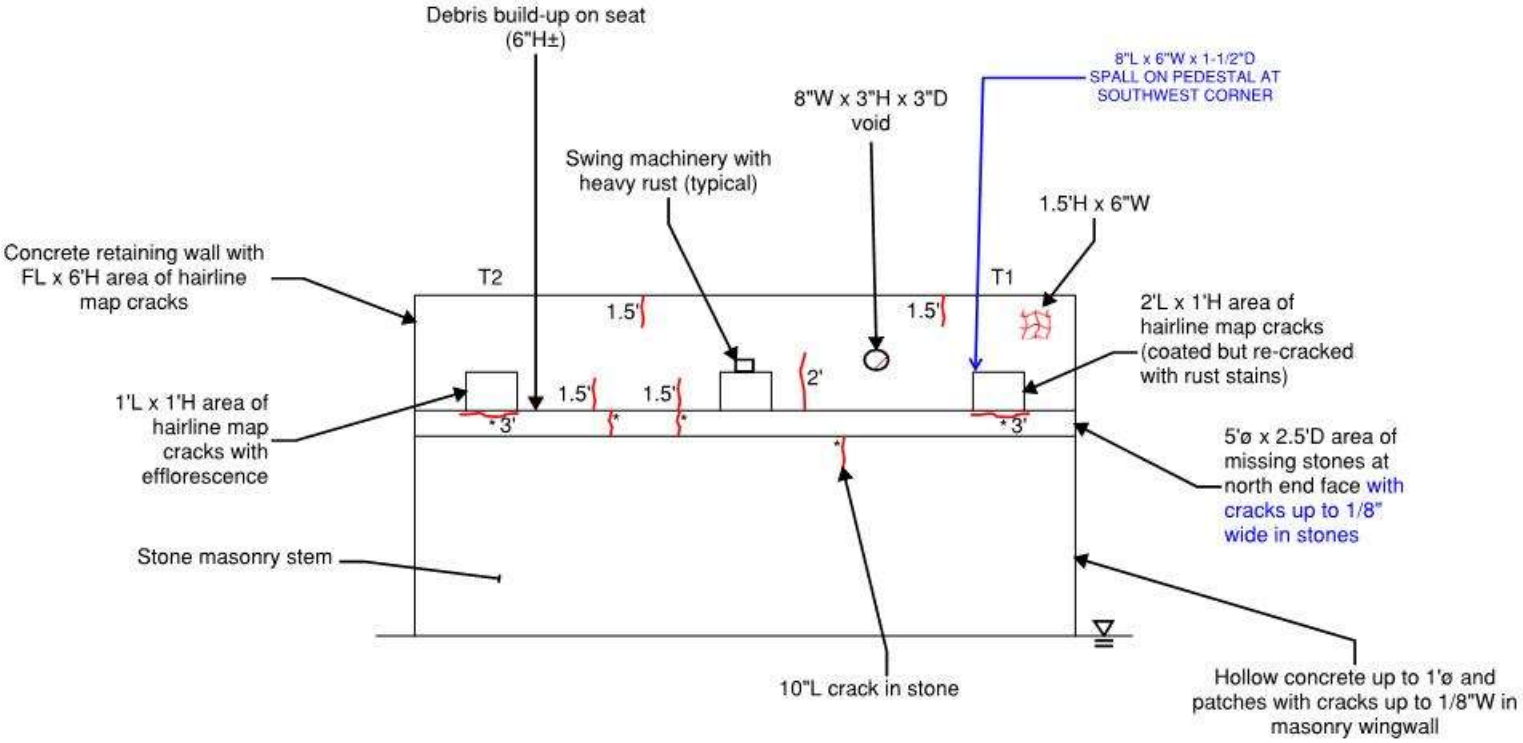


General Notes:
- See "Truss 1 South Elevation - Spans 1 & 2" general notes.
- Several diagonal cables and rods loose and sagging up to 2".
- Light rust on cables and rods.
- Moderate rust on rods in span 4.

BOTTOM CHORD LATERAL BRACING - SPANS 3 & 4

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



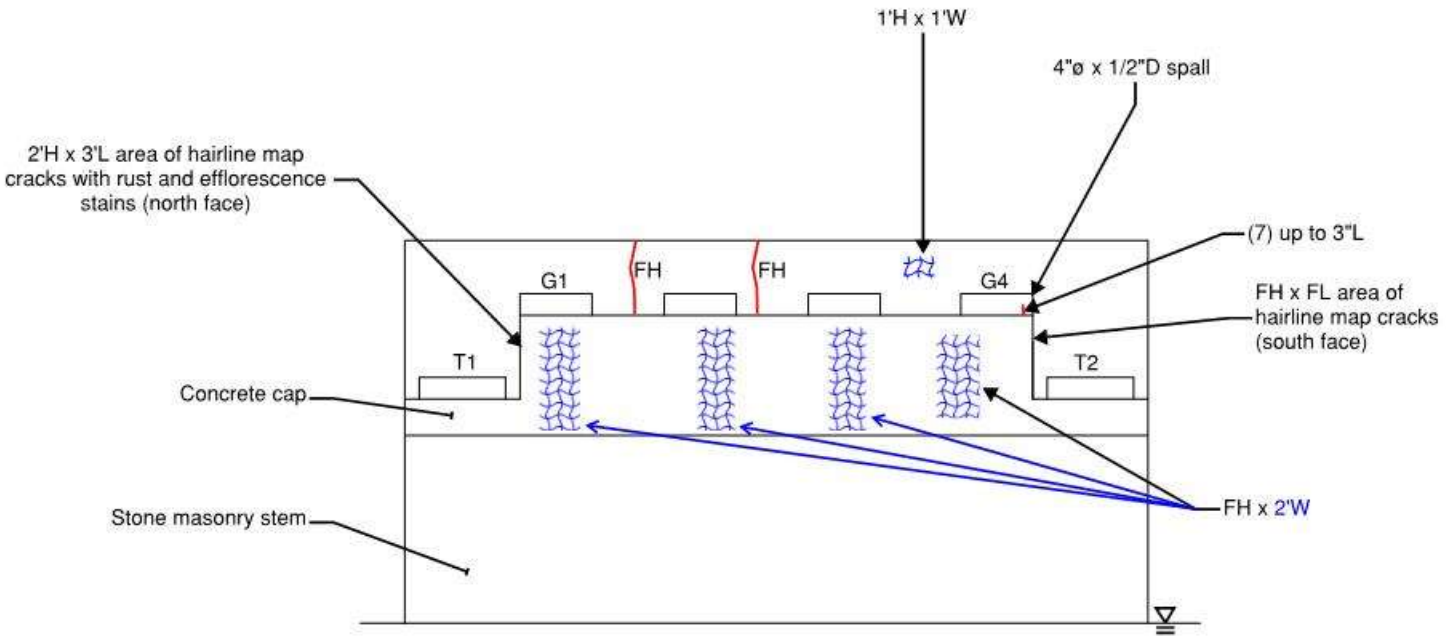
General Notes:
-Mortar joints with patch material separated from stone at random locations
-50%± of mortar pointing missing
-Voids between stones up to 4'D (mostly near water line)
-Timber platform attached to front face of stone masonry stem (not shown for clarity)
-Skim coat on backwall and pedestals beginning to peel
-Minor accumulation of debris on abutment seat and pedestals (unless otherwise noted)
-Efflorescence staining along construction joint between pedestal and seat

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

ABUTMENT 1

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



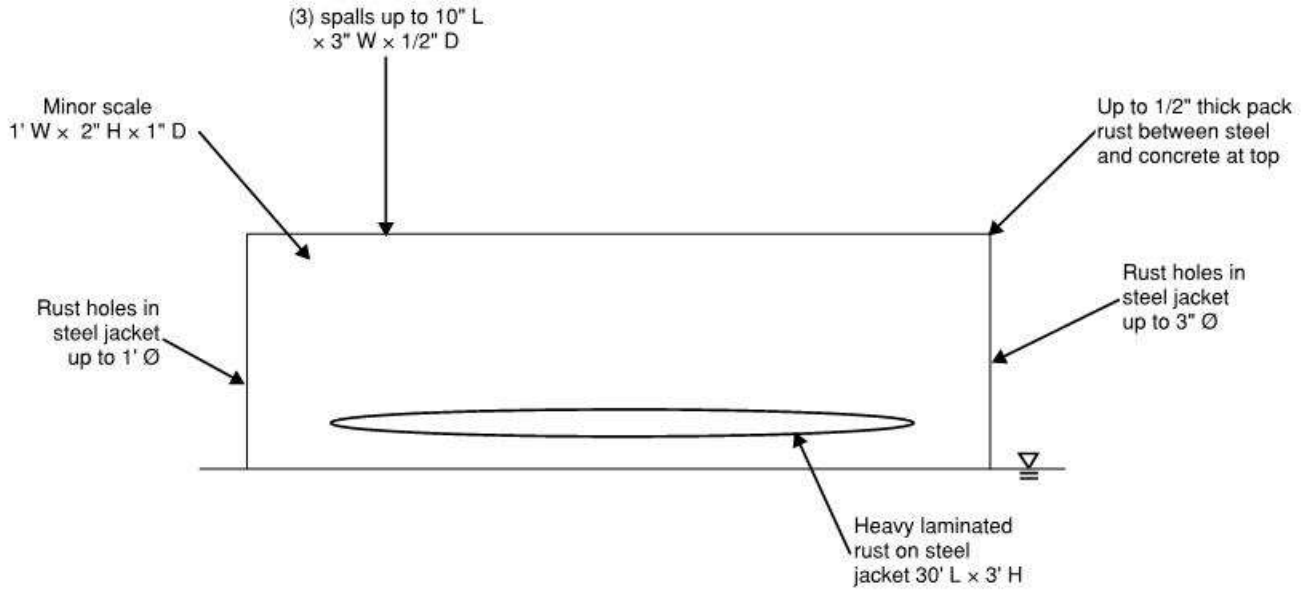
General Notes:
-Mortar joints with patch material separated from stone at random locations
-50%± of mortar pointing missing
-Evidence of leakage on backwall and concrete cap

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- FH Full Height

ABUTMENT 2

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:
- Swing machinery and cap girder on top
- Fender system not shown for clarity (see channel sketch)
- Steel encasement of concrete pier is severely corroded below high water line (heavy laminated rust up to 3'H × full perimeter) and areas of 100% section loss with spalled concrete
- Top of concrete pier with isolated hairline cracks up to 3'L and widespread map cracks up to 3'W × 1'L
- Timber work platforms at north and south ends on top of fender
- Steel grate walkway at west end attached at top
- Minor ponding water inside of circular steel member on top

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 1 - EAST ELEVATION

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: KHI, MMB (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



General Notes:
- See Pier 1, East Elevation

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 1 - WEST ELEVATION

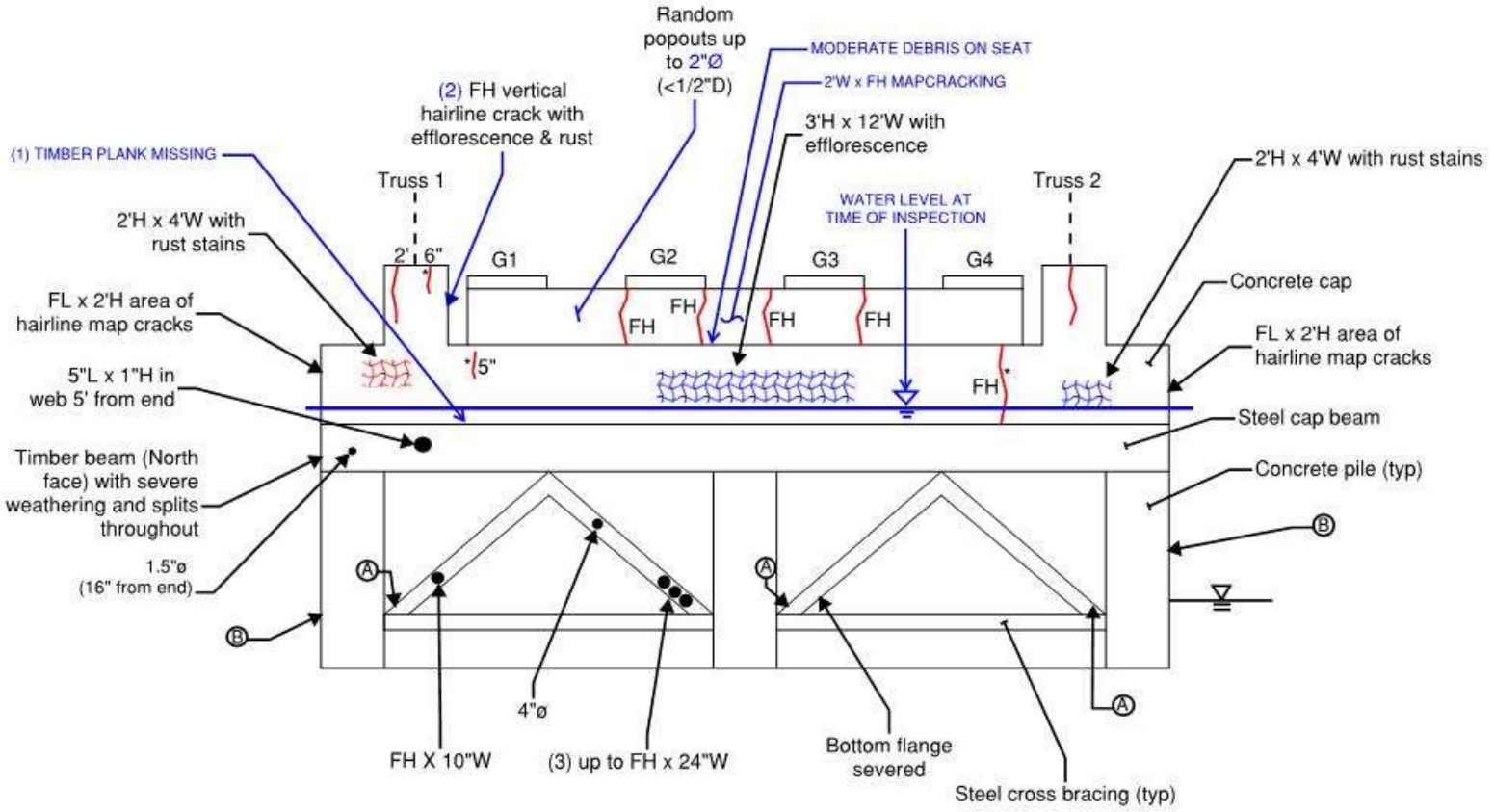
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:
Ⓐ- Steel cross bracing has several locations of 100% section loss x up to 3'W at the ends (disconnected from piles at these locations)
Ⓑ- Fiberglass shell missing, exposed concrete pile with heavy scale up to full perimeter x 3'H x up to 4"D with exposed rebar

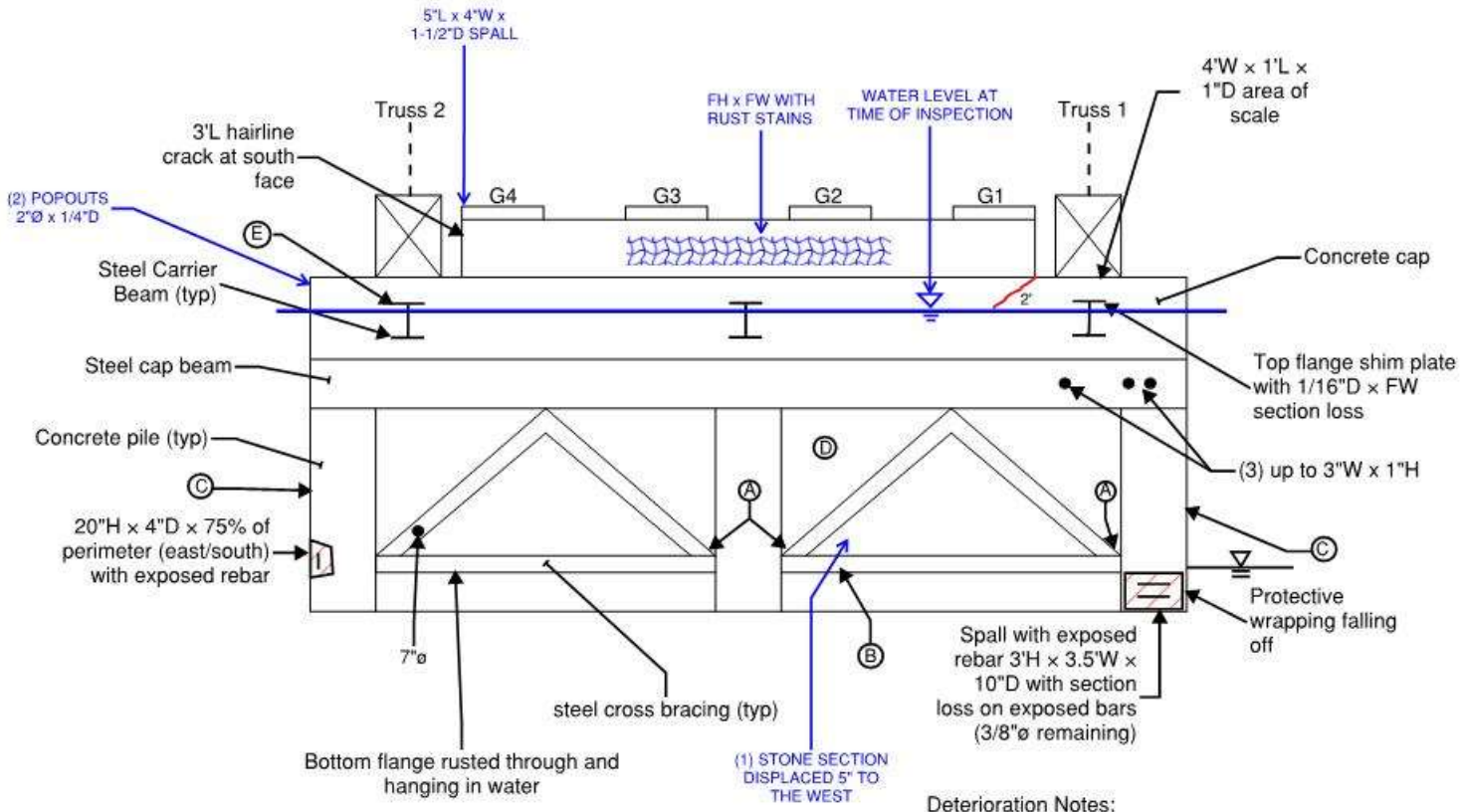
General Notes:
-Light sand accumulation on pier cap
-Concrete skimcoat peeling at random locations
-Moderate-Heavy rust on cap beam

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- Perforation in web

PIER 2 - WEST ELEVATION

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:
- Ⓐ- Steel cross bracing has several locations of 100% section loss x up to 2'W at the ends (disconnected from piles at these locations)
- Ⓑ- 100% bottom flange loss x 2'L
- Ⓒ- Fiberglass shell missing, exposed concrete pile with heavy scale up to full perimeter x 3'H x up to 4"D
- Ⓓ- 3'L x 1.5'W x 5"D chipped stone and 15"D mortar void in stone masonry pier wall behind steel cross bracing
- Ⓔ- Shim plate with 11"L x FW x 1/8" thick remaining with knife edge up to FW x 5"L at east end

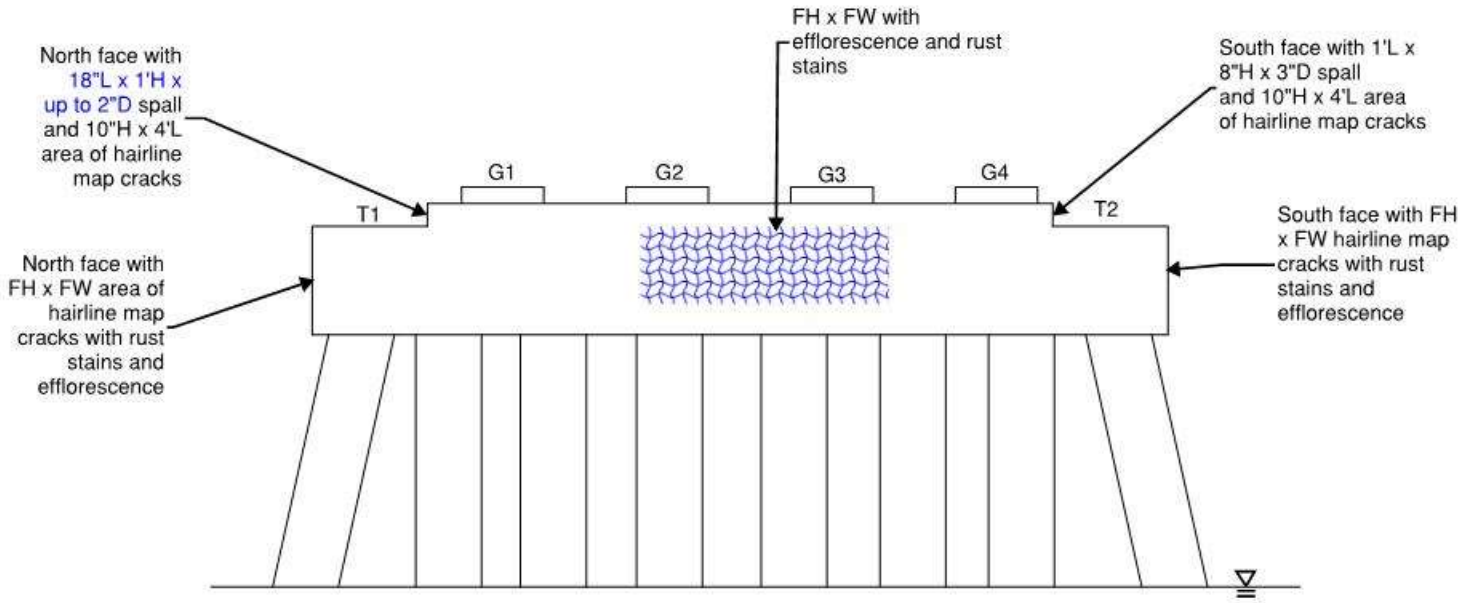
General Notes:
- Concrete skimcoat peeling at random locations
- Light sand accumulation on pier cap
- Moderate to heavy rust throughout steel cap beam and cross bracing
- Shim plates on top flanges of steel carrier beams with areas of laminated rust

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- Perforation in web

PIER 2 - EAST ELEVATION

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE:11/16/16	BRIDGE NO.: 01349



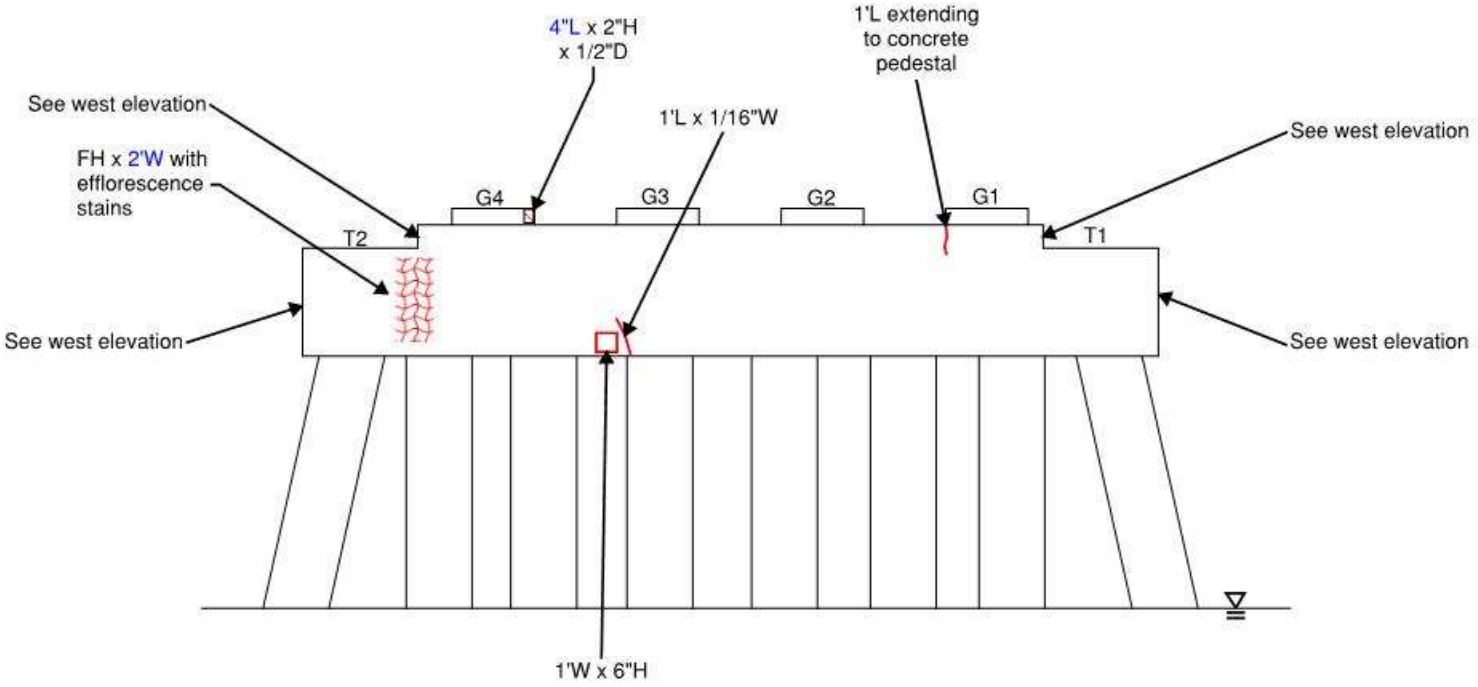
General Notes:
-Moderate silt and algae staining on concrete cap, full height under trusses and FW x 6"H along the bottom.
-Piles wrapped in fiberglass jacket.

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 3 - WEST ELEVATION

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:
-See Pier 3, West Elevation sheet

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 3 - EAST ELEVATION

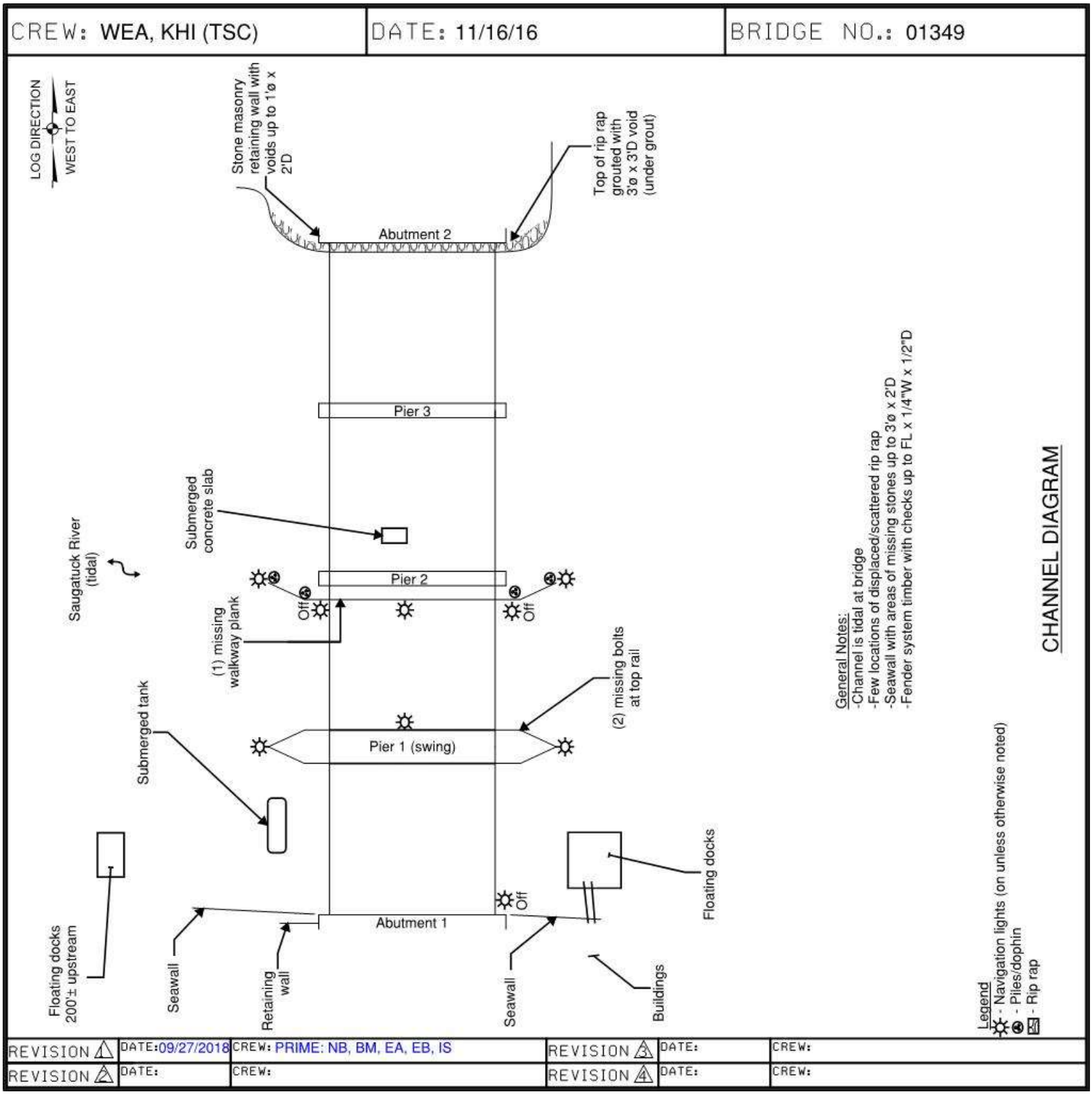
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: WEA, KHI (TSC) | DATE: 11/16/16 | BRIDGE NO.: 01349

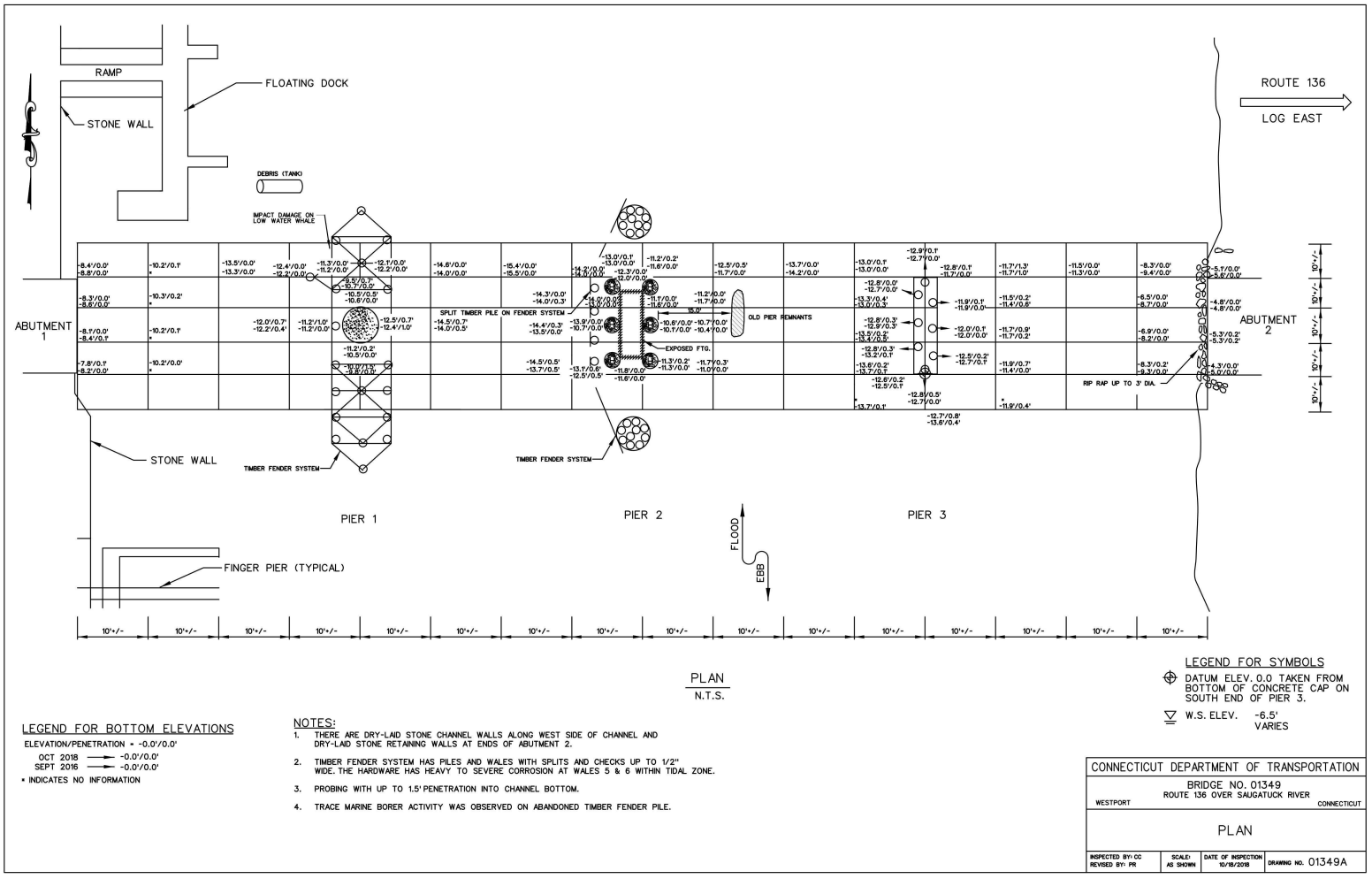


REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE:	CREW:	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



PLAN
N.T.S.

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -6.5' VARIES

LEGEND FOR BOTTOM ELEVATIONS

ELEVATION/PENETRATION = -0.0'/0.0'

OCT 2018 —► -0.0'/0.0'
SEPT 2016 —► -0.0'/0.0'

* INDICATES NO INFORMATION

NOTES:

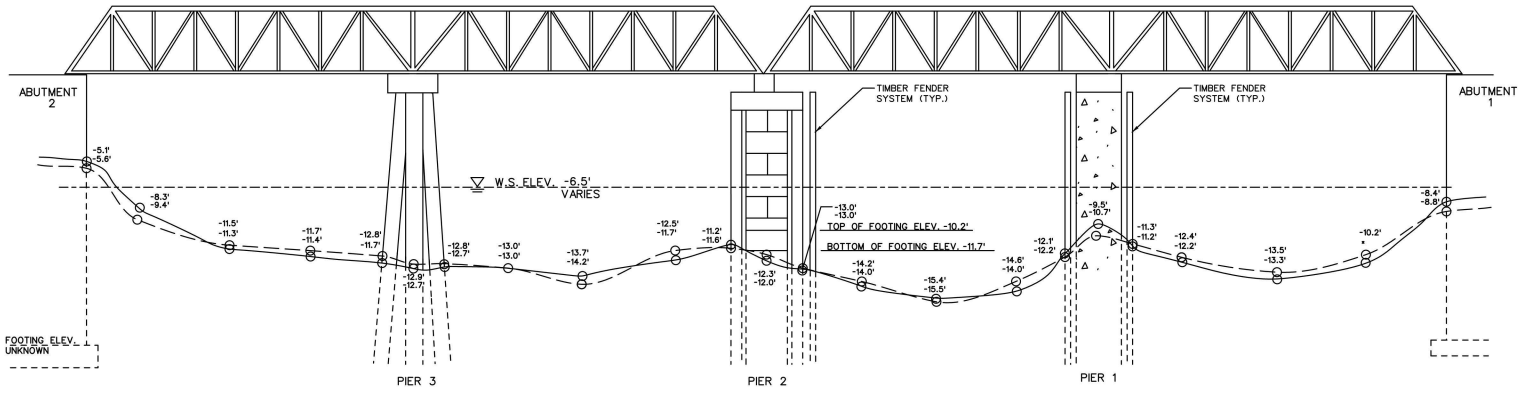
1. THERE ARE DRY-LAID STONE CHANNEL WALLS ALONG WEST SIDE OF CHANNEL AND DRY-LAID STONE RETAINING WALLS AT ENDS OF ABUTMENT 2.
2. TIMBER FENDER SYSTEM HAS PILES AND WALES WITH SPLITS AND CHECKS UP TO 1/2" WIDE. THE HARDWARE HAS HEAVY TO SEVERE CORROSION AT WALES 5 & 6 WITHIN TIDAL ZONE.
3. PROBING WITH UP TO 1.5' PENETRATION INTO CHANNEL BOTTOM.
4. TRACE MARINE BORER ACTIVITY WAS OBSERVED ON ABANDONED TIMBER FENDER PILE.

CONNECTICUT DEPARTMENT OF TRANSPORTATION			
BRIDGE NO. 01349 ROUTE 136 OVER SAUGATUCK RIVER WESTPORT — CONNECTICUT			
PLAN			
INSPECTED BY: CC REVISED BY: PR	SCALE: AS SHOWN	DATE OF INSPECTION: 10/18/2018	DRAWING NO. 01349A

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



UPSTREAM (NORTH) PROFILE
N.T.S.

LEGEND FOR BOTTOM ELEVATIONS
ELEVATION = -0.0'
OCT 2018 → -0.0'
SEPT 2016 → -0.0'
* INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES
OCT. 2018
SEPT. 2016

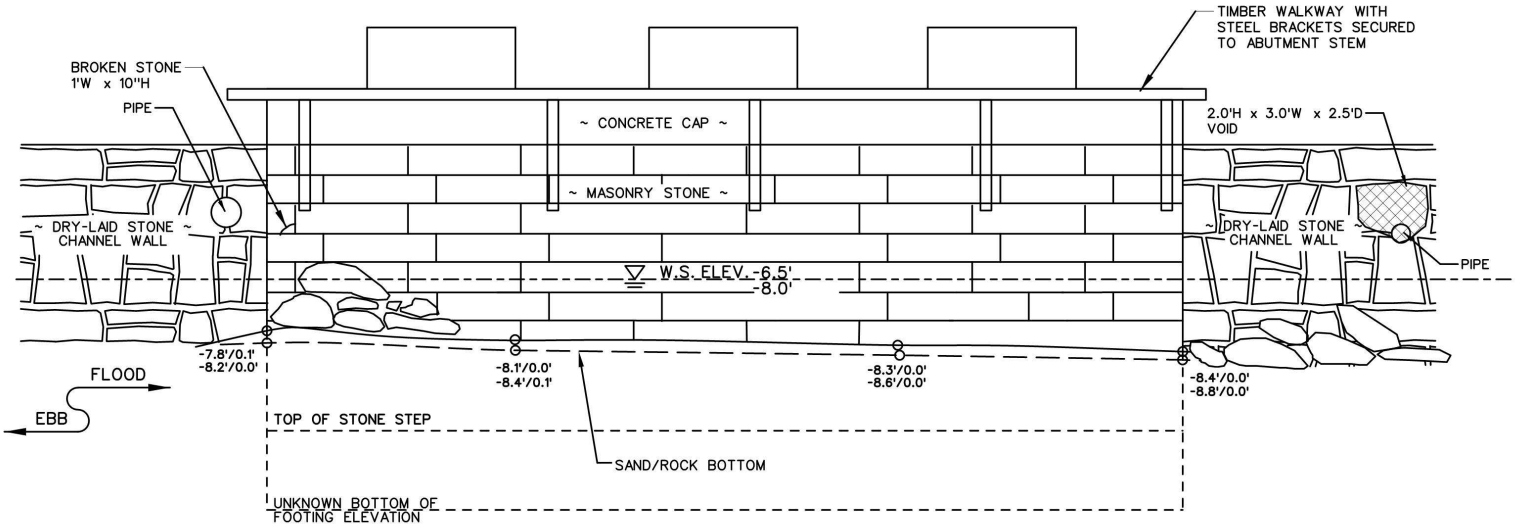
LEGEND FOR SYMBOLS
DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
W.S. ELEV. -6.5' VARIES

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT
UPSTREAM (NORTH) PROFILE
INSPECTED BY: CC REVISED BY: PR | SCALE: AS SHOWN | DATE OF INSPECTION 10/18/2018 | DRAWING NO. 01349B

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



NOTES:

1. GROUT-REPAIR / EPOXY COATING ON STONE MASONRY STEM HAS FAILED UP TO 90% IN TIDAL ZONE.
2. STONE MASONRY STEM HAS 75% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 3' BETWEEN STONES.
3. STONE MASONRY RETURN WALL HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 3' BETWEEN STONES WITH VOIDS UP TO 1' DIA. DUE TO MISSING MORTAR AND CHINK STONES.
4. DRY-LAID STONE CHANNEL WALLS HAVE PENETRATIONS UP TO 3' BETWEEN STONES.
5. NORTH RETURN WALL, 11' FROM CORNER AT RETAINING WALL INTERFACE EXHIBITS A 1.5'W x 2'H x 3'D VOID AT EL. -3.0'.

ABUTMENT 1
N.T.S.

LEGEND FOR SYMBOLS

⊕ DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

▽ W.S. ELEV. -6.5' -8.0'

LEGEND FOR BOTTOM ELEVATIONS

ELEVATION/PENETRATION = -0.0'/0.0'
OCT 2018 → -0.0'/0.0'
SEPT 2016 → -0.0'/0.0'
* INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES

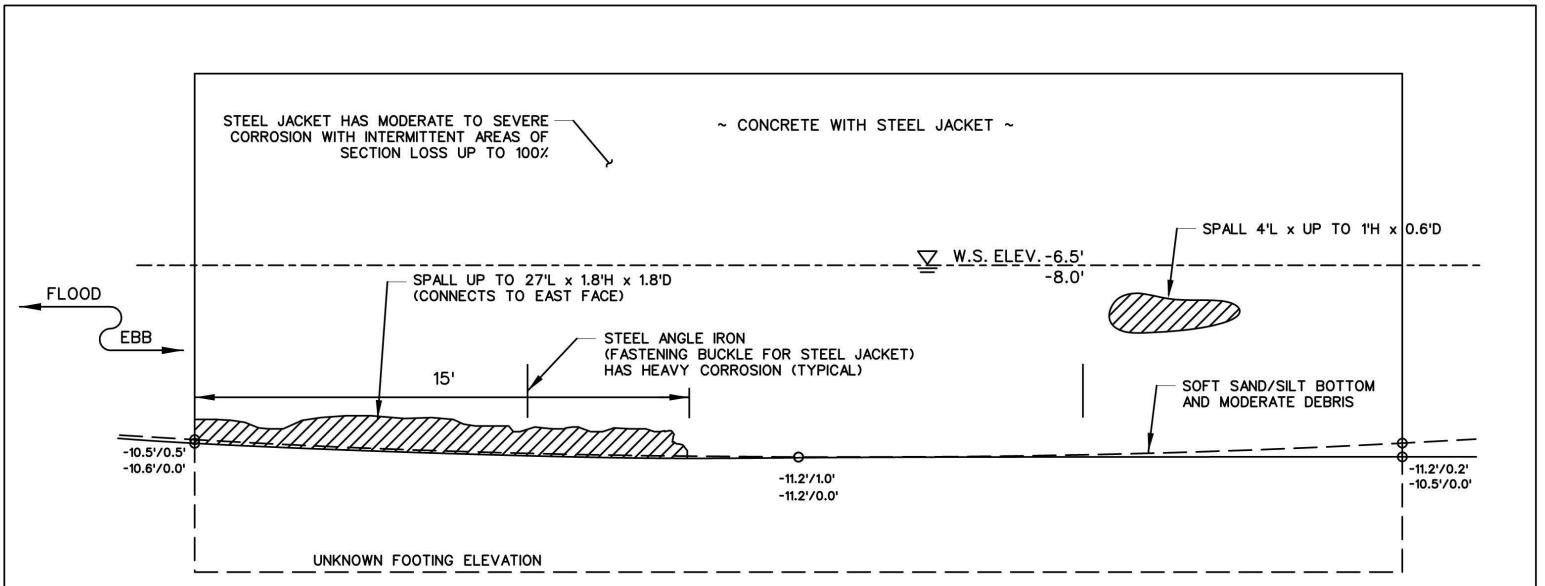
——— OCT. 2018
— — — — SEPT. 2016

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

ABUTMENT 1

INSPECTED BY: CC REVISED BY: PR	SCALE: AS SHOWN	DATE OF INSPECTION 10/18/2018	DRAWING NO. 01349C



PIER 1 (WEST ELEVATION)
N.T.S.

NOTES:

1. THERE IS A 4' HIGH BAND OF MISSING STEEL JACKET FROM 0.5' ABOVE WATER SURFACE TO 3.5' BELOW WATER SURFACE. AREAS OF EXPOSED CONCRETE HAVE MODERATE TO SEVERE SCALING WITH EXPOSED / LOOSE AGGREGATE.
2. CONCRETE OVERPOUR NOTED AT CHANNEL BOTTOM.
3. THERE IS TRACE MARINE BORER ACTIVITY ON THE FENDER SYSTEM.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -6.5' / -8.0'

LEGEND FOR BOTTOM ELEVATIONS

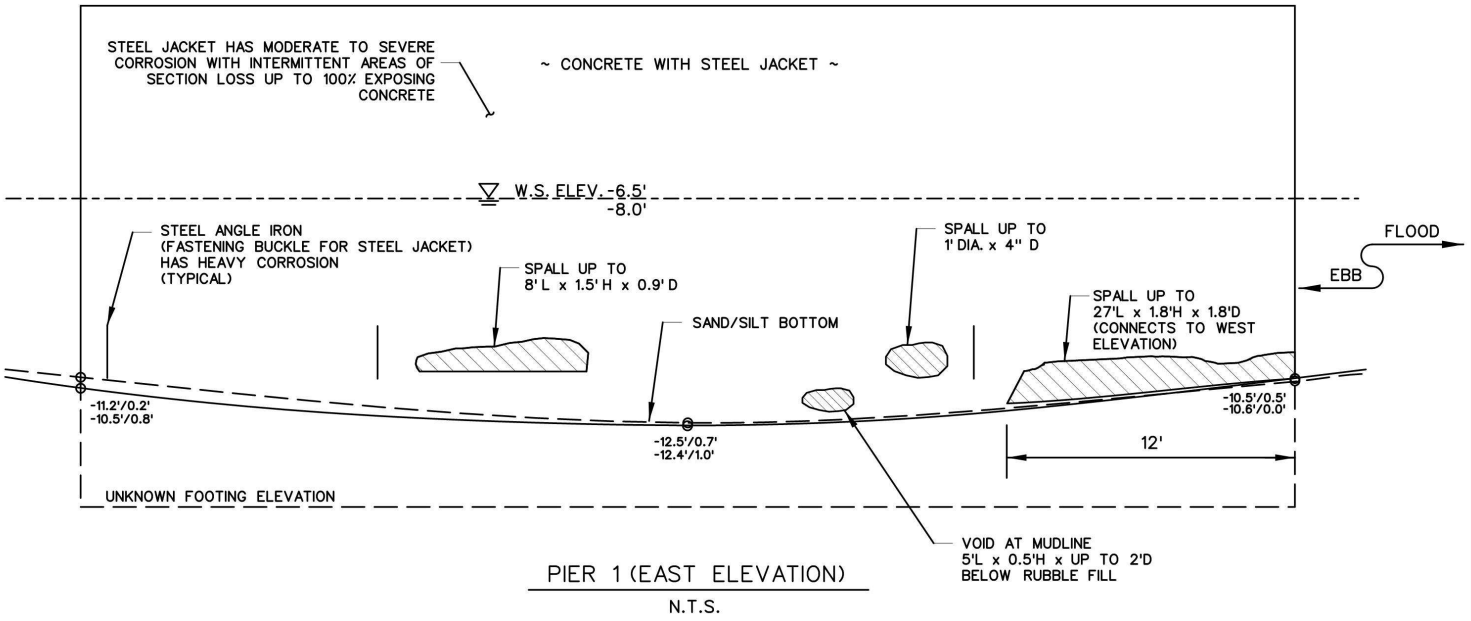
ELEVATION/PENETRATION = -0.0'/0.0'
OCT 2018 → -0.0'/0.0'
SEPT 2016 → -0.0'/0.0'
* INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES

- OCT. 2018
- SEPT. 2016

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT
PIER 1 (WEST ELEVATION)

INSPECTED BY: CC REVISED BY: PR	SCALE: AS SHOWN	DATE OF INSPECTION 10/18/2018	DRAWING NO. 01349D



PIER 1 (EAST ELEVATION)

N.T.S.

NOTES:

1. THERE IS A 4' HIGH BAND OF MISSING STEEL JACKET FROM 0.5' ABOVE WATER SURFACE TO 3.5' BELOW WATER SURFACE. AREAS OF EXPOSED CONCRETE HAVE MODERATE TO SEVERE SCALING WITH EXPOSED / LOOSE AGGREGATE.
2. CONCRETE OVERPOUR NOTED AT CHANNEL BOTTOM.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -6.5' -8.0'

LEGEND FOR BOTTOM ELEVATIONS

ELEVATION/PENETRATION = -0.0'/0.0'

OCT 2018 → -0.0'/0.0'

SEPT 2016 → -0.0'/0.0'

* INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES

——— OCT. 2018

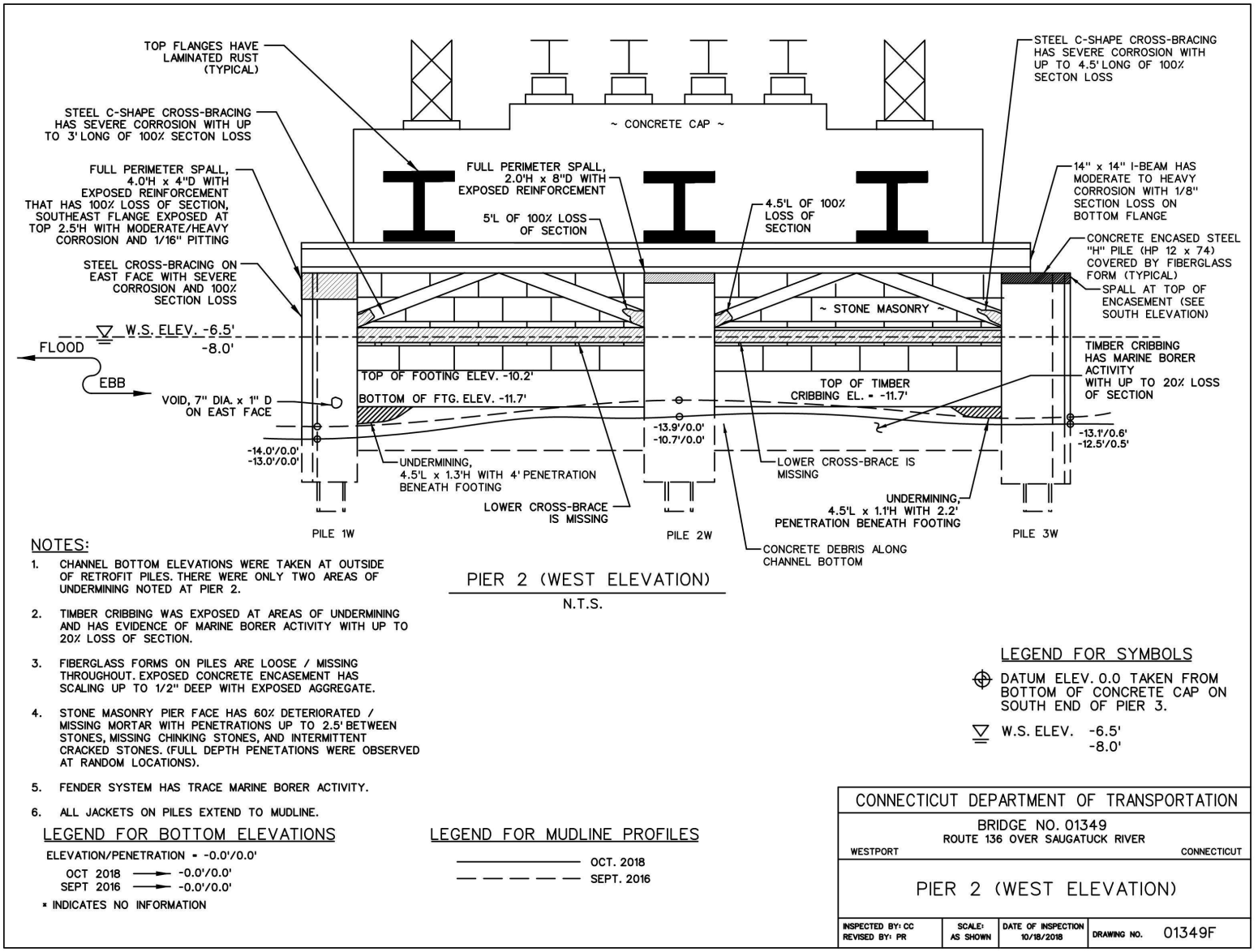
— — — — — SEPT. 2016

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 1 (EAST ELEVATION)

INSPECTED BY: CC REVISED BY: PR	SCALE: AS SHOWN	DATE OF INSPECTION 10/18/2018	DRAWING NO. 01349E



PIER 2 (WEST ELEVATION)
N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. TIMBER CRIBBING WAS EXPOSED AT AREAS OF UNDERMINING AND HAS EVIDENCE OF MARINE BORER ACTIVITY WITH UP TO 20% LOSS OF SECTION.
3. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS SCALING UP TO 1/2" DEEP WITH EXPOSED AGGREGATE.
4. STONE MASONRY PIER FACE HAS 60% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES, MISSING CHINKING STONES, AND INTERMITTENT CRACKED STONES. (FULL DEPTH PENETATIONS WERE OBSERVED AT RANDOM LOCATIONS).
5. FENDER SYSTEM HAS TRACE MARINE BORER ACTIVITY.
6. ALL JACKETS ON PILES EXTEND TO MUDLINE.

LEGEND FOR BOTTOM ELEVATIONS

ELEVATION/PENETRATION = -0.0'/0.0'
OCT 2018 → -0.0'/0.0'
SEPT 2016 → -0.0'/0.0'
* INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES

OCT. 2018
SEPT. 2016

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
W.S. ELEV. -6.5' -8.0'

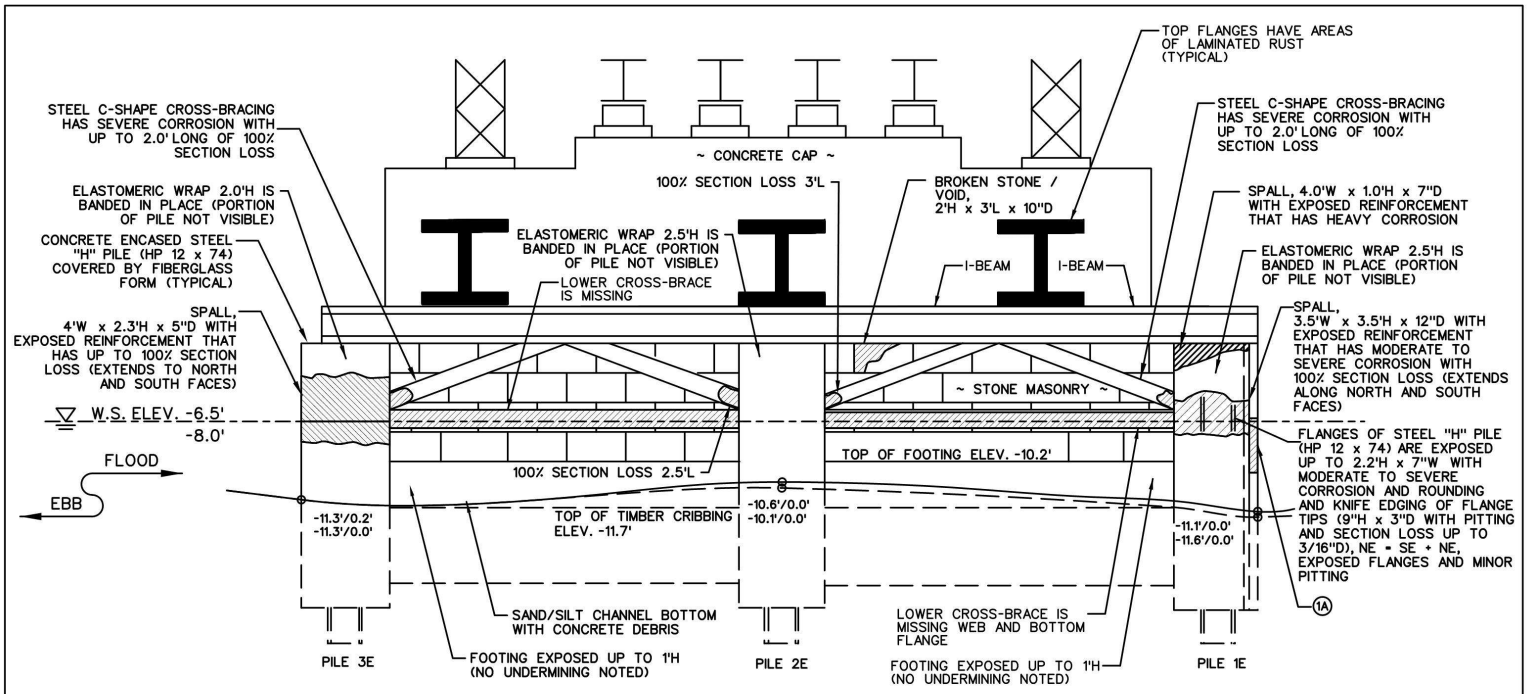
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT
PIER 2 (WEST ELEVATION)

INSPECTED BY: CC REVISED BY: PR	SCALE: AS SHOWN	DATE OF INSPECTION 10/18/2018	DRAWING NO. 01349F

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



PIER 2 (EAST ELEVATION)

N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS SCALING UP TO 1/2" DEEP WITH EXPOSED AGGREGATE.
3. STONE MASONRY PIER FACE HAS 70% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES AND INTERMITTENT CRACKED STONES. (SOME OF MORTAR LOSS IS FULL DEPTH).
4. ELASTOMERIC WRAP WAS OBSERVED AT THE TOP OF ALL EAST PILES. THEY APPEAR GROUT FILLED (NEW).
5. ALL JACKETS ON PILES GO TO MUDLINE.

(1A) — STEEL BEAM WELDED TO STEEL "H" PILE HAS SEVERE CORROSION WITH UP TO 100% SECTION LOSS 2.5'H AT BOTTOM OF PLATE IN TIDAL ZONE

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -6.5' / -8.0'

LEGEND FOR BOTTOM ELEVATIONS

ELEVATION/PENETRATION = -0.0'/0.0'

OCT 2018 → -0.0'/0.0'
SEPT 2016 → -0.0'/0.0'

* INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES

———— OCT. 2018
— — — — — SEPT. 2016

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

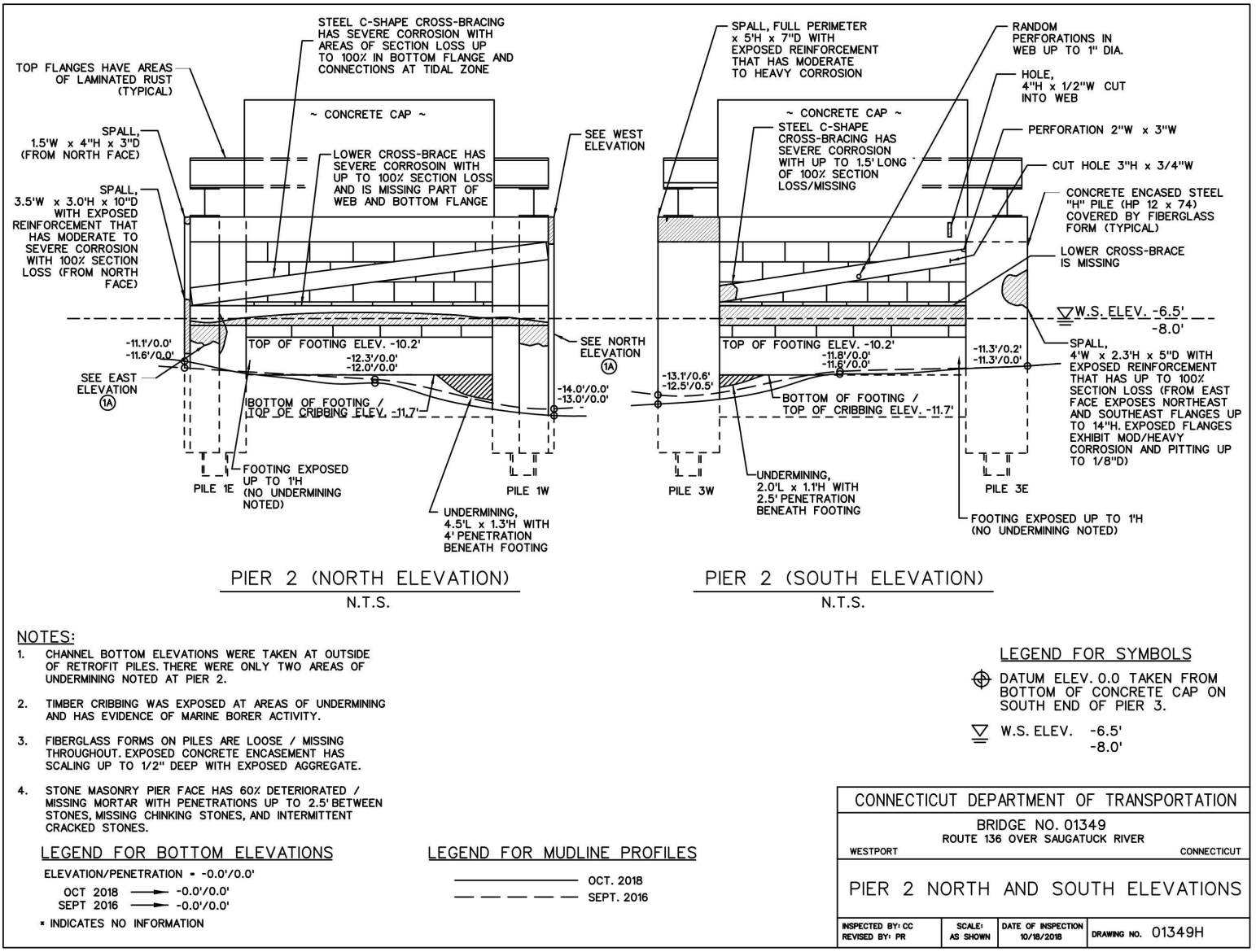
PIER 2 (EAST ELEVATION)

INSPECTED BY: CC REVISED BY: PR	SCALE: AS SHOWN	DATE OF INSPECTION 10/18/2018	DRAWING NO. 01349G

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



PIER 2 (NORTH ELEVATION)
N.T.S.

PIER 2 (SOUTH ELEVATION)
N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. TIMBER CRIBBING WAS EXPOSED AT AREAS OF UNDERMINING AND HAS EVIDENCE OF MARINE BORER ACTIVITY.
3. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS SCALING UP TO 1/2" DEEP WITH EXPOSED AGGREGATE.
4. STONE MASONRY PIER FACE HAS 60% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES, MISSING CHINKING STONES, AND INTERMITTENT CRACKED STONES.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -6.5' / -8.0'

LEGEND FOR BOTTOM ELEVATIONS

ELEVATION/PENETRATION = -0.0'/0.0'

OCT 2018 → -0.0'/0.0'
SEPT 2016 → -0.0'/0.0'

× INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES

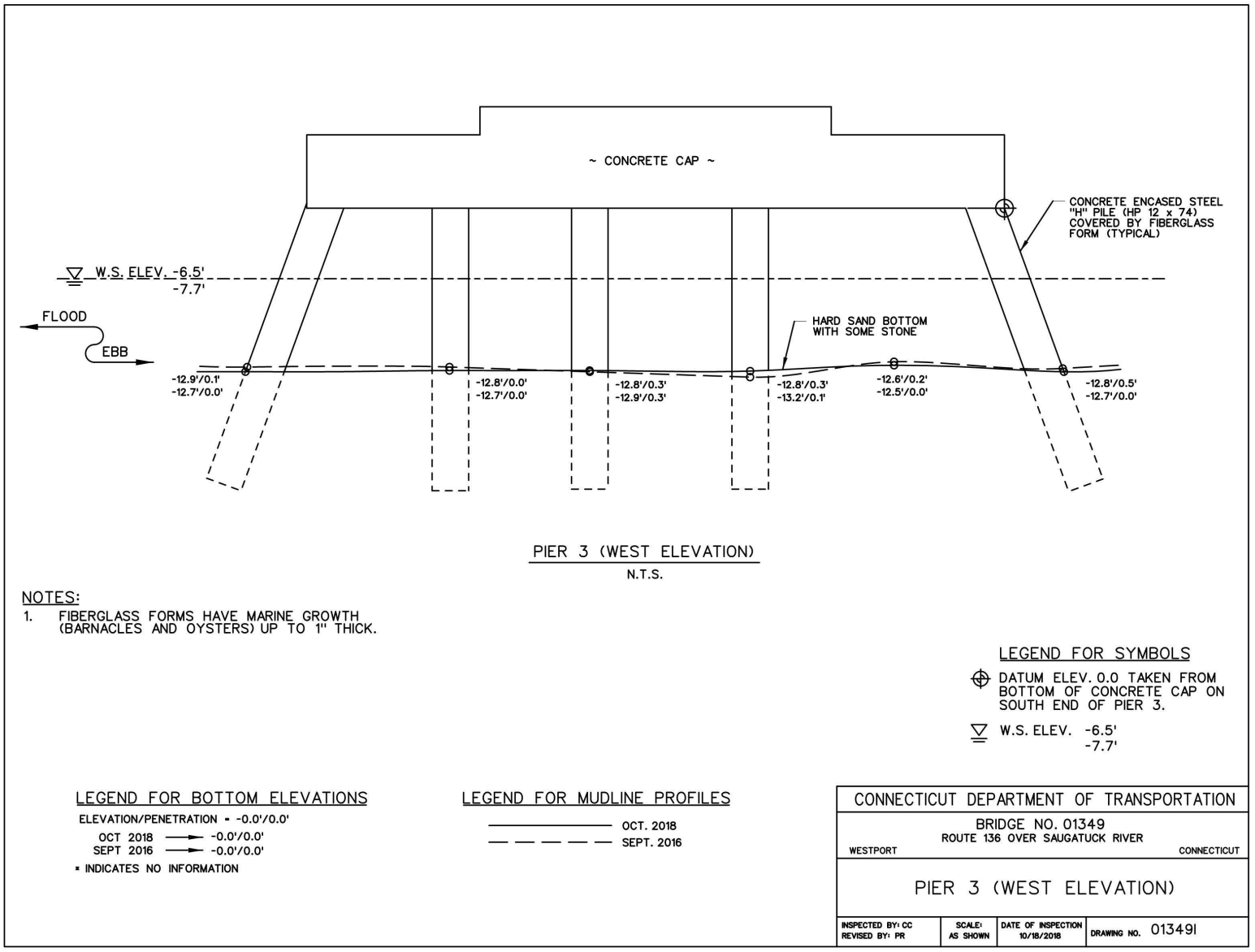
———— OCT. 2018
— — — — — SEPT. 2016

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 2 NORTH AND SOUTH ELEVATIONS

INSPECTED BY: CC REVISED BY: PR	SCALE: AS SHOWN	DATE OF INSPECTION 10/18/2018	DRAWING NO. 01349H



PIER 3 (WEST ELEVATION)
N.T.S.

NOTES:
1. FIBERGLASS FORMS HAVE MARINE GROWTH (BARNACLES AND OYSTERS) UP TO 1" THICK.

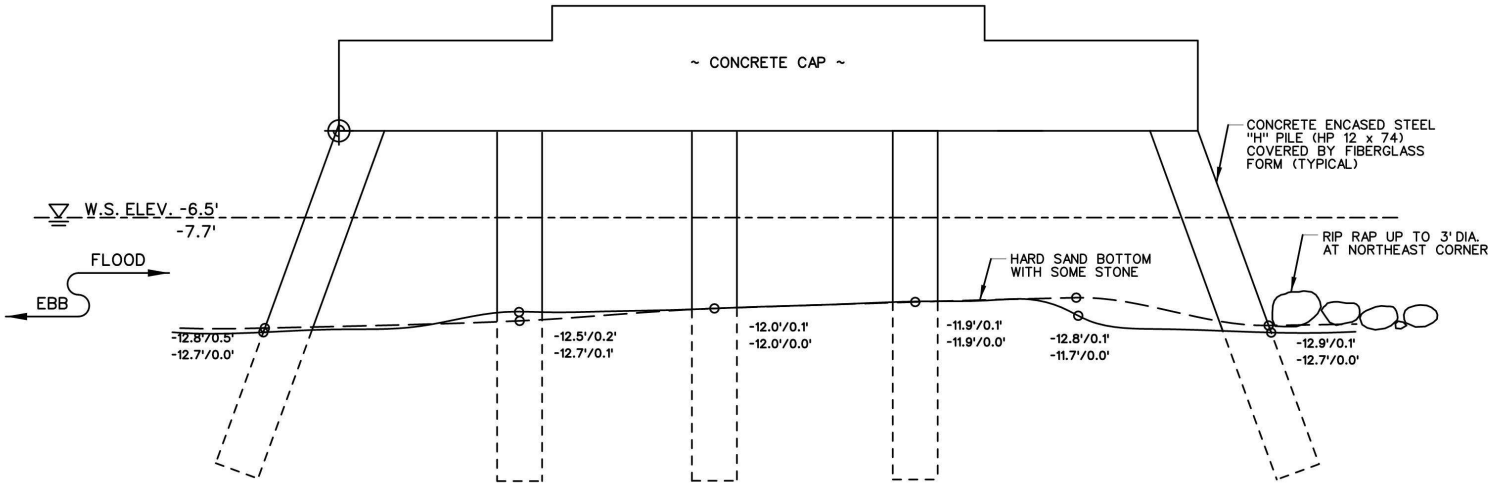
LEGEND FOR SYMBOLS
- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -6.5' / -7.7'

LEGEND FOR BOTTOM ELEVATIONS
ELEVATION/PENETRATION = -0.0'/0.0'
OCT 2018 → -0.0'/0.0'
SEPT 2016 → -0.0'/0.0'
* INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES
OCT. 2018
SEPT. 2016

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT
PIER 3 (WEST ELEVATION)

INSPECTED BY: CC REVISED BY: PR	SCALE: AS SHOWN	DATE OF INSPECTION 10/18/2018	DRAWING NO. 013491



PIER 3 (EAST ELEVATION)
N.T.S.

NOTES:
1. FIBERGLASS FORMS HAVE MARINE GROWTH (BARNACLES AND OYSTERS) UP TO 1" THICK.

LEGEND FOR SYMBOLS
- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -6.5' / -7.7'

LEGEND FOR BOTTOM ELEVATIONS
ELEVATION/PENETRATION = -0.0'/0.0'
OCT 2018 → -0.0'/0.0'
SEPT 2016 → -0.0'/0.0'
* INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES
———— OCT. 2018
— — — — — SEPT. 2016

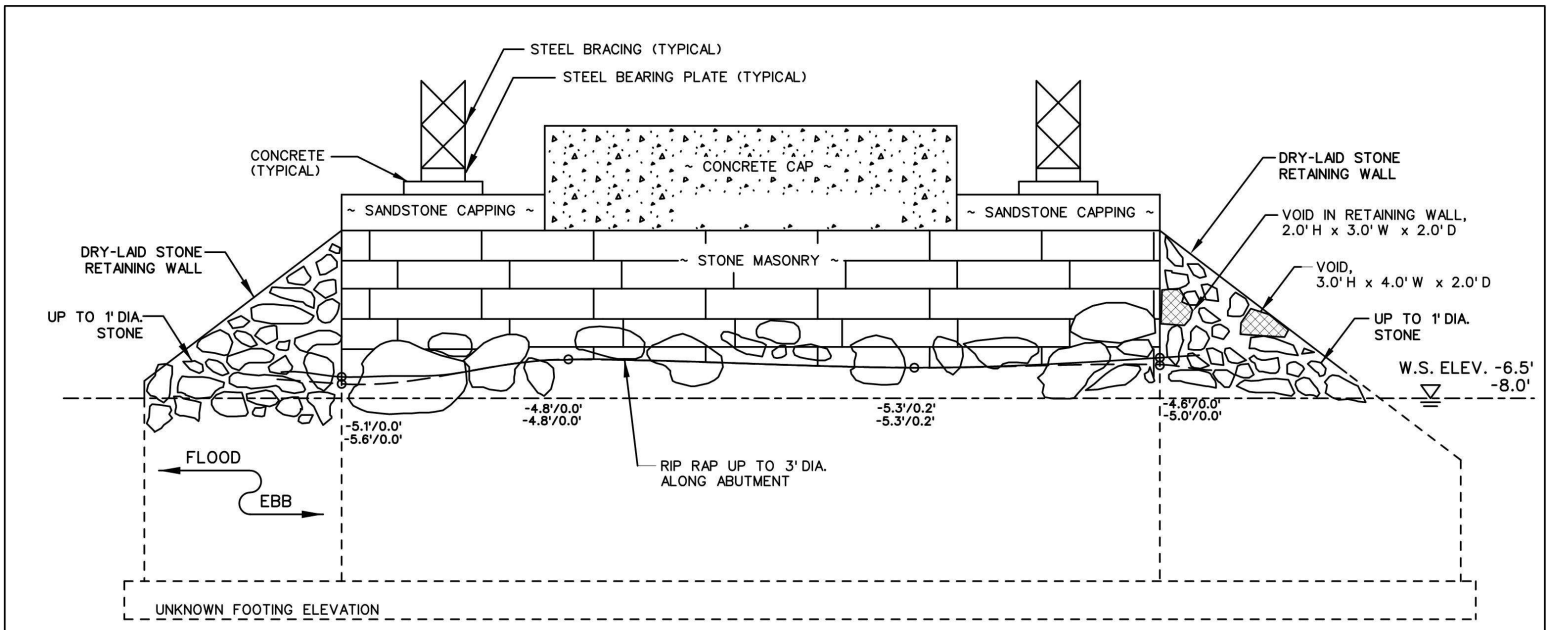
CONNECTICUT DEPARTMENT OF TRANSPORTATION
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT
PIER 3 (EAST ELEVATION)

INSPECTED BY: CC REVISED BY: PR	SCALE: AS SHOWN	DATE OF INSPECTION 10/18/2018	DRAWING NO. 01349J

Sketches
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



ABUTMENT 2
N.T.S.

NOTES:
1. GROUT-REPAIR / EPOXY COATING ON STONE MASONRY HAS FAILED UP TO 90% IN TIDAL ZONE.
2. STONE MASONRY STEM AND RETURN WALLS HAVE 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 4' BETWEEN STONES.
3. DRY-LAID STONE RETAINING WALLS HAVE PENETRATIONS UP TO 3' BETWEEN STONES.

LEGEND FOR SYMBOLS
- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -6.5' -8.0'

LEGEND FOR BOTTOM ELEVATIONS
ELEVATION/PENETRATION = -0.0'/0.0'
OCT 2018 → -0.0'/0.0'
SEPT 2016 → -0.0'/0.0'
* INDICATES NO INFORMATION

LEGEND FOR MUDLINE PROFILES
- OCT. 2018
- SEPT. 2016

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

ABUTMENT 2

INSPECTED BY: CC REVISED BY: PR	SCALE: AS SHOWN	DATE OF INSPECTION 10/18/2018	DRAWING NO. 01349K

Form: Asset Photos
Inspection type: Fracture
Inspection Date: 9/27/2018
Inspected by: Prime

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



Photo Number: 1 Photo Taken: 09/27/2018

Bridge identification number.



Photo Number: 2 Photo Taken: 09/27/2018

South elevation of the bridge.



Photo Number: 3 Photo Taken: 09/27/2018

North elevation of the bridge.



Photo Number: 4 Photo Taken: 09/27/2018

Bridge from the west approach, looking east.



Photo Number: 5 Photo Taken: 09/27/2018

West approach from the bridge, looking west.



Photo Number: 6 Photo Taken: 09/27/2018

Bridge from the east approach, looking west.



Photo Number: 7 Photo Taken: 09/27/2018

East approach from the bridge, looking east.



Photo Number: 8 Photo Taken: 09/27/2018

Typical top of deck overlay in Span 1, looking southeast. Note: Heavy wear and longitudinal cracks.



Photo Number: 9 Photo Taken: 09/27/2018

Typical top of deck overlay in Span 3, looking southwest. Note: Raveling and potholes up to 1" deep in westbound lane.



Photo Number: 10 Photo Taken: 09/27/2018

Span 1, Bay 5, Panel 3 with peeling of paint at underside, looking east.



Photo Number: 11 Photo Taken: 10/12/2018

Span 3, typical underside of deck and framing plan, looking east.



Photo Number: 12 Photo Taken: 10/12/2018

Span 3, north end of sidewalk near Pier 2. Note: Section loss and perforation on SIP form around weep.



Photo Number: 13 Photo Taken: 09/27/2018

South curb and metal beam rail, looking southwest.



Photo Number: 14 Photo Taken: 09/27/2018

Timber sidewalk, looking east.



Photo Number: 15 Photo Taken: 09/27/2018

Up to 1" deep vertical misalignment between sidewalk planks at Pier 2.



Photo Number: 16 Photo Taken: 09/27/2018

Span 3, Stringers S1 and S2 at 1st stringer support beam connection with one (1) missing anchor bolt each and one (1) backed off anchor bolt nut each.



Photo Number: 17 Photo Taken: 09/27/2018

Northeast approach bituminous sidewalk with 1" deep settlement.



Photo Number: 18 Photo Taken: 09/27/2018

West end of south metal beam rail near Abutment 1 deck joint with minor damage.



Photo Number: 19 Photo Taken: 09/27/2018

North bridge metal beam rail at Pier 2 with minor impact damage. Note: Boxing gloves nearly touching each other with only 1/16" wide gap separating the two.



Photo Number: 20 Photo Taken: 09/27/2018

North sidewalk railing and chain link fence, looking east.



Photo Number: 21 Photo Taken: 09/27/2018

Chain link fence disconnected at bottom near Pier 1.



Photo Number: 22 Photo Taken: 09/27/2018

Span 2, north scupper grate near Pier 2 up to 50% clogged with debris (typical in all scupper grates).



Photo Number: 23 Photo Taken: 09/27/2018

Open steel armored deck joint over Abutment 1, looking south.



Photo Number: 24 Photo Taken: 09/27/2018

Open steel armored deck joint over Pier 2, looking south. Note: Raveling along the steel joint plate.



Photo Number: 25 Photo Taken: 09/27/2018

Strip seal deck joint over Abutment 2, looking south. Note: Deck joint partially filled with sand.



Photo Number: 26 Photo Taken: 09/27/2018

Northeast approach metal beam rail, looking northwest.



Photo Number: 27 Photo Taken: 09/27/2018

Northeast approach metal beam rail with missing trailing end and impact damage.



Photo Number: 28 Photo Taken: 09/27/2018

Typical east approach overlay, looking south. Note: Mapcracking in eastbound lane.



Photo Number: 29 Photo Taken: 09/27/2018

East approach pavement adjacent to Abutment 2 deck joint header with settlement/potholes up to 4" deep.



Photo Number: 30 Photo Taken: 10/12/2018

Girder G2-G4 elastomeric bearings at Pier 3, looking southeast.



Photo Number: 31 Photo Taken: 09/27/2018

Span 3, Truss 1 bearing at Pier 2. Note: Anchor bolts are backed off with a missing washer at northeast anchor bolt.



Photo Number: 32 Photo Taken: 10/12/2018

Truss 2 bearing at Abutment 2 with vegetation on top of bearing plate.



Photo Number: 33 Photo Taken: 09/27/2018

Span 2, Truss 2 screw jack bearing at Pier 2.



Photo Number: 34 Photo Taken: 09/27/2018

Span 1, typical bottom flange transition, looking south. (Girder G4 shown near Pier 1)



Photo Number: 35 Photo Taken: 09/27/2018

Span 2, Girder G7 bottom flange with scrape marks at mid-span.



Photo Number: 36 Photo Taken: 09/27/2018

Interior of end floorbeam at Abutment 1, looking north. Note: Rusting along bottom of interior diaphragm & heavy debris along the floor.



Photo Number: 37 Photo Taken: 09/27/2018

Span 2, inside of end floorbeam at Pier 2, looking north. Note: Timber plank & pigeon debris.



Photo Number: 38 Photo Taken: 09/27/2018

Interior of pivot girder at Pier 1, looking north. Note: Moderate laminated rust on bottom flange and girder web bases.

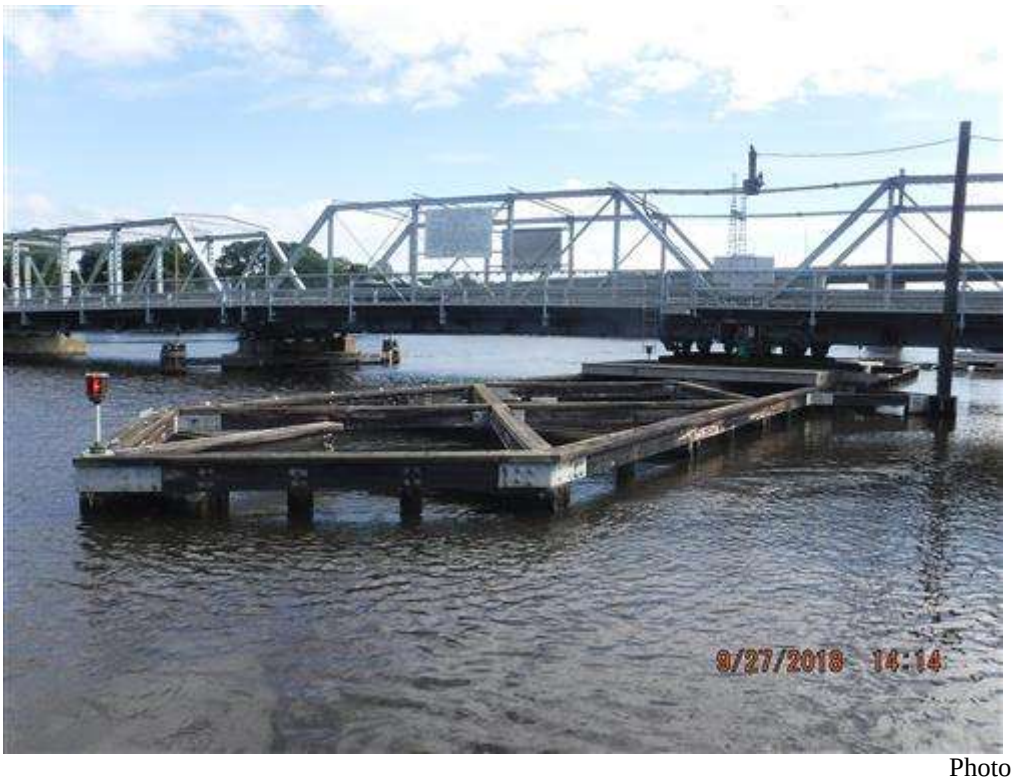


Photo Number: 39 Photo Taken: 09/27/2018

Typical configuration of north fascia of Truss 1, looking southeast.



Photo Number: 40 Photo Taken: 09/27/2018

Typical configuration of south fascia of Truss 2, looking east.



Photo Number: 41 Photo Taken: 09/27/2018

Span 1, Truss 1 bottom chord at L1 with disconnected lattice bar & perforations on plate, looking west



Photo Number: 42 Photo Taken: 09/27/2018

Span 1, Truss 1 bottom chord cover plate at L4 with perforation.



Photo Number: 43 Photo Taken: 10/12/2018

Span 2, Truss 1 bottom chord bottom flange plate with heavy laminated rust and section loss.



Photo Number: 44 Photo Taken: 10/12/2018

Truss 2 in Span 3, north eyebar of memebr L4-U5 is bent up to 4" for full length.



Photo Number: 45 Photo Taken: 10/12/2018

Truss 2 in Span 3, bottom horizontal member L0-L1 with gap between pin nut and eyebar head.



Photo Number: 46 Photo Taken: 09/27/2018

Truss 1 over Pier 1, top chord member U4-U6 is bent laterally and vertically.



Photo Number: 47 Photo Taken: 10/12/2018

Truss 2 in Span 1, vertical angle member L1-U1 with impact damage.



Photo Number: 48 Photo Taken: 09/27/2018

Truss 1 in Span 1, member L0-U1 with bolted repair plates.



Photo Number: 49 Photo Taken: 10/12/2018

Truss 1 in Span 3, member L2-U2 with bolted repair plates.



Photo Number: 50 Photo Taken: 10/12/2018

Span 1, sway strut at node U6 with impact damage and dented angle legs up to 1/2", looking north.



Photo Number: 51 Photo Taken: 09/27/2018

Truss 1 in Span 2 at member L8-U8 with crack at bottom of southeast angle leg.



Photo Number: 52 Photo Taken: 10/12/2018

Truss 2 in Span 2 at member L7-U7 with two (2) cracks in the vertical leg of northwest angle.

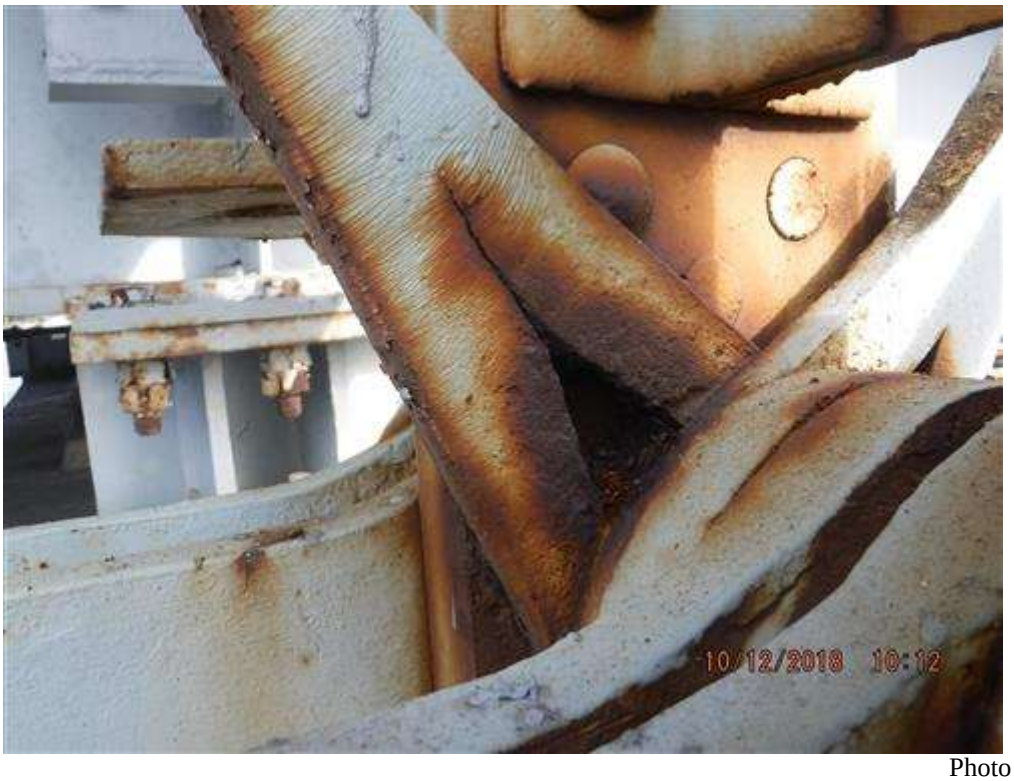


Photo Number: 53 Photo Taken: 10/12/2018

Truss 2 over Pier 3, south face of north bar with crack at the eyebar head forge line at member U4-L5.



Photo Number: 54 Photo Taken: 10/12/2018

Truss 2 in Span 3, south eyebar of member L4-U5 is disconnected/fractured at bottom below the deck.



Photo Number: 55 Photo Taken: 10/12/2018

Span 3, lower lateral bracing rod at L3 has a crack half the circumference of the rod and rod is slightly bent.



Photo Number: 56 Photo Taken: 09/27/2018

Span 1, north elevation of Girder G3 at Abutment 1, looking southwest. Note: Web bowed full height at splice.



Photo Number: 57 Photo Taken: 10/12/2018

Abutment 2 elevation.



Photo Number: 58 Photo Taken: 10/12/2018

East elevation of Pier 2, looking southwest.



Photo Number: 59 Photo Taken: 09/27/2018

East elevation of Pier 2 cap with mapcracking throughout.



Photo Number: 60 Photo Taken: 09/27/2018

Girder G7 pedestal at Pier 2 with spall at south side.



Photo Number: 61 Photo Taken: 10/12/2018

East elevation of Pier 3.



Photo Number: 62 Photo Taken: 10/12/2018

Pier 3, north top cap fascia near Truss 1 bearing with spall.



Photo Number: 63 Photo Taken: 10/12/2018

East elevation of Pier 2 at Pile 2 with perforations on cross bracing and disconnected from pile.



Photo Number: 64 Photo Taken: 09/27/2018

West elevation of Pier 2 seat, looking north. Note: Debris accumulation at seat.



Photo Number: 65 Photo Taken: 09/27/2018

Upstream channel, looking north.



Photo Number: 66 Photo Taken: 09/27/2018

Downstream channel, looking south.



Photo Number: 67 Photo Taken: 09/27/2018

Fender system at Pier 1 south end, looking north.



Photo Number: 68 Photo Taken: 09/27/2018

Span 2 at Pier 2, missing plank at fender system at northwest end.



Photo Number: 69 Photo Taken: 09/27/2018

Span 1, Girder G7 near Abutment 1. Note: Navigation light not on at time of inspection.



Photo Number: 70 Photo Taken: 10/12/2018

Clearance and weight limit signs at west approach.

01349

Photo Number: 71 Photo Taken: 10/18/2018

Bridge identification number.



Photo Number: 72 Photo Taken: 10/18/2018

Abutment 2 elevation, looking east.

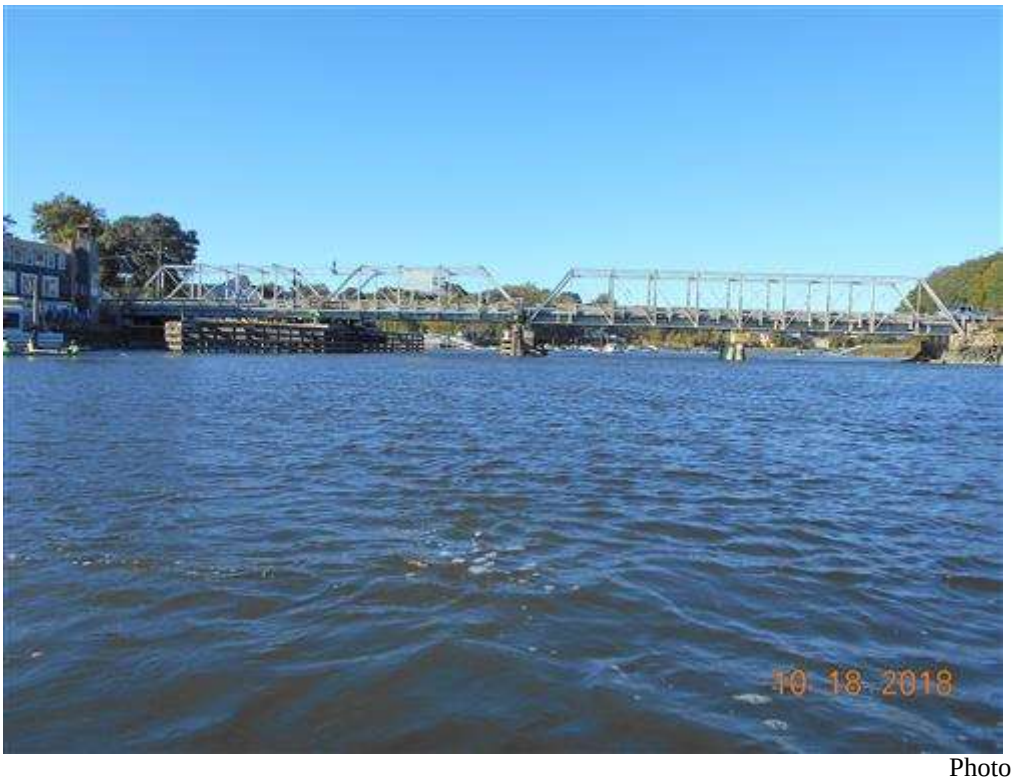


Photo Number: 73 Photo Taken: 10/18/2018

South bridge elevation, looking north.



Photo Number: 74 Photo Taken: 10/18/2018

North bridge elevation, looking south.



Photo Number: 75 Photo Taken: 10/18/2018

Abutment 2 mortar condition, looking east. Note: Deteriorated/missing mortar on abutment stem.

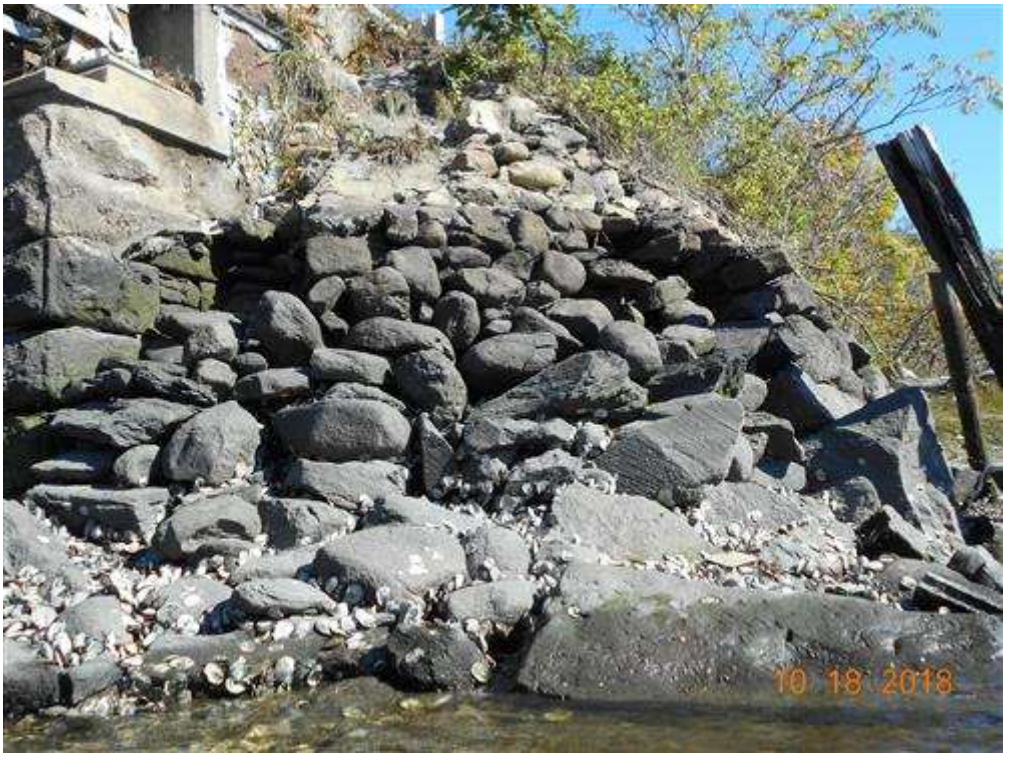


Photo Number: 76 Photo Taken: 10/18/2018

Southeast retaining wall/wingwall, looking northeast. Note: The wall has stone voids.



Photo Number: 77 Photo Taken: 10/18/2018

Abutment 1 elevation, looking west. Note: Timber walkway anchored to abutment stem. Deteriorated/missing mortar and failing grout repair/epoxy coating.



Photo Number: 78 Photo Taken: 10/18/2018

Pier 1 west elevation and fender system, looking east.



Photo Number: 79 Photo Taken: 10/18/2018

Pier 1 east elevation and fender system, looking west.



Photo Number: 80 Photo Taken: 10/18/2018

Pier 1 at south end. Note: Steel jacket with moderate to severe corrosion.



Photo Number: 81 Photo Taken: 10/18/2018

Pier 1 spalling below water surface elevation.



Photo Number: 82 Photo Taken: 10/18/2018

Pier 2 west elevation and fender system, looking east.



Photo Number: 83 Photo Taken: 10/18/2018

Pier 2 east elevation and fender system, looking west.



Photo Number: 84 Photo Taken: 10/18/2018

Pier 2 pile 1E jacket exhibits a spall with exposed H-pile flange tips with corrosion, pitting and rounding of flange.



Photo Number: 85 Photo Taken: 10/18/2018

Pier 2 pile 1W jacket with spall and exposed reinforcement and exposed flange tips.



Photo Number: 86 Photo Taken: 10/18/2018

Pier 2 pile 2W with spall in jacket with exposed reinforcement at top on east side.



Photo Number: 87 Photo Taken: 10/18/2018

Pier 2 north side of pile 3E, jacket exhibits spalling with exposed reinforcement and exposed flange tips. The diagonal brace exhibits 100% loss of section .



Photo Number: 88 Photo Taken: 10/18/2018

Pier 2 northeast side of pile 2E, diagonal brace exhibits 100% loss of section. Note: Elastomeric jacket and bands at top of pile.



Photo Number: 89 Photo Taken: 10/18/2018

Pier 2, north side of pile 2W, diagonal brace with 100% loss of section.

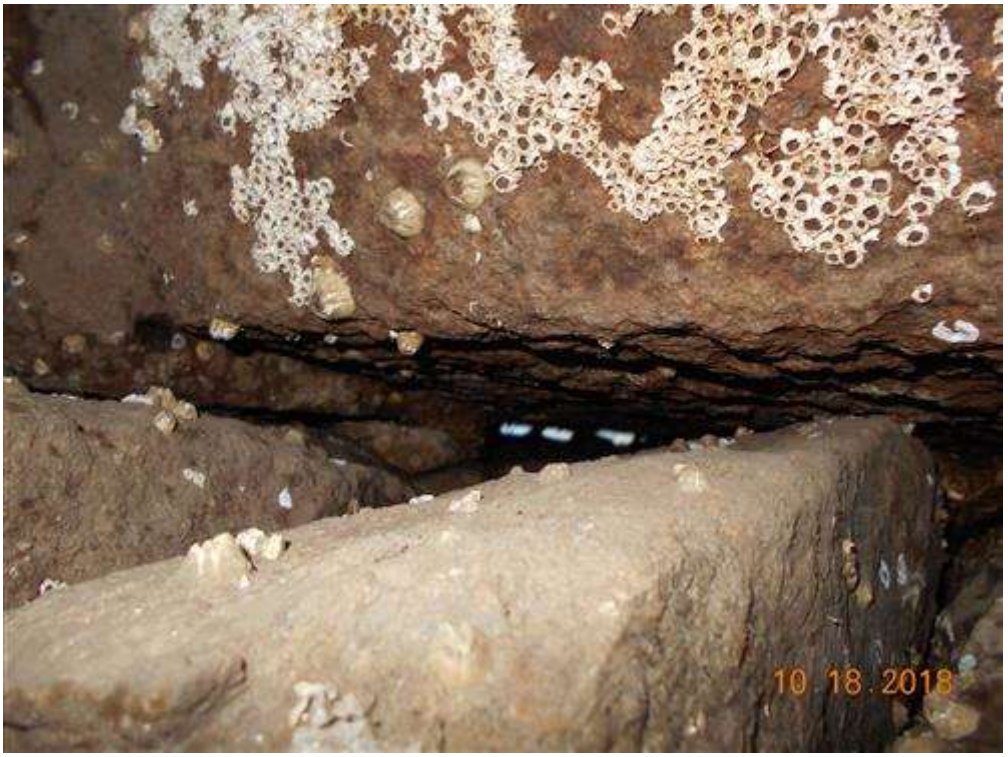


Photo Number: 90 Photo Taken: 10/18/2018

Pier 2 west elevation with missing mortar with full depth penetration.



Photo Number: 91 Photo Taken: 10/18/2018

Pier 2 west side exhibits undermining of the footing and exposed timber cribbing with marine borer activity and loss of section.

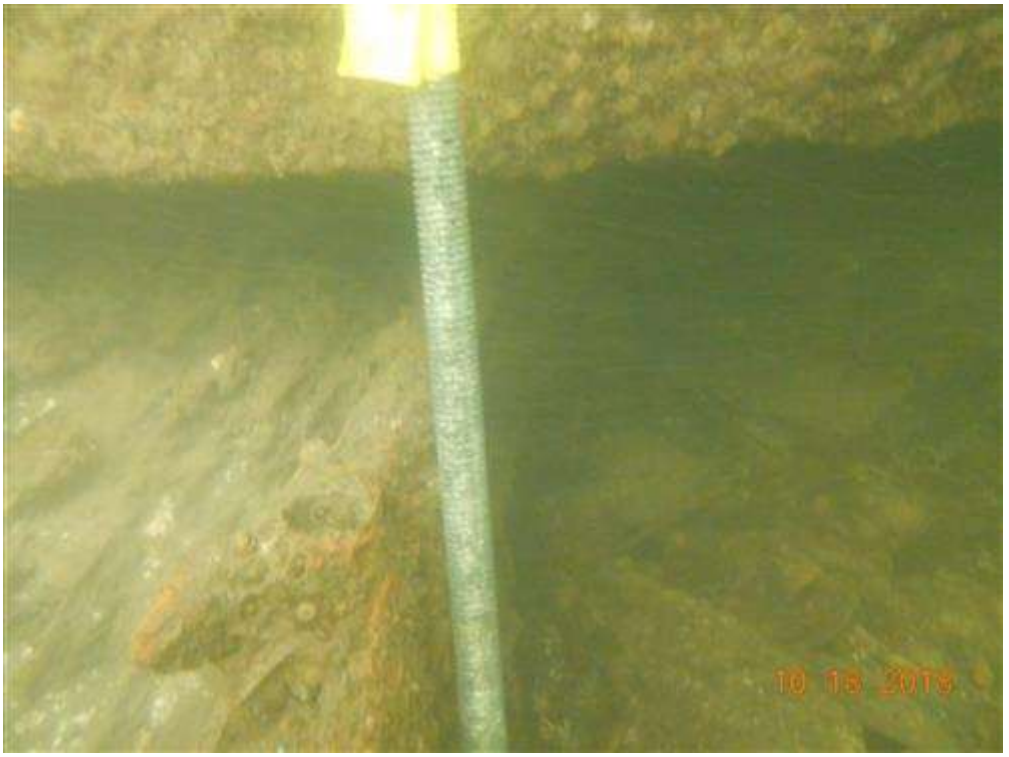


Photo Number: 92 Photo Taken: 10/18/2018

Pier 2 west side exhibits undermining of the footing and exposed timber cribbing with marine borer activity and loss of section.

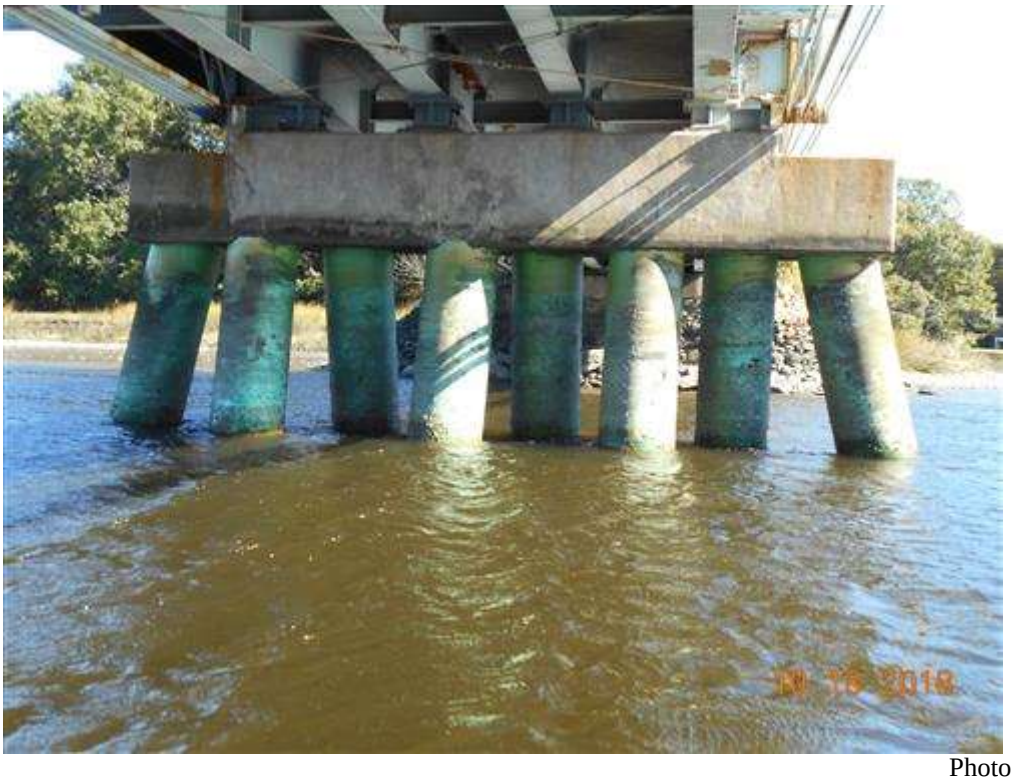


Photo Number: 93 Photo Taken: 10/18/2018

Pier 3 west elevation, looking east. Note: Reinforced concrete encased in steel H-piles covered by fiberglass forms.



Photo Number: 94 Photo Taken: 10/18/2018

Pier 3 east elevation, looking west.

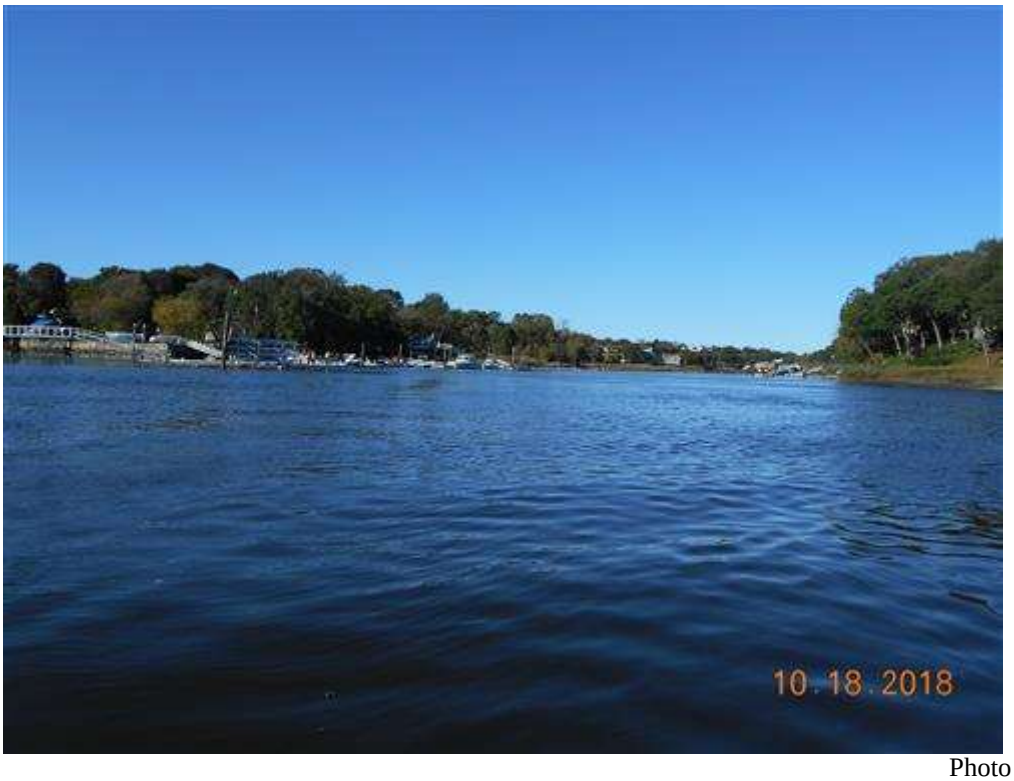


Photo Number: 95 Photo Taken: 10/18/2018

Channel looking upstream/flood (north).

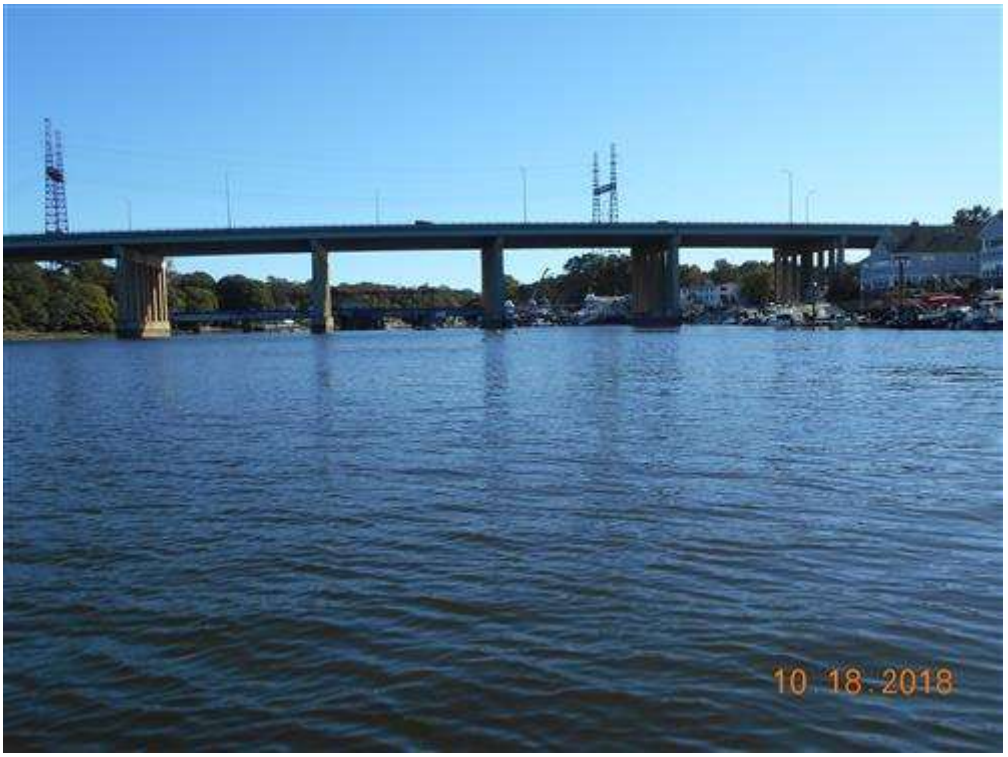


Photo Number: 96 Photo Taken: 10/18/2018

Channel looking downstream/ebb (south).



Photo Number: 97 Photo Taken: 10/18/2018

Northwest channel wall, looking west. Note: Dry-laid stone with voids.



Photo Number: 98 Photo Taken: 10/18/2018

Northwest channel wall, looking west. Note: Dry-laid stones with voids.



Photo Number: 99 Photo Taken: 10/18/2018

Wale 5 exhibits severe corrosion of hardware (typical).



Photo Number: 100 Photo Taken: 10/18/2018

Trace marine borer activity on fender pile (typical).

ROUTINE MECHANICAL INSPECTION

BRIDGE SAFETY INSPECTION

BRIDGE NO. 01349

Feature Carried: Route 136
Feature Crossed: Saugatuck River
Westport, Connecticut



State Project No. 170-3414

October 16, 2018

Prepared for:
Connecticut Department of Transportation

Prepared by:

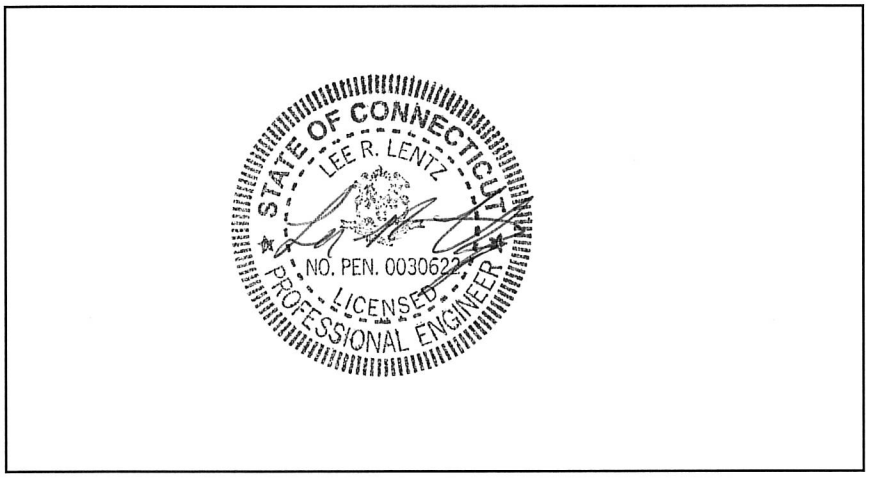
MODJESKI and MASTERS
Experience great bridges.

PRIME AE™

PRIME AE Group, Inc.
55 Capital Boulevard | 2nd Floor | Rocky Hill, CT 06067 | P: 860 436 5600 | F: 860 436 5601

Bridge No. 01349, Route 136 over Saugatuck River, Westport, CT

Inspected By: Modjeski and Masters, Inc. Date: 10/16/2018



Professional Certification: I hereby certify that this report, including all of its contents, has been approved by me, and that I am a duly licensed professional engineer under the laws of the State of Connecticut.

Signature:

License No.: PEN. 0030622 *Date:* 11/20/18

EXECUTIVE SUMMARY

MECHANICAL INSPECTION REPORT

ConnDOT, BRIDGE NO. 01349

A routine mechanical inspection of the Westport swing bridge over the Saugatuck River was performed between October 16-17, 2018 and on November 5, 2018 by Mr. R.C. Hoffman, P.E., Miss S.M. Seitz, E.I.T., and Mr. J.R. Hess, E.I.T. of Modjeski and Masters, Inc.

The AASHTO Movable Bridge Inspection, Evaluation and Maintenance Manual, 2017 Edition, and the ConnDOT Bridge Inspection Manual were utilized as the guidelines for the inspection. The "routine inspection" guidelines were utilized as the basis for equipment evaluation and testing. Equipment listed herein was examined and photographed, and observed deficiencies were documented. Additionally, items classified as deficient in the previous inspection report were inspected for compliance with the recommendations for repair and/or replacement listed therein.

This report is written from the perspective of the dates of the inspection described herein; the use of present tense herein in no way implies that the descriptions presented are accurate as of any subsequent date.

The general condition of the mechanical system is good. When the following items have been addressed and assuming proper maintenance is provided, long term reliable operation is anticipated:

SPAN DRIVE MACHINERY

1. There is a gap at the split on coupling C2 (between the main motor and right angle reducer) with lube leaking out of the gap.
2. The coupling on the motor rear shaft (C3) is leaking (missing gasket) and interferes with the span control reducer during operation.
3. The right angle gear reducer drain plug is corroded and not able to be removed preventing an oil test.
4. Very heavy accumulation of dirt/debris on top of the right angle reducer, which is trapping moisture and causing corrosion.
5. The right angle gear reducer desiccant is expired.
6. The main pinion shaft is covered in excess lube coming from the pinion shaft bearing seals.
7. The lower pinion bearing has a corroded plug in the lubrication port and no lubrication fitting.
8. The open gearing teeth have little to no fresh lubrication on them and are corroded.
9. The most north section of the rack segment is filled with water.
10. It appears that the bridge comes to an uncontrolled stop after the motor deenergizes and the brake sets. The swing span oscillates by moving through the backlash on both sides of the pinion tooth.

SPAN SUPPORT AND ALIGNMENT

1. The balance wheel clearance with the track ranges from 0 to 0.288 inches while the design clearance was 1/16 inches. The wheels slide against the track instead of rotating.
2. The balance wheel bearing bushing clearance is well outside the range for an RC6 fit for most of the wheels.
3. There are no limit switches to disengage all screw jack motors when the screw jacks are being operated manually which creates a hazard.
4. All screw jack gear reducer desiccants are expired.
5. The oil samples taken from the south center jack reducers showed signs of water contamination.
6. The oil sample taken from the southeast end jack upper reducer showed signs of water contamination. The northwest and southeast upper end jack gear reducer dipsticks show that the oil level is low.
7. The screw jack lower reducers do not have a dipstick, sight glass, or any other means to monitor the oil level.
8. The screw jack couplings do not have lubrication fittings on them and the plugs are painted over showing no signs of recent lubrication.
9. Screw jack bearing surfaces have moderate to severe corrosion with delamination. There are small gaps under the end screw jacks with the base when fully driven. The gaps are not the entire way through the interface.
10. There appears to be a leak coming from the center pivot bearing at the northeast corner purging out over the top of the strip seal.
11. The fully closed rigid stop is deformed, most likely from hard impact with the span.
12. The centering device has moderate paint failure and corrosion.

MISCELLANEOUS

1. Various components do not have fresh lubrication or do not show signs that plugs are being removed during lubrication.
2. Throughout the machinery system, various supports, housings, couplings, connecting bolts, and shafts exhibit minor to severe paint failure and corrosion.
3. There are oil and lubrication leaks at multiple bearing/coupling seals and reducer drains.
4. During operation, the span guard rails rub against the approach guard rails.

Please direct persons under your jurisdiction to:

SPAN DRIVE MACHINERY

1. Replace the gasket and tighten all bolts on coupling C2 to eliminate the gap at the split. Clean lubrication that leaked from this gap.
2. Replace the missing gasket at coupling C3.
3. Replace gear reducer drain plug with ¼-turn ball valve to allow for easy removal in the future. Use the drain to collect an oil sample for testing.
4. Spot clean and paint the top of the right angle reducer.
5. Replace gear reducer desiccant.
6. Replace pinion shaft bearing seals that are causing leaks and clean the pinion shaft.
7. Remove the corroded plug on the lower pinion bearing lubrication port and install a fitting.
8. Clean pinion and rack teeth of old lube and apply fresh lubricant regularly.
9. Drain the collected water in the northernmost rack section and inspect the rack bolts. Create a drain hole to prevent future water collection.
10. Investigate methods to reduce shock loading on machinery at full open.

SPAN SUPPORT AND ALIGNMENT

1. Adjust the balance wheel clearance with the track to achieve 1/16 inch when all screw jacks are driven. Adjust the center screw jack stroke as necessary. Test operate and verify that there is no hard contact between the balance wheels and track in one quadrant for the full operation.
2. Reduce the balance wheel bearing bushing clearance by removing liner shims to achieve an RC6 fit as designed.
3. Install limit switches at all screw jacks (center and end) to disable the motors when they are being manually operated.
4. Replace all screw jack gear reducer desiccants.
5. Drain, flush, and refill all center screw jack reducers with new oil. Check for source of water entry and repair.
6. Drain, flush, and refill all end screw jack reducers with new oil. Check for source of water entry and repair.
7. Install a sight glass or dipstick at all screw jack lower reducers to monitor oil level.
8. Install lubrication fittings at all screw jack couplings.
9. Clean and lubricate all center and end screw jack bearing surfaces as a part of the routine maintenance. Adjust the screw jack stroke to ensure firm contact when driven.
10. Clean grease from the leak at the center pivot bearing. Ensure the drain plug is removed when lubricating the bearing.
11. Monitor the fully closed rigid stop for increased deformation or damage.
12. Replace the centering device guides and limit switch mount.

MISCELLANEOUS

1. Ensure all components that require lubrication (i.e. couplings, open

gearing, bearings, etc.) are being lubricated at the frequency based upon movable bridge industry standard practice/manufacturer recommendations. Create, or verify current, lubrication procedure for all components to allow grease to purge through purge ports. Verify quantity of lubrication based upon movable bridge industry standard practice/manufacturer recommendations. Update maintenance training and manual to include all component lubrication information.

2. Spot clean and repair paint systems throughout the mechanical systems, with emphasis on connecting bolts and machinery couplings. The paint system used should be suitable for the service environment and be applicable to rusted surfaces cleaned only with solvent and hand tools.
3. Clean all oil/seal leaks and repair the source of the leak. Monitor these areas for future leaks.

TABLE OF CONTENTS
ConnDOT Bridge No: 01349

EXECUTIVE SUMMARY 3
GENERAL DESCRIPTION 8
OBSERVATIONS AND FINDINGS 10
- SPAN DRIVE COMPONENTS 10
  - Motor 10
  - Motor Brake 10
  - Span Control 10
  - Couplings 10
  - Enclosed Gear Reducer 11
  - Pinion Shaft 11
  - Pinion Shaft Bearings 11
  - Open Gearing 11
- SPAN SUPPORT AND ALIGNMENT 12
  - Balance Wheels and Track 12
  - Center Screw Jacks 12
  - End Screw Jacks 13
  - Center Pivot Bearing 14
  - Rigid Stops 14
  - Centering Device 15
- MISCELLANEOUS 15
- SPAN OPERATION 15

RECOMMENDATIONS 16

APPENDIX I: MACHINERY SCHEMATICS

APPENDIX II: INSPECTION PHOTOGRAPHS

APPENDIX III: OIL ANALYSIS REPORTS

APPENDIX IV: NUMERICAL CONDITION REPORT

APPENDIX V: FIELD NOTES

APPENDIX VI: TIME AT BRIDGE SITE

GENERAL DESCRIPTION

ConnDOT Bridge No. 01349 is a center bearing swing span which carries one lane, in each direction, of Route 136 vehicular traffic and one pedestrian sidewalk on the north side over the Saugatuck River in Westport, Connecticut. The swing span is 141 feet and 2 inches long between the centers of the end jacks. The swing span is 21 feet and 3 inches wide between truss centers and is oriented generally east to west. The operator control console is located on the north sidewalk at roadway level above the center pier. Machinery in this report is identified by compass direction and are referenced to the center pivot bearing. The bridge opens approximately 83.5 degrees only in one direction to allow passage of marine traffic.

The machinery was rehabilitated in 2013 but is otherwise original and dates back to 1989. The machinery for this bridge consists of components assembled into two major functional subsystems:

1. Span drive, which includes:
    a. Main motor
    b. Motor brake
    c. Span control
    d. Couplings
    e. Enclosed gear reducer
    f. Pinion shaft
    g. Bearings
    h. Drive pinion and rack
2. Span support and alignment, which includes:
    a. Balance wheels and track
    b. Center jacks
    c. End jacks
    d. Center pivot bearing
    e. Rigid stops
    f. Centering device

The movable span is rotated by one span drive. The drive consists of a 3 hp, 900 rpm electric motor with an integral disc brake, coupled to a right-angle enclosed gear reducer and then to a rack-engaging pinion via a vertically mounted pinion shaft. The rear motor shaft is coupled to span control equipment which consists of a gear reducer and rotary cam limit switch. Bridge rotation is realized when motor rotation and torque is transferred through the right-angle reducer and pinion. The pinion torque reacting on the rack (with integral track), which is fixed to the pivot pier (pier 1), causes the span to rotate about the center bearing which is mounted to the pivot pier. Figures 1 and 2 of Appendix I present the machinery layout. As shown in Appendix I, the major span drive elements highlighted above are connected and supported by appropriate couplings and bearings.

The span drive machinery is located below the roadway level and is accessible from the center pier. The space available for the machinery is limited, resulting in difficult access for both maintenance and inspection. Components on the output shaft side of the right angle reducers are more readily accessible than those on the respective input side.

During rotation, the entire weight of the bridge is supported by the center pivot bearing, which is comprised of a base casting, spherical roller thrust bearing, top casting, and dust cover. The base casting is secured to the center pier and the top casting to the span. The sliding surfaces are lubricated through lubrication ports and the dust cover surrounds the upper portion of the assembly.

Eight balance wheels are distributed radially about the center bearing to provide stability for imbalance and external loads such as wind and ice. The balance wheels are not intended to support either dead or live loads in the bridge closed position. The track for the balance wheels is integral with the rack gear.

For stability under live loads, in the closed position, there are two center screw jack and four end screw jack assemblies. The center jack assemblies are located on the center pier at the north and south pivot girders. The end jack assemblies are located at each corner of the movable span. The end jacks also support the dead load of the swing span along with the center pivot bearing. Each screw jack assembly consists of a base, which is anchored to the pier, and an independent operating machinery system, which is secured to the movable structure. The screw jack operating machinery consists of a 3.3 hp, 1800 rpm electrical motor with and integral disc brake, two right angle gear reducers, couplings, a floating shaft (only for the center jacks), an actuator, protective boot, and limit switches.

In the engaged position, the screw jacks are driven in contact with the bases to level the road surfaces of the swing span with the road surfaces of the approaches, and transfer the live loads to the piers. The center jacks allow for 3” travel while the end jacks allow for 5” travel to accommodate deflection. When withdrawn, the screw jacks retract from their bases on the rest piers so that the span can rotate. Each screw jack is located directly beneath the lower chord of the movable span truss. Figure 3 of Appendix I presents a schematic diagram of the screw jack machinery.

To prevent overtravel in both directions, the bridge has a fully open and a fully closed rigid stop. The fully open rigid stop is located on the center pier and consists of a strike plate mounted to the span and a spring bumper mounted to the pier. The fully closed rigid stop is located on the west pier at the center of the span. The fully closed rigid stop consists of a strike plate mounted to the span and a bumper block mounted to the pier. A manual centering device is also located at the center of the west pier. A vertical rod is accessed from the roadway level and is lowered by hand to engage a receiver mounted to the west pier.

OBSERVATIONS AND FINDINGS

During the course of the inspection, all machinery components were visually inspected statically and during operation. Various measurements were taken to monitor wear compared to previous inspections. Couplings and bearings were visually inspected but not opened for an internal inspection. Enclosed gear reducer inspection covers were not removed due to lack of access; however, representative oil samples were taken, and oil levels were checked.

SPAN DRIVE COMPONENTS

Motor

The main drive motor is generally in fair condition. It is a Reuland 3 hp, 900 rpm electric motor with a 215 TENV frame. The mounting bolts do not have double nuts, but the fasteners are not corroded. There are signs of fresh lubrication. See the Electrical Inspection report for additional details.

Motor Brake

The main Stearns disc brake is integral with the main span drive motor. Brake covers were not removed during the inspection. The manual release operates smoothly.

Span Control

Located behind the main motor, the span instrumentation components consist of a gear reducer and rotary cam limit switch. These components are generally in fair condition. The gear reducer has single nuts on the mounting bolts with some corrosion on the fasteners. There is a light coating of debris and lubrication under the reducer. The limit switch has widespread corrosion and moderate paint failure.

Couplings

There are four span drive couplings. C1 is a Falk double engagement coupling connecting the right angle reducer and pinion shaft. It has a seal leak on the channel side causing a light to moderate coating of grease on the lower half of the coupling. C1 also has moderate paint failure and significant corrosion on the top half of the coupling (see Photograph M1 in Appendix II).

C2 is a Falk grid coupling connecting the main motor and right angle reducer. There is a gap at the split of this coupling with lubrication leaking from the split (see Photograph M2). The lubrication port of this coupling is painted over with no signs of lubrication. There is moderate paint failure on this coupling.

Couplings C3 and C4 are the span instrumentation couplings. These couplings are in good condition. Coupling C3 is noisy during operation and has wear marks showing signs that it is scraping against the span control reducer (see Photograph M3). This

coupling has a missing gasket that should be replaced.

Enclosed Gear Reducer

The main drive reducer is generally in fair condition. The oil plug at the drain pipe is not able to be removed and there is no overhead access, so an oil sample was not taken. However, the oil level on the site glass appears adequate. There is corrosion and debris buildup on top of the reducer and on the mounting surface (see Photograph M4). The manual input shafts have minor widespread corrosion and chipped paint. The desiccant is expired and should be replaced.

Pinion Shaft

The pinion shaft is generally in good condition. It is painted and has not developed corrosion due to grease leaking past seals of the adjacent pinion bearing. The leaking seals should be replaced, and the shaft should be cleaned.

Pinion Shaft Bearings

The pinion shaft Torrington spherical roller bearings are generally in good condition. The mounting bolts have single nuts and the heads of the bolts are unpainted. It appears that the purge plugs on the top of the bearings are not being used. The lower bearing lubrication port contains a corroded plug and does not appear to be used (see Photograph M5). The upper bearing has light corrosion at the support interface. Both bearings have a layer of grease on them with minor corrosion and paint failure. Seals are leaking and should be replaced.

Open Gearing

The pinion and rack are in fair condition. There is little to no lubrication on the teeth and moderate surface corrosion, especially on the rack (see Photograph M6). The gear teeth have smooth surfaces and the rack opening face has a slight pitch line depression. Operation is generally smooth.

Chordal tooth thickness measurements for both the pinion and the rack were taken at the top and bottom of the tooth face. See Photograph M7 and M8 for an indication of which teeth were measured. The single tooth caliper has an addendum stop setting in order to get the thickness of the tooth at the pitch line. The addendums and original tooth thicknesses were calculated from the information on the original machinery drawings. The results of the gear tooth measurements are in Table M-1.

Table M-1

		Addendum (in)	Chordal Tooth Thickness Measurements		
			Original (in)	Current (in)	Wear %
Pinion	Top	0.660	0.999	0.995	0.36
	Bottom			0.996	
Rack	Top	0.638	1.000	0.983	1.70
	Bottom			0.997	

Minimal wear has occurred according to the measurements taken. Cleaning and relubrication of rack and pinion teeth should be a part of the regular maintenance procedures.

The rack bolts are generally in good condition. The northern most section of the segment for rack bolts is filled with water and likely causing damage to the bolts (see Photograph M9). This section should be drained regularly.

SPAN SUPPORT AND ALIGNMENT

Balance Wheels and Track

The track is generally in good condition. There is minor debris buildup and minor corrosion near the anchor bolts.

The eight balance wheels are in fair condition. Some of the balance wheel contacting surfaces exhibit minor surface corrosion. Wheel 7 has paint failure on the bearing cap and wheel 8 has minor corrosion on the bearing cap. Wheels 1 through 4 and wheel 7 cannot be rotated by hand. This indicates that they are either contacting the track and have potential to carry live load (wheels 1 and 2) or that they are not adequately lubricated (wheels 3, 4, and 7). The balance wheels are not intended to carry load when the span is closed and jacks are driven. The balance wheel bearing bolts have minor to moderate corrosion and paint failure. All wheel bearing lubrication fittings show signs of fresh lubrication. Wheels 5 through 8 have slight lubrication buildup at the shaft and journal interface.

The balance wheel clearance with the track when the jacks are engaged ranges from 0 to 0.288 inches with an average of 0.132 inches. Wheels 1 and 2 are in contact with the track when the jacks are driven. A table of these values can be seen on page 9 of the Field Notes in Appendix V. Most of the balance wheels do not contact the track during operation. When they do contact the track, they often slide against it instead of rotating.

The original balance wheel bearing clearance was designed to be an RC6 fit. Except for wheel 1 bushings, wheel 6 outboard bushing, and wheel 7 inboard bushing, the clearance measurements show that all other bushings are out of the 0.003 inch to 0.009 inch range for an RC6 fit. Measurements can be seen on page 10 of the Field Notes in Appendix V.

Center Screw Jacks

The two center screw jack assemblies overall are in fair condition and operate smoothly. The motor is a Reuland 3.3 hp, 1800 rpm, 184 TENV frame electric motor with a Stearns integral disc brake. The main motor is connected to the upper right angle reducer with a Falk grid 1020T10D coupling. The upper right angle reducer is a Falk

1020 FC83 with a ratio of 7.669:1. The upper reducer is coupling connected to a floating shaft and then the lower reducer with Falk single engagement couplings. The lower reducer is a Foote-Jones Maxi-Power reducer, model 7SBV, with a ratio of 4.125:1. The lower reducer is coupling connected to a Duff-Norton machine screw actuator rated at 50 tons with 3 inches of travel.

There is no limit switch to disable the motors during manual operation which presents a hazard. The north motor lubrication purge is not being used and the south motor does not show signs of recent lubrication.

The north upper reducer shows signs of delamination localized at the housing split and the south upper and lower reducers do not show signs of recent lubrication at the fittings. All reducer desiccants are expired and need to be replaced.

Couplings do not appear to have been lubricated recently as they do not have any fittings and the plugs are painted over. The south upper floating shaft coupling has a small leak at the flex hub.

Open gears for the rotary cam limit switch show no signs of recent lubrication and make noise during operation.

The screw jack actuators do not appear to have been lubricated recently. The protective boots on the jacks are typically in good condition with minor debris and grease buildup. Bearing surfaces for the screw jacks are generally dry with moderate to severe corrosion and delamination (see Photographs M10 and M11).

Overall, the assemblies have varying degrees of surface corrosion ranging from minor to severe. The couplings and floating shafts show minor to severe paint failure as well (see Photograph M12).

Representative oil samples were taken from the south upper reducer and south lower reducer and the results can be found in Appendix III. The upper reducer oil is in “severe” condition and the lower reducer oil is in “abnormal” condition due to high levels of water. All reducers should be drained, flushed, and filled with new oil. Also, check for a source of water entry to prevent further contamination.

End Screw Jacks

The four end screw jack assemblies overall are in fair condition and operate smoothly. The motor is a Reuland 3.3 hp, 1800 rpm, 184 TENV frame electric motor with a Stearns integral disc brake. The main motor is connected to the upper right angle reducer with a Falk grid 1020T10D coupling. The upper right angle reducer is a Falk 1020 FC83 with a ratio of 7.669:1. The upper reducer is coupling connected to the lower reducer with a Falk double engagement coupling. The lower reducer is a Foote-Jones Maxi-Power reducer, model 7SBV, with a ratio of 4.125:1. The lower reducer is

coupling connected to a Duff-Norton machine screw actuator rated at 150 tons with 5 inches of travel.

There is no limit switch to disable the motors during manual operation which presents a hazard. The southwest motor shows no signs of recent lubrication.

Almost all upper and lower reducers have no signs of fresh lubrication on all fittings and the northwest and southeast upper reducer oil levels are low on the dipsticks. The northeast upper and lower reducers have an oil leak at the drains. The southeast upper reducer has a leak at the output shaft and the manual shaft is corroded. The southwest upper reducer has excess lubrication leaking from the seal. All reducer desiccants are expired and need to be replaced.

Couplings do not appear to have been lubricated recently as they do not have any fittings and the plugs are painted over. The northeast motor coupling has a leak at the split and the northwest motor coupling gasket is starting to work itself out.

Open gears for the rotary cam limit switch show no signs of recent lubrication and make noise during operation.

The northwest and southwest jacks have a buildup of excess grease. The protective boots on the jacks are typically in good condition with minor debris and grease buildup. The southeast jack has a gap with the base so that a 0.003 inch feeler can fit under the east and west sides when fully driven (see Photograph M13). This gap is not present around the entire jack. The bearing surfaces are corroded but have fresh lube on them.

Overall, the assemblies have varying degrees of surface corrosion ranging from minor to severe. The couplings show minor to severe paint failure as well.

Representative oil samples were taken from the southeast upper reducer and southeast lower reducer and the results can be found in Appendix III. The upper reducer oil is in “abnormal” condition due to high levels of water and the lower reducer oil is in “normal” condition. All reducers should be drained, flushed, and filled with new oil. Also, check for a source of water entry to prevent further contamination.

Center Pivot Bearing

The center bearing assembly is in fair condition. There is minor isolated corrosion at the base. There is minor to moderate corrosion on the upper casting and the upper casting bolts (see Photograph M14). There is evidence of a lubrication leak at the northeast corner purging out over the top of the strip seal. This should be cleaned and the drain plug should be removed when lubricating the bearing.

Rigid Stops

The center pier fully open rigid stop is in good condition with some minor corrosion at

the base plate (see Photograph M15).

The end pier fully closed rigid stop is in good condition with minor to moderate corrosion on the strike plate, base, and mounting bolts (see Photograph M16). The rigid stop is deformed likely from impact with the span.

Centering Device

The centering device rod, limit switch mount, and guides have moderate paint failure, corrosion, and debris buildup (see Photograph M17). The pier mounted receiver has minor corrosion and heavy debris buildup. The rod is in contact with the receiver at the south side when the span is in the fully closed position (see Photograph M18).

MISCELLANEOUS

It should be noted that the space available for the main drive machinery is limited, resulting in difficult access for both maintenance and inspection.

SPAN OPERATION

Modjeski and Masters coordinated with Prime and CTDOT directly to organize bridge operations for Westport. Kevin Davis (CTDOT) and a small maintenance crew were at the bridge site for operations. Shortly after arrival, Mr. Davis made a phone call to have a police officer and patrol car stop traffic at both ends of the bridge. Mr. Davis and the maintenance crew were able to provide the access we needed by unlocking cabinets, gates, and platforms. They also provided all manpower and expertise necessary to operate the bridge including the manual traffic gates, the manual centering device, the screw jacks, and the main drive motor. Mr. Baihai Wang (CTDOT Bridge Safety) was also on site to witness the bridge operation.

Operation of the bridge is generally smooth with a few minor exceptions. The rack and pinion drift for about two teeth and rock back and forth for about seven seconds at the full open position. It appears that the bridge comes to an uncontrolled stop after the motor deenergizes and the brake sets. The swing span oscillates by moving through the backlash on both sides of the pinion tooth.

Coupling C3 rubs against the span control reducer during operation. The rotary cam limit switch open gears at the screw jacks are not lubricated make noise during operation. Lastly, the swing span guard rails rub on the approach guard rails.

RECOMMENDATIONS

		Priority
SPAN DRIVE MACHINERY		
1.	Replace the gasket and tighten all bolts on coupling C2 to eliminate the gap at the split.	Routine Repair
2.	Replace the missing gasket at coupling C3.	Routine Repair
3.	Replace gear reducer drain plug with ¼-turn ball valve to allow for easy removal. Use the drain to collect an oil sample for testing.	Priority Repair
4.	Spot clean and paint the top of the right angle reducer.	Routine Repair
5.	Replace gear reducer desiccant.	Priority Repair
6.	Replace pinion shaft bearing seals that are causing leaks and clean the pinion shaft.	Priority Repair
7.	Remove the corroded plug on the lower pinion bearing lubrication port and install a fitting.	Priority Repair
8.	Clean pinion and rack teeth of old lube and apply fresh lubricant regularly.	Routine Repair
9.	Drain the collected water in the northernmost rack section and inspect the bolts. Create a drain hole to prevent water collection.	Routine Repair
10.	Eliminate shock loading on open gearing at full open.	Routine Repair
SPAN SUPPORT AND ALIGNMENT		
1.	Adjust the balance wheel clearance with the track to achieve 1/16 inch when all screw jacks are driven. Adjust the center screw jack stroke as necessary. Test operate and verify that there is no hard contact between the balance wheels and track in one quadrant for the full operation.	Routine Repair
2.	Reduce the balance wheel bearing bushing clearance by removing liner shims to achieve an RC6 fit as designed.	Priority Repair
3.	Install limit switches at all screw jacks (center and end) to disable the motors when they are being manually operated.	Priority Repair
4.	Replace all screw jack gear reducer desiccants.	Priority Repair
5.	Drain, flush, and refill all center screw jack reducers with new oil.	Priority Repair

	Check for source of water entry and repair.	
6.	Drain, flush, and refill all end screw jack reducers with new oil. Check for source of water entry for all end screw jack reducers and repair.	Priority Repair
7.	Install a sight glass or dipstick at all screw jack lower reducers to monitor oil level.	Routine Repair
8.	Install lubrication fittings at all screw jack couplings.	Priority Repair
9.	Clean and lubricate all center and end screw jack bearing surfaces as a part of the routine maintenance. Adjust the screw jack stroke to ensure firm contact when driven.	Priority Repair
10.	Clean grease from the leak at the center pivot bearing. Ensure the drain plug is removed when lubricating the bearing.	Priority Repair
11.	Monitor the fully closed rigid stop for increased deformation or damage.	Routine Repair
12.	Replace the centering device limit switch mount and guides.	Priority Repair

MISCELLANEOUS

1.	Ensure all components that require lubrication (i.e. couplings, open gearing, bearings, etc.) are being lubricated at the frequency based upon movable bridge industry standard practice/manufacturer recommendations. Create, or verify current, lubrication procedure for all components to allow grease to purge through purge ports. Verify quantity of lubrication based upon movable bridge industry standard practice/manufacturer recommendations. Update maintenance training and manual to include all component lubrication information.	Priority Repair
2.	Spot clean and repair paint systems throughout the mechanical systems, with emphasis on connecting bolts and machinery couplings. The paint system used should be suitable for the service environment and be applicable to rusted surfaces cleaned only with solvent and hand tools.	Routine Repair
3.	Clean all oil/seal leaks and repair the source of the leak. Monitor these areas for future leaks.	Priority Repair

APPENDIX I
MACHINERY SCHEMATICS

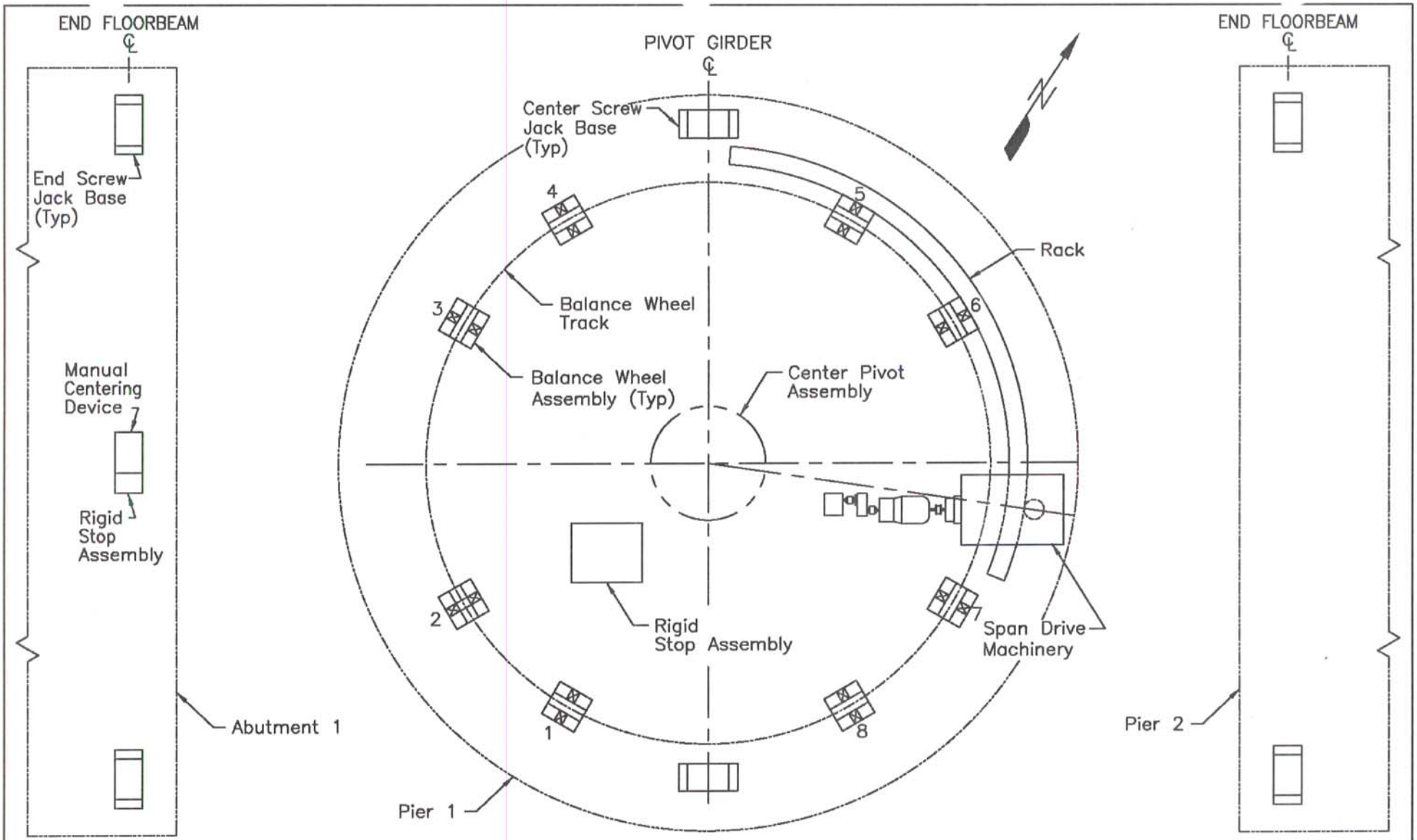


Figure 1. Plan View of Span Drive Machinery and Span Support Machinery

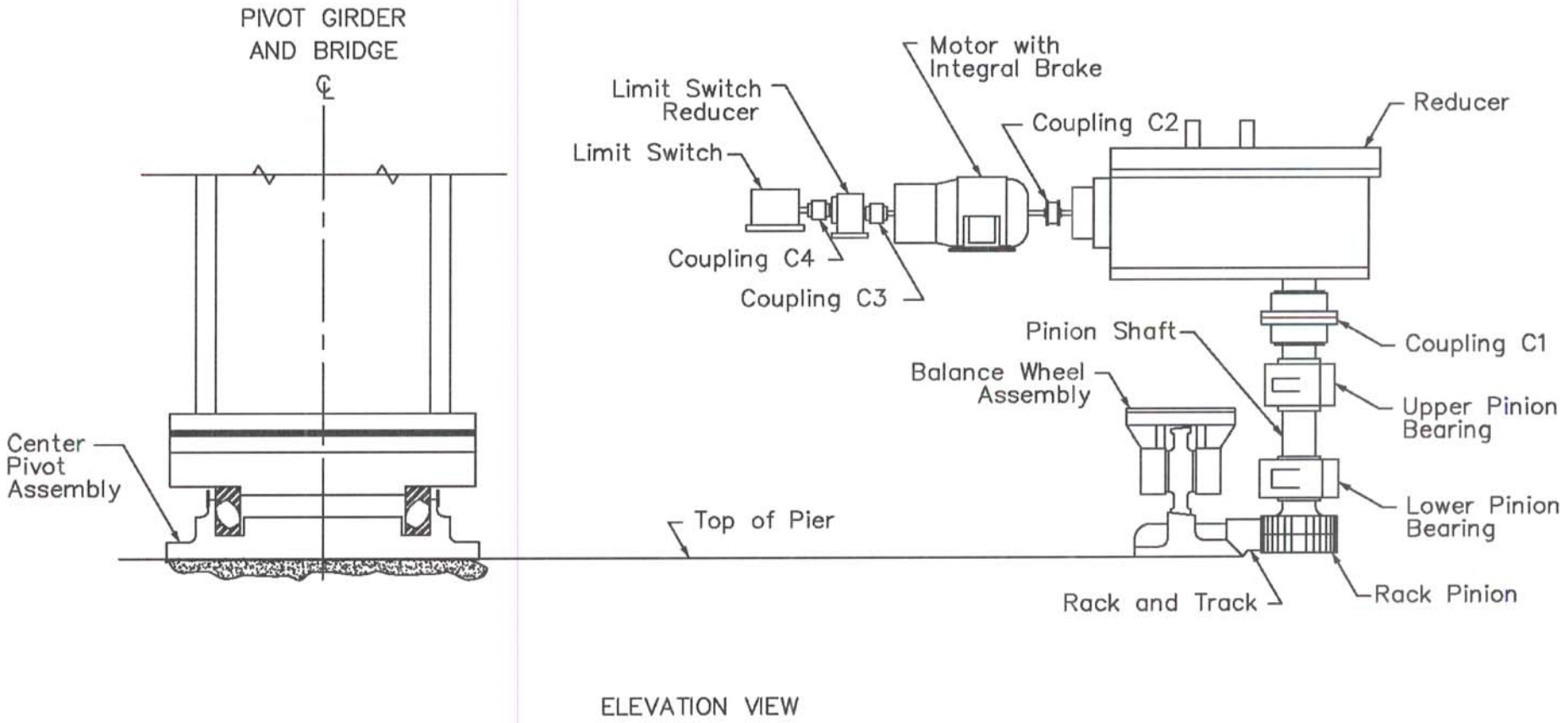


Figure 2. Span Drive Machinery

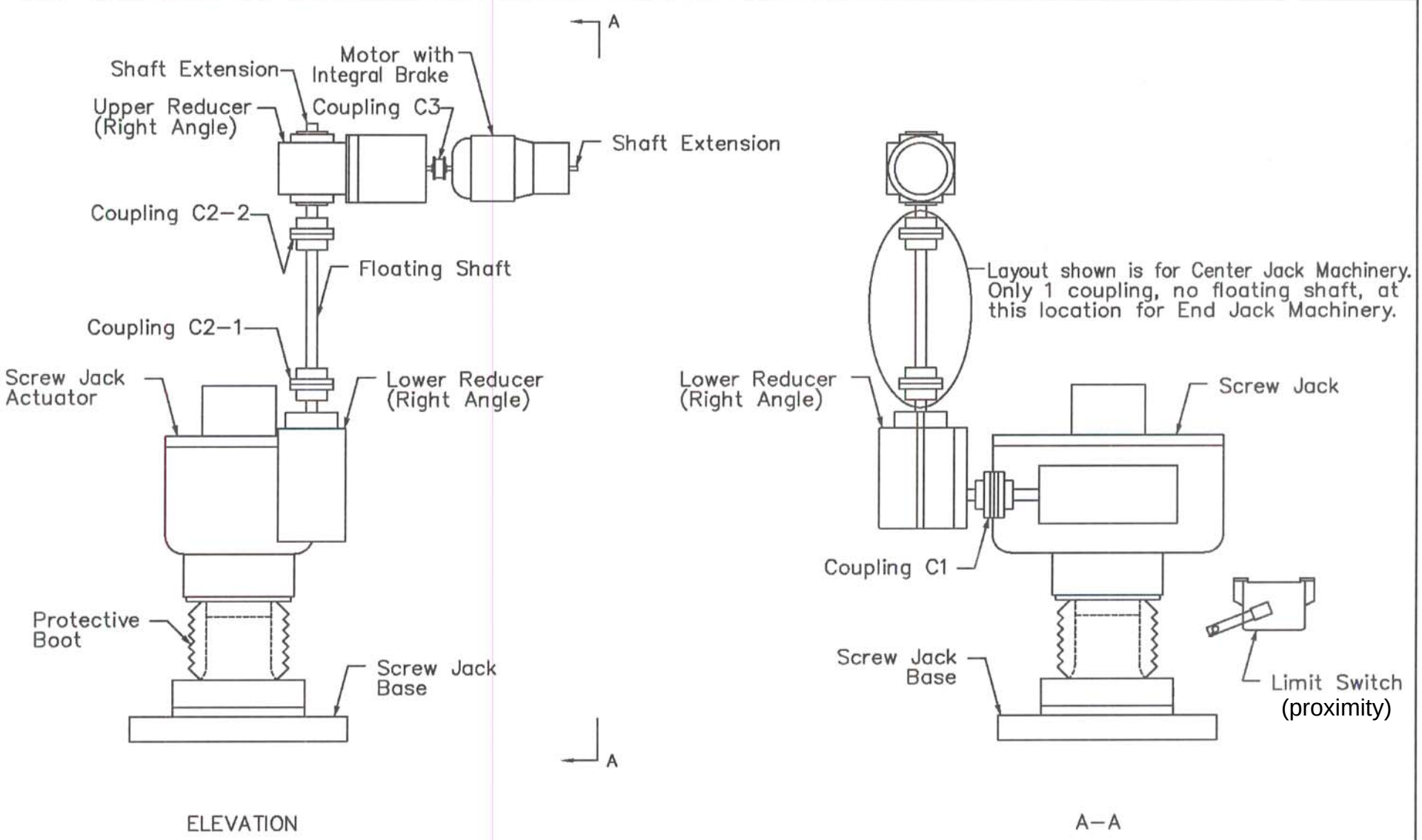


Figure 3. Screw Jack Machinery
Typical Arrangement

APPENDIX II
INSPECTION PHOTOGRAPHS

Bridge No.	01349	**Inspected by:**	R. C. Hoffman, S. M. Seitz, and J. R. Hess
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	10-16-2018, 10-17-18, 11-05-18
Feature Crossed:	Saugatuck River		



Photo M1:
Coupling C1 with moderate paint failure and corrosion.



Photo M2:
Coupling C2 with a gap at the split and lubrication leak (arrow).

Bridge No.	01349	**Inspected by:**	R. C. Hoffman, S. M. Seitz, and J. R. Hess
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	10-16-2018, 10-17-18, 11-05-18
Feature Crossed:	Saugatuck River		

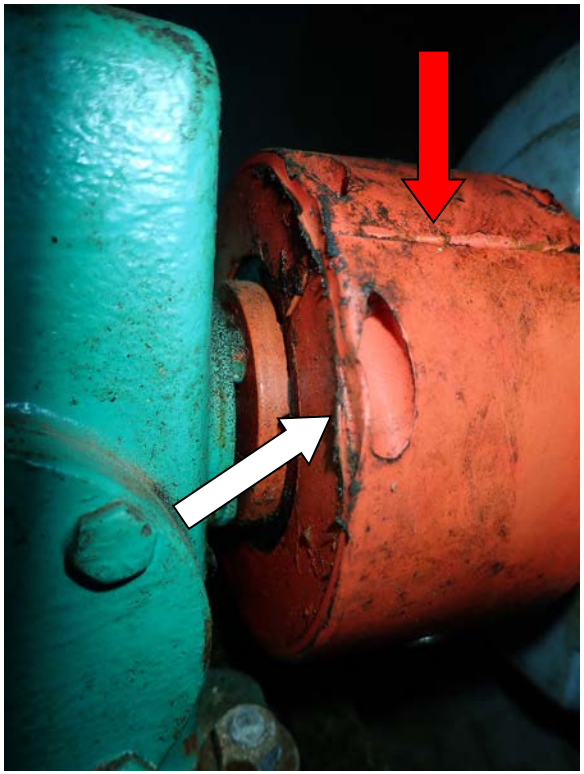


Photo M3:
Coupling C3 with wear marks from scraping reducer (white arrow) and missing gasket (red arrow).



Photo M4:
The top of the main right angle reducer with typical heavy dirt/debris accumulation causing corrosion.

Bridge No.	01349	**Inspected by:**	R. C. Hoffman, S. M. Seitz, and J. R. Hess
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	10-16-2018, 10-17-18, 11-05-18
Feature Crossed:	Saugatuck River		



Photo M5:
Lower pinion bearing with corroded plug in lubrication port (circle).



Photo M6:
Rack teeth with typical moderate surface corrosion and lack of lubrication.

Bridge No.	01349	**Inspected by:**	R. C. Hoffman, S. M. Seitz, and J. R. Hess
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	10-16-2018, 10-17-18, 11-05-18
Feature Crossed:	Saugatuck River		



Photo M7:
Pinion tooth measured (left) is five teeth from the most engaged tooth at fully closed (right).



Photo M8:
Rack tooth measured is 8 teeth from the most engaged rack tooth at fully closed.

Bridge No.	01349	**Inspected by:**	R. C. Hoffman, S. M. Seitz, and J. R. Hess
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	10-16-2018, 10-17-18, 11-05-18
Feature Crossed:	Saugatuck River		



Photo M9:
North rack bolt section filled with water.



Photo M10:
Center screw jack bearing surface with typical corrosion and delamination.

Bridge No.	01349	**Inspected by:**	R. C. Hoffman, S. M. Seitz, and J. R. Hess
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	10-16-2018, 10-17-18, 11-05-18
Feature Crossed:	Saugatuck River		



Photo M11:
Center screw jack bearing surface with typical corrosion and delamination.



Photo M12:
Center screw jack typical coupling and floating shaft condition with paint failure and surface corrosion.

Bridge No.	01349	**Inspected by:**	R. C. Hoffman, S. M. Seitz, and J. R. Hess
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	10-16-2018, 10-17-18, 11-05-18
Feature Crossed:	Saugatuck River		



Photo M13:
Southeast end screw jack gap on east and west sides with 0.003” feeler.



Photo M14:
Center pivot bearing upper casting mounting with typical moderate corrosion.

Bridge No.	01349	**Inspected by:**	R. C. Hoffman, S. M. Seitz, and J. R. Hess
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	10-16-2018, 10-17-18, 11-05-18
Feature Crossed:	Saugatuck River		



Photo M15:
Fully open rigid stop with minor corrosion at the mounting base.



Photo M16:
Fully closed rigid stop with moderate corrosion and deformation from impact.

Bridge No.	01349	**Inspected by:**	R. C. Hoffman, S. M. Seitz, and J. R. Hess
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	10-16-2018, 10-17-18, 11-05-18
Feature Crossed:	Saugatuck River		



Photo M17:
Manual centering device rod and guides with moderate corrosion, paint failure, and debris buildup.



Photo M18:
Manual centering device receiver with minor corrosion and heavy debris buildup. The centering device rod contacts the receiver on the south side.

APPENDIX III
OIL ANALYSIS REPORTS

UIN 06D12B5

Gearbox

Unit No. Westport

Unit:
Make
Model
Serial No.

Site

Compartment:
Name South Center Jack Upper Gearbox
Make
Model
Serial No.
Capacity: 0.0

Customer:

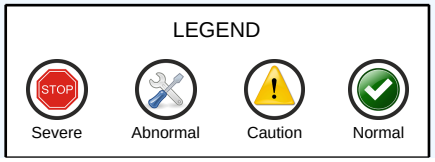
MODJESKI & MASTERS INC
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

DIAGNOSIS

All wear levels appear within acceptable limits for first sample. Heavy concentration of water present. Silicon level (dirt/sealant material) satisfactory. Unable to obtain accurate viscosity result at 100C due to presence of water in sample. Action: Check for source of water entry. Drain oil from unit if not already changed. Resample after corrective action to further monitor.

ANALYST: Eric.Dunlap





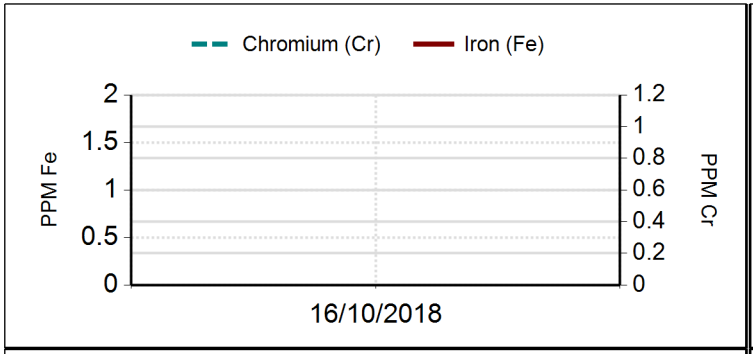
DATE SAMPLED		16-Oct-18
DATE RECEIVED		23-Oct-18
DATE REPORTED		25-Oct-18

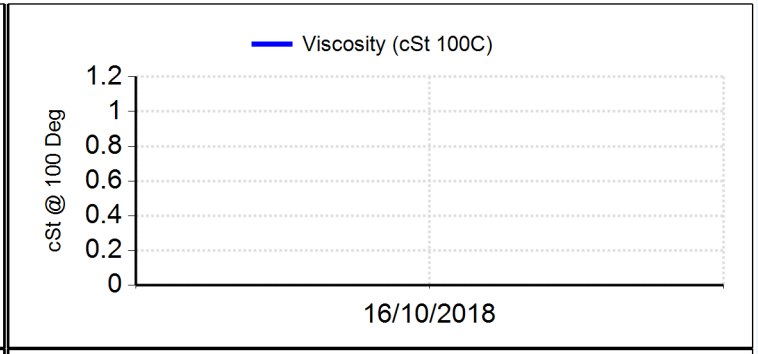
LAB NO.		41022050109
SIF NO.		34028617
TIME ON UNIT	Hrs	
TIME ON OIL	Hrs	
OIL BRAND		Unidentified
OIL TYPE		Unidentified
OIL GRADE		Unknown
OIL ADDED		
FILTER	Hrs	Not Applicable
OIL CHANGED		
WO NUMBER		

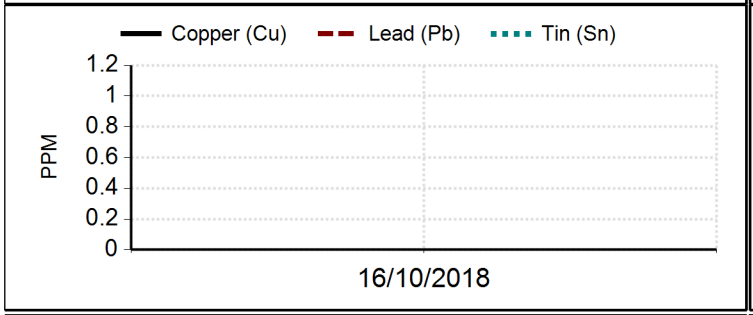
Metals (ppm)	
Iron (Fe)	2
Chromium (Cr)	<1
Lead (Pb)	<1
Copper (Cu)	<1
Tin (Sn)	<1
Aluminium (Al)	<1
Nickel (Ni)	<1
Silver (Ag)	<1
Titanium (Ti)	<1
Vanadium (V)	<1
Contaminants (ppm)	
Silicon (Si)	3
Sodium (Na)	46
Potassium (K)	1
Additives (ppm)	
Magnesium (Mg)	1
Calcium (Ca)	21
Barium (Ba)	<1
Phosphorus (P)	38
Zinc (Zn)	54
Molybdenum (Mo)	<1
Boron (B)	<5
Contaminants	
Water (%)	21.39
Physical Tests	
Viscosity (cSt 100C)	N/A
Solids (%)	<0.1
Additional	
PQ Index	12

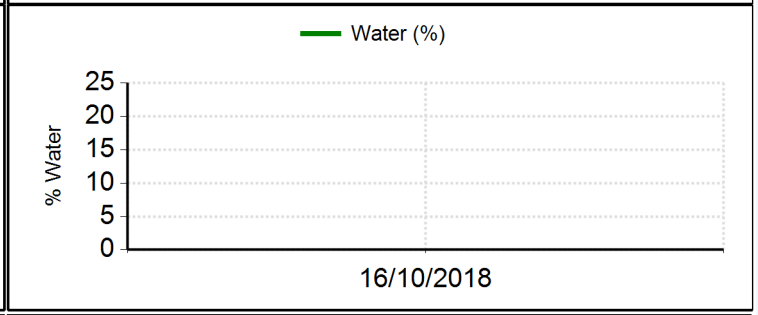


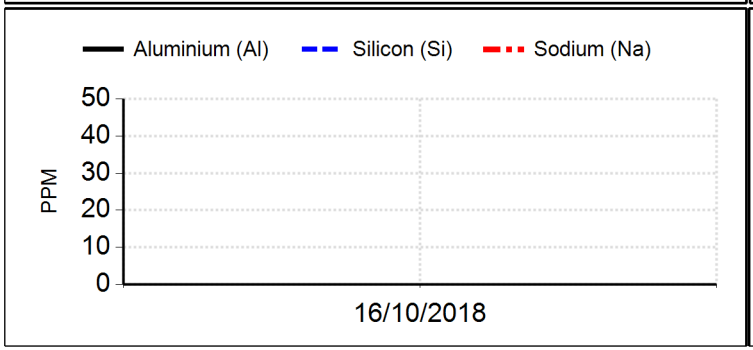
UIN 06D12B5











Filter Image

Filter patch test is not performed Contact laboratory for more information

Since services are based on samples and information supplied by others, and since corrective actions, if any, are necessarily taken by others, these services are rendered without any warranty or liability of any kind beyond the actual amount paid to ALS Tribology for the services. Reported recommendations are based on interpretations of the generated test results and historical data. Certain test results appearing in this report may have been tested at other ALS laboratories within the Tribology divisional network.

Modjeski & Masters Inc
Attn:
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

151 T002 v1.9

U.S. Laboratories

Atlanta, Georgia - 420
3121 Presidential Drive
Atlanta, GA 30340
800.394.3669

Valley View, Ohio - 410
6180 Halle Dr. Suite D
Valley View, OH 44125
800.726.5400

Kansas City, Kansas - 430
935 Sunshine Road
Kansas City, KS 66115
800.332.8055

Phoenix, Arizona - 440
3319 West Earll Drive
Phoenix, AZ 85017
800.445.7930

Portland, Oregon - 401
4943 NW Front Avenue
Portland, OR 97210
800.770.4128

Canadian Laboratories

Burlington, Ontario - 450
5036 South Service Rd.
Burlington, ON L7L5Y73
877.732.9559

Edmonton, Alberta - 402
10717-176 Street
Edmonton, AB T5S 1K1
888.489.0057

Sales & Marketing

Houston, Texas
10450 Stancliff Road, Suite 210
Houston, TX 77099
877.835.8437

International Locations

Australia
Brisbane, Perth, Sydney, Muswellbrook

South America
Santiago de Chile, Belo Horizonte, Sao Paulo, Brazil

New Zealand
Wellington

Southeast Asia
Kuala Lumpur, Singapore

Europe
Prague

TEST METHODS:

Acid Number:	ASTM D974/D664 (*M)
Base Number:	ASTM D4739 (*M)
Base Number (Perchloric):	ASTM D2896
Fuel Dilution by GC:	ASTM D7593
Fuel Dilution Visc/Setaflash	ASTM D445/D7279/D3828
Fuel Soot ATR/IR:	ASTM D7686 (*M)
Soot by FTIR:	ASTM D7844
Glycol:	ASTM D2982
Metals by ICP AES:	ASTM D5185 (*M)
Ox, NOx, SOx, FTIR:	ASTM D7418/D7414/D7415 D7624
PQ Index:	ASTM D8120 (*M)
Particle Count:	ASTM D7647 (*M) / ISO 4406
Viscosity:	ASTM D445 / D7279
Water KF:	D6304C / E203 (*M)
Water Crackle:	In House

*M - Modified Method

UIN 06D12B2

Gearbox

Unit No. Westport

Unit:
Make
Model
Serial No.

Site

Compartment:
Name South Center Jack Lower Gearbox
Make
Model
Serial No.

Capacity: 0.0

Customer:

MODJESKI & MASTERS INC
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

DIAGNOSIS

Engine wear levels appear satisfactory for first sample. Moderate concentration of water present. Silicon level (dirt/sealant material) satisfactory. Unable to obtain accurate viscosity result at 100C due to presence of water in sample. Action: Check for source of water entry. Drain oil from unit if not already changed. Resample at a reduced service interval to monitor and establish wear trend.

ANALYST: Eric.Dunlap

Abnormal

LEGEND

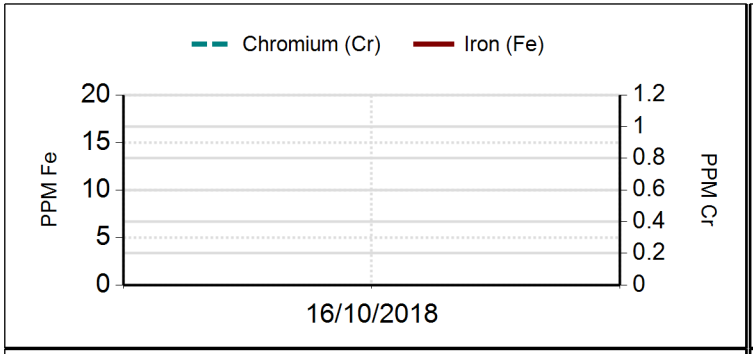
Severe | Abnormal | Caution | Normal

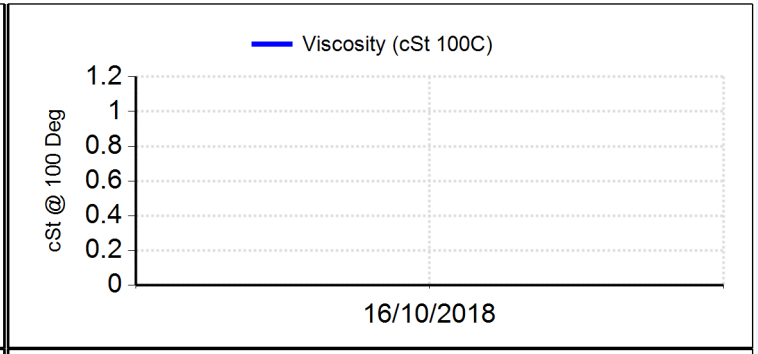
DATE SAMPLED		16-Oct-18
DATE RECEIVED		23-Oct-18
DATE REPORTED		25-Oct-18
LAB NO.		41022050108
SIF NO.		34028619
TIME ON UNIT	Hrs	
TIME ON OIL	Hrs	
OIL BRAND		Unidentified
OIL TYPE		Unidentified
OIL GRADE		Unknown
OIL ADDED		
FILTER	Hrs	Not Applicable
OIL CHANGED		
WO NUMBER		
Metals (ppm)		
Iron (Fe)		20
Chromium (Cr)		<1
Lead (Pb)		<1
Copper (Cu)		1
Tin (Sn)		<1
Aluminium (Al)		1
Nickel (Ni)		<1
Silver (Ag)		<1
Titanium (Ti)		<1
Vanadium (V)		<1
Contaminants (ppm)		
Silicon (Si)		17
Sodium (Na)		10
Potassium (K)		<1
Additives (ppm)		
Magnesium (Mg)		3
Calcium (Ca)		120
Barium (Ba)		<1
Phosphorus (P)		393
Zinc (Zn)		518
Molybdenum (Mo)		<1
Boron (B)		<5
Contaminants		
Water (%)		0.63
Physical Tests		
Viscosity (cSt 100C)		N/A
Solids (%)		<0.1
Additional		
PQ Index		11

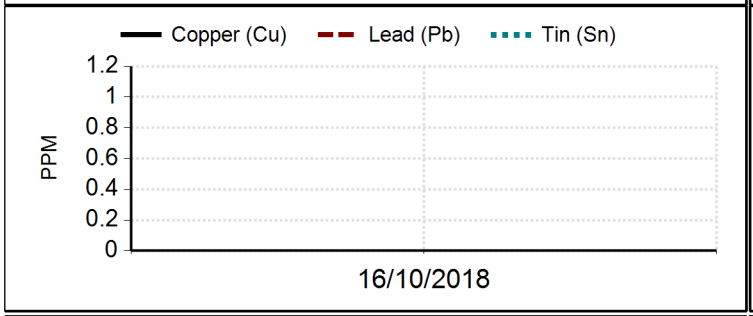
Right Solutions • Right Partner

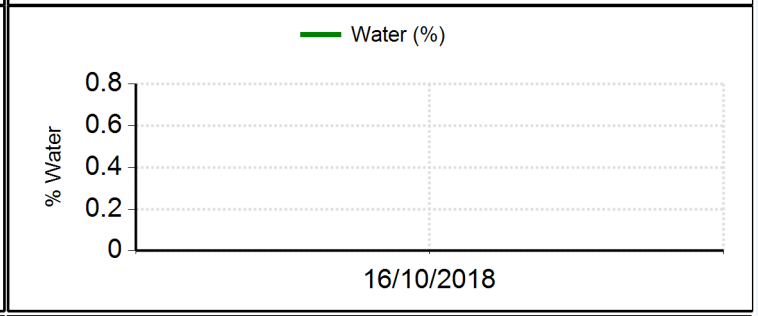
152

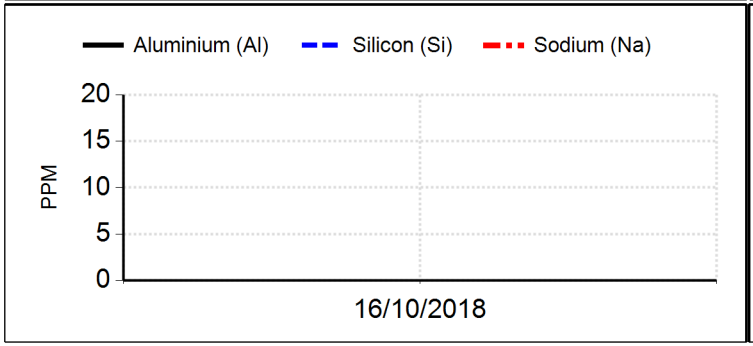
UIN 06D12B2











Filter Image

Filter patch test is not performed Contact laboratory for more information

Since services are based on samples and information supplied by others, and since corrective actions, if any, are necessarily taken by others, these services are rendered without any warranty or liability of any kind beyond the actual amount paid to ALS Tribology for the services. Reported recommendations are based on interpretations of the generated test results and historical data. Certain test results appearing in this report may have been tested at other ALS laboratories within the Tribology divisional network.

Modjeski & Masters Inc
Attn:
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

153 0002 v1.9

U.S. Laboratories

Atlanta, Georgia - 420
3121 Presidential Drive
Atlanta, GA 30340
800.394.3669

Valley View, Ohio - 410
6180 Halle Dr. Suite D
Valley View, OH 44125
800.726.5400

Kansas City, Kansas - 430
935 Sunshine Road
Kansas City, KS 66115
800.332.8055

Phoenix, Arizona - 440
3319 West Earll Drive
Phoenix, AZ 85017
800.445.7930

Portland, Oregon - 401
4943 NW Front Avenue
Portland, OR 97210
800.770.4128

Canadian Laboratories

Burlington, Ontario - 450
5036 South Service Rd.
Burlington, ON L7L5Y73
877.732.9559

Edmonton, Alberta - 402
10717-176 Street
Edmonton, AB T5S 1K1
888.489.0057

Sales & Marketing

Houston, Texas
10450 Stancliff Road, Suite 210
Houston, TX 77099
877.835.8437

International Locations

Australia
Brisbane, Perth, Sydney, Muswellbrook

South America
Santiago de Chile, Belo Horizonte, Sao Paulo, Brazil

New Zealand
Wellington

Southeast Asia
Kuala Lumpur, Singapore

Europe
Prague

TEST METHODS:

Acid Number:	ASTM D974/D664 (*M)
Base Number:	ASTM D4739 (*M)
Base Number (Perchloric):	ASTM D2896
Fuel Dilution by GC:	ASTM D7593
Fuel Dilution Visc/Setaflash	ASTM D445/D7279/D3828
Fuel Soot ATR/IR:	ASTM D7686 (*M)
Soot by FTIR:	ASTM D7844
Glycol:	ASTM D2982
Metals by ICP AES:	ASTM D5185 (*M)
Ox, NOx, SOx, FTIR:	ASTM D7418/D7414/D7415 D7624
PQ Index:	ASTM D8120 (*M)
Particle Count:	ASTM D7647 (*M) / ISO 4406
Viscosity:	ASTM D445 / D7279
Water KF:	D6304C / E203 (*M)
Water Crackle:	In House

*M - Modified Method

UIN 06D12B7

Gearbox

Unit No. Westport

Unit:
Make
Model
Serial No.

Site

Compartment:
Name SE End Jack Upper Gearbox
Make
Model
Serial No.
Capacity: 0.0

Customer:

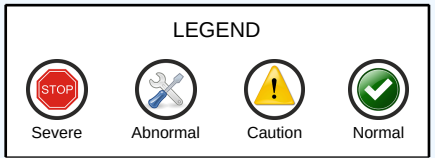
MODJESKI & MASTERS INC
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

DIAGNOSIS

All wear levels appear within acceptable limits for first sample. Moderate concentration of water present. Silicon level (dirt/sealant material) satisfactory. Unable to obtain accurate viscosity result at 100C due to presence of water in sample. Action: Check for source of water entry. Drain oil from unit if not already changed. Resample at a reduced service interval to monitor and establish wear trend.

ANALYST: Eric.Dunlap





DATE SAMPLED	16-Oct-18
DATE RECEIVED	23-Oct-18
DATE REPORTED	25-Oct-18

LAB NO.		41022050110
SIF NO.		34028621
TIME ON UNIT	Hrs	
TIME ON OIL	Hrs	
OIL BRAND		Unidentified
OIL TYPE		Unidentified
OIL GRADE		Unknown
OIL ADDED		
FILTER	Hrs	Not Applicable
OIL CHANGED		
WO NUMBER		

Metals (ppm)	
Iron (Fe)	25
Chromium (Cr)	<1
Lead (Pb)	<1
Copper (Cu)	<1
Tin (Sn)	<1
Aluminium (Al)	1
Nickel (Ni)	<1
Silver (Ag)	<1
Titanium (Ti)	<1
Vanadium (V)	<1
Contaminants (ppm)	
Silicon (Si)	17
Sodium (Na)	5
Potassium (K)	<1
Additives (ppm)	
Magnesium (Mg)	4
Calcium (Ca)	101
Barium (Ba)	<1
Phosphorus (P)	387
Zinc (Zn)	505
Molybdenum (Mo)	<1
Boron (B)	<5
Contaminants	
Water (%)	0.60
Physical Tests	
Viscosity (cSt 100C)	N/A
Solids (%)	<0.1
Additional	
PQ Index	63

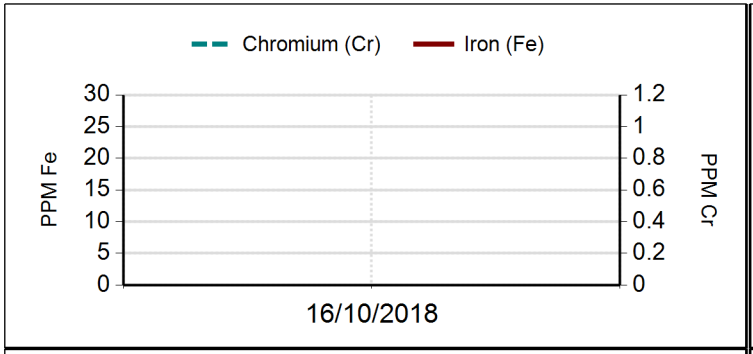


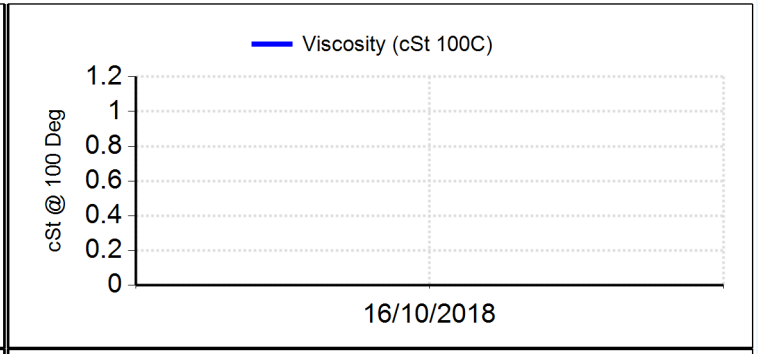
Right Solutions • Right Partner

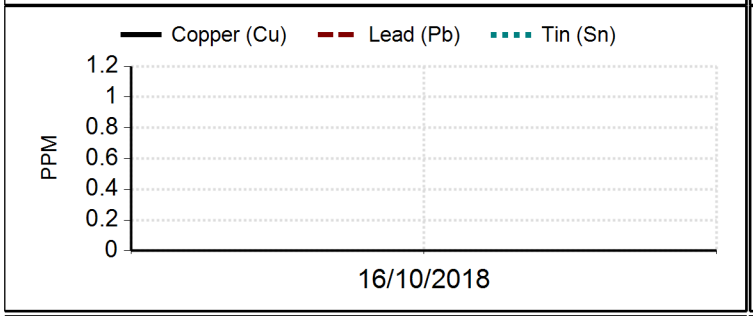
154

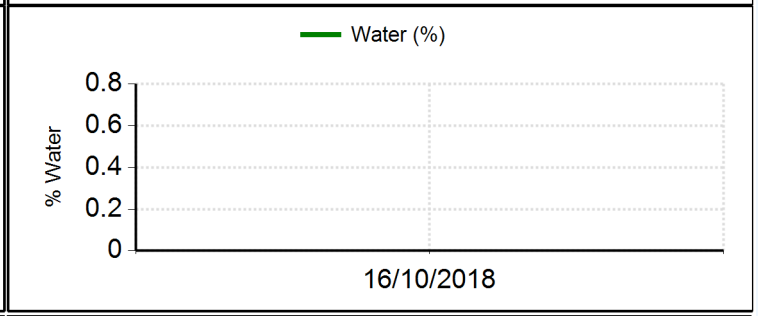
Right Solutions • Right Partner

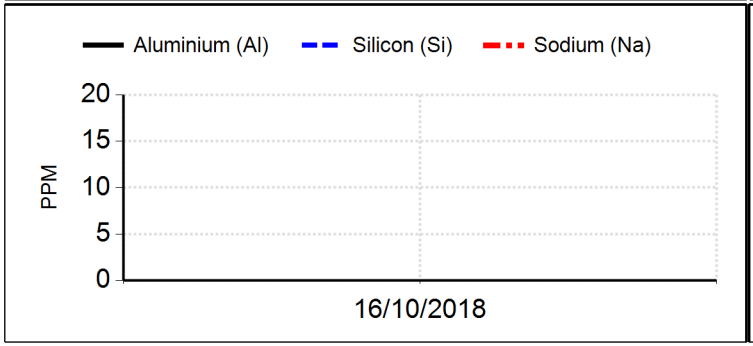
UIN 06D12B7











Filter Image

Filter patch test is not performed Contact laboratory for more information

Since services are based on samples and information supplied by others, and since corrective actions, if any, are necessarily taken by others, these services are rendered without any warranty or liability of any kind beyond the actual amount paid to ALS Tribology for the services. Reported recommendations are based on interpretations of the generated test results and historical data. Certain test results appearing in this report may have been tested at other ALS laboratories within the Tribology divisional network.

Modjeski & Masters Inc
Attn:
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

155 T002 v1.9

U.S. Laboratories

Atlanta, Georgia - 420
3121 Presidential Drive
Atlanta, GA 30340
800.394.3669

Valley View, Ohio - 410
6180 Halle Dr. Suite D
Valley View, OH 44125
800.726.5400

Kansas City, Kansas - 430
935 Sunshine Road
Kansas City, KS 66115
800.332.8055

Phoenix, Arizona - 440
3319 West Earll Drive
Phoenix, AZ 85017
800.445.7930

Portland, Oregon - 401
4943 NW Front Avenue
Portland, OR 97210
800.770.4128

Canadian Laboratories

Burlington, Ontario - 450
5036 South Service Rd.
Burlington, ON L7L5Y73
877.732.9559

Edmonton, Alberta - 402
10717-176 Street
Edmonton, AB T5S 1K1
888.489.0057

Sales & Marketing

Houston, Texas
10450 Stancliff Road, Suite 210
Houston, TX 77099
877.835.8437

International Locations

Australia
Brisbane, Perth, Sydney, Muswellbrook

South America
Santiago de Chile, Belo Horizonte, Sao Paulo, Brazil

New Zealand
Wellington

Southeast Asia
Kuala Lumpur, Singapore

Europe
Prague

TEST METHODS:

Acid Number:	ASTM D974/D664 (*M)
Base Number:	ASTM D4739 (*M)
Base Number (Perchloric):	ASTM D2896
Fuel Dilution by GC:	ASTM D7593
Fuel Dilution Visc/Setaflash	ASTM D445/D7279/D3828
Fuel Soot ATR/IR:	ASTM D7686 (*M)
Soot by FTIR:	ASTM D7844
Glycol:	ASTM D2982
Metals by ICP AES:	ASTM D5185 (*M)
Ox, NOx, SOx, FTIR:	ASTM D7418/D7414/D7415 D7624
PQ Index:	ASTM D8120 (*M)
Particle Count:	ASTM D7647 (*M) / ISO 4406
Viscosity:	ASTM D445 / D7279
Water KF:	D6304C / E203 (*M)
Water Crackle:	In House

*M - Modified Method

UIN 06D12B9

Gearbox

Unit No. Westport

Unit:
Make
Model
Serial No.

Site

Compartment:
Name SE End Jack Lower Gearbox
Make
Model
Serial No.
Capacity: 0.0

Customer:

MODJESKI & MASTERS INC
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

DIAGNOSIS

All wear levels appear within acceptable limits for first sample. Silicon level (dirt/sealant material) satisfactory. Water content acceptable. Please provide missing oil information; we need manufacturer, type, and grade to evaluate the oil data. Action: Resample at next recommended interval to monitor and establish wear trend.

ANALYST: Eric.Dunlap

Normal

LEGEND

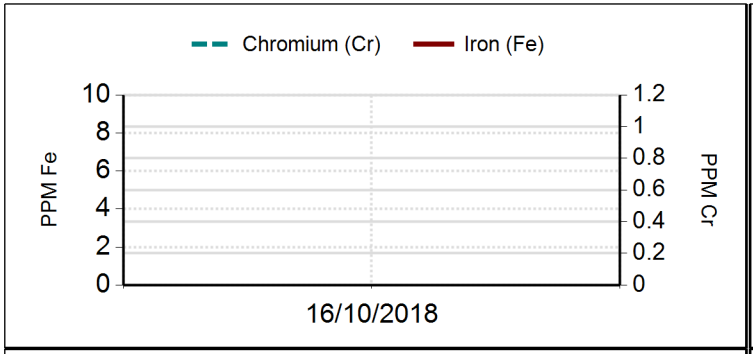
Severe | Abnormal | Caution | Normal

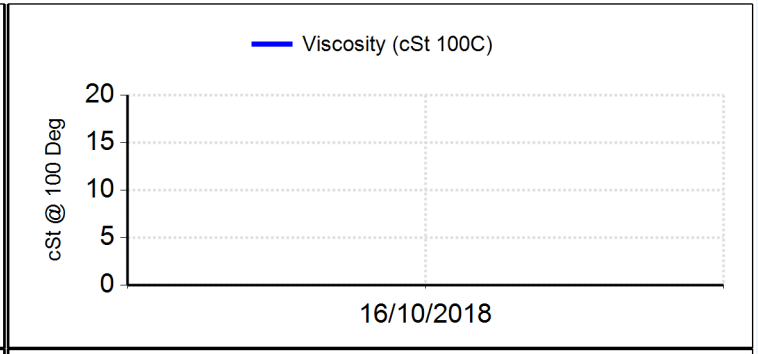
DATE SAMPLED	16-Oct-18
DATE RECEIVED	23-Oct-18
DATE REPORTED	25-Oct-18

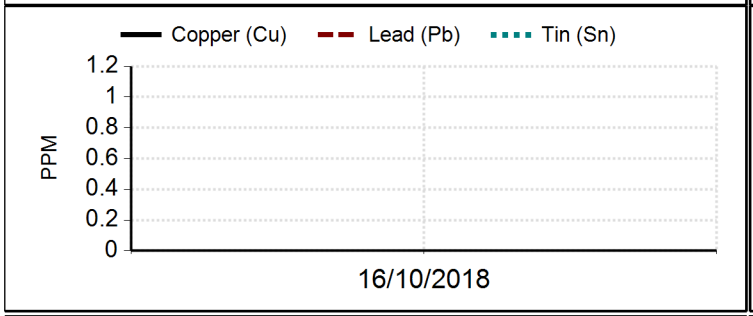
LAB NO.		41022050111
SIF NO.		34028623
TIME ON UNIT	Hrs	
TIME ON OIL	Hrs	
OIL BRAND		Unidentified
OIL TYPE		Unidentified
OIL GRADE		Unknown
OIL ADDED		
FILTER	Hrs	Not Applicable
OIL CHANGED		
WO NUMBER		

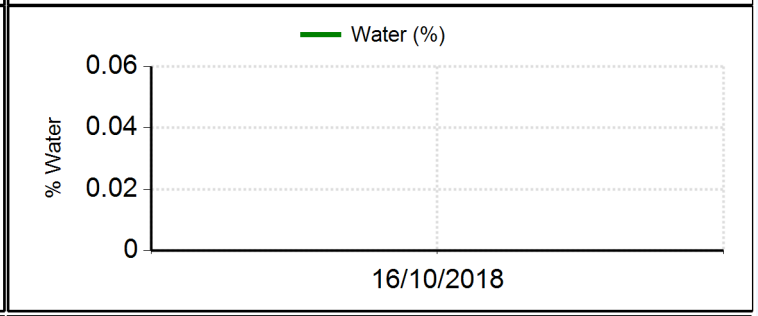
Metals (ppm)	
Iron (Fe)	9
Chromium (Cr)	<1
Lead (Pb)	<1
Copper (Cu)	<1
Tin (Sn)	<1
Aluminium (Al)	<1
Nickel (Ni)	<1
Silver (Ag)	<1
Titanium (Ti)	<1
Vanadium (V)	<1
Contaminants (ppm)	
Silicon (Si)	6
Sodium (Na)	3
Potassium (K)	<1
Additives (ppm)	
Magnesium (Mg)	1
Calcium (Ca)	100
Barium (Ba)	<1
Phosphorus (P)	366
Zinc (Zn)	479
Molybdenum (Mo)	<1
Boron (B)	<5
Contaminants	
Water (%)	<0.05
Physical Tests	
Viscosity (cSt 100C)	19.1
Solids (%)	<0.1
Additional	
PQ Index	<10

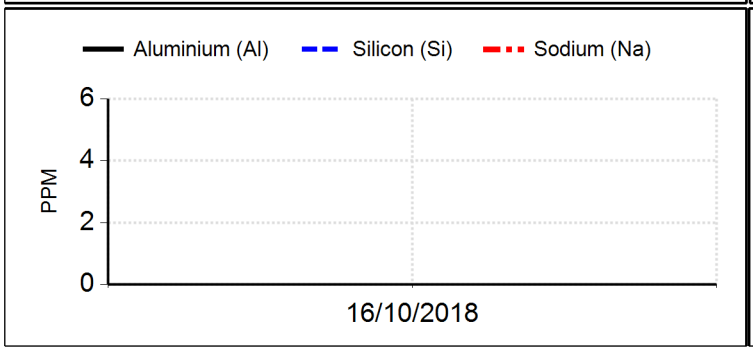
UIN 06D12B9











Filter Image

Filter patch test is not performed Contact laboratory for more information

Since services are based on samples and information supplied by others, and since corrective actions, if any, are necessarily taken by others, these services are rendered without any warranty or liability of any kind beyond the actual amount paid to ALS Tribology for the services. Reported recommendations are based on interpretations of the generated test results and historical data. Certain test results appearing in this report may have been tested at other ALS laboratories within the Tribology divisional network.

Modjeski & Masters Inc
Attn:
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

157 T002 v1.9

U.S. Laboratories

Atlanta, Georgia - 420
3121 Presidential Drive
Atlanta, GA 30340
800.394.3669

Valley View, Ohio - 410
6180 Halle Dr. Suite D
Valley View, OH 44125
800.726.5400

Kansas City, Kansas - 430
935 Sunshine Road
Kansas City, KS 66115
800.332.8055

Phoenix, Arizona - 440
3319 West Earll Drive
Phoenix, AZ 85017
800.445.7930

Portland, Oregon - 401
4943 NW Front Avenue
Portland, OR 97210
800.770.4128

Canadian Laboratories

Burlington, Ontario - 450
5036 South Service Rd.
Burlington, ON L7L5Y73
877.732.9559

Edmonton, Alberta - 402
10717-176 Street
Edmonton, AB T5S 1K1
888.489.0057

Sales & Marketing

Houston, Texas
10450 Stancliff Road, Suite 210
Houston, TX 77099
877.835.8437

International Locations

Australia
Brisbane, Perth, Sydney, Muswellbrook

South America
Santiago de Chile, Belo Horizonte, Sao Paulo, Brazil

New Zealand
Wellington

Southeast Asia
Kuala Lumpur, Singapore

Europe
Prague

TEST METHODS:

Acid Number:	ASTM D974/D664 (*M)
Base Number:	ASTM D4739 (*M)
Base Number (Perchloric):	ASTM D2896
Fuel Dilution by GC:	ASTM D7593
Fuel Dilution Visc/Setaflash	ASTM D445/D7279/D3828
Fuel Soot ATR/IR:	ASTM D7686 (*M)
Soot by FTIR:	ASTM D7844
Glycol:	ASTM D2982
Metals by ICP AES:	ASTM D5185 (*M)
Ox, NOx, SOx, FTIR:	ASTM D7418/D7414/D7415 D7624
PQ Index:	ASTM D8120 (*M)
Particle Count:	ASTM D7647 (*M) / ISO 4406
Viscosity:	ASTM D445 / D7279
Water KF:	D6304C / E203 (*M)
Water Crackle:	In House

*M - Modified Method

APPENDIX IV
NUMERICAL CONDITION REPORT

MOVABLE SPANS
NUMERICAL CONDITION INSPECTION REPORT
MECHANICAL COMPONENTS

BRIDGE NUMBER: 01349 **INSPECTION DATES: 10/16/18, 10/17/18 , 11/05/18**

COMMON COMPONENTS		BASCULE SPANS		LIFT SPANS	
COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*
OPEN GEARING	6	RACK & RACK PINION	N	RING GEARS	N
REDUCERS	6	TRUNNION ASSY.	N	SHEAVES	N
SHAFTS	7	SPAN LOCKS	N	DRUMS	N
BEARINGS	7	TAIL LOCKS	N	SHEAVE TRUNNION ASSY.	N
COUPLINGS	5	CURVED TREAD PLATES	N	DRUM BEARING ASSY.	N
FASTENERS	6	STRAIGHT TREAD PLATES	N	WIRE ROPES AND FITTINGS	N
MACHINERY SUPPORTS	7	**SWING SPANS**		SPAN GUIDES	N
CENTERING DEVICE ASSY.	5	CENTER BEARING ASSY.	6	BALANCE CHAINS	N
BUFFER CYLINDERS	N	CIRCULAR RACK	6	**MISC. COMPONENTS**	
STRIKE PLATES	N	BALANCE WHEEL ASSY.	6	END SCREW JACKS	6
EMERGENCY DRIVES	7	CIRCULAR TRACK	7	CENTER SCREW JACKS	6
LIVE LOAD SHOES	N	RIM-BEARING ASSY.	N	FULLY OPENED RIGID STOP	7
BRAKES	7	CENTER WEDGE ASSY.	N	FULLY CLOSED RIGID STOP	6
		END WEDGE ASSY.	N		

MECHANICAL CONDITION OVERALL RATING: 7

* NCR IS AN ACRONYM FOR NUMERICAL CONDITION RATING; SEE BELOW:

NUMERICAL CONDITION RATING INFORMATION

9 NEW: Displays no wear and/or deterioration: excellent functional performance.

8 EXCELLENT: Displays insignificant wear and/or deterioration: performs intended function with very high degree of reliability and effectiveness.

7 GOOD: Very early wear/deterioration: performs with high degree of reliability and/or effectiveness.

6 FAIR: Early measurable wear/deterioration: performs with little reduction in reliability and/or effectiveness.

5 ADEQUATE: Moderate wear/deterioration: performs with moderate reduction in reliability and/or effectiveness.

4 MARGINAL: Advanced wear/deterioration: performance marginal: corrective action required within one year.

3 POOR: Severe wear/deterioration: performance poor and/or unreliable: corrective action required within six months.

2 URGENT: Movable span operation highly unreliable or dangerous and should be restricted: corrective action required as soon as possible.

1 CRITICAL: Movable span operation prohibited pending replacement or repair.

0 FAILURE: Movable span will not operate without replacement or repair.

N Not Applicable

APPENDIX V
FIELD NOTES

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 1 of 32

SPAN DRIVE MOTOR:

Motor Identification per Schematic:	Span Drive Motor	
Name Plate Info.:	Manufacturer: Reuland	Type: A000
	Serial No: 13-1103A-1	Code: M
	Prod. No: 0030F-1AAB-0020	Style: ABR
	Horsepower: 3HP	Encl.: TENV
	SF: 1.15	RPM: 900 RPM
	Amps: 12.4	HZ: 60
	Volts: 208	Frame: 215
	Phase: 3	Time Rating: 30
Brake:	Integral disc brake with manual release; Manual release operates smoothly	
Shafts:	Shaft extensions are unguarded	
Lubrication:	Fresh lube on lube port	
Bolts:	Do not have double nuts (would typically recommend double); Not corroded (maybe stainless steel)	
Supports:	Small amount of debris	
General Comments:	Paint is in good condition	

SPAN INSTRUMENTATION:

Worm Gear Reducer:	Parallel offset reducer; Light coating of debris; Paint in good condition; Single nuts on bolts with some corrosion on fasteners; Lube under reducer from the coupling gasket
Span Position Limit Switch:	Widespread corrosion; Moderate paint failure
General:	Light debris

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 2 of 32

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C1**
Nameplate Data:	NA
Coupling Type:	Falk Flex-Flex
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Seal leak on channel side
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	Light to moderate coating of grease on lower half of coupling; Grease leaking out of seal on lower half on channel side
Comments:	Moderate paint failure and corrosion especially on the upper half of the coupling

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C2**
Nameplate Data:	NA
Coupling Type:	Falk Grid 1030T10D
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Torn and possibly missing
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good
Alignment:	Gap in the split most likely from not being tightened completely
Lubrication:	Lube coming out of gap in split; Port is painted over with no signs of lubrication through it
Comments:	Light coating of grease; Moderate paint failure but no corrosion yet

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 3 of 32

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C3**
Nameplate Data:	NA
Coupling Type:	Martin 50
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Torn gasket laying under coupling
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Key and keyway are in good condition
Alignment:	Good
Lubrication:	Good
Comments:	Overall good condition; Light coating of debris; ~1/32” away from the reducer; Scraping against limit switch reducer as it rotates causing it to wear in that location and make noise during operation

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C4**
Nameplate Data:	NA
Coupling Type:	Martin 40 (similar to coupling C3)
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Gasket is in good condition
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	Good
Comments:	Overall good condition; Small amount of grease buildup

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 4 of 32

SPAN DRIVE PINION SHAFT:

Shaft Identification per Schematic:	Pinion Shaft
Surface Condition:	Paint is in good condition – excess lubrication on surface is preventing it from corroding
Hubs and Keys:	Pinion is integral with shaft
Alignment:	Good
General:	Covered in grease

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 5 of 32

PINION SHAFT BEARING - UPPER:

Bearing Identification per Schematic:	SPAN DRIVE – UPPER BEARING
Bearing Type:	Spherical Roller Bearing (smaller size than lower bearing)
Journal Diameter:	NM
Clearance:	NM
Lubrication:	Appear to be only using purge on bottom and not the top; The fitting has fresh lube
Bolts:	Single mounting nuts (should be double)
Support:	Light corrosion at bearing and support interface
Comments:	Minor paint failure and minor corrosion; Layer of grease and debris

PINION SHAFT BEARING - LOWER:

Bearing Identification per Schematic:	SPAN DRIVE – LOWER BEARING
Bearing Type:	Torrington SAFS 528; Spherical Roller Bearing
Journal Diameter:	NM
Clearance:	NM
Lubrication:	Appear to be only using purge on bottom and not the top; Not using the lower lube port (there is a corroded plug in there)
Bolts:	Heads of bolts are unpainted; Single mounting nuts (should be double)
Support:	Good
Comments:	Silicone sealant around the base; Shaft is in good condition; A lot of grease buildup between lower bearing and pinion

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 6 of 32

SPAN DRIVE ENCLOSED GEARING:

Item:	Span Drive Primary Reducer		
Nameplate:	Manufacturer: Horsburgh and Scott	Ser. No.: 1000Bv	
	Size/Type: Spiral Bevel	HP: 3.7	Ratio: 363:1
	Repair Order No.: NA	Input RPM: 900	
		Service Factor: NM	
Lubrication:	Plug will not come off at drain pipe and no overhead access – cannot get oil sample; Oil level is halfway on site glass		
Seals:	Good		
Housing:	Paint is in good condition (looks more recent than other components); Corrosion and debris buildup on top of reducer and mounting surface		
Shafts:	Chipped paint and minor widespread corrosion on manual input shafts		
Bearings:	Good		
Bolts:	Good		
General:	Desiccant is expired		

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 7 of 32

RACK AND PINION:

			Chordal Tooth Thickness Measurements (all dimensions in inches)			
		Addendum	Original	2017	Current	Tooth Measured
Pinion	Top	0.660	0.999	0.980	0.995	5 from most engaged tooth
	Bottom			0.973	0.996	
Rack	Top	0.638	1.000	0.959	0.983	8 from most engaged tooth
	Bottom			0.971	0.997	

Observations: Pinion

Opening Face	Surface corrosion; Very light lube; Smooth surface Photos SMS696-698, SMS1069-1072
Closing Face	Surface corrosion; Very light lube; Smooth surface Photos SMS699-700, SMS1074-1075

Observations: Rack

Opening Face	Surface corrosion (heavier than pinion); Almost no lube but some hardened lube; Slight pitch line depression Photos SMS701, SMS1078
Closing Face	Surface corrosion (heavier than pinion); Almost no lube but some hardened lube Photos SMS702-703, SMS1079

Observations During Operation:	Smooth operation; Drifts about 2 teeth; Rocks back and forth for about 7 seconds.

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 8 of 32

RACK AND TRACK CONDITION:

Bolts:	North End Rack Bolts -> Last cut out for bolts on rack segment is full of water; Drain should be cleared; The bolts in this section are most likely corroded Rack Bolts -> Most of them are studs but some are bolts; All bolts painted with light debris Track Bolts -> Good condition; Debris buildup; Minor corrosion on the most North bolt washer
General Notes:	2 long segments with rack teeth, 7 short segments Track -> Minor debris buildup; No significant defects; Minor corrosion on inside where the segment mounts to concrete

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 9 of 32

BALANCE WHEELS:

Wheel Number	Lubrication:	Bolts:	Free Movement? Yes/No	General:	Clearance with Jacks Engaged (design clearance 0.063"):	Clearance with Jacks Disengaged:
1	Good, fresh grease	Good paint, Mounting bolt heads corroded	No	Some corrosion on wheel tread	None	Not Measured
2	Good, fresh grease	Paint in good condition	No	Some corrosion on wheel tread	None	Not Measured
3	Good, fresh grease	Minor paint failure and corrosion	No	Very minor corrosion on wheel tread	0.110"	Not Measured
4	Good, fresh grease	Minor surface corrosion, Upper have moderate corrosion	No	Wheel tread good	0.288"	Not Measured
5	Good, fresh grease, Slight buildup	Upper have minor corrosion	Yes	Wheel tread good	0.241"	Not Measured
6	Good, fresh grease, Slight buildup	Upper and lower have minor corrosion	Yes	Minor corrosion on wheel tread	0.238"	Not Measured
7	Good, fresh grease, Slight buildup on wheel	Minor to moderate paint failure and corrosion	No	Bearing cap paint failure	0.120"	Not Measured
8	Fresh, Minor excess grease	Upper bolts minor/moderate paint failure, Lower bolts minor paint failure/corrosion	Yes	Minor corrosion on wheel tread, Cap very minor corrosion	0.060"	Not Measured

(All balance wheel bearing bolts have single nuts)

Observations During Operation:	Balance wheels mostly do not touch track during operation. They often slide against the track instead of rolling when they do touch.

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 10 of 32

BALANCE WHEEL BEARING CLEARANCE:

Wheel Number	Inboard (in):	Location:	Outboard (in):	Location:
1	0.003	Bottom	0.003	Bottom
2	0.032	Bottom	0.032	Bottom
3	0.024	Bottom	0.017	Bottom
4	<0.003	Bottom	0.012	Bottom
5	0.047	Top	0.011	Top
6	<0.003	Top	0.004	Top
7	0.005	Bottom	0.030	Top
8	0.025	Top	0.030	Bottom

Design clearance RC6= 0.003” to 0.009”.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

CENTER PIVOT BEARING:

General Notes:	Good condition Minor isolated corrosion at base Minor corrosion at upper mounting surface Evidence of lube leak in NE corner (see photos)

CENTER RIGID STOP (fully open):

General Notes:	Good condition Some minor corrosion at base plate

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 12 of 32

NORTH CENTER JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Stearns, Hand release functional, 10 ft-lb	
Housing:	Minor isolated corrosion, Minor corrosion mounting surface	
Bearings:	Some grease present	
Fasteners:	Minor/moderate corrosion	
Lubrication:	Probably not using purge	
Comments:	NA	

NORTH CENTER JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Minor/Moderate corrosion
Cover Condition:	Minor isolated paint failure
Hubs and Keys:	Not visible
Alignment:	Good
Lubrication:	No signs of fresh lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 13 of 32

NORTH CENTER JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Isolated minor corrosion, delamination		
Bearings:	Fresh lube		
Fasteners:	Minor corrosion		
Lubrication:	Okay		
Operation:	Smooth		
Comments:	Minor/moderate corrosion on mounting surface		

NORTH CENTER JACK MACHINERY: UPPER REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks
Cap & Housing Bolts:	Minor/moderate corrosion
Cover Condition:	Moderate/severe corrosion
Hubs and Keys:	Paint failure
Alignment:	Good
Lubrication:	No sign of lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 14 of 32

NORTH CENTER JACK MACHINERY: FLOATING SHAFT

Identification per Schematic:	
Surface Condition:	Minor surface corrosion and paint failure
Hubs and Keys:	Moderate corrosion
Alignment:	Good
General:	NA

NORTH CENTER JACK MACHINERY: LOWER REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	
Cap & Housing Bolts:	Severe corrosion
Cover Condition:	
Hubs and Keys:	
Alignment:	
Lubrication:	
Comments:	Typical of upper

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 15 of 32

NORTH CENTER JACK MACHINERY: LOWER REDUCER

<table>
<tr><td colspan="4">Identification per Figures:</td></tr>
<tr><td rowspan="4">Type / ID Plate Data</td><td colspan="3">Manufacturer: Foote-Jones Maxi-power</td></tr>
<tr><td>Size: 7SBV</td><td>Ratio: 4.125:1</td><td rowspan="2">Serial No.: OC62072-03</td></tr>
<tr><td>Lubrication: See nameplate</td><td>Output Torque: NM</td></tr>
<tr><td>HP Rating: NM</td><td>Input RPM: NM</td><td>Service Factor: 1.17</td></tr>
<tr><td>Housing:</td><td colspan="3">Minor surface corrosion</td></tr>
<tr><td>Bearings:</td><td colspan="3">Good</td></tr>
<tr><td>Fasteners:</td><td colspan="3">Mounting: Moderate corrosion; Split: Very minor corrosion</td></tr>
<tr><td>Lubrication:</td><td colspan="3">Signs of use</td></tr>
<tr><td>Operation:</td><td colspan="3">Smooth</td></tr>
<tr><td>Comments:</td><td colspan="3">Desiccant is expired; Oil fill/level plug has severe corrosion</td></tr>
</table>

NORTH CENTER JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Duff Norton 8k-1850-1x
Protective Boot:	Good; grease and debris buildup
Base:	Moderate corrosion and paint failure; Bolts in good condition
Limit Switches:	Corrosion; Gears for RCLS are dry and clang during operation
Operation:	Smooth
Comments:	No signs of lube; Upper bolts have minor corrosion Bearing surfaces are dry and have moderate to severe corrosion with delamination

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 16 of 32

SOUTH CENTER JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Manual release operational	
Housing:	Very minor isolated corrosion	
Bearings:	Good	
Fasteners:	Very minor isolated corrosion	
Lubrication:	No sign of lubrication	
Comments:	NA	

SOUTH CENTER JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	
Nameplate Data:	Falk
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Not visible
Alignment:	Good
Lubrication:	No sign of fresh lube
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 17 of 32

SOUTH CENTER JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Very minor corrosion at split		
Bearings:	No sign of recent lube		
Fasteners:	Mounting bolts have minor corrosion		
Lubrication:	Took oil sample; Just below “full” on dipstick		
Operation:	Smooth		
Comments:	NA		

SOUTH CENTER JACK MACHINERY: UPPER REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear.
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Small leak at flex hub
Cap & Housing Bolts:	Okay
Cover Condition:	Moderate corrosion, Lube buildup
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of lubrication at port
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 18 of 32

SOUTH CENTER JACK MACHINERY: FLOATING SHAFT

Identification per Schematic:	
Surface Condition:	Good; Minor corrosion at bottom
Hubs and Keys:	Good
Alignment:	Good
General:	NA

SOUTH CENTER JACK MACHINERY: LOWER REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Minor corrosion
Cover Condition:	Moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of lube at port
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 19 of 32

SOUTH CENTER JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Good; Very minor corrosion at bottom		
Bearings:	No sign of lube at port		
Fasteners:	Mounting: 1 with minor corrosion, not fully engaged with nut		
Lubrication:	Took oil sample		
Operation:	Smooth		
Comments:	Desiccant needs to be replaced		

SOUTH CENTER JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Duff Norton 8k-1850-1x
Protective Boot:	Good; Slight grease buildup
Base:	Minor isolated corrosion
Limit Switches:	Proximity switches good; Gears for RCLS are dry and clang during operation
Operation:	Smooth
Comments:	Upper bolts: Moderate corrosion, moderate corrosion on upper mounting surface Bearing surfaces are dry and have moderate to severe corrosion with delamination

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 20 of 32

NORTHEAST END JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800 rpm
Brake:	Good	
Housing:	Minor isolated corrosion; Minor paint failure on mounting feet	
Bearings:	Dry grease	
Fasteners:	Minor corrosion	
Lubrication:	No fresh grease on fittings	
Comments:	NA	

NORTHEAST END JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Leak at split
Cap & Housing Bolts:	Minor/moderate corrosion
Cover Condition:	Good
Hubs and Keys:	Not visible
Alignment:	Good
Lubrication:	No signs of fresh lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 21 of 32

NORTHEAST END JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Minor isolated corrosion; Moderate at shims and at bottom		
Bearings:	Some recent lube on 1 bearing, other is dry		
Fasteners:	Minor/moderate corrosion		
Lubrication:	Leak at drain		
Operation:	Smooth		
Comments:	NA		

NORTHEAST END JACK MACHINERY: REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Same as cover
Cover Condition:	Moderate paint failure and corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of lube
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 22 of 32

NORTHEAST END JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Minor/moderate isolated corrosion		
Bearings:	Not fresh lubrication		
Fasteners:	Minor corrosion on East bolts, Moderate corrosion on West bolts		
Lubrication:	Oil leak at bottom (drain or split)		
Operation:	Smooth		
Comments:	Desiccant is expired; Moderate isolated corrosion on mounting surface		

NORTHEAST END JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Grease dripping from shaft (remote lube); Minor isolated corrosion
Protective Boot:	Grease buildup; Good condition
Base:	Grease buildup; Good condition; Minor corrosion
Limit Switches:	Good
Operation:	Smooth
Comments:	Upper bolts: Minor corrosion Shims: Moderate corrosion LL shoes are corroded and have some fresh lube

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 23 of 32

SOUTHEAST END JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Good	
Housing:	Paint in good condition	
Bearings:	Good	
Fasteners:	Good; Very minor corrosion	
Lubrication:	Appears recent	
Comments:	Very minor corrosion at foot	

SOUTHEAST END JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lube
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 24 of 32

SOUTHEAST END JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Good paint		
Bearings:	Good		
Fasteners:	Very minor corrosion		
Lubrication:	Leak at output shaft; Took oil sample; Oil Barely at dipstick		
Operation:	Smooth		
Comments:	Corrosion at upper mounting shim Manual shaft is corroded		

SOUTHEAST END JACK MACHINERY: REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good
Cover Condition:	Minor/moderate paint failure
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	Buildup on top half
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 25 of 32

SOUTHEAST END JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Good paint		
Bearings:	Some grease (dry)		
Fasteners:	1 unpainted		
Lubrication:	Took oil sample		
Operation:	Smooth		
Comments:	Desiccant is expired		

SOUTHEAST END JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Lube leak (remote fittings); Corrosion at upper mounting
Protective Boot:	Good
Base:	Bolts in good condition; Minor corrosion on plate; Grease/debris
Limit Switches:	Corrosion
Operation:	Smooth
Comments:	0.003” feeler fits under on East/West sides LL shoes are corroded and have some fresh lube

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 26 of 32

NORTHWEST END JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Manual release functional	
Housing:	Minor corrosion (on feet also)	
Bearings:	Fresh grease	
Fasteners:	Minor corrosion	
Lubrication:	Good	
Comments:	NA	

NORTHWEST END JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Gasket starting to come out
Cap & Housing Bolts:	Minor corrosion
Cover Condition:	Good
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 27 of 32

NORTHWEST END JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Minor/moderate corrosion		
Bearings:	Dry grease fitting		
Fasteners:	Minor/moderate corrosion		
Lubrication:	Oil level 1/8” low on dipstick		
Operation:	Smooth		
Comments:	NA		

NORTHWEST END JACK MACHINERY: REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Minor/moderate corrosion
Cover Condition:	Moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 28 of 32

NORTHWEST END JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Minor corrosion		
Bearings:	Dry grease fitting		
Fasteners:	Minor corrosion		
Lubrication:	Okay		
Operation:	Smooth		
Comments:	NA		

NORTHWEST END JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Minor/moderate corrosion on upper mounting bolts; Excess grease on shaft; Good paint
Protective Boot:	Good; Covered in grease
Base:	Minor corrosion; Grease buildup
Limit Switches:	Good
Operation:	Smooth
Comments:	No gap on base LL shoes are corroded and have some fresh lube

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 29 of 32

SOUTHWEST END JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Manual release functional	
Housing:	Minor corrosion	
Bearings:	Dry fittings	
Fasteners:	Good condition	
Lubrication:	No sign of fresh lube	
Comments:	NA	

SOUTHWEST END JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	Grease/debris from reducer input shaft bearing
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 30 of 32

SOUTHWEST END JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Good; Lube leak		
Bearings:	No grease on upper; Excess grease leaking from seal		
Fasteners:	Good condition; Lower has minor corrosion		
Lubrication:	Over “full” line on dipstick		
Operation:	Smooth		
Comments:	NA		

SOUTHWEST END JACK MACHINERY: REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good
Cover Condition:	Grease from reducer
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of lube at ports
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 31 of 32

SOUTHWEST END JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: NM	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Good condition		
Bearings:	Lube fittings dry		
Fasteners:	Good condition		
Lubrication:	Oil not tested		
Operation:	Smooth		
Comments:	Desiccant is expired		

SOUTHWEST END JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Excessive grease buildup
Protective Boot:	Good condition; Covered in grease
Base:	Good condition; Covered in grease/debris; Some minor corrosion
Limit Switches:	Good
Operation:	Smooth
Comments:	Upper bolts: minor/moderate corrosion No gap on base LL shoes are corroded and have some fresh lube

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Oct/Nov 2018
FOR: **PRIME ENGINEERING**	CREW: RCH, SMS, JRH	SHEET: 32 of 32

MANUAL CENTERING DEVICE:

Identification per Figures:	
Comments:	Isolated corrosion on base with heavy debris buildup Rod and guides have moderate paint failure, corrosion, and debris buildup Rod in contact with the receiver on the south side

END RIGID STOP ASSEMBLY (fully closed):

Identification per Figures:	
Comments:	Minor/moderate corrosion on the strike plates, base and mounting bolts Does not contact when fully closed Deformed from impact

GENERAL:

Comments:	Swing span guard rails rub on approach guard rails during operation.

APPENDIX VI
TIME AT BRIDGE SITE

TIME AT BRIDGE SITE

BRIDGE NUMBER: 01349

INSPECTION DATE: 10/16/18 to 10/17/18

Mechanical Personnel:

Personnel	Tuesday (10/16/18)	Wednesday (10/17/17)
Reid Hoffman	8:00 AM to 5:30 PM	8:00 AM to 9:30 AM
Shannon Seitz	8:00 AM to 5:30 PM	8:00 AM to 9:30 AM

INSPECTION DATE: 11/05/18

Mechanical Personnel:

Personnel	Monday (11/05/18)
Reid Hoffman	12:00 PM to 3:30 PM
Jack Hess	12:00 PM to 3:30 PM

ROUTINE ELECTRICAL INSPECTION

BRIDGE SAFETY INSPECTION
BRIDGE NO. 01349

Feature Carried: Route 136
Feature Crossed: Saugatuck River
Westport, Connecticut



State Project No. 170-3414

October 16, 2018

Prepared for:
Connecticut Department of Transportation

Prepared by:

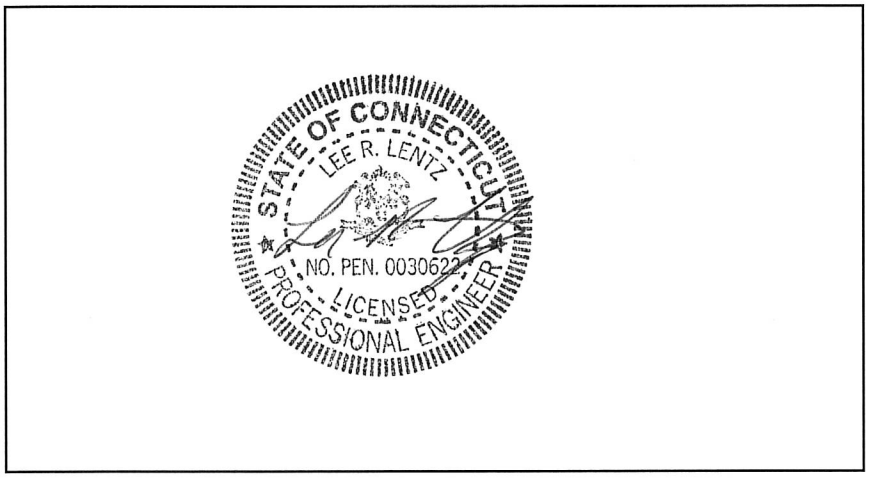
MODJESKI and MASTERS
Experience great bridges.

PRIME AE™

PRIME AE Group, Inc.
55 Capital Boulevard | 2nd Floor | Rocky Hill, CT 06067 | P: 860 436 5600 | F: 860 436 5601

Bridge No. 01349, Route 136 over Saugatuck River, Westport, CT

Inspected By: Modjeski and Masters, Inc. Date: 10/16/2018



Professional Certification: I hereby certify that this report, including all of its contents, has been approved by me, and that I am a duly licensed professional engineer under the laws of the State of Connecticut.

Signature:

License No.: PEN. 0030622 *Date:* 11/20/18

EXECUTIVE SUMMARY

ELECTRICAL INSPECTION REPORT

ConnDOT BR. NO. 01349

A routine Electrical inspection of the Westport swing bridge over the Saugatuck River was performed between October 16-17, 2018 by Mr. J.E. Gerhart, P.E. of Modjeski and Masters, Inc. and operational inspection was performed on November 5, 2018 by Ms. N.K. Bhinge and Mr. K.M. Gable of Modjeski and Masters, Inc.

The AASHTO Movable Bridge Inspection, Evaluation and Maintenance Manual, 2017 Edition, and the ConnDOT Bridge Inspection Manual were utilized as the guidelines for the inspection. The "routine inspection" guidelines were utilized as the basis for equipment evaluation and testing. Equipment listed herein was examined and photographed, and observed deficiencies were documented. Additionally, items classified as deficient in the previous inspection report were inspected for compliance with the recommendations for repair and/or replacement listed therein.

This report is written from the perspective of the dates of the inspection described herein; the use of present tense herein in no way implies that the descriptions presented are accurate as of any subsequent date.

The general condition of the electrical system is good (Overall Rating = ‘7’). When these items have been addressed and assuming the current level of maintenance is continued, long term reliable operation is anticipated:

1. There is minor corrosion on the east meter cabinet and also on the west meter cabinet.
2. There is minor corrosion on the interior terminals and conduits in the east and west service cabinets.
3. The electric space heaters in the east and west service cabinets are not functioning.
4. The GFCI test and reset buttons are not functioning in the east and west service cabinets.
5. The west service cabinet door gasket is damaged.
6. There are miscellaneous items stored in the bottom of the left cabinet and the center cabinet.
7. There are splices made with wire nuts in violation of AASHTO Article 8.9.2 within the left cabinet and on the backside of the interior panel in the center cabinet.
8. The bottom of the center cabinet has moderate corrosion.
9. The southwest end jack legend plate is missing.
10. The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
11. Minor corrosion on the span rotary cam limit switch.

12. Moderate corrosion and a damaged gasket on the SW jack rotary cam limit switch.
13. Moderate corrosion and the cover could not be opened on the NW jack rotary cam limit switch.
14. Moderate corrosion on the SE jack rotary cam limit switch.
15. Moderate corrosion and a damaged gasket on the north center jack rotary cam limit switch
16. Moderate corrosion, damaged gasket, and the bottom wingnut is missing on the south center jack rotary cam limit switch.
17. The west barrier gate arm lever arm limit switch can seize in the actuated position and there is minor corrosion on the conduit fitting.
18. The east barrier gate limit switch is permanently seized in the actuated position.
19. Missing driven south center proximity limit switch.
20. The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
21. The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for both center jack locations and the NE and SW end jacks.
22. Water is present in the bottom of the NE end jack motor disconnect.
23. Missing nameplate and minor corrosion on cover and conduit fitting of the NE end jack motor disconnect.
24. Minor corrosion on conduit clamps throughout bridge.
25. Severe corrosion on underground conduit at the east shore service cabinet.
26. The southwest, northeast, and southeast span navigation lights were not operational.
27. The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02.
28. The east approach traffic signals and gong were not operational.
29. Striping on the west pedestrian gates stops before the end of the gate.
30. The barrier gates were not fully engaged in the receiver when lowered on both approaches.
31. None of the barrier gate lights were operational.
32. No lighting for maintenance is provided on the bridge.
33. Barrier gates are not interlocked with control system.
34. Centering device is not interlocked with jack control.
35. Jacks are not interlocked with span movement.

Please direct persons under your jurisdiction to make the following repairs for each deficiency listed above:

1. Remove the corrosion, coat with protective coating.
2. Remove the corrosion, coat with protective coating.
3. Replace the space heaters.
4. Replace the GFCI receptacles.
5. Replace the door gasket.
6. Remove miscellaneous items.

7. Replace wire nut splices with crimp type splices.
8. Remove the corrosion, coat with protective coating.
9. Replace the legend plate.
10. Install limit switch and wire into control system.
11. Remove the corrosion, coat with protective coating.
12. Remove the corrosion, coat with protective coating, and replace the door gasket.
13. Remove the corrosion, coat with protective coating, and repair door fasteners.
14. Remove the corrosion, coat with protective coating.
15. Remove the corrosion, coat with protective coating, and replace the door gasket.
16. Remove the corrosion, coat with protective coating, replace the door gasket, and repair the cover fasteners.
17. Replace limit switch.
18. Replace limit switch.
19. Replace limit switch.
20. Install limit switch and wire into control system.
21. Swap conductors on both ends of the load side of the disconnect switches.
22. Remove water and repair conduit system and or disconnect to prevent reoccurrence.
23. Replace nameplate, remove the corrosion, coat with protective coating.
24. Replace nameplate, remove the corrosion, coat with protective coating.
25. Replace corroded section of conduit.
26. Repair or replace span navigation lights.
27. Install traffic signals.
28. Repair the east approach traffic signals and gong.
29. Replace striping on gate arm.
30. Repair barrier gate receivers.
31. Repair barrier gate arm lights.
32. Install lighting and receptacles in maintenance and access areas.
33. Interlock barrier gates with control system.
34. Interlock centering device with jack control.
35. Interlock jack position with span movement.

TABLE OF CONTENTS
ConnDOT Bridge No. 01349

EXECUTIVE SUMMARY ii
GENERAL DESCRIPTION 1
OBSERVATIONS AND FINDINGS 3
- ELECTRICAL SERVICE 3
- BRIDGE CONTROLS & CONTROL PANELS 4
- MOVABLE SPAN DRIVE MOTOR & BRAKE 5
- LIMIT SWITCHES AND FEEDBACK DEVICES 6
- JACKS 7
- SPAN LOCK 8
- CONDUIT, RACEWAYS, AND JUNCTION BOXES 8
- NAVIGATION LIGHTS AND HORN 9
- TRAFFIC SIGNALS 9
- TRAFFIC GATES 9
- BARRIER GATES 10
- GENERAL LIGHTING AND RECEPTACLES 10
- INTERLOCK TESTING 10

CONCLUSION 11
RECOMMENDATIONS 12

APPENDICES:

APPENDIX A ELECTRICAL MEASUREMENTS
APPENDIX B ELECTRICAL PHOTOGRAPHS
APPENDIX C NUMERICAL CONDITION REPORT
APPENDIX D FIELD NOTES
APPENDIX E TIME AT BRIDGE SITE

GENERAL DESCRIPTION

ConnDOT Bridge No. 01349 is carries one lane of traffic of route 136 in each direction over the Saugatuck River in Westport, Connecticut. The overall length of the bridge is 287 feet consisting of two fixed spans and a swing span measuring 141 feet. The bridge is oriented in a west to east direction. There is no operator's house at the bridge; instead, the bridge is controlled from the cabinets located the along the sidewalk on the north side of the bridge at the center of the movable span. The bridge opens approximately 90 degrees to allow passage of marine traffic in the one navigable channel located to the east of the center pier.

The electrical systems consists of a 208/120 volt, three phase, 60 Hz service on the east shore for the main span and east barrier gate lights, a 240/120 volt single phase, 60Hz service on the east shore for the east traffic signal and east fender navigation lights, one 3 HP span drive motor with motor brake, limit switches, center and end jacks, fender and span navigation lighting, traffic signal and gong on the east approach, wiring, conduit, cables and raceways, disconnect switches, and control cabinets located along the sidewalk at the center of the movable span. The control cabinets contain the operator station, relay control system, circuit breakers, and motor starters for the end wedges and span drive motor.

There are no traffic gates present at the bridge. There are barrier gates on both approaches that are manually operated. The barrier gate position is not interlocked with the operation of the bridge. A center pin is equipped with a limit switch that is interlocked with the controls for the movement of the span.

Modjeski and Masters performed a static field inspection of the electrical systems on the Westport Bridge over the Saugatuck River (ConnDOT Bridge No. 01349) in Westport, Connecticut from October 16, 2018 through October 17, 2018. The electrical field inspector was Mr. J.E. Gerhart, P.E. A follow up operational electrical inspection was performed on November 5, 2018 by Ms. N.K. Bhinge, P.E. and K.M. Gable. The inspection was conducted as part of ConnDOT's biennial inspection program. The scope of the assignment consisted of visual inspection and quantitative measurements. This included functional operation of the bridge electrical systems, insulation resistance measurements, and current measurements with sufficient depth to highlight problem areas that could affect the continued safe and reliable operation of the bridge.

The following codes and standards were considered for this inspection and report:

American Association of State Highway and Transportation Officials (AASHTO)
NFPA 70, National Electric Code (NEC)
NFPA 101, Life Safety Code (LSC)
National Electrical Manufacturers Association (NEMA)
Manual on Uniform Traffic Control Devices (MUTCD)

Code of Federal Regulation, Title 33 (CFR)
American Railway Engineering and Maintenance-of-Way Association (AREMA)

This report provides visual inspection findings, testing findings, evaluation, conclusions, and recommendations. Appendices are provided for photographs, field notes, and the Numerical Condition Inspection Report.

This report is written from the perspective of the dates of the inspection described herein; the use of present tense in no way implies that the descriptions presented are accurate as of any subsequent date. There is no warranty that all defects were discovered during the inspection or that defects will not later appear.

OBSERVATIONS AND FINDINGS

ELECTRICAL SERVICE

The bridge has two electrical services, one on each shore.

The west shore electrical service is 208/120 VAC, 3-phase, 60 HZ, 4-wire, supplied by three pole mounted transformers located on the west side of Riverside Ave. The service point is located in a weatherproof freestanding cabinet on top of a concrete pad. The service supplies power to the main span via an aerial cable, and the west approach barrier gate lights. Control logic for the west approach traffic signal, that has been removed, remain in the service cabinet.

There is a second service located in the same general area as the west shore bridge service that supplies power to the holiday lights on the bridge and the trees along the north side of the west approach. This service does not interface with the bridge and is excluded from this inspection.

The east shore electrical service is 240/120 VAC, single phase, 60 HZ, 3-wire, supplied from a pole mounted transformer on the NW corner of the Bridge St (Route 136) and Imperial Ave intersection. The service point is located in a weatherproof freestanding cabinet on top of a concrete pad. The service supplies power to the east fender navigation lights, east approach traffic signal and barrier gate lights. Control logic for the east approach traffic signal and cabinet containing the signal preemption controls for the Westport fire department are also located within the cabinet.

Voltage measurements were made of each phase to phase and phase to ground of both services. Measurements were made with the bridge open to vehicular traffic with the control and drive systems off. The measurements are within utility allowable tolerances for the services provided.

Utility Service	Nominal Voltage (Volts)	Phase A to B / Phase A to Gnd. (Volts)	Phase B to C / Phase B to Gnd. (Volts)	Phase C to A / Phase C to Gnd. (Volts)
East	120/240	245.9 / 122.9	NA / 122.7	NA / NA
West	208/120	208.5 / 121.7	209.2 / 121.3	211 / 121.3

Table E1: Utility Voltage Measurements

Deficiencies regarding the utility service were recorded as follows:

- There is minor corrosion on the east meter cabinet (see Photograph E1) (as noted in previous inspection reports) and also on the west meter cabinet (see Photograph E2).
- There is minor corrosion on the interior terminals and conduits in the east (see Photographs E3 & E4) and west (see Photograph E5) service cabinets (as noted in previous inspection reports).

- The electric space heaters in the east (see Photograph E3) and west (see Photograph E5) service cabinets are not functioning (as noted in previous inspection reports).
- The GFCI test and reset buttons are not functioning in the east (see Photograph E4) and west (see Photograph E5) service cabinets.
- The west service cabinet door gasket is damaged (see Photograph E6) (as noted in previous inspection reports).

BRIDGE CONTROLS & CONTROL PANELS

The bridge control relays, motor starters, circuit breakers, and control panel are housed in three cabinets along the sidewalk at the center of the movable span.

The left cabinet contains circuit breakers and motor starters for the southeast end jack and the south, and north center jacks. Wiring within the cabinet is in a neat and workmanlike fashion.

The center cabinet contains an interior control panel consisting of selector switches for jack group control, center jack control, and end jack control; key switches for center jack bypass, end jack bypass, screw jack bypass, and span motor brake auto/manual; pushbuttons for open span, close span, horns and stop; and indicators for the status of the bridge systems. Located behind the interior control panel are circuit breakers, fuses, control relays, and the soft starter for the main span motor. Wiring within the cabinet is in a neat and workmanlike fashion.

The right cabinet contains circuit breakers and motor starters for the northwest, southwest, and northeast end jacks. Wiring within the cabinet is in a neat and workmanlike fashion.

Deficiencies regarding the bridge controls and control panels were recorded as follows:

- There are miscellaneous items stored in the bottom of the left cabinet (see Photograph E7) and the center cabinet (see Photograph E8) (as noted in previous inspection reports).
- There are splices made with wire nuts in violation of AASHTO Article 8.9.2 within the left cabinet (see Photograph E7) and on the backside of the interior panel in the center cabinet (see Photograph E9) (as noted in previous inspection reports).
- The bottom of the center cabinet has moderate corrosion (see Photograph E8) (as noted in previous inspection reports).
- The southwest end jack legend plate is missing (see Photograph E10).

MOVABLE SPAN DRIVE MOTOR & BRAKE

One span drive motor is responsible for the span movement. The motor is provided with an integral motor brake. The primary shaft of the motor is connected to a gearbox which has an auxiliary shaft for manual operation. The secondary shaft of the motor is connected to a rotary cam limit switch for span position.

A limit switch is installed on the brake to prevent operation of the main motor when the brake is manually released.

The span motor is provided with a 120V 50 watt heater and the brake has a 120V 25 watt heater.

The disconnect for the span motor also disconnects the power to the brake. A separate disconnect is provided for the motor heaters and brake limit switch.

Nameplate data for the main motor & brake was recorded as follows:

Main Motor		**Brake**	
Manufacturer:	Reuland	**Manufacturer:**	Stearns
Serial No.:	13-1103A-1	**Serial No.:**	41041M001
Horsepower:	3 HP	**Model No.:**	108704200324B
Phase:	3	**Torque:**	35 lb-ft
Frequency:	60 Hz	**Frequency:**	60
Voltage:	208 V	**Voltage:**	200
Full Load Amps:	12.4 A	**Inrush Amps:**	10.3
Speed:	900 RPM	**Holding Amps:**	0.7
Frame:	215	**Mounting:**	Horiz/V.Below
Encl:	TENV		

Phase ‘B’ motor currents were measured while the span was moving. The main motor currents were measured from the load side of the reversing starter. The current readings show that the motors are operating within the nameplate ratings. See Appendix A for graphs showing main motor currents.

During closing, the span stops at near closed, and then the operator jogs the motor until the fully closed position is reached by pressing the ‘jog’ pushbutton. This jogging is indicated on the graph in Appendix A and is above motor nameplate current due to the inrush of repeated starts and stops of the motor in a short period of time.

The insulation resistance level of phase B of the span drive motor was measured with respect to ground. These readings were taken from the load side of the motor disconnect switch. The insulation resistance values are acceptable. The differences in values between last inspection and this inspection are due the limits of the meter used

during the previous inspection and to weather conditions the day of the testing. The readings were taken after 60 seconds with the meter voltage set at 500V. See Table E1 for tabulated data regarding insulation resistances.

Motor	Previous Inspection February 3, 2017	Current Inspection December 12, 2017
	Motor Phase to Ground	Motor Phase B to Ground
Span Drive Motor	>550 MΩ	4.70 GΩ

Table E1: Main Drive Motor Insulation Resistance Measurements

Deficiencies regarding the main motors were recorded as follows:

- The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked (as noted in previous inspection reports).

LIMIT SWITCHES AND FEEDBACK DEVICES

Limit switches are provided for different electrical components for sending feedback signals to the bridge control system. Rotary cam limit switches are provided for span movement at the main motor and the end and center jacks. Lever arm limit switches are provided for the barrier gates lowered position, centering device installed, and fully open position. Proximity limit switches are provided for the raised and lowered position of the end and center jacks.

Deficiencies regarding the limit switches were recorded as follows:

- Minor corrosion on the span rotary cam limit switch (see Photograph E11) (as noted in previous inspection reports).
- Moderate corrosion (as noted in previous inspection reports) and a damaged gasket on the SW jack rotary cam limit switch (see Photograph E12).
- Moderate corrosion and the cover could not be opened on the NW jack rotary cam limit switch (see Photograph E13) (as noted in previous inspection reports).
- Moderate corrosion on the SE (see Photograph E14) and NE (see Photograph E15) jack rotary cam limit switch (as noted in previous inspection reports).
- Moderate corrosion (as noted in previous inspection reports) and a damaged gasket on the north center jack rotary cam limit switch (see Photograph E16).
- Moderate corrosion (as noted in previous inspection reports), damaged gasket, and the bottom cover bolt is damaged on the south center jack rotary cam limit switch (see Photograph E17).

- The west barrier gate arm lever arm limit switch can seize in the actuated position and there is minor corrosion on the conduit fitting (see Photograph E18).
- The east barrier gate is permanently seized in the actuated position (see Photograph E19) (as noted in previous inspection reports).
- Missing driven south center proximity limit switch (see Photograph E20).

JACKS

The swing span is equipped with four end jacks, one at each corner, and two center jacks. The motors are provided with integral motor brakes. The primary shaft of the motor is connected to a gearbox which has an auxiliary shaft for manual operation. The secondary shaft of the motor is not in use.

The motors are provided with a 120V 50 watt heater and the brake has a 120V 25 watt heater.

The disconnect for the jack motor disconnects power to the motor and brake and has an auxiliary contact that disconnects power to the heaters.

Nameplate data for the end wedge motors was recorded as follows:

Main Motor		**Brake**	
Manufacturer:	Reuland	**Manufacturer:**	Stearns
Horsepower:	3.3 HP	**Model No.:**	108701200111B
Phase:	3	**Torque:**	10 lb-ft
Frequency:	60 Hz	**Frequency:**	60
Voltage:	208 V	**Voltage:**	200
Full Load Amps:	10.6 A	**Inrush Amps:**	4.3
Speed:	1800 RPM	**Holding Amps:**	0.3
Frame:	184	**Mounting:**	Horiz/V.Below
Encl:	TENV		

Phase ‘B’ jack motor currents were measured while the jacks were being retracted and driven. The jack motor currents were measured from the load side of the overload in the jack starter cabinet. The current readings show jack motors are operating below their respective nameplate ratings. See Appendix A for graphs regarding jack motor currents.

The insulation resistance level of phase B of each jack drive motor was measured with respect to ground. These readings were taken from the load side of the local motor disconnect. The recorded insulation resistance values are acceptable. The readings were taken after 60 seconds with the meter voltage set at 500V. See Table E3 for tabulated data regarding insulation resistances.

Motor	Previous Inspection February 3, 2017	Current Inspection October 16, 2017
	Motor Phase to Ground	Motor Phase B to Ground
SW End Jack Motor	>550 MΩ	>10 GΩ
NW End Jack Motor	>550 MΩ	>10 GΩ
SE End Jack Motor	>550 MΩ	>10 GΩ
NE End Jack Motor	>550 MΩ	852 MΩ
North Center Jack Motor	>550 MΩ	>10 GΩ
South Center Jack Motor	>550 MΩ	>10 GΩ

Table E3: End Wedge Motor Insulation Resistance Measurements

Deficiencies regarding the end wedge motors were recorded as follows:

- The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked (as noted in previous inspection reports).
- The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for both center jack locations and the NE and SW end jacks (see Photographs E21-24) (as noted in previous inspection reports).
- Water is present in the bottom of the NE end jack motor disconnect (see Photograph E25).
- Missing nameplate and minor corrosion on cover and conduit fitting of the NE end jack motor disconnect (see Photograph E26).

SPAN LOCK

A manual span locking pin is provided at the center of the west end of the span.

No deficiencies regarding span lock were recorded.

CONDUIT, RACEWAYS, AND JUNCTION BOXES

The conduits throughout the bridge structure is primarily PVC coated Rigid Galvanized Steel and wiring is stranded copper. The condition of the conduits and wiring ranges from adequate to good.

Deficiencies regarding conduit, raceways, and junction boxes were recorded as follows:

- Minor corrosion on conduit clamps throughout bridge (see Photograph E27) (as noted in previous inspection reports).

- Severe corrosion on underground conduit at the east shore service cabinet (see Photograph E28) (as noted in previous inspection reports).

NAVIGATION LIGHTS AND HORN

3 navigation lights are installed on the east fender and controlled by a photo control at the base of the east barrier gate. The center pier fender system has a navigation light at each end and one on at the center of the east channel. The center fender navigation lights are always on.

The span is equipped with 3 alternating green and red navigation lights – two on the south ends of the span and one on the north east end under the sidewalk.

The navigation horn is mounted on the center north truss above the control cabinets.

Deficiencies regarding navigation lights and horn were recorded as follows:

- The southwest, northeast, and southeast span navigation lights were not operational. A SMS work item was created for this deficiency at the time of the inspection.

TRAFFIC SIGNALS

Only the east approach has traffic signals and they are manually activated by a switch on the traffic signal pole. The west approach traffic signals have been removed. Normal operating procedure is to have traffic stopped by local police on both approaches for all bridge operations.

Deficiencies regarding traffic signals were recorded as follows:

- The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02.
- The east approach traffic signals and gong were not operational.

TRAFFIC GATES

No traffic gates are installed on either approach. Manual pedestrian gates are provided close to the receiver end of the barrier gates to block the sidewalk on the north side of the bridge.

Deficiencies regarding the traffic gates were recorded as follows:

- Striping on the west pedestrian gates stops before the end of the gate (see Photograph E29).

BARRIER GATES

Manually operated (no motor) barrier gates are installed at both approaches. The barrier gates have three warning lights each. During the operational testing, none of the barrier gate lights were functional.

Deficiencies regarding the traffic gates were recorded as follows:

- The barrier gates were not fully engaged in the receiver when lowered on both approaches (see Photograph E30) (as noted in previous inspection reports).
- None of the barrier gate lights were operational.

GENERAL LIGHTING AND RECEPTACLES

No maintenance lighting or receptacles are provided on the bridge.

Deficiencies regarding general lighting and receptacles were recorded as follows:

- No lighting or receptacles for maintenance are provided on the bridge (as noted in previous inspection reports).

INTERLOCK TESTING

Interlock testing was performed to determine whether all AASHTO required safety interlocks are incorporated into the bridge control system.

There is no connection between approaches and control on the movable span resulting in the barrier gates not interlocked with the movement of the span. No test were needed to confirm no interlock.

The following interlock testing was performed:

1. With the span partially open (end clear of abutment) and the centering device vertical rod removed, attempt to drive an end jack.
   Result: FAIL – Jack was driven.

2. With the span partially open, centering device vertical rod removed, and one end jack fully driven, attempt to open and close the span.
   Result: FAIL – Span moved in both directions.

3. With the span partially open, all jacks retracted, and the centering device vertical rod installed, attempt to open and close the span.
   Result: PASS – Span did not move in either direction.

Deficiencies regarding interlock testing were recorded as follows:

- Barrier gates are not interlocked with control system.
- Centering device is not interlocked with jack control.
- Jacks are not interlocked with span movement.

CONCLUSION

The bridge operated properly and without any incidents during the operational testing. The manual nature of the traffic control allows for safe operation even with the installed traffic control devices not operational, or not installed. The bridge is in generally good condition. Most deficiencies discovered will require a minor effort to correct and can be addressed by bridge maintenance personnel.

Modjeski and Masters coordinated with Prime and ConnDoT to organize bridge operations for Westport. Bridge operator from ConnDoT and a small maintenance crew were at the bridge site for operations. The bridge operator coordinated with police to stop traffic at both ends of the bridge. ConnDoT maintenance crew were able to provide the access required for this inspection by unlocking cabinets, gates, and platforms. They also provided all manpower and expertise necessary to operate the bridge including the manual traffic gates, the manual centering device, the screw jacks, and the main drive motor. ConnDoT bridge safety personnel was also on site to witness the bridge operation.

RECOMMENDATIONS

Based on this inspection, the following recommendations are made to ensure long-term safe and reliable operation of the bridge. These recommendations have been prioritized based on the ConnDOT Inspection Manual.

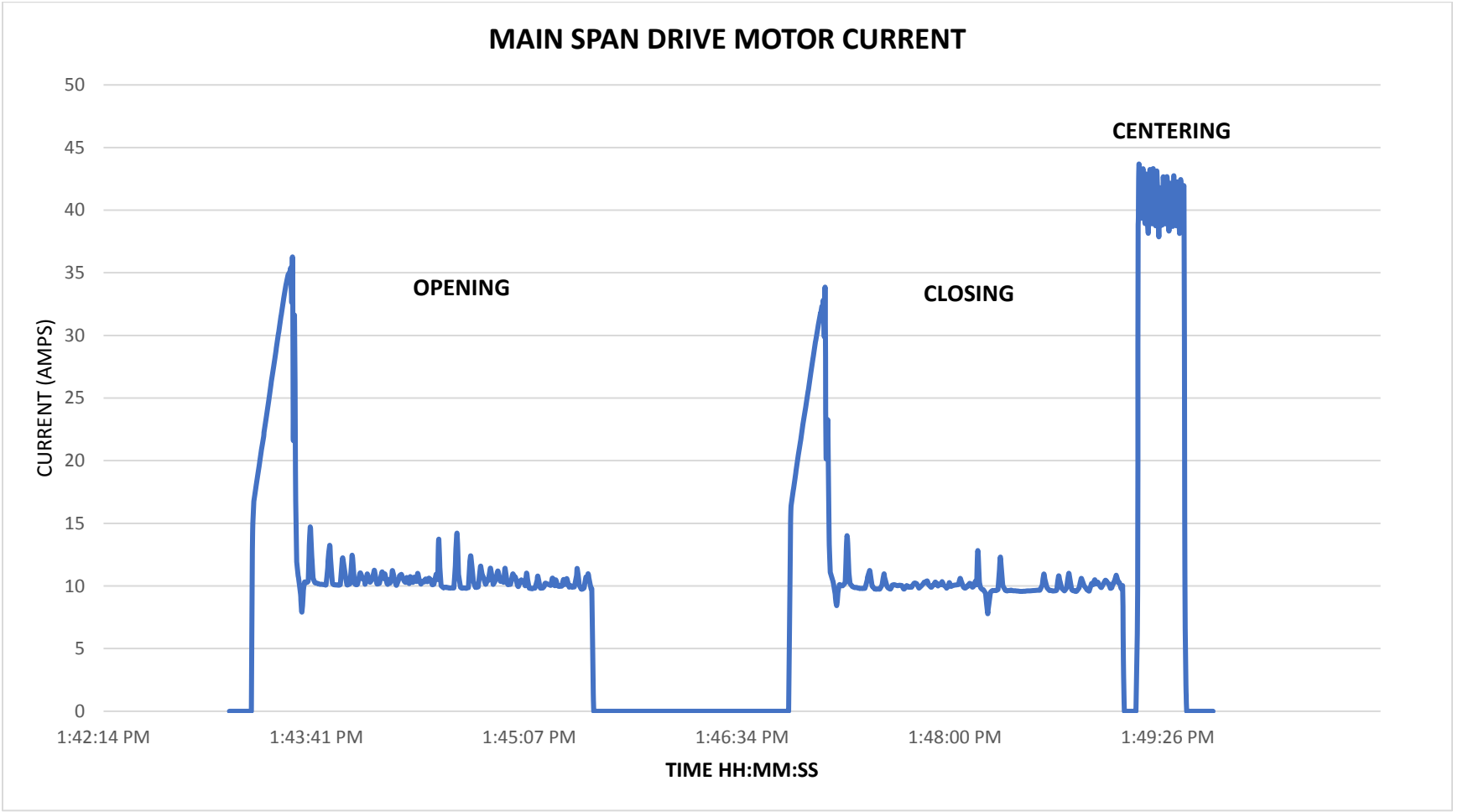
Item	Description	Priority
1	There is minor corrosion on the east meter cabinet and also on the west meter cabinet. Remove the corrosion, coat with protective coating.	None
2	There is minor corrosion on the interior terminals and conduits in the east and west service cabinets. Remove the corrosion, coat with protective coating.	None
3	The electric space heaters in the east and west service cabinets are not functioning. Replace the space heaters.	None
4	The GFCI test and reset buttons are not functioning in the east and west service cabinets. Replace the GFCI receptacles.	None
5	The west service cabinet door gasket is damaged. Replace the door gasket.	None
6	There are miscellaneous items stored in the bottom of the left cabinet and the center cabinet. Remove miscellaneous items.	None
7	There are splices made with wire nuts in violation of AASHTO Article 8.9.2 within the left cabinet and on the backside of the interior panel in the center cabinet. Replace wire nut splices with crimp type splices.	None
8	The bottom of the center cabinet has moderate corrosion. Remove the corrosion, coat with protective coating.	None
9	The southwest end jack legend plate is missing. Replace the legend plate.	None

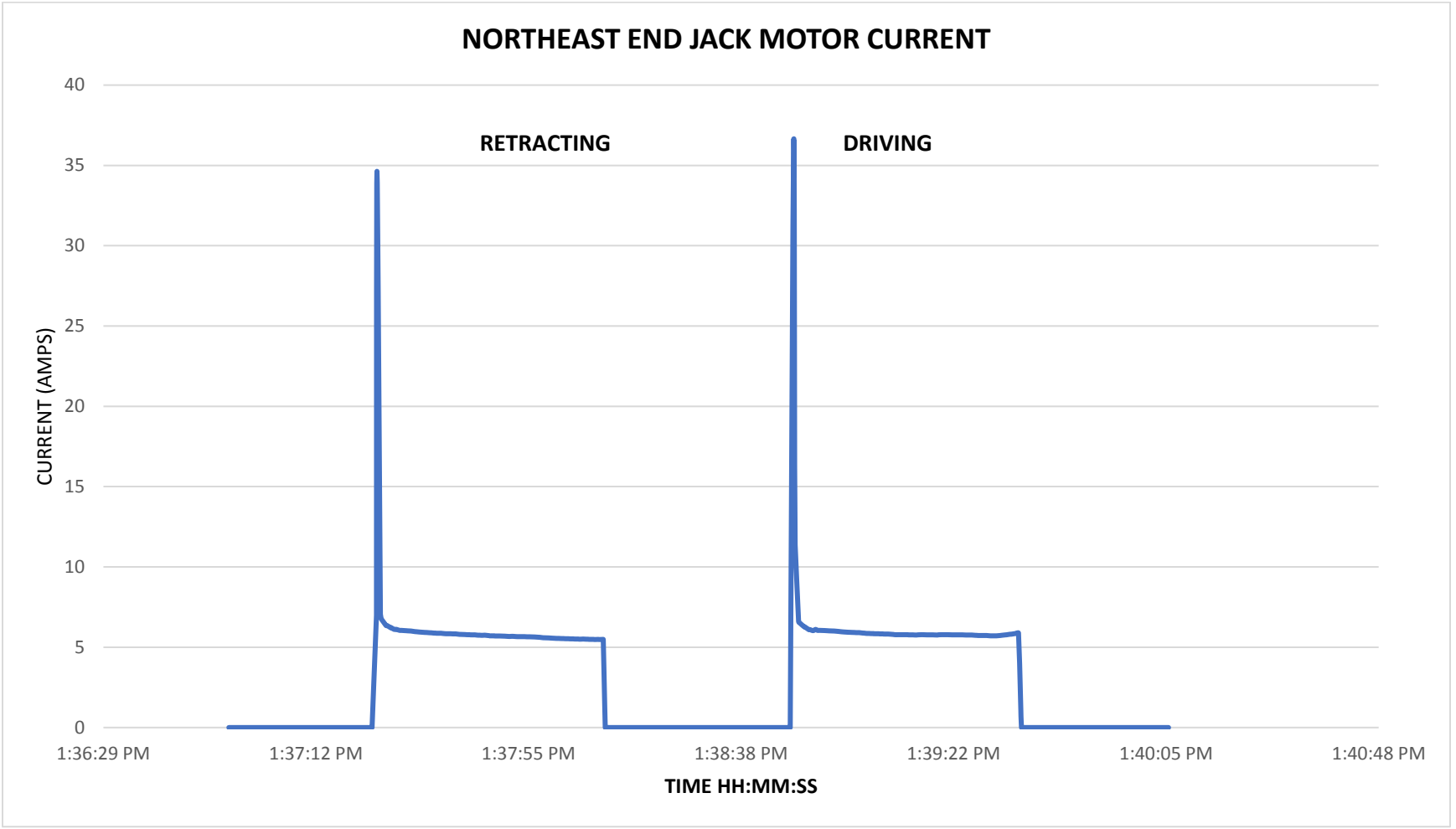
Item	Description	Priority
10	The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked. Install limit switch and wire into control system.	Priority Repair
11	Minor corrosion on the span rotary cam limit switch. Remove the corrosion, coat with protective coating.	None
12	Moderate corrosion and a damaged gasket on the SW jack rotary cam limit switch. Remove the corrosion, coat with protective coating, and replace the door gasket.	None
13	Moderate corrosion and the cover could not be opened on the NW jack rotary cam limit switch. Remove the corrosion, coat with protective coating, and repair door fasteners.	None
14	Moderate corrosion on the SE jack rotary cam limit switch. Remove the corrosion, coat with protective coating.	None
15	Moderate corrosion and a damaged gasket on the north center jack rotary cam limit switch Remove the corrosion, coat with protective coating, and replace the door gasket.	None
16	Moderate corrosion, damaged gasket, and the bottom wingnut is missing on the south center jack rotary cam limit switch. Remove the corrosion, coat with protective coating, replace the door gasket, and repair the cover fasteners.	None
17	The west barrier gate arm lever arm limit switch can seize in the actuated position and there is minor corrosion on the conduit fitting. Replace limit switch.	None

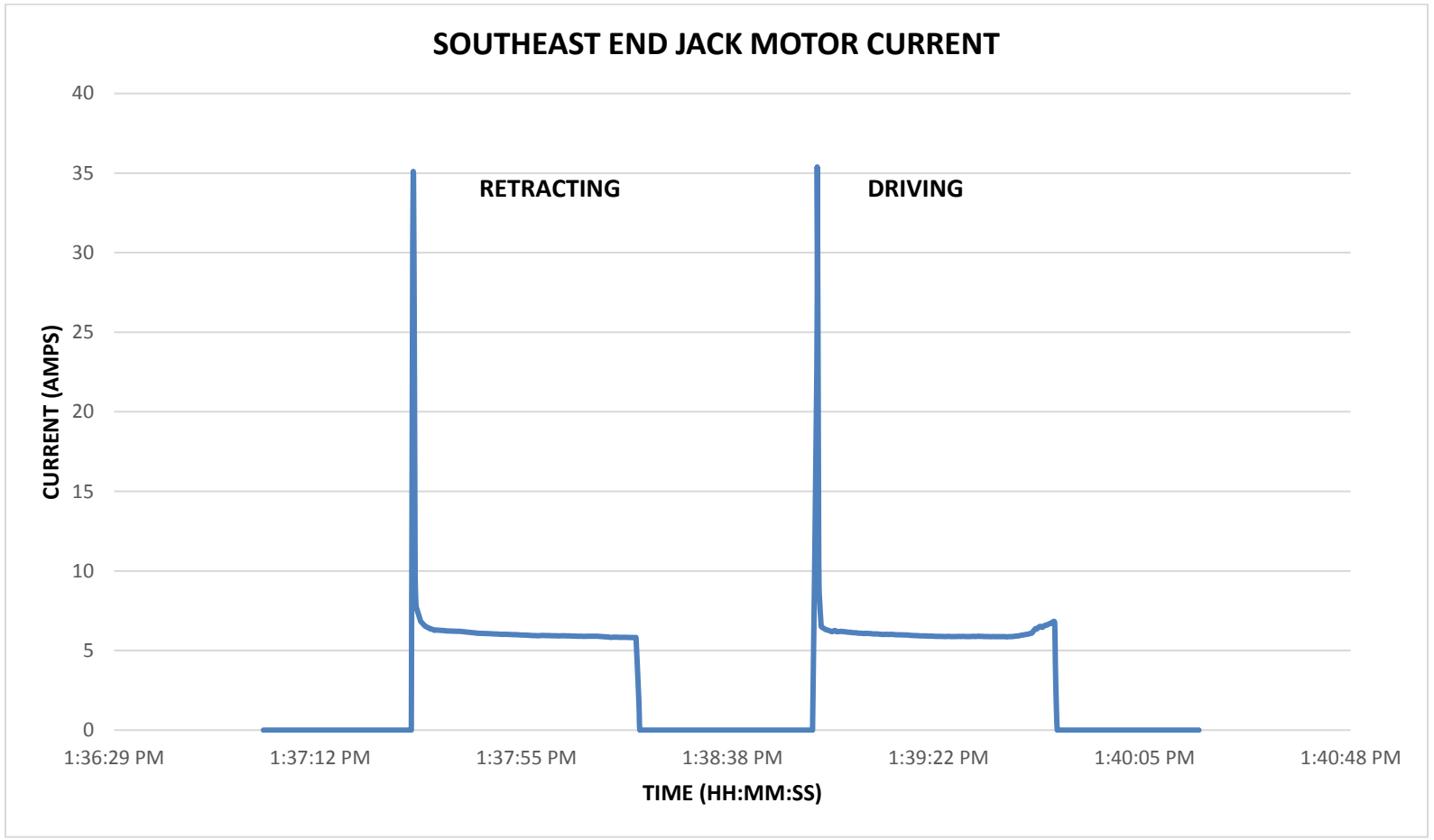
Item	Description	Priority
18	The east barrier gate is permanently seized in the actuated position. Replace limit switch.	None
19	Missing driven south center proximity limit switch. Replace limit switch.	Routine Repair
20	The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked. Install limit switch and wire into control system.	Priority Repair
21	The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for both center jack locations and the NE and SW end jacks. Swap conductors on both ends of the load side of the disconnect switches.	None
22	Water is present in the bottom of the NE end jack motor disconnect. Remove water and repair conduit system and or disconnect to prevent reoccurrence.	None
23	Missing nameplate and minor corrosion on cover and conduit fitting of the NE end jack motor disconnect. Replace nameplate, remove the corrosion, coat with protective coating.	None
24	Minor corrosion on conduit clamps throughout bridge. Replace nameplate, remove the corrosion, coat with protective coating.	None
25	Severe corrosion on underground conduit at the east shore service cabinet. Replace corroded section of conduit.	Routine Repair

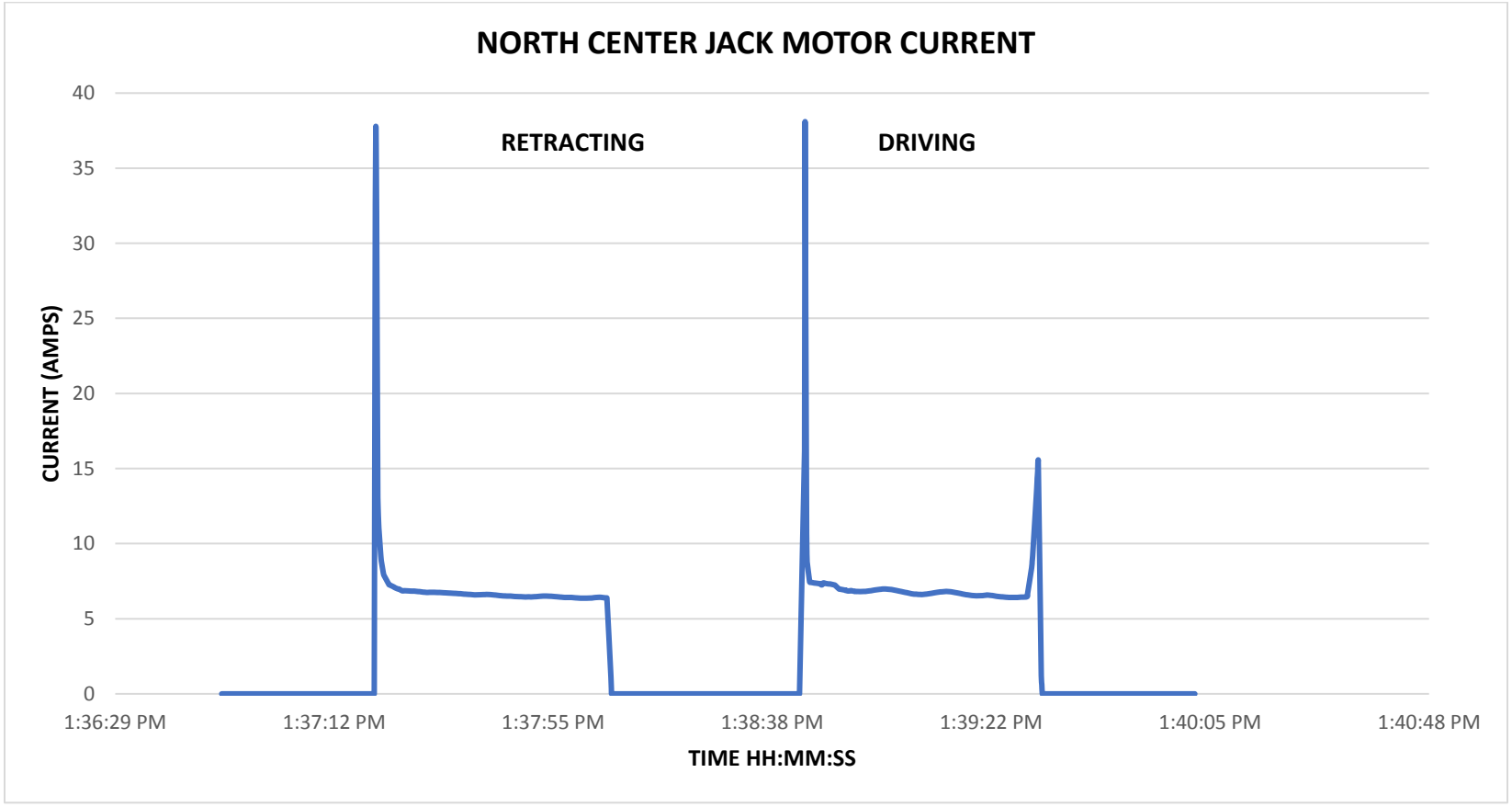
Item	Description	Priority
26	The southwest, northeast, and southeast span navigation lights were not operational. Repair or replace span navigation lights	Priority Repair
27	The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02. Install traffic signals.	Priority Repair
28	The east approach traffic signals and gong were not operational. Repair the east approach traffic signals and gong.	Priority Repair
29	Striping on the west pedestrian gates stops before the end of the gate. Replace striping on gate arm.	None
30	The barrier gates were not fully engaged in the receiver when lowered on both approaches. Repair barrier gate receivers.	Routine Repair
31	None of the barrier gate lights were operational. Repair barrier gate arm lights.	Routine Repair
32	No lighting for maintenance is provided on the bridge. Install lighting and receptacles in maintenance and access areas.	Routine Repair
33	Barrier gates are not interlocked with control system. Interlock barrier gates with control system.	Priority Repair
34	Centering device is not interlocked with jack control. Interlock centering device with jack control.	Priority Repair
35	Jacks are not interlocked with span movement. Interlock jack position with span movement.	Priority Repair

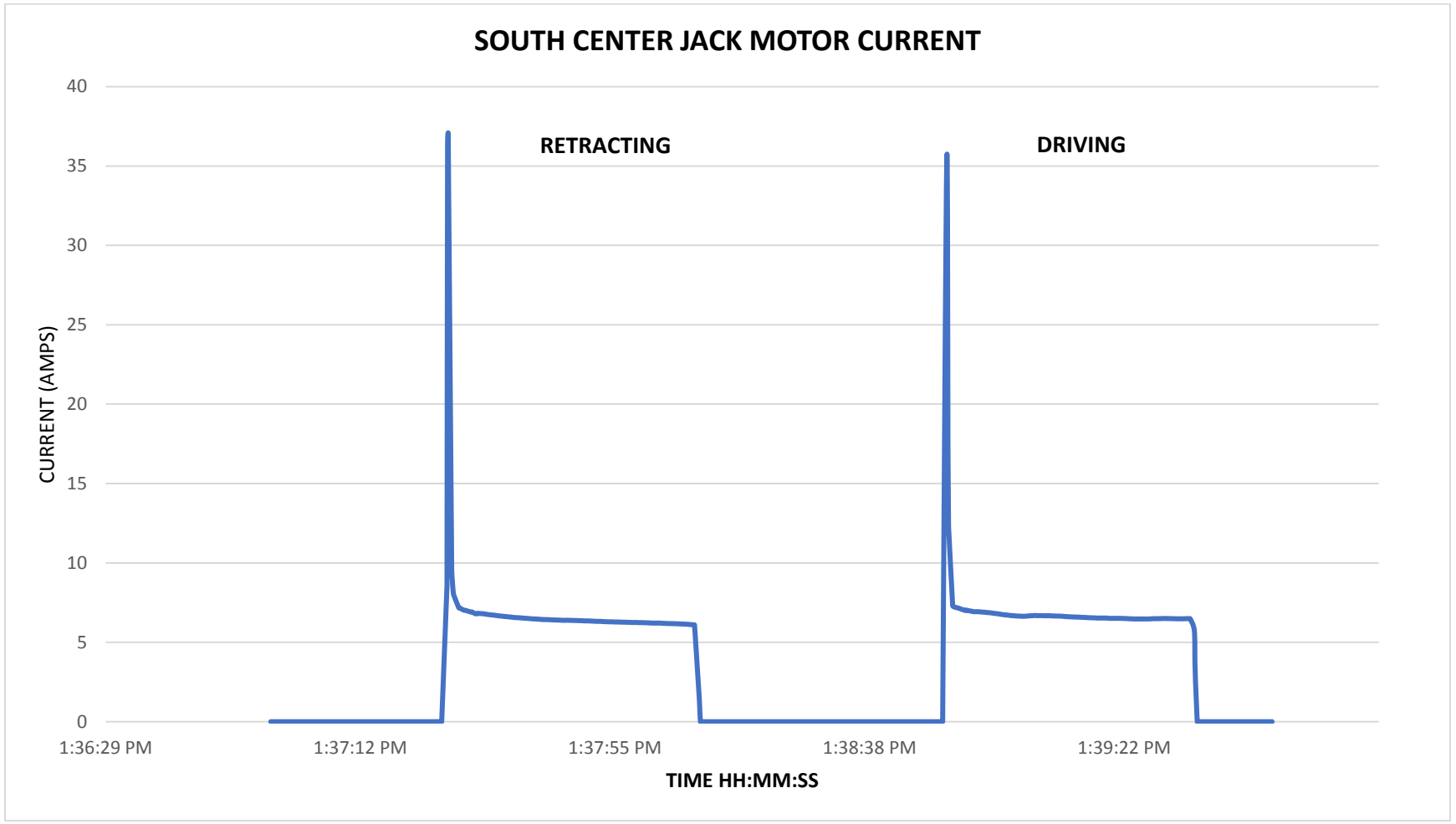
APPENDIX A: ELECTRICAL MEASUREMENTS

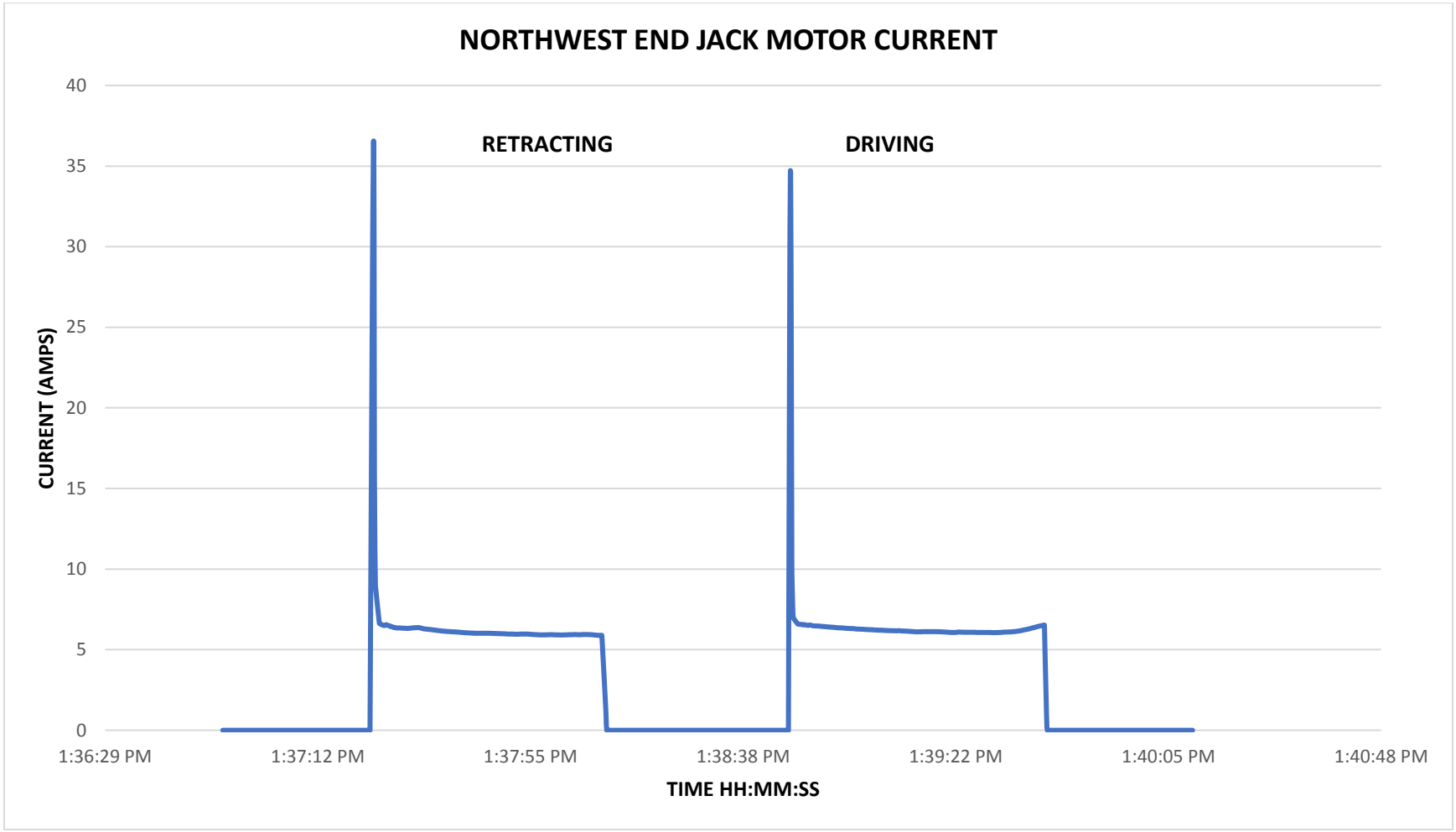

MAIN SPAN DRIVE MOTOR CURRENT
CURRENT (AMPS)
50
45
40
35
30
25
20
15
10
5
0
OPENING
CLOSING
CENTERING
1:42:14 PM
1:43:41 PM
1:45:07 PM
1:46:34 PM
1:48:00 PM
1:49:26 PM
TIME HH:MM:SS

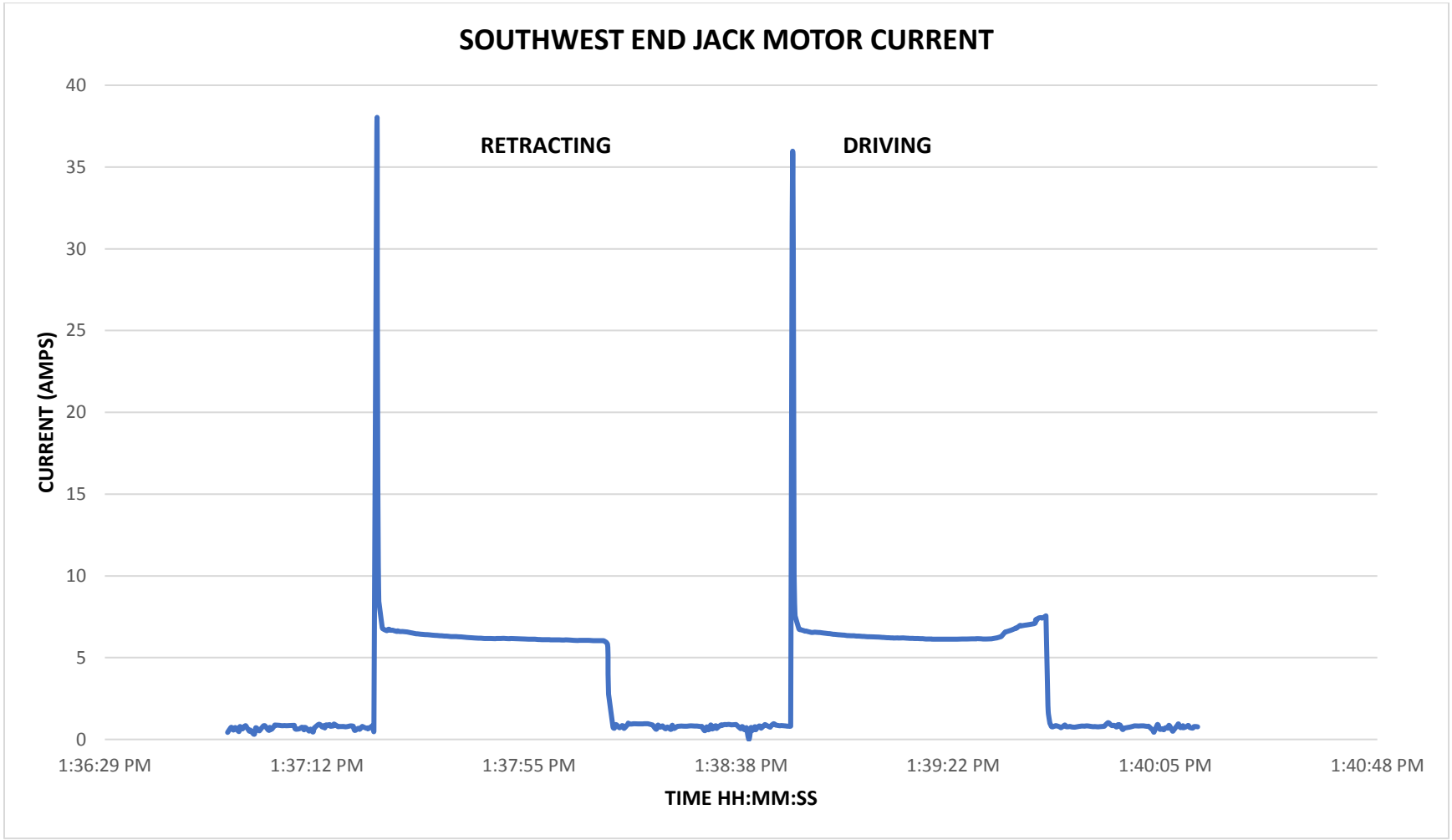

NORTHEAST END JACK MOTOR CURRENT
RETRACTING
DRIVING
CURRENT (AMPS)
40
35
30
25
20
15
10
5
0
1:36:29 PM
1:37:12 PM
1:37:55 PM
1:38:38 PM
1:39:22 PM
1:40:05 PM
1:40:48 PM
TIME HH:MM:SS


SOUTHEAST END JACK MOTOR CURRENT
40
35
30
25
20
15
10
5
0
CURRENT (AMPS)
RETRACTING
DRIVING
1:36:29 PM
1:37:12 PM
1:37:55 PM
1:38:38 PM
1:39:22 PM
1:40:05 PM
1:40:48 PM
TIME (HH:MM:SS)


NORTH CENTER JACK MOTOR CURRENT
RETRACTING
DRIVING
CURRENT (AMPS)
40
35
30
25
20
15
10
5
0
1:36:29 PM
1:37:12 PM
1:37:55 PM
1:38:38 PM
1:39:22 PM
1:40:05 PM
1:40:48 PM
TIME HH:MM:SS


SOUTH CENTER JACK MOTOR CURRENT
RETRACTING
DRIVING
CURRENT (AMPS)
40
35
30
25
20
15
10
5
0
1:36:29 PM
1:37:12 PM
1:37:55 PM
1:38:38 PM
1:39:22 PM
TIME HH:MM:SS


NORTHWEST END JACK MOTOR CURRENT
RETRACTING
DRIVING
CURRENT (AMPS)
40
35
30
25
20
15
10
5
0
1:36:29 PM
1:37:12 PM
1:37:55 PM
1:38:38 PM
1:39:22 PM
1:40:05 PM
1:40:48 PM
TIME HH:MM:SS


SOUTHWEST END JACK MOTOR CURRENT
RETRACTING
DRIVING
CURRENT (AMPS)
40
35
30
25
20
15
10
5
0
1:36:29 PM
1:37:12 PM
1:37:55 PM
1:38:38 PM
1:39:22 PM
1:40:05 PM
1:40:48 PM
TIME HH:MM:SS

APPENDIX B: ELECTRICAL PHOTOGRAPHS

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E1:
East Service Meter
Minor corrosion



Photo No. E2:
West Service Meter
Minor corrosion

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

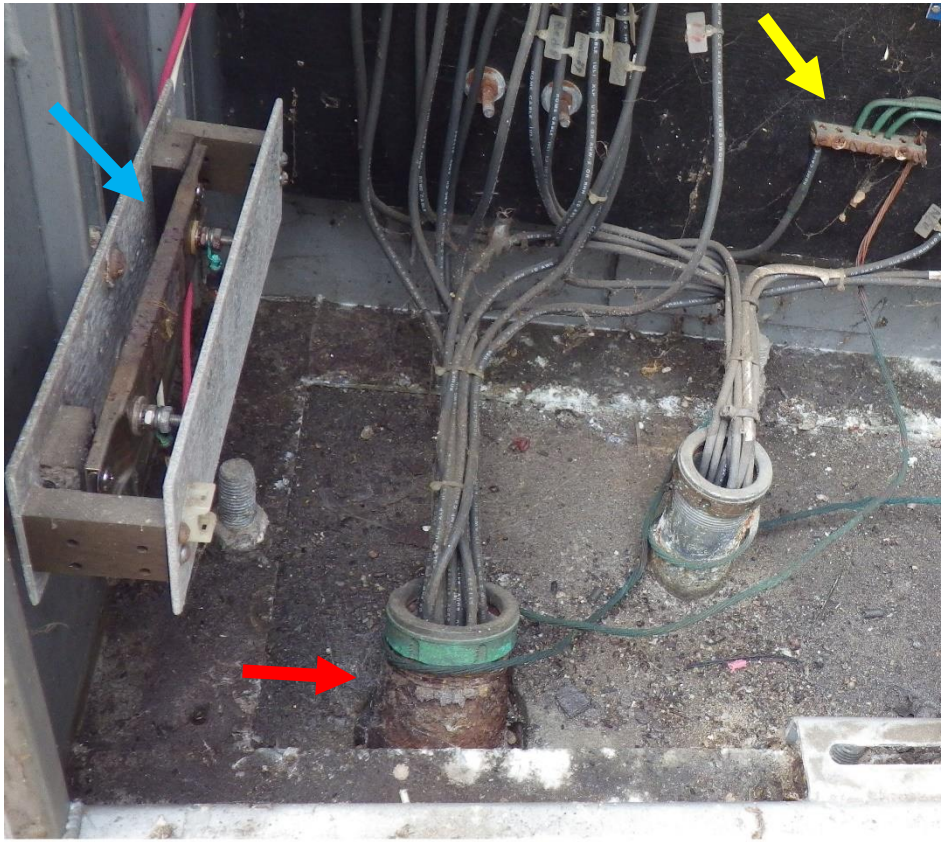


Photo No. E3:
East Service Meter Interior
Minor corrosion on conduits (red arrow) and terminals (yellow arrow)
Nonfunctioning enclosure heater (blue arrow)



Photo No. E4:
East Service Meter Interior
Minor corrosion on terminals (yellow arrow)
Nonfunctioning test/reset buttons on GFCI (orange arrow)

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

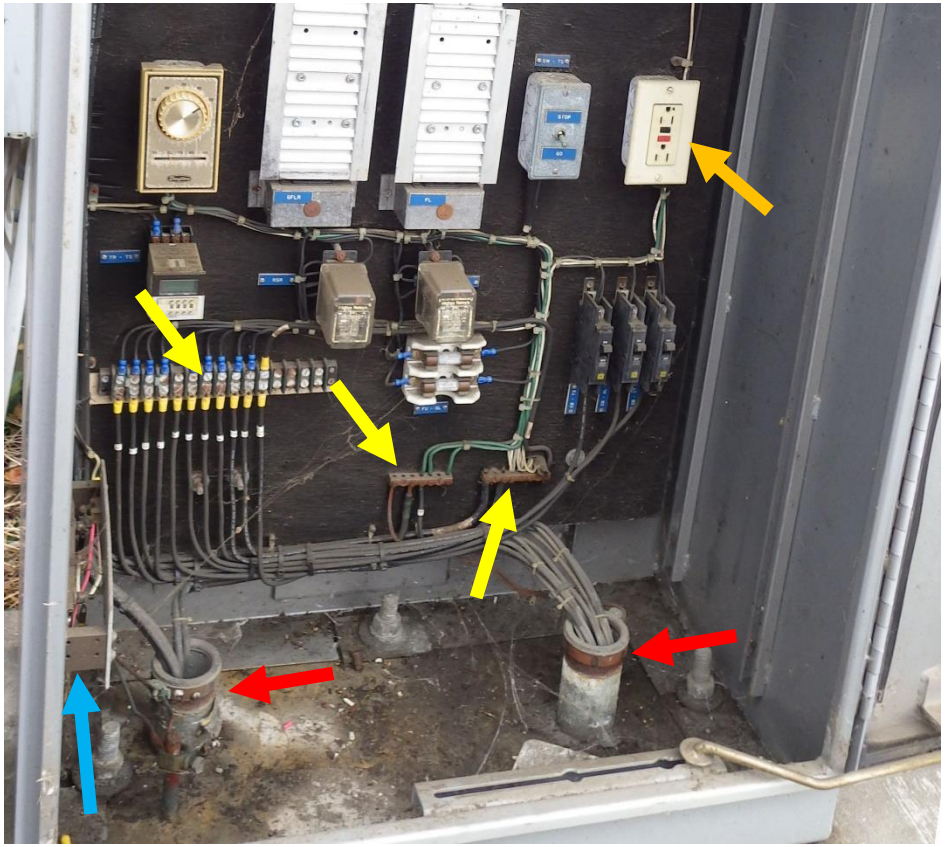


Photo No. E5:
West Service Meter Interior
Minor corrosion on conduits (red arrow) and terminals (yellow arrow)
Nonfunctioning enclosure heater (blue arrow)
Nonfunctioning test/reset buttons on GFCI (orange arrow)



Photo No. E6:
West Service Meter Interior
Damaged door gasket

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

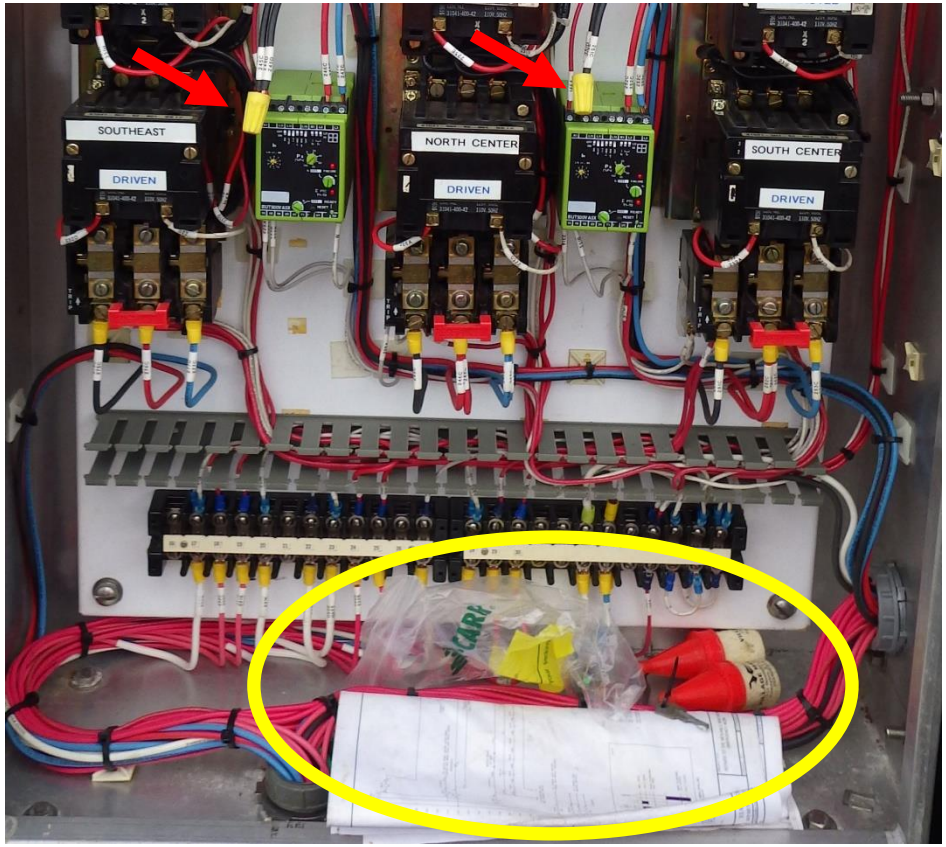


Photo No. E7:
Left Control Cabinet
Miscellaneous items stored in bottom (yellow circle)
Wire nut splices (red arrow)



Photo No. E8:
Center Control Cabinet
Miscellaneous items stored in bottom (yellow circle)
Moderate corrosion on the bottom of the enclosure (red arrow)

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

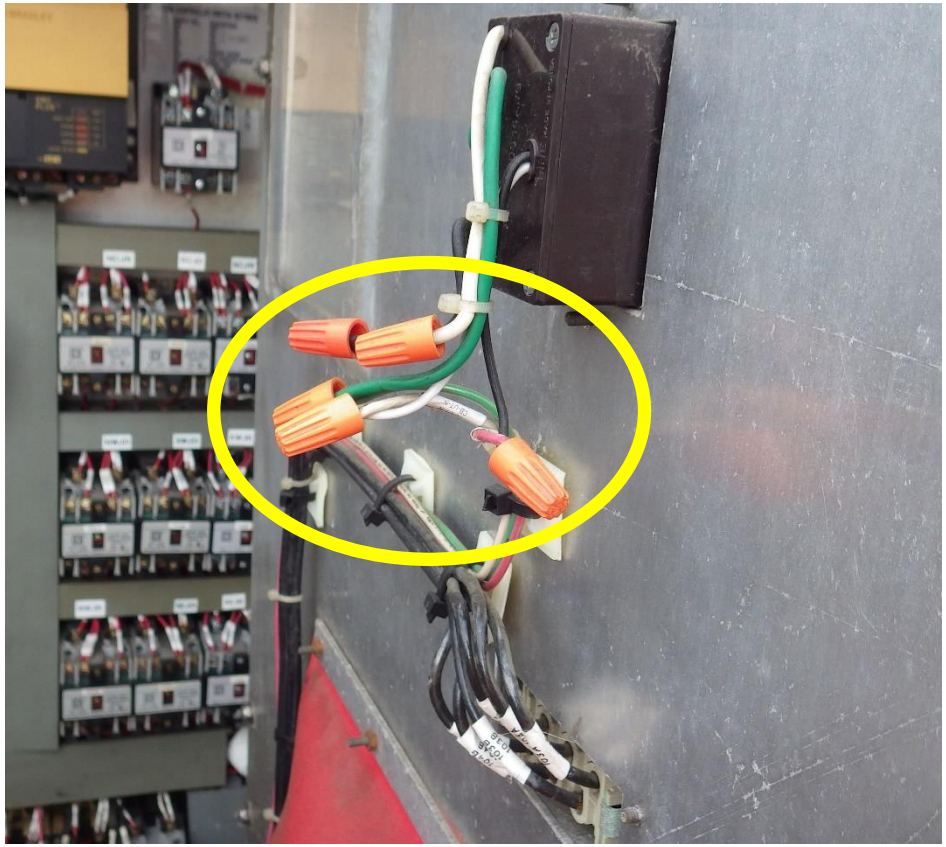


Photo No. E9:
Center Control Cabinet
Wire nut splice behind interior control panel



Photo No. E10:
Center Control Cabinet
Missing southwest end jack legend plate

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

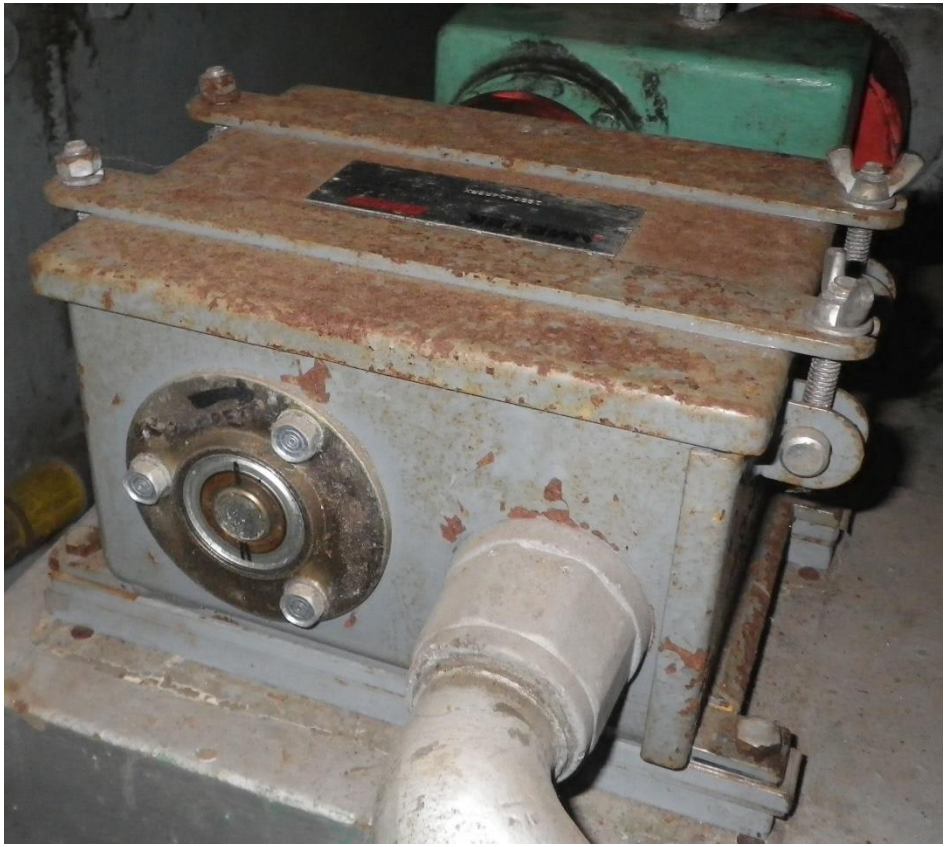


Photo No. E11:
Span Rotary Cam Limit Switch
Minor corrosion



Photo No. E12:
SW Jack Rotary Cam Limit Switch
Moderate corrosion
Damaged gasket

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E13:
NW Jack Rotary Cam Limit Switch
Moderate corrosion
Cover could not be opened due to corroded fasteners



Photo No. E14:
SE Jack Rotary Cam Limit Switch
Moderate corrosion

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E15:
NE Jack Rotary Cam Limit Switch
Moderate



Photo No. E16:
North Center Jack Rotary Cam Limit Switch
Moderate corrosion
Damaged gasket

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

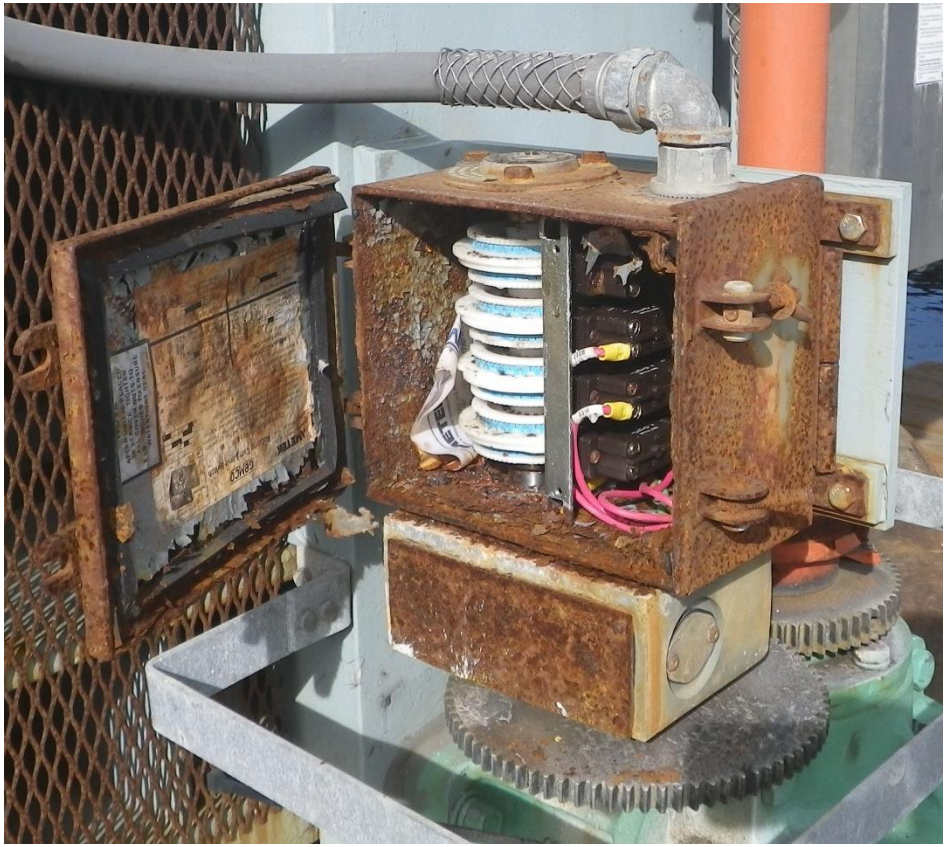


Photo No. E17:
South Center Jack Rotary Cam Limit Switch
Moderate corrosion
Damaged gasket
Damaged bottom cover bolt

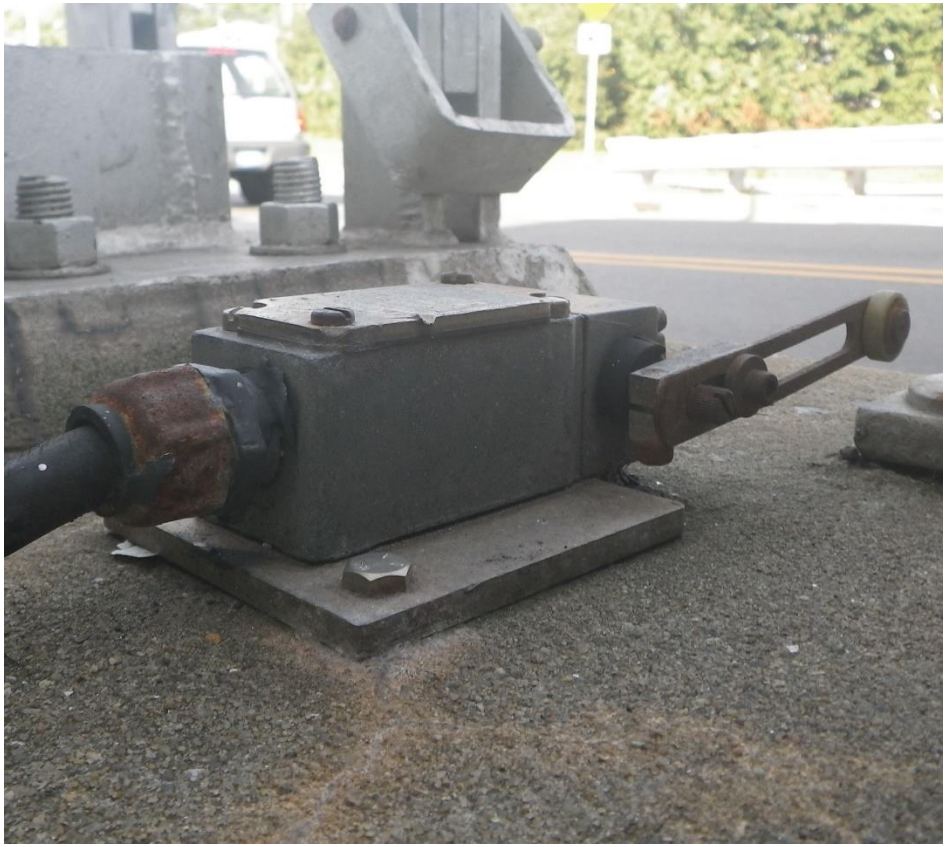


Photo No. E18:
West Barrier Gate Lever Arm Limit Switch
Seizes in the actuated position
Minor corrosion on conduit fitting

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E19:
East Barrier Gate Lever Arm Limit Switch
Permanently seized in the actuated position

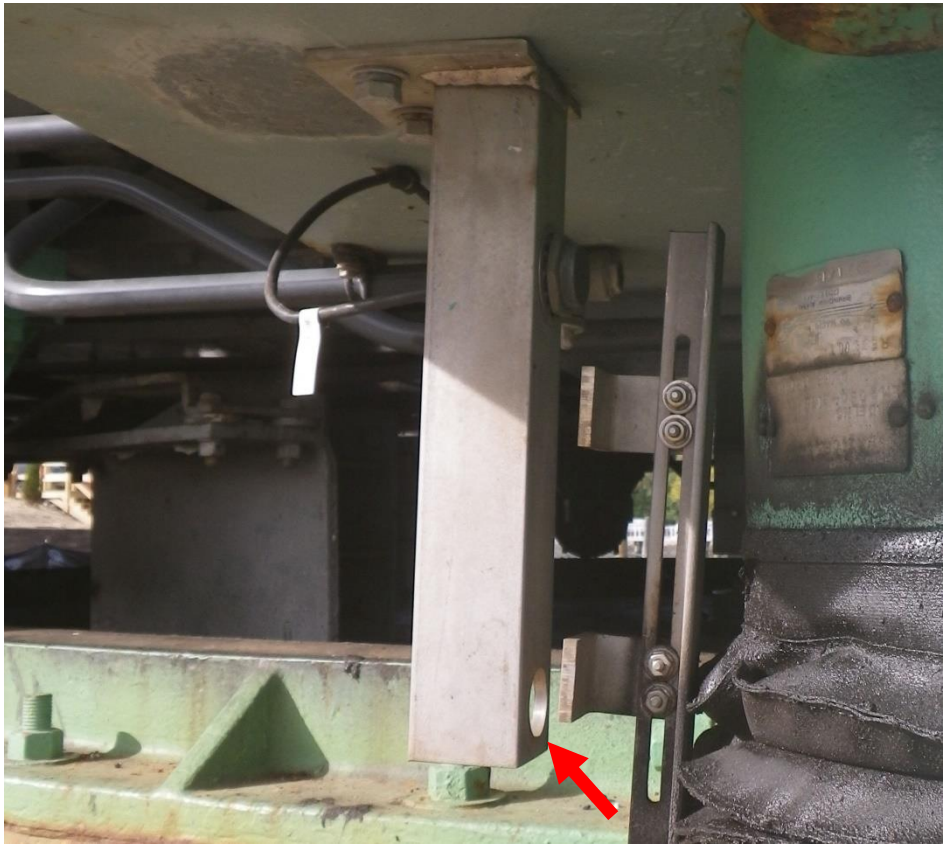


Photo No. E20:
South Center Jack Proximity Limit Switches
Missing lowered limit switch

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

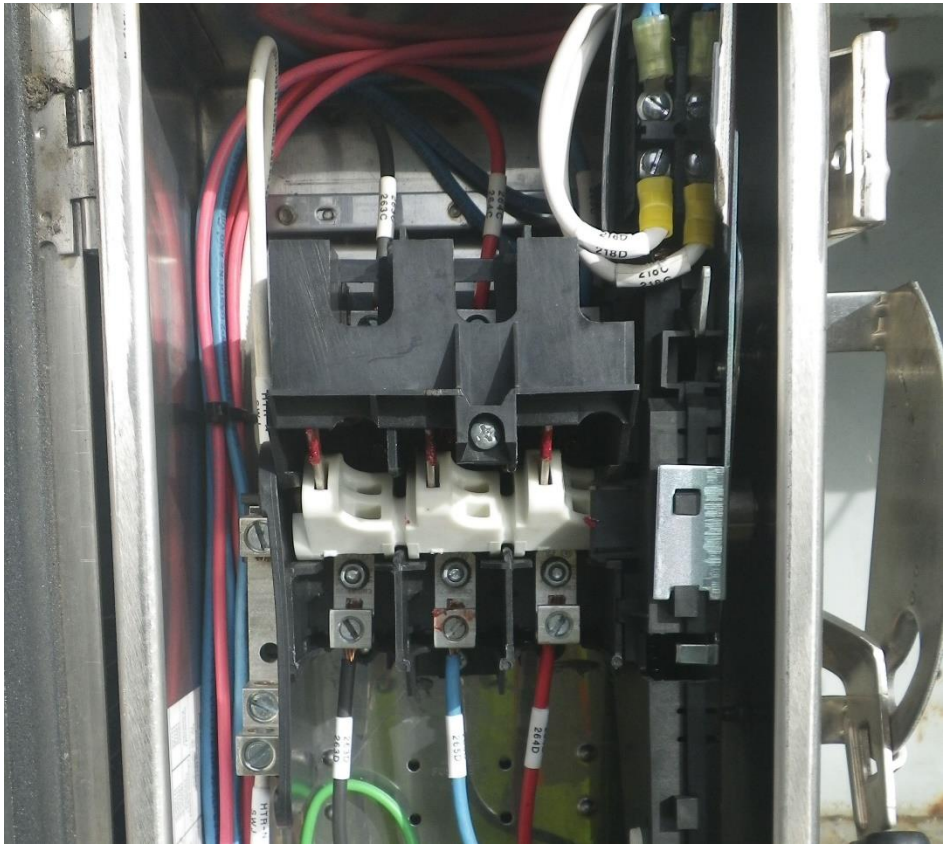


Photo No. E21:
SW End Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

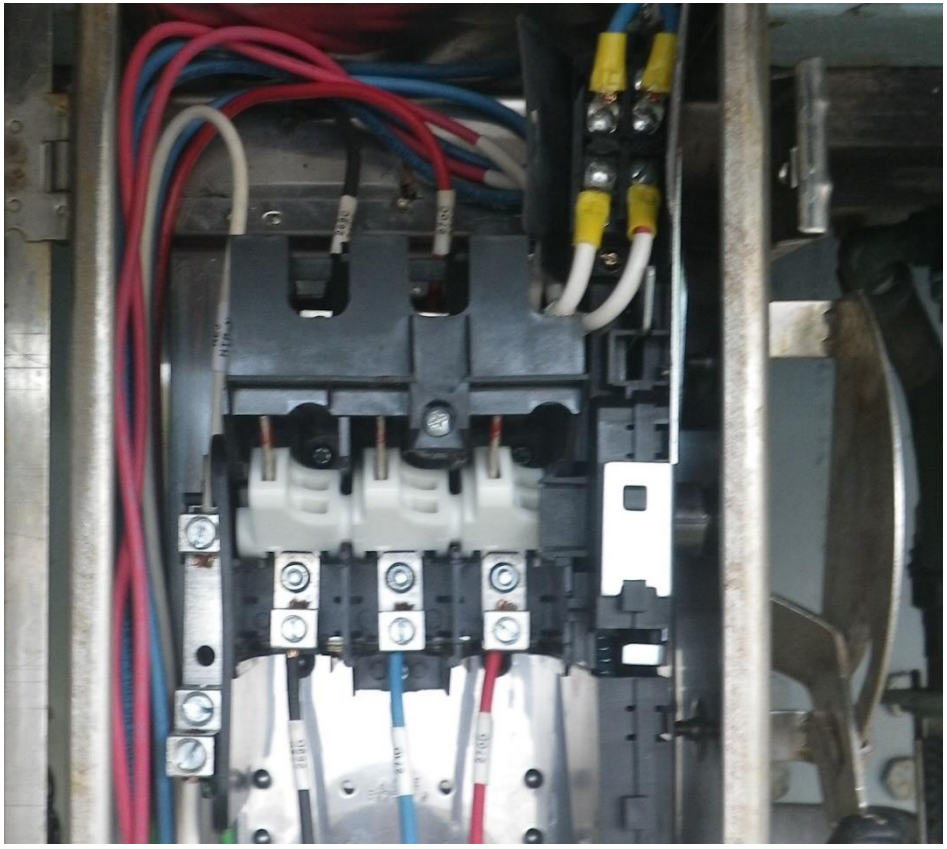


Photo No. E22:
NE End Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

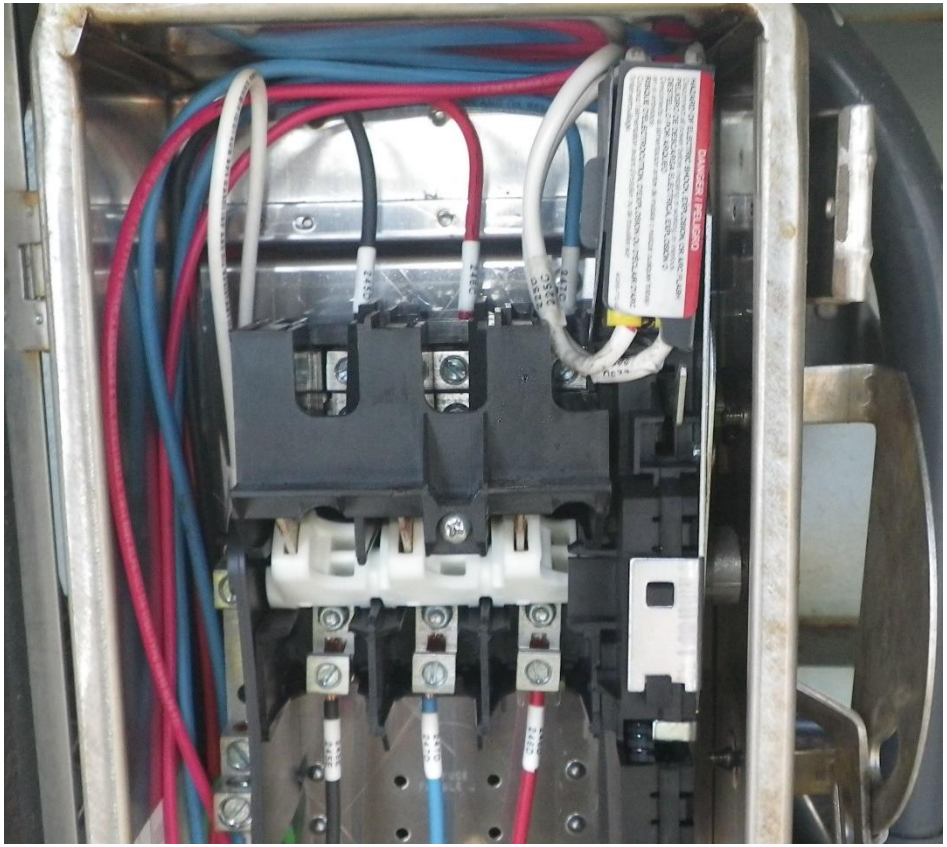


Photo No. E23:
North Center Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

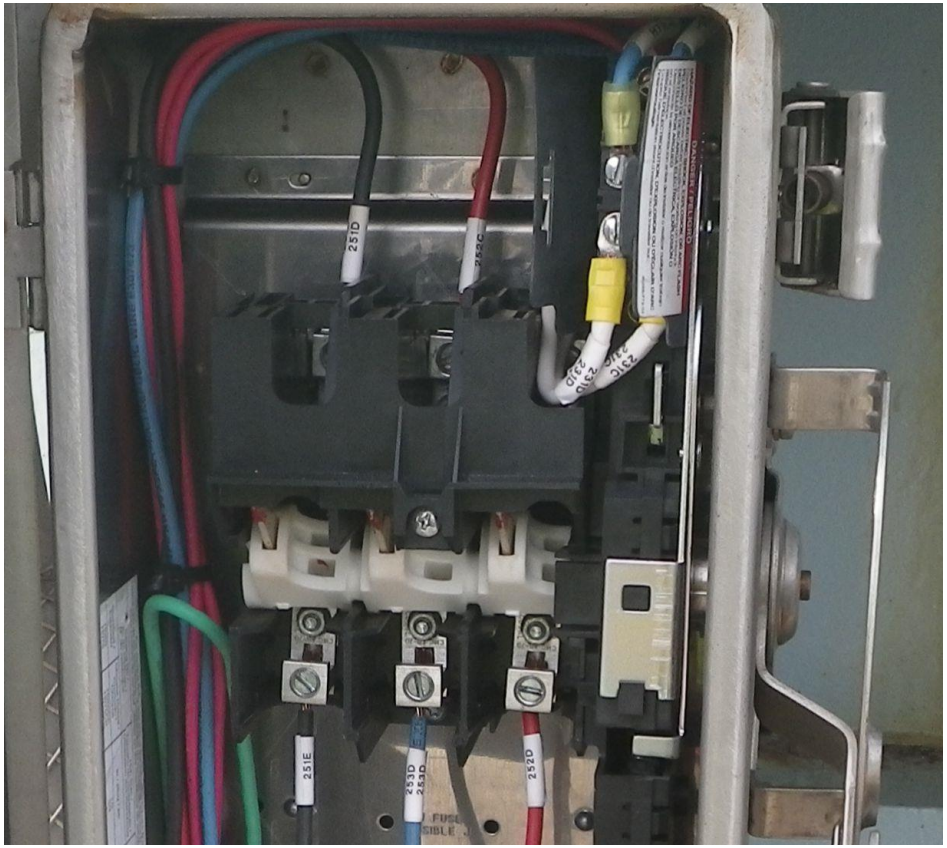


Photo No. E24:
South Center Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

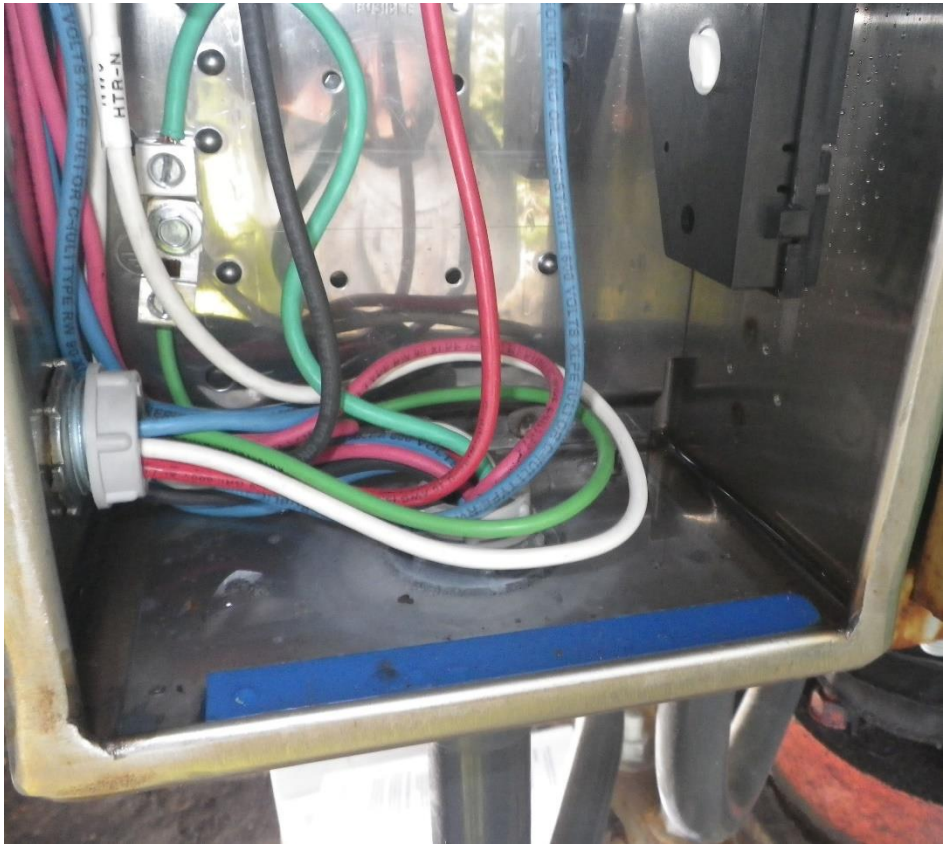


Photo No. E25:
NE End Jack Motor Disconnect
Water in the bottom of the enclosure



Photo No. E26:
SE End Jack Motor Disconnect
Missing nameplate
Minor corrosion on cover and conduit fitting

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E27:
Main Power Conduit On Span
Minor corrosion on conduit clamp (typical throughout bridge)



Photo No. E28:
East Shore Service Conduit
Severe corrosion

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E29:
West Pedestrian Gate
Striping stops before end of gate



Photo No. E30:
East Barrier Gate
Gate not fully engaged in receiver

APPENDIX C: NUMERICAL CONDITION REPORT

MOVABLE SPANS

NUMERICAL CONDITION INSPECTION REPORT
ELECTRICAL COMPONENTS

BRIDGE NUMBER: 01349 INSPECTION DATES: 10/16/18 thru 10/17/18 & 11/5/18

COMMON COMPONENTS		BASCULE SPANS		LIFT SPANS	
COMPONENTS TITLE	NCR*	COMPONENTS TITLE	NCR*	COMPONENTS TITLE	NCR*
WIRING AND CABLE	5	SPAN SEATED LIMIT SWITCH	N/A	FESTOONED CABLE	N/A
CONDUIT AND RACEWAY	5	SPAN LOCK MOTORS	N/A	SPAN SEATED LIMIT SWITCH	N/A
UTILITY SERVICE	7	BRAKES	N/A	SPAN LOCKS	N/A
SPAN DRIVE MOTORS	7			WEDGE MOTORS	N/A
SWITCHGEAR	6			DRIVE SYNC SYSTEM	N/A
MOTOR CONTROLS	7	**SWING SPANS**			
CONTROL DESK	6	COMPONENTS TITLE	NCR*		
PLC CONTROLS	N/A	END OF TRAVEL LIMIT SWITCH	7		
SPAN POSITION INDICATOR	N/A	CENTERING DEVICE	4		
SUBMARINE CABLE	N/A	WEDGE MOTORS	N/A		
DISCONNECT SWITCHES	7	JACK MOTORS	7		
GENERAL LIGHTING	3				
ROADWAY LIGHTING	N/A				
TRAFFIC SIGNALS	3	**MISC. COMPONENTS**			
TRAFFIC GATES	N/A	CONTROL LOGIC INTERLOCKS	3		
RESISTANCE BARRIERS	6				
NAVIGATION LIGHTS	7				
STANDBY GENERATOR	N/A				
ELECTRICAL CONDITION OVERALL		**RATING: 7**			

* NUMERICAL CONDITION RATING

9	NEW: Excellent functional Performance.	4	MARGINAL: Corrective action required within one year.
8	EXCELLENT: Performs intended function with very high degree of reliability and effectiveness.	3	POOR: Performance poor and/or unreliable: corrective actions required within six months.
7	GOOD: Performs with high degree of reliability and/or effectiveness.	2	URGENT: Movable span operation highly unreliable or dangerous and should be restricted. Corrective action required as soon as possible.
6	FAIR: performs with little reduction in reliability and/or effectiveness.	1	CRITICAL: Movable span Operation prohibited pending replacement or repair.
5	ADEQUATE: Performs with moderate reduction in reliability and/or effectiveness.	N/A	Not Applicable

APPENDIX D: FIELD NOTES

OBSERVATIONS AND FINDINGS

This report is based on a visual routine inspection of the bridge. The following sections describe the bridge and focus on the electrical installation and electrical equipment to assure the safety and reliability of the bridge.

Bridge Electrical Service

The bridge is provided with two electric utility services. The electric utility service at the west bridge approach consists of a 208/120 VAC, 3-phase, 4-wire, solidly grounded overhead service provided by a bank of three pole mounted transformers (see photo E1). This service terminates in a weatherproof, freestanding enclosure. The enclosure contains the electrical distribution equipment for the west bridge approach electrical service and a 3-phase, 50 Amp, 208 VAC feeder for the movable span. An electric utility meter is mounted on the side of the enclosure, which is the utility service entrance point for this service.

The electrical installation associated with the west service is operational and in good condition. The enclosure is provided with a space heater, but this device was found to be inoperable at the time of inspection. The enclosure also contains control relays and switches for the control of the west bridge approach traffic signals, however, the west traffic signals and gong, along with their pole, have been removed.

A second electrical utility meter is provided at the bridge northwest approach and is used to feed an auxiliary power panel for bridge auxiliary power, such as lighting and receptacles. All equipment for the auxiliary service appears to be in good condition.

The electric utility service at the east bridge approach consists of a 240 VAC, single phase, 3-wire service. This service terminates in a weatherproof, freestanding enclosure mounted on a concrete pad at the southeast corner of the bridge approach (see photo E2). The enclosure contains the electrical distribution equipment for the east bridge approach electrical service. An electric utility meter is mounted on the side of the enclosure, which is the utility service entrance point for this service. The electrical installation associated with the service is operational and in fair condition. The enclosure is provided with a space heater, but this device was found to be inoperable at the time of inspection. As with the west electric utility service enclosure, the east service enclosure contains the control logic for the east approach traffic signals. The operation and status of this system is identical to that at the west bridge approach. In addition to the conventional traffic signal control system, the enclosure also contains a Westport Fire Department control cabinet used to preempt the traffic signals.

coupled to the reducer that is coupled to the bridge machinery. The main drive motor, brake, and motor disconnects are in good condition.

wire and splices in Heater & CS disconnect

Span Drive Motor Nameplate:

Manufacturer:	Reuland
Horsepower:	3 HP
Volts:	208V
Amperes:	12.4A
Hertz:	60 Hz
Phase:	3
Enclosure:	TENV
Serial No.	13-1103A-1
RPM:	900

The main drive-reducing gearbox is provided with an auxiliary drive shaft for manual operation that can be used by hand cranking from the roadway above. This hand cranking arrangement is not provided with limit switches to prevent electrical operation of the bridge with the hand crank inserted.

The main span drive motor was found to be in good external condition, and the internal winding resistance is in excellent condition.

In an effort to determine the quality and life expectancy of the main span drive motor, the motor electrical insulation resistance levels were measured with respect to ground using a 500 Volt "megger." The results are tabulated in Table E2 below:

	Motor and Feeders Phase to Ground (meg Ohms)
Span Drive Motor	>550

A -> 4,356
B -> 4.70G
C -> 5.0G

Table E2
Span Drive Motor Insulation Resistance Measurement

The weather conditions during the measurements were dry and the temperature was approximately 31°F.

The insulation resistance level of the main span drive motor indicates that the motor winding insulation levels are acceptable.

In an effort to determine the operating characteristics of the main span motor and to determine its operating loads, its stator load currents were measured during opening and closing operating cycles as shown in Table E3 below:

	Phase A (Amps)	Phase B (Amps)	Phase C (Amps)
Main Span Drive Motor Open	10-12	10-12	10-12
Main Span Drive Motor Close	9-11	9-11	9-11

Table E3
Main Span Drive Motor Currents

From the above results, it can be seen that the load currents of the main span drive motors are all well within the nameplate rating of the motors.

The motor and associated equipment is located directly below the deck of the bridge in a confined space with little room to carry out maintenance or replacement. Additionally, there is no lighting in this area.

Deficiencies regarding the movable span drive motor were recorded as follows:

- As noted in the previous Electrical Inspection Reports, the main drive-reducing gearbox is provided with an auxiliary drive shaft for manual operation via hand cranking from the roadway. This hand cranking arrangement is not provided with limit switches to prevent electrical operation of the bridge with the hand crank inserted. This presents a hazardous situation for operators with the possibility of electric operation while hand cranking and subsequent potential of injury to the operator.
- As noted in the previous Electrical Inspection Reports, lighting for the span drive motor area is non-existent and creates a hazardous situation for maintenance personnel at night.

Motor Brake

The single motor brake in the drive system is of the solenoid type and is provided with a hand release mechanism to enable bridge operation in the event of brake or electric power failure. The hand release mechanism is furnished with a limit switch that is interlocked with the bridge control logic to prevent operation of the bridge drive system with the brake hand-released. No brake "Set" or brake "Released" limit switches are provided with the brake for indication of status of the brake and for interlocking with the bridge drive system.

The motor brake is in good condition and is installed with a safety disconnect switch. This disconnect switch is housed in a NEMA 4X stainless steel enclosure and mounted in close proximity to the main drive motor.

LS @ WBG can seize in actuated position if pushed far enough

Field Feedback Devices

For the barrier gates, the arm position of each gate is monitored by one lever arm limit switch located under the gate arm. This switch provides control for the arm lights and warning gongs.

The jack positions are monitored by limit switches in order to provide interlocks to prevent operation of the drive motor unless all jacks are fully raised. Each jack is provided with a "Pulled" and "Driven" proximity type limit switch at the jack, as well as a rotary cam limit switch located near the jack motor after the right-angle reducer. Rotary cam limit switches at each jack location exhibit severe corrosion and water intrusion. These switches appear to be in NEMA 4 enclosures and are not suitable for the location at which they are installed.

SW RC torn gasket no water NW RC couldn't open
SE no water
NE no water
NC no water
SC no water

A single rotary cam limit switch associated with the span drive provides span position data for the bridge control logic system (fully centered, nearly closed, nearly open and span fully open). The rotary cam limit switch is housed in a NEMA 4 enclosure and has been properly installed with all conductors well terminated and labeled. The limit switch exhibits light corrosion. A separate end-of-travel lever arm limit switch is provided as backup in the event of rotary cam limit switch failure and is used to prevent over-travel of the span. This over-travel limit switch is a sealed lever-arm type unit.

A sealed lever-arm type limit switch is installed at the centering pin. This switch prevents the span from operating when the centering pin is in place. This limit switch is well installed and is well integrated into the bridge control system (see photo E10).

W LS minor corroded as well as arm & abnormal sw w/o arm

Deficiencies regarding the field feedback devices were recorded as follows:

- As noted in the previous Electrical Inspection Reports, there is severe corrosion and evidence of water intrusion at each span jack rotary cam limit switch enclosure (see photos E11 and E12). Fasteners at the northwest span jack limit switch enclosure are seized.
- There is ~~mild~~ moderate corrosion at the span position rotary cam limit switch (see photo E13).
- The "Pulled" proximity limit switch at the southeast span jack is damaged. It was necessary to use the span jack bypass switch in order to open the span (see photo E14).
- The limit switch at the east barrier gate arm is seized in the actuated position (see photo E15).

LS replaced operation not verified

SE jack lowered LS missing & ~~good~~ JB conduit opening is not covered exposing conductors inside

Jacks

Brake equipped w/ 25W space heater

The movable span is provided with six span lifting jacks. The actuators are squirrel cage induction type motors equipped with 50 Watt space heaters and shaft mounted Stearns type brakes. Each jack motor is provided with a NEMA 4X stainless steel disconnect switch within reach. The jack motors are in good condition.

Jack Motor Nameplate:

Manufacturer:	Reuland
Horsepower:	3.3
Volts:	208V
Amperes:	10.6A
Hertz:	60Hz
Phase:	3
Enclosure:	TENV
RPM:	1800

Jack Brake Nameplate:

Manufacturer:	Stearns
Model:	108701200111
Torque:	10 lb-ft
Amps Inrush:	4.3A
Amps Holding:	0.3A
Volts:	200V

In an effort to determine the quality and life expectancy of the span jack electrical installation, span jack motor windings and motor feeder insulation resistance levels were measured with respect to ground using a 500 Volt "megger." The results are tabulated in Table E4 below:

	Motor and Feeders Phase to Ground (meg Ohms)
North Center Jack Motor	>550
South Center Jack Motor	>550
Northeast Jack Motor	>550
Northwest Jack Motor	>550
Southeast Jack Motor	>550
Southwest Jack Motor	>550

Table E4
Span Jack Motor Insulation Resistance Measurements

The weather condition during the measurements was dry and the temperature was approximately 31°F.

Deficiencies regarding the jacks were recorded as follows:

- As noted in previous Electrical Inspection Reports, the grating for accessing the span center jacks creates an operating hazard when in the lowered position. The operator is not provided with any feedback (indicator light driven off of a strategically located limit switch) indicating the position of this grating nor is the span drive motor prevented from operating when the grating is in the lowered position.
- As noted in previous Electrical Inspection Reports, there are no electrical interlocks to prevent electrical operation of the jacks while they are being hand-cranked.
- As noted in previous Electrical Inspection Reports, conductor color coding is inconsistent between the line and load sides of the North Center Jack, South Center Jack, Northeast Jack, and the Southwest Jack disconnect switches (see photo E16).

Span Lock

A span lock is provided at the west end of the movable span and is used to lock the span in the centered position. This lock is manually operated and is provided with a limit switch to prevent operation of the span when the lock is inserted.

General Electrical Installation

PVC coated Rigid Galvanized Steel (RGS) is the primary conduit type used throughout the structure. Conductors are copper stranded with insulations suitable for the application.

The electrical system of the bridge was found to be in good overall general condition.

Deficiencies regarding the bridge electrical installation were recorded as follows:

- As noted in previous Electrical Inspection Reports, the PVC coated galvanized steel conduits leading into the main power and control enclosure exhibit signs of aging and deterioration.
- As noted in previous Electrical Inspection Reports, there is minor corrosion on the conduit supports located throughout the bridge.
- As noted in previous Electrical Inspection Reports, there is severe corrosion on the underground conduits feeding the east utility service enclosure (see photo E17).

Navigation Lighting and Horn

Each fender system facing the navigable channel is provided with three pedestal type 180-degree red navigation lights. The lights are fed by a conduit installation and controlled via a photo-controller and contactor housed in the operator's control panel.

The navigation lights appear to have been well installed and appear to have recently been replaced.

3 - NW missing

Four navigation lights consisting of alternate 90-degree red and green lenses are located on the movable span and are used to signal marine traffic. Span mounted navigation lights appear to have been properly installed and exhibit only minor signs of corrosion. Maintenance indicated that the lights were operational at night, but did not know where they were energized from. There is no manual control.

A separate navigation horn is mounted on the bridge truss, on the north side of the span with trumpets facing both the north and south channels. The horn warns the approaching marine traffic that the bridge is about to be operated. The horn was operated at the time of the inspection and performed adequately.

Traffic Signals

The east bridge approach is provided with two sets of traffic signals. The traffic signals are of the three-aspect type and are suspended over the roadway from a pole-mounted cantilevered arm (see photo E18). The traffic signals are manually operated from a switch at the bridge approach and timed switching is achieved via timing devices located in the electric utility enclosure. The west bridge approach was previously equipped similarly to the east approach; however, the lights and the pole have been removed and capped with a PVC junction box. MUTCD section 4J.02 states that "Traffic control at movable bridges shall include both signals and gates." The current configuration at the west approach provides neither, and is not considered an exception.

Deficiencies regarding the traffic signals were recorded as follows:

- As noted in the previous Electrical Inspection Reports, there is moderate corrosion on several interior terminals within the east and west electric service enclosures. This is likely due to the inoperable space heaters. These heaters aid in preventing condensation within the enclosure (see photo E19).
- As noted in the previous Electrical Inspection Reports, the traffic signals and gong at the west approach have been removed. As a result, the equipment within the west service enclosure is abandoned in place. MUTCD Section 4J.02 requires the use of signals at each bridge approach.
- As noted in the previous Electrical Inspection Reports, the door gasket for the west electric service enclosure has failed (see photo E20).
- The warning gong at the east bridge approach is inoperable (see photo E21).

Traffic Gates

The bridge had previously been provided with one manually operated traffic gate at each approach. These gates have been completely removed. Manually operated pedestrian gates are provided at each approach.

Deficiencies regarding the traffic signals were recorded as follows:

- The paint at the east approach pedestrian gate has failed (see photo E22).

repainted

west gate not painted entire way

Traffic Barriers

The bridge is provided with one traffic barrier gate at each approach. Each traffic barrier is provided with 3 arm lights for increased visibility and safety. The three arm lights are automatically turned on only when the limit switch under the arm is triggered. During the inspection the limit switch for each barrier gate was tested for functionality, with the east switch found to be seized in the actuated position.

These barrier gates are not provided with interlock limit switches to prevent operation of the movable span.

Deficiencies regarding the traffic barriers were recorded as follows:

- As noted in the previous Electrical Inspection Reports, the traffic barriers are not provided with interlock limit switches to prevent operation of the movable span unless the barriers are in the down position.
- As noted in the previous Electrical Inspection Reports, the SO cord for the west approach barrier gate arm lights is beginning to deteriorate (see photo E23).
- As noted in the previous Electrical Inspection Reports, cable clamps for the SO cable feeding the warning lights on each barrier gate are typically corroded (see photo E24).
- As noted in the previous Electrical Inspection Reports, the innermost warning light fixture at the east barrier gate has standing water and connections within are severely corroded. The lamp has failed as a result (see photo E25).
- As noted in the previous Electrical Inspection Reports, the latching mechanisms at both the east and west barrier gates do not engage their receivers, reducing the ability of the barriers to arrest an errant vehicle (see photo E26).
- The outermost light fixture at the east barrier gate also has standing water within (see photo E27).

repaired by electrical dept Limit switch

General, Utility, and Emergency Lighting

A lighting panel is located on the Northwest approach of the bridge with photocell sensors to automatically turn 'on' and 'off' the bridge west approach street lights. The roadway lighting has been provided and is operational on both bridge approaches.

No lighting has been provided at the main drive machinery space, jack machinery spaces and at the main power and control enclosure areas. This is considered inappropriate according to the work place safety code.

only RW light on west approach is off bridge, powered from ~~east~~ utility lines & photo control @ luminaire

- no RW lights on bridge

east approach RW light fed from ~~same~~ utility line w/ local photo control

Holiday decoration lights have been installed throughout the entire bridge structure by a volunteer organization. Although it is acceptable to use extension cords for the temporary power, the connections that have been made from extension cords are not weather proof, therefore are considered inappropriate for such application (see photo E28).

Deficiencies regarding the lighting are recorded as follows:

- As noted in the previous Electrical Inspection Reports, there is no lighting for maintenance or emergency lighting at the bridge.
- As noted in the previous Electrical Inspection Reports, the use of non-weatherproof connections for the holiday decoration lights contravenes code.

OBSERVATIONS AND FINDINGS

This report is based on a visual routine inspection of the bridge. The following sections describe the bridge and focus on the electrical installation and electrical equipment to assure the safety and reliability of the bridge.

Bridge Electrical Service

The bridge is provided with two electric utility services. The electric utility service at the west bridge approach consists of a 208/120 VAC, 3-phase, 4-wire, solidly grounded overhead service provided by a bank of three pole mounted transformers (see photo E1). This service terminates in a weatherproof, freestanding enclosure. The enclosure contains the electrical distribution equipment for the west bridge approach electrical service and a 3-phase, 50 Amp, 208 VAC feeder for the movable span. An electric utility meter is mounted on the side of the enclosure, which is the utility service entrance point for this service.

The thermostat was cranked upto 90°F, the heater did not turn ON. The 'test re-test' feature of GFCI does not work.

The electrical installation associated with the west service is operational and in good condition. ✓The enclosure is provided with a space heater, but this device was found to be inoperable at the time of inspection. ✓The enclosure also contains control relays and switches for the control of the west bridge approach traffic signals, however, the west traffic signals and gong, along with their pole, have been removed. Not sure if this was installed in the first place.

A second electrical utility meter is provided at the bridge northwest approach and is used to feed an auxiliary power panel for bridge auxiliary power, such as lighting and receptacles. All equipment for the auxiliary service appears to be in good condition.

The thermostat was cranked upto 90°F, the heater did not turn ON. The 'test re-test' function of GFCI does not work

The electric utility service at the east bridge approach consists of a 240 VAC, single phase, 3-wire service. ✓This service terminates in a weatherproof, freestanding enclosure mounted on a concrete pad at the southeast corner of the bridge approach (see photo E2). ✓The enclosure contains the electrical distribution equipment for the east bridge approach electrical service. ✓An electric utility meter is mounted on the side of the enclosure, which is the utility service entrance point for this service. The electrical installation associated with the service is operational and in fair condition. ✓The enclosure is provided with a space heater, but this device was found to be inoperable at the time of inspection. ✓As with the west electric utility service enclosure, the east service enclosure contains the control logic for the east approach traffic signals. The operation and status of this system is identical to that at the west bridge approach. ✓In addition to the conventional traffic signal control system, the enclosure also contains a Westport Fire Department control cabinet used to preempt the traffic signals.

To determine the adequacy and stability of the bridge electric utility service, the phase-to-phase and phase-to-ground voltages were measured at both the east and west bridge approaches. The results are tabulated in Table E1 below:

	Phase A to B/ Phase A to Gnd. (Volts)	Phase B to C/ Phase B to Gnd. (Volts)	Phase A to C/ Phase C to Gnd. (Volts)	Frequency (Hz)
East Service	245/123 245.9/122.9	N/A /123 NA/122.7	N/A N/A	59.98
West Service	210/121 208.5/121.7	208/121 209.2/121.3	210/121 211/121.3	59.98

Table E1
240/208 VAC Service Voltages and Frequency

The measurements of voltage were taken with all bridge auxiliaries operational, but the bridge drive system switched off and not drawing current.
From the above table, it can be seen that the no-load phase-to-phase voltages are balanced within 1.0% of the nominal or generator service voltage of 208/120 Volts.

Deficiencies regarding the electric utility service were recorded as follows:

- ~~As noted in the previous Electrical Inspection Reports, the west main electric utility metering cabinet exhibits signs of corrosion (see photo E3).~~
- ✓ As noted in the previous Electrical Inspection Reports, space heaters for the east and west electric service enclosures are inoperable (see photo E4).

Bridge Controls & Control Panels

Electrical controls for the movable span are housed within three weatherproof enclosures located on the north side of the structure at the center of the movable span. The three enclosures are of NEMA 4X design and they are in fair condition. The internal control system components were also found to be in good condition.

✓ The main power and control enclosure consists of all electrical controls and electrical starters for the movable span. The electrical starters for the jacking system are housed within the remaining two enclosures (see photos E5 and E6).

✓ The electrical control system consists of the electrical starters for the span drive motor, brake, jacks, distribution equipment, relay logic, control switches, pushbuttons, and indicator lights. The control system provides the operator with status indication for the span drive, jack position, and power availability.

✓ The control logic for bridge operation consists of control relays manufactured by Allen Bradley (Type P). The relays are properly installed within the main bridge enclosure and are clearly identified with all wiring labeled.

The electrical motor starter for the span drive motor consists of a soft-start unit manufactured by Allen-Bradley. The electrical starter equipment is properly installed within the main bridge control enclosure and clearly identified with all wiring labeled.
Also contains reversing contactors w/ overloads
Each jacking system enclosure consists of motor controllers for three jack actuators; one enclosure serving the northeast jack and both center jacks system and one enclosure serving the southeast and both west jacks. Each jack actuator motor controller consists of a circuit breaker and reversing starter with properly sized thermal overload relays all manufactured by Square D. The electrical starter equipment is properly installed within the three enclosures and clearly identified with all wiring labeled.

Previous reports indicated that span centering was achieved using an automated system that jogged the span into place in one-second intervals. Over the course of several openings of the span, there was no automatic centering of the span observed. The span stopped reliably on command without any unnecessary jogging.

In general, the bridge controls functioned as designed and were found to be in satisfactory condition at the time of inspection. Although the control relays are in fair condition, they appear to have a significant portion of their useful lives remaining.

Deficiencies regarding the bridge controls and control panels were recorded as follows:

- As noted in the previous Electrical Inspection Reports, there is ~~minor~~ significant corrosion at the bottom within the interior of the main power and control enclosure at the center span (see photo E7).
  Wire nuts at the back of the control panel.
- As noted in the previous Electrical Inspection Reports, there are combustible materials stored within the interior of the main power and control enclosure at the center span (see photo E7). Miscellaneous items / screw drivers
  All lights on the control panel are push to test. All light bulbs work.
- As noted in the previous Electrical Inspection Reports, the space heater within the interior of the main power and control enclosure did not appear to function during testing. Additionally, the heater has charred the plastic cable tray within the enclosure at some point.
- As noted in the previous Electrical Inspection Reports, the span jacks can be driven when the span is not fully centered or locked, creating a potential for equipment damage.
  'Power ON' and 'South Center Jack Driven' light did not turn ON.
- There are wire nut splices within the left starter cabinet. This is a violation of AASHTO Article 8.9.2 (see photo E8).
  Center Jack control legend plate is missing.
- The legend plates for the jack selector switches are not secure (see photo E9).

~~Movable Span Drive Motor~~

~~The movable span drive system consists of one main drive induction motor with an associated shaft-mounted, solenoid-operated brake. The motor is provided with a double extension shaft. One shaft is connected to the brake and a speed reducer, which in turn drives a rotary cam type limit switch. The second motor shaft extension is~~

Field Feedback Devices

For the barrier gates, the arm position of each gate is monitored by one lever arm limit switch located under the gate arm. This switch provides control for the arm lights and warning gongs. Gate arm lights do not turn ON/not functional

The jack positions are monitored by limit switches in order to provide interlocks to prevent operation of the drive motor unless all jacks are fully raised. Each jack is provided with a "Pulled" and "Driven" proximity type limit switch at the jack, as well as a rotary cam limit switch located near the jack motor after the right-angle reducer. Rotary cam limit switches at each jack location exhibit severe corrosion and water intrusion. These switches appear to be in NEMA 4 enclosures and are not suitable for the location at which they are installed.

A single rotary cam limit switch associated with the span drive provides span position data for the bridge control logic system (fully centered, nearly closed, nearly open and span fully open). The rotary cam limit switch is housed in a NEMA 4 enclosure and has been properly installed with all conductors well terminated and labeled. The limit switch exhibits light corrosion. A separate end-of-travel lever arm limit switch is provided as backup in the event of rotary cam limit switch failure and is used to prevent over-travel of the span. This over-travel limit switch is a sealed lever-arm type unit.

A sealed lever-arm type limit switch is installed at the centering pin. This switch prevents the span from operating when the centering pin is in place. This limit switch is well installed and is well integrated into the bridge control system (see photo E10).

Deficiencies regarding the field feedback devices were recorded as follows:

- As noted in the previous Electrical Inspection Reports, there is severe corrosion and evidence of water intrusion at each span jack rotary cam limit switch enclosure (see photos E11 and E12). Fasteners at the northwest span jack limit switch enclosure are seized.
- There is mild corrosion at the span position rotary cam limit switch (see photo E13).
- The "Pulled" proximity limit switch at the southeast span jack is damaged. It was necessary to use the span jack bypass switch in order to open the span (see photo E14).
- The limit switch at the east barrier gate arm is seized in the actuated position (see photo E15).

Jacks

The movable span is provided with six span lifting jacks. The actuators are squirrel cage induction type motors equipped with 50 Watt space heaters and shaft mounted Stearns type brakes. Each jack motor is provided with a NEMA 4X stainless steel disconnect switch within reach. The jack motors are in good condition.

The navigation lights appear to have been well installed and appear to have recently been replaced.

Four navigation lights consisting of alternate 90-degree red and green lenses are located on the movable span and are used to signal marine traffic. Span mounted navigation lights appear to have been properly installed and exhibit only minor signs of corrosion. Maintenance indicated that the lights were operational at night, but did not know where they were energized from. There is no manual control.

A separate navigation horn is mounted on the bridge truss, on the north side of the span with trumpets facing both the north and south channels. The horn warns the approaching marine traffic that the bridge is about to be operated. The horn was operated at the time of the inspection and performed adequately.

Traffic Signals

The east traffic lights are not operational. Police stop at the east and west intersection to block traffic. No manual operations were made to the traffic signals.

The east bridge approach is provided with two sets of traffic signals. The traffic signals are of the three-aspect type and are suspended over the roadway from a pole-mounted cantilevered arm (see photo E18). The traffic signals are manually operated from a switch at the bridge approach and timed switching is achieved via timing devices located in the electric utility enclosure. The west bridge approach was previously equipped similarly to the east approach; however, the lights and the pole have been removed and capped with a PVC junction box. MUTCD section 4J.02 states that "Traffic control at movable bridges shall include both signals and gates." The current configuration at the west approach provides neither, and is not considered an exception.

Deficiencies regarding the traffic signals were recorded as follows:

- As noted in the previous Electrical Inspection Reports, there is moderate corrosion on several interior terminals within the east and west electric service enclosures. This is likely due to the inoperable space heaters. These heaters aid in preventing condensation within the enclosure (see photo E19).
- As noted in the previous Electrical Inspection Reports, the traffic signals and gong at the west approach have been removed. As a result, the equipment within the west service enclosure is abandoned in place. MUTCD Section 4J.02 requires the use of signals at each bridge approach.
- As noted in the previous Electrical Inspection Reports, the door gasket for the west electric service enclosure has failed (see photo E20).
- The warning gong at the east bridge approach is inoperable (see photo E21).

Not sure, this could not be verified.

Traffic Gates

The bridge had previously been provided with one manually operated traffic gate at each approach. These gates have been completely removed. Manually operated pedestrian gates are provided at each approach.

Deficiencies regarding the traffic signals were recorded as follows:

- The paint at the east approach pedestrian gate has failed (see photo E22).

Traffic Barriers

The bridge is provided with one traffic barrier gate at each approach. Each traffic barrier is provided with 3 arm lights for increased visibility and safety. The three arm lights are automatically turned on only when the limit switch under the arm is triggered. During the inspection the limit switch for each barrier gate was tested for functionality, with the east switch found to be seized in the actuated position. The west limit switch is not seized but is not used for interlocking and control.

These barrier gates are not provided with interlock limit switches to prevent operation of the movable span.

Deficiencies regarding the traffic barriers were recorded as follows:

- As noted in the previous Electrical Inspection Reports, the traffic barriers are not provided with interlock limit switches to prevent operation of the movable span unless the barriers are in the down position.
- As noted in the previous Electrical Inspection Reports, the SO cord for the west approach barrier gate arm lights is beginning to deteriorate (see photo E23).
- As noted in the previous Electrical Inspection Reports, cable clamps for the SO cable feeding the warning lights on each barrier gate are typically corroded (see photo E24).
- As noted in the previous Electrical Inspection Reports, the innermost warning light fixture at the east barrier gate has standing water and connections within are severely corroded. The lamp has failed as a result (see photo E25). No water was seen
- As noted in the previous Electrical Inspection Reports, the latching mechanisms at both the east and west barrier gates do not engage their receivers, reducing the ability of the barriers to arrest an errant vehicle (see photo E26).
- The outermost light fixture at the east barrier gate also has standing water within (see photo E27). Water could not be seen

None of the east & west gate arm lights were functional.

The west gate does not have a latching mechanism. The east gate has a manual latching mechanism but was not latched @ the time of the inspection

General, Utility, and Emergency Lighting

A lighting panel is located on the Northwest approach of the bridge with photocell sensors to automatically turn 'on' and 'off' the bridge west approach street lights. The roadway lighting has been provided and is operational on both bridge approaches.

No lighting has been provided at the main drive machinery space, jack machinery spaces and at the main power and control enclosure areas. This is considered inappropriate according to the work place safety code.

Current recordings of all 6 jack motors raising and lowering on phase B along with opening and closing of phase B of the span drive motor (use 6 meters and move the current clamp from the first jack that operates to the span motor and then back once fully closed)

Operational sequence notes:

1. The police cars station themselves at the east and west approaches
2. Maintenance manually lowers east and west gates

Open Span: Operator retracts all jacks, maintenance pulls the centering pin out. Operator sounds the bridge horn. Operator opens the span by pressing 'Open' pushbutton

Close span: The operator closes the span by pressing 'Close' pushbutton. The span begins to close and stops at near close position. The operator closes the span by pressing 'Jog' pushbutton and manually aligns the span. After aligning, the maintenance inserts the centering pin. Operator drives all the jacks. Maintenance raises all the gates.

CURRENT READINGS

1. SE Jack – Meter 1 – ØA - Saved as Motor 1
2. NC Jack – Meter 2 – ØA - Saved as Motor 1
3. SC Jack – Meter 5 – ØA - Saved as Motor 1
4. NW Jack – Meter 4 – ØA - Saved as Motor 1
5. SW Jack – Meter 3 – ØA - Saved as Motor 1
6. NE Jack – Meter 6 – ØA - Saved as Motor 1
7. Main motor – Meter 5 – ØA - Saved as Motor 2

Interlock testing:

1. With the span partially open (end clear of abutment) and the centering pin removed, attempt to lower an end jack

EXPECTED RESULT: jack should not lower PASS / FAIL ✓

End Jacks can be lowered

2. With the span partially open and one end jack fully lowered, attempt to open and close the span

EXPECTED RESULT: Span should not move in either direction. PASS / FAIL ✓

The span moved in either direction

3. With the span partially open and the centering pin installed, attempt to open and close the span

EXPECTED RESULT: Span should not move in either direction. PASS / FAIL ✓

The span did not move in either direction

APPENDIX E: TIME AT BRIDGE SITE

TIME AT BRIDGE SITE

Bridge Number: 01349

Inspection Date: 10/16/18 to 10/17/18

Personnel	Tuesday	Wednesday
Jonathan Gerhart	8:00 AM to 5:30 PM	8:00 AM to 9:30 AM

Inspection Date: 11/05/18

Personnel	Monday
Neha Bhinge	12:00PM to 3:30 PM
Kyle Gable	12:00PM to 3:30 PM

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: TE3 Review
Assigned To: Baihai Wang
Work Item ID: 01349-2019-0009
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: MISCELLANEOUS:

1. Various components do not have fresh lubrication or do not show signs that plugs are being removed during lubrication.
2. Throughout the machinery system, various supports, housings, couplings, connecting bolts, and shafts exhibit minor to severe paint failure and corrosion.
3. There are oil and lubrication leaks at multiple bearing/coupling seals and reducer drains.
4. During operation, the span guard rails rub against the approach guard rails.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: TE3 Review
Assigned To: Baihai Wang
Work Item ID: 01349-2019-0008
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: SPAN SUPPORT AND ALIGNMENT:

1. The balance wheel clearance with the track ranges from 0 to 0.288 inches while the design clearance was 1/16 inches. The wheels slide against the track instead of rotating.
2. The balance wheel bearing bushing clearance is well outside the range for an RC6 fit for most of the wheels.
3. There are no limit switches to disengage all screw jack motors when the screw jacks are being operated manually which creates a hazard.
4. All screw jack gear reducer desiccants are expired.
5. The oil samples taken from the south center jack reducers showed signs of water contamination.
6. The oil sample taken from the southeast end jack upper reducer showed signs of water contamination. The northwest and southeast upper end jack gear reducer dipsticks show that the oil level is low.
7. The screw jack lower reducers do not have a dipstick, sight glass, or any other means to monitor the oil level.
8. The screw jack couplings do not have lubrication fittings on them and the plugs are painted over showing no signs of recent lubrication.
9. Screw jack bearing surfaces have moderate to severe corrosion with delamination. There are small gaps under the end screw jacks with the base when fully driven. The gaps are not the entire way through the interface.
10. There appears to be a leak coming from the center pivot bearing at the northeast corner purging out over the top of the strip seal.
11. The fully closed rigid stop is deformed, most likely from hard impact with the span.
12. The centering device has moderate paint failure and corrosion.

Date Completed:
Actual Quantity:

Form: Maintenance
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER

:Bridge No 01349

Town: WESTPORT
Inventory Route: Non-NHS

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: TE3 Review
Assigned To: Baihai Wang
Work Item ID: 01349-2019-0007
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: SPAN DRIVE MACHINERY:

1. There is a gap at the split on coupling C2 (between the main motor and right angle reducer) with lube leaking out of the gap.
2. The coupling on the motor rear shaft (C3) is leaking (missing gasket) and interferes with the span control reducer during operation.
3. The right angle gear reducer drain plug is corroded and not able to be removed preventing an oil test.
4. Very heavy accumulation of dirt/debris on top of the right angle reducer, which is trapping moisture and causing corrosion.
5. The right angle gear reducer desiccant is expired.
6. The main pinion shaft is covered in excess lube coming from the pinion shaft bearing seals.
7. The lower pinion bearing has a corroded plug in the lubrication port and no lubrication fitting.
8. The open gearing teeth have little to no fresh lubrication on them and are corroded.
9. The most north section of the rack segment is filled with water.
10. It appears that the bridge comes to an uncontrolled stop after the motor deenergizes and the brake sets. The swing span oscillates by moving through the backlash on both sides of the pinion tooth.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: TE3 Review
Assigned To: Baihai Wang
Work Item ID: 01349-2019-0006
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Electrical
Structural Component: N/A

Comments:
1. There is minor corrosion on the east meter cabinet and also on the west meter cabinet.
2. There is minor corrosion on the interior terminals and conduits in the east and west service cabinets.
3. The electric space heaters in the east and west service cabinets are not functioning.
4. The GFCI test and reset buttons are not functioning in the east and west service cabinets.
5. The west service cabinet door gasket is damaged.
6. There are miscellaneous items stored in the bottom of the left cabinet and the center cabinet.
7. There are splices made with wire nuts in violation of AASHTO Article 8.9.2 within the left cabinet and on the backside of the interior panel in the center cabinet.
8. The bottom of the center cabinet has moderate corrosion.
9. The southwest end jack legend plate is missing.
10. The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
11. Minor corrosion on the span rotary cam limit switch.
12. Moderate corrosion and a damaged gasket on the SW jack rotary cam limit switch.
13. Moderate corrosion and the cover could not be opened on the NW jack rotary cam limit switch.
14. Moderate corrosion on the SE jack rotary cam limit switch.
15. Moderate corrosion and a damaged gasket on the north center jack rotary cam limit switch
16. Moderate corrosion, damaged gasket, and the bottom wingnut is missing on the south center jack rotary cam limit switch.
17. The west barrier gate arm lever arm limit switch can seize in the actuated position and there is minor corrosion on the conduit fitting.
18. The east barrier gate limit switch is permanently seized in the actuated position.
19. Missing driven south center proximity limit switch.
20. The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
21. The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for both center jack locations and the NE and SW end jacks.
22. Water is present in the bottom of the NE end jack motor disconnect.
23. Missing nameplate and minor corrosion on cover and conduit fitting of the NE end jack motor disconnect.
24. Minor corrosion on conduit clamps throughout bridge.
25. Severe corrosion on underground conduit at the east shore service cabinet.
26. The southwest, northeast, and southeast span navigation lights were not operational.
27. The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02.
28. The east approach traffic signals and gong were not operational.
29. Striping on the west pedestrian gates stops before the end of the gate.
30. The barrier gates were not fully engaged in the receiver when lowered on both approaches.
31. None of the barrier gate lights were operational.
32. No lighting for maintenance is provided on the bridge.
33. Barrier gates are not interlocked with control system.
34. Centering device is not interlocked with jack control.
35. Jacks are not interlocked with span movement.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Bridge Maintenance Garage
Assigned To: District_3 Bridge
Work Item ID: 01349-2018-0005
Date Issued: 11/07/2018
Priority: Priority Repair
Deficiency: Sidewalk/ Safety Walk
Structural Component: Deck
Comments: - The northeast approach sidewalk has settled up to 1” adjacent to bridge sidewalk.
- There is vertical misalignment between adjacent sidewalk planks up to 1” deep at Pier 2.
Please repair the above deficiencies.

Date Completed:
Actual Quantity:



Bridge from the east approach, looking west.

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status:	Bridge Maintenance Garage	Assigned To:	District_3 Bridge	Work Item ID:	01349-2018-0003
Date Issued:	11/06/2018	Priority:	Routine Repair		

Deficiency: Sidewalk/ Safety Walk
Structural Component:
Comments: The safety walk along the west side of Pier 2 has a missing plank

Date Completed:
Actual Quantity:



Span 2 at Pier 2, missing plank at fender system at northwest end.

Inspection Type: Fracture Critical and Routine and Underwater

BRIDGE NO. 01349

83500 - WESTPORT

ROUTE 136

over

SAUGATUCK RIVER

Fracture Critical and Routine and
Underwater Inspection

9/16/2020

Inspected by: Baker Engineering

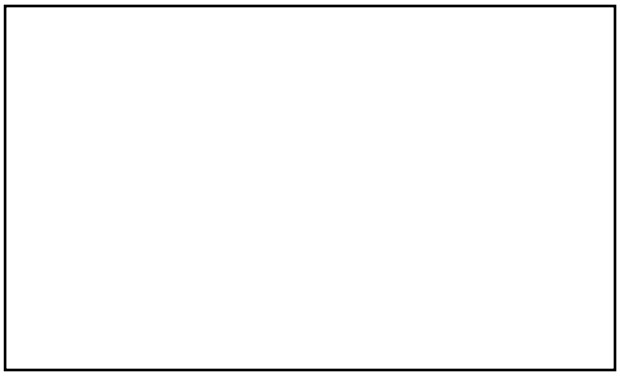


TABLE OF CONTENTS

Section	Page Number
Report Title Page	1
Location Map	2
In-Depth Components	3
Structure Inventory and Appraisal (BRI-19)	4
Inspection Data (BRI-18)	9
National Bridge Elements	19
Underwater Inspection (BRI-59)	21
Underwater Inspection (BRI-58)	22
Fracture Critical Data (BRI-12)	26
Sketches	29
UW Drawings	59
Pictures	70
Mechanical Report	131
Electrical Report	216
Highway Bridge Work Items	297

Bridge No. 01349, Route 136 over Saugatuck River, Westport

Inspected By: Michael Baker International, Inc. Date: 09/16/2020



Professional Certification: I hereby certify that this report, including all of its contents, has been approved by me, and that I am a duly licensed professional engineer under the laws of the State of Connecticut.

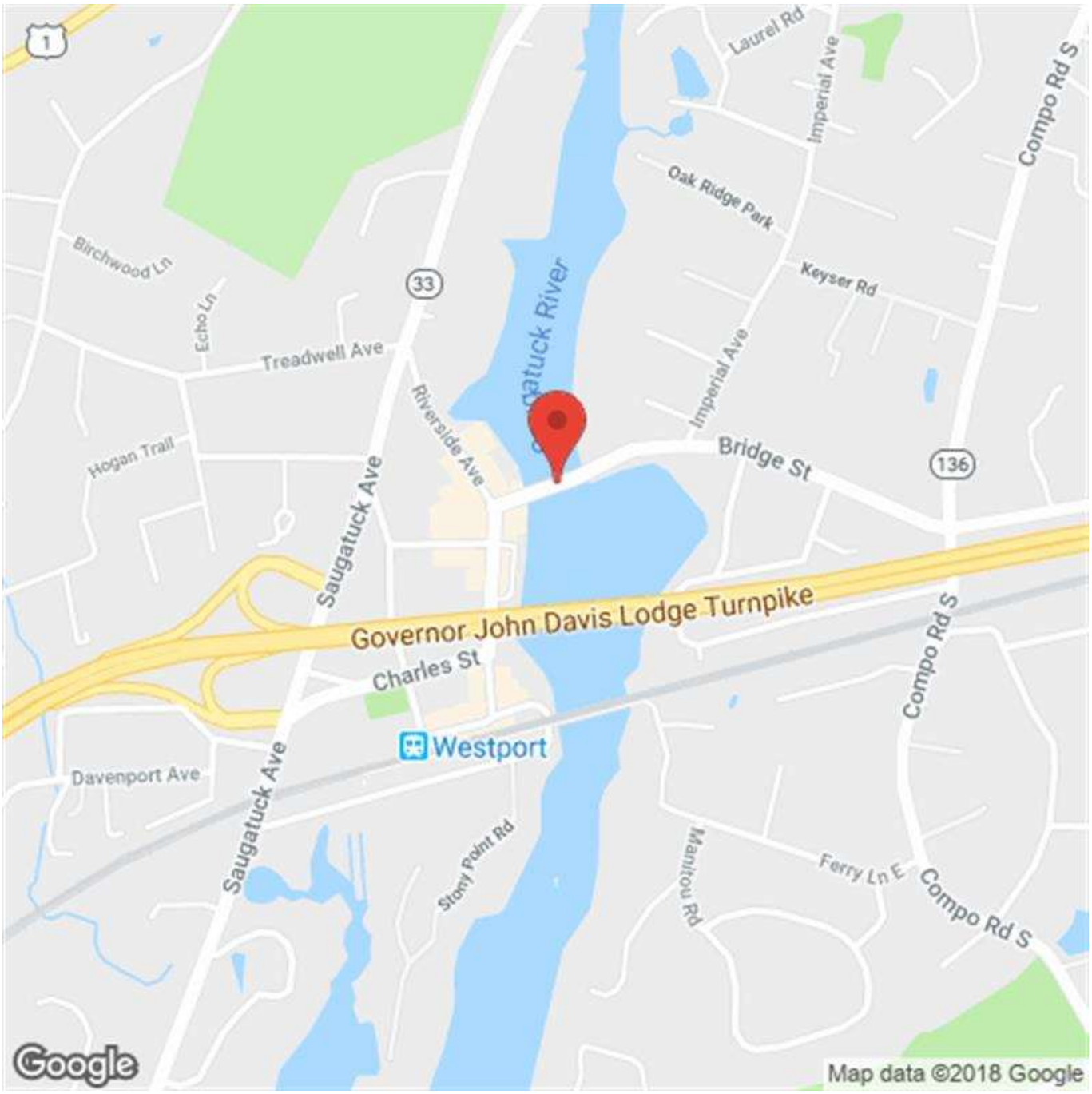
Signature:

License No.: CT PE 20004 *Date: 10/23/2020*

Form: Location
Inspection type: Fracture
Inspection Date: 9/16/2020
Inspected by: Baker Engineering

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



Location Map # 1

Bridge No. 01349
Route 136 over Saugatuck River
Westport, CT

In-Depth Components

Bridge: 01349

Town: 83500 - WESTPORT

Carried: ROUTE 136

Crossed: SAUGATUCK RIVER

In-Depth - 1

Component:	Steel Multi-Girders
Comments:	Hands-on inspection of open holes in longitudinal girder webs in spans 1-2. Note: All other fatigue category E & intersecting welds are between fracture critical box/pivot girders and longitudinal girders. Thus, should be inspected every inspection.
Access Requirements:	Raft and scaffolding.

Last Inspected: 11/09/2012 Frequency: 120 Inspection Due Date: 09/16/2022

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/16/2020
Inspected by: Baker Engineering

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

STRUCTURE INVENTORY & APPRAISAL

INSPECTION

Structurally Deficient	Y	Functionally Obsolete	N
Sufficiency Rating	4.0		
(90) Inspection Date	09/16/2020	(91) Frequency	24
Indepth Insp	No	Proposed next Indepth Year	
Deck Survey Date	1/1/1900	Class	03
Access	40 - Boat or raft (other than inflatable boats issued to inspection teams)	Flagman	0

	Frequency	Date	Type
Fracture	24	09/16/2020	J Steel Pier Caps, welded box or plate girders
Underwater	24	09/16/2020	B Underwater Only
Special			

IDENTIFICATION

Bridge Name	WILLIAM F. CRIBARI MEMORIAL BRIDGE
Town Code - Name	83500 - WESTPORT
(5) Inventory Route	
(A) Record Type	1: Route carried "on" the structure
(B) Signing Prefix	3 - STATE HIGHWAY
(C) Level of Service	1 - MAINLINE
(D) Route Number.	00136
(E) Dir Suffix	0 - NOT APPLICABLE
(6A) Featured Intersected	SAUGATUCK RIVER
(6B) Critical Facility Indicator	
(7) Facility Carried	ROUTE 136
(9) Location	BETWEEN I-95 EXIT 17 & 18
(11) Mile Post	8.65 Miles
(16) Latitude	41 Deg. 7 Min. 21.94 Sec.
(17) Longitude	-73 Deg. 22 Min. 8.77 Sec.
(98) Border Bridge	
(A) State Code	(B) Percent Responsibility %
(C) Border Town Name	
(99) Border Bridge Structure No.	

STRUCTURE TYPE & MATERIALS

(43) Structure Type, Main	
A) Material	4 - Steel continuous
B) Design Type	17 - Movable - Swing
(44) Structure Type, Approach	
A) Material	4 - Steel continuous
B) Design Type	02 - Stringer/Multi-beam or Girder
(45) Number of Spans, Main Unit	002
(46) Number of Approach Spans	0002
(107) Deck Structure Type	5 - Steel Plate (inclues orthotropic)
(108) Wearing Surface/Protection Systems	
A) Type of Wearing Surface	6 - Bituminous
B) Type of Membrane	1 - Built-up
C) Type of Deck Protection	0 - None
Substructure	
A) Material	1 - STONE
B) Design Type	1 - FULL HEIGHT STEM
Paint	
Type	
Year	
Comment	

GEOMETRIC DATA

(48) Length of Maximum Span	70 ft.
(49) Structure Length	287 ft.
(50) Curb or Sidewalk Widths	
A) Left	3 ft. 8 in.
B) Right	0 ft. 0 in.
(51) Bridge Roadway Width Curb to Curb	19 ft. 6 in.
(52) Deck Width, Out to Out	20 ft. 0 in.
(32) Approach Roadway Width	21 ft.

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/16/2020
Inspected by: Baker Engineering

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

(33) Bridge Median: 0 - No median

Deck Area: 7653 sq. ft.

(34) Skew Angle: 00 deg.

(35) Structure Flared: 0 - No flare

(10) Inv. Rte. Min. Vert. Clearance: 13 ft. 10 in.

(47) Inv. Rte. Total Horiz. Clr.: 19 ft. 6 in.

Log Inv. Rte. Total Horiz. Clr.: 19 ft. 6 in.

RLog Inv. Rte. Total Horiz. Clr.: 0 ft. 0 in.

(53) Min. Vert. Clearence Over Bridge: 12 ft. 10 in.

(54) Log-Min. Vert. Underclearance: N ref. 0 ft. 0 in.

(55) Min. Lat Underclearance on Right: N ref. 0 ft. 0 in.

(56) Min. Lat Underclearance on Left: 0 ft. 0 in.

AGE AND SERVICE

Year Built: 1870 (106) Year Reconstructed: 1993

(42) Type of Service

A) On: 1 - Highway

B) Under: 5 - Waterway

(28) Number of Lanes

A) On: 02 B) Under: 00

(29) Average Daily Traffic: 14600

Is Above Half ADT?: No

(109) Precent Truck: 5 %

(30) Years of ADT: 2017

(19) Bypass, Detour Length: 1 Miles

CONDITION

(58) Deck: 5

(59) Superstructure: 5

(60) Substructure: 4

(61) Channel & Channel Protections: 5

(62) Culverts: N

(36) Traffic Safety Features

A) Bridge Railings: 0

B) Transitions: 0

C) Approach Guardrail: 0

D) Approach Guardrail Ends: 0

APPRAISALS

(67) Structural Evaluation: 2

(68) Deck Geometry: 2

(69) Underclearances, Vert. & Horiz.: N

(71) Waterway Adequacy: 8

(72) Approach Roadway Alignment: 6

(113) Scour Critical: 8

COMMENTS

Item 27 = 1870(Do Not Change): Oldest Swing Span in United States.

WATERWAY

Drainage Basin Waterway: 7200 - Saugatuck River

(38) Navigation Control: 1 - Navigation control on waterway (bridge permit required)

(39) Navigation Vertical Clearance: 7 ft.

(40) Navigation Horiz. Clr.: 50 ft.

(111) Pier/Abutment Navigation: 2 - In place and functioning

(116) Vert-Lift Brg Nav Min: ft. In.

CLASSIFICATION

(112) NBIS Bridge Length: Yes

(104) Highway System: 0 - Structure/Route is NOT on NHS

(26) Functional Class: 16 - Urban - Minor Arterial

(100) Defense Highway: 0 - Not a STRAHNET route

(101) Parallel Structure: N - No parallel structure

(102) Direction of Traffic: 2 - 2-way traffic

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/16/2020
Inspected by: Baker Engineering

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

(103) Temporary Structure	
(110) Designated National Network	0 - Inventory route not on network
(20) Toll	3 - On Free Road
(21) Maintain	01 - State Highway Agency
(22) Owner	01 - State Highway Agency
Report Class	S - STATE
(37) Historical Significance	1 - On National Register

POSTED SIGNS

Other Posted Sign 1	8 - Other warning signs
Other Posted Sign 2	

	Actual	Recomended	
Posted Load Single Unit Truck			tons
Posted Load Semi-Trailer Truck			tons
Posted Load 4 Axle Truck			tons
Posted Load 3S2 Truck			tons
All Vehicles	20	20	tons

Posted Vert. Clearance on Bridge	12	ft. 7	in.
Posted Vert. Underclearance		ft.	in.
Posted Speed Limit on Bridge	25	m.p.h.	

OTHER FEATURES

Fence Required	No
Fence Present	Yes
Fence Type	2 - Chain Link
Fence Height	4.3
Fence Material	2 - Steel
Fence Top Type	1 - Vertical
Barrel Ladders	No
Stand Pipes	No
Catwalks	No

PROPOSED IMPROVEMENTS

(75A) Type of Work Proposed	31 - Replacement - Load/Geometry
(75B) Work Done By	1 - Work to be done by contract
(76) Length of Structure Improvement	ft.
(94) Bridge Improvement Cost	$
(95) Roadway Improvement Cost	$
(96) Total Project Cost	$ 40000
(97) Year of Improvement Estimate	2016
(114) Future ADT	21694
(115) Year of Future ADT	2037
DOT Bridge Program List No	28
Project No	0158-0214
Advertised Date	11/27/2024

LOAD RATING & POSTING

(31) Design Load	5 - HS 20
(63) Operating Rating Type	8 - Load and Resistance Factor (LRFR) rating reported by rating factor (RF) method using HL93 loading
(64) Operating Rating	0.40
(65) Inventory Rating Type	8 - Load and Resistance Factor (LRFR) rating reported by rating factor (RF) method using HL93 loading
(66) Inventory Rating	0.31
Evaluation Code	F - Load & Resistance Factor Rating
Year of Evaluation	2017
(70) Bridge Posting	0 - More than 39.9% below legal loads
(41) Structure Status	P - Posted for Load

Moveable Inspection System	No
Haunches Present over Roadway	NO
Utilities	U | Unknown Duct

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/16/2020
Inspected by: Baker Engineering

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

INSPECTOR'S SIGNATURES:

1) Date: 10/22/2020

2) Date: 10/23/2020

3) Date:

4) Date:

P.E. SIGNATURE: Date: 10/23/2020

P.E. # 20004

Reviewed By: Adam Taddonio Date: 11/10/2020

Form: BRI-18, Rev. 1/14
Inspection type: Fracture
Inspection Date: 9/16/2020
Inspected by: Baker Engineering

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

FIELD INSPECTION REPORT

Location:	BETWEEN I-95 EXIT 17 & 18	Year Built:	1870	Snooper Required:	☐
Main Material:	4 - Steel continuous	Year Rebuilt	1993	Snooper Used:	☐
Main Design:	17 - Movable - Swing				

Inspectors:

Lead Inspector:	Albert Ho
Inspector:	Task:
Balboni,Michael	BSE - Inspector
Fadelici,Bryce	BSE - Inspector
Gentile,Jason	BSE - Inspector
Ho,Albert	BSE - Inspector
Hueber,Conor	BSE - Inspector
Kurasz,Tomasz	BSE - Inspector
Sirotko,Stephen	BSE - Inspector

Visits:

Visit Date:	Temp:	Start Time:	End Time:
09/16/2020	70	08:30 AM	03:15 PM
09/17/2020	70	08:30 AM	01:00 PM
09/24/2020	57	08:15 AM	01:45 PM

58. DECK:

Overall Rating: 5

Rating		
Overlay:	5	- Heaving/wheel line rutting up to 2" high/deep. - Random linear cracks up to 1/4" wide. - Raveling adjacent to curbs up to 6" wide x 1/2" deep. - Raveling adjacent to span 2, pier 2 steel joint plate up to 1" deep. - Three scrapes up to 6" long x 2" wide x 1" deep in span 3. See field sheets and photos 10, 12 & 17-18.
Deck - Str. Condition:	5	Welded steel plate deck in spans 1 & 2 (swing spans) that functions as a top flange for girders: - See "Girders" item below. Exodermic deck in spans 3 & 4 (fixed spans): - Random light rust. - Deck overhangs have random laminated rust with perforations up to 2' x 1' around weeps/scuppers. See field sheets and photos 2-3 & 11.
Curbs:	6	Steel channel curbs: - Moderate rust and isolated laminated rust with up to 1/8" deep section loss. - Minor scrapes. - East end of north curb is a 6" high blunt/sharp edge that is bent back 1" from impact. - Average curb reveal is 7" at both sides. - Northeast approach curb is missing for 2' long with an exposed rebar. See field sheets and photos 12 & 17-19.
Median:	N	
Sidewalks:	5	Timber plank sidewalk at north side of bridge: - Random planks are misaligned and bent up at the ends up to 1/2" high. - Minor checks and wear. - Previously noted vertical misalignment between planks at pier 2 repaired/not seen this inspection. - Two planks at the northwest approach adjacent to bridge are disconnected/loose. - BS&E & DOT Maintenance were notified of this condition at time of inspection.

		Timber sidewalk stringers & transverse steel support members: - Extra timber stringer between stringers 1 & 2 over abutment 1, pier 1 and pier 2. - Checks up to 1/4" wide along the bottom. - Random connection bolts or nuts are backed off, loose and/or missing. - Connection brackets have laminated rust and up to paper thin remaining and up to 1.5" perforations. - This condition is typically along the bottom 4" of brackets. - Support beam top flanges have up to full width x 2" long x 1/8" deep section loss adjacent to brackets. - Support beams in swing spans have flame cut flanges at random locations. Concrete approach sidewalk at northwest: - Isolated 4' long x 3/8" wide transverse crack. Bituminous approach sidewalk at northeast: - Previously noted settlement adjacent to bridge repaired/not seen this inspection. See field sheets and photos 13-16.
Parapet:	N	
Railing:	6	Metal W-beam rails: - Isolated post base plates with heavy laminated rust. - Random light to moderate impact damage. - Span 1, south railing at abutment 1 has a post bent east +/-1'. - Span 2, north railing has a 3' long x 2" high tear. - Northeast corner with heavy impact damage with isolated tears up to 3" x 1". - +/-1' gap between bridge and approach rail at northeast due to missing approach end treatment. - Previously noted rubbing ends at northwest corner repaired/not seen this inspection. - Previously noted disconnected post at span 3, south railing repaired/not seen this inspection. - 20' of guide rail attached directly to truss members above north rail to protect electrical box at pier 1. Sidewalk railing with chain link fence: - See "Fence" item below. See field sheets and photos 10, 12 & 17-19.
Paint:	7	- Less than 10% of painted surfaces deteriorated; also, see "Fence" item below.
Fence:	7	Chain link fence & rail along north sidewalk: - Previously noted missing connection bolts in span 1 at pier 1 replaced/not seen this inspection. - Previously noted disconnected fence at this location also not found/repaired. - Rating increased due to repair. See field sheets and photos 12-13.
Drains:	6	Scuppers: - Grates are up to 66% clogged; all down pipes are clear. - Grates have settled up to 2" deep relative to the overlay. - Span 4, north center grate concrete apron has an 18" long x 6" wide x 1" deep spall. PVC weeps: - No significant deficiencies. See field sheets and photos 11 & 17.
Lighting Standard:	N	

Overall Utility Condition Rating	6 - Fair

Utility Type/Size

U | Unknown Duct	- Several utility conduits attached to underside of superstructure with no

		notable deficiencies. - In span 1 at the north sidewalk, there is one missing utility cover & one cover with no bolts (can be lifted by hand). See field sheets and photo 13.
Construction Joints:	N	
Expansion Joint:	6	Steel-armored open joints at abutment 1 and pier 2: - Random nicks and gouges in steel armor. Strip seal joint at abutment 2: - Steel extrusion at bridge side was loose in westbound lane. - Critical "B" was issued at time of inspection. - Portions of strip seal removed and filled with bituminous at time of inspection by DOT Maintenance. - Rating lowered since abutment 2 joint is no longer a formal joint. See field sheets and photos 18-20.

Haunches Present over travelway? NO

APPROACH CONDITION:

Overall Rating: 6

Rating

Approach Slab:	N	- None per plans.
Relief Joints:	N	
Approach Guide Rail:	5	Metal beam railings: - Minor scrapes and dents. - Northwest approach metal beam rail near west traffic gate is missing an end treatment. - Northeast approach metal beam rail adjacent to bridge is missing an end treatment. - Boxing glove ends at west approaches have heavy impact damages. See field sheets and photos 6-9 & 19-21.
Approach Pavement:	7	- Newer pavement installed since last inspection. - East approach adjacent to concrete header with up to 1" deep settlement (smooth transition). See field sheets and photos 6-7.
Approach Embankment:	8	

Trafic Safety Features

Bridge Railings:	0	Do not meet standards for Non-NHS bridges.
Transitions:	0	Do not meet current standards (steel block-outs and not continuous).
Approach Guardrails:	0	Do not meet current standards (steel block-outs).
Approach Guardrail Ends:	0	Do not meet current standards (blunt ends at the west approach).

59. SUPERSTRUCTURE:

Trusses are ornamental and do not carry live load, only self-weight.

Overall Rating: 5

Rating

Bearing Devices:	6	Elastomeric bearings under trusses and girders in spans 3 and 4: - Pads in neutral position and have slight tilts up to 1/4" at 70°F. - Sole plates are typically bowed/dished up to 1/2" (appears as-built). - Plates typically have light to moderate rust, but up to laminated rust at abutment 2 bearings.

		- Truss 1 bearing on box girder at abutment 1 has a 4" x 6" x 1/4" gap under pad (covered by debris). - Truss 2 bearing on box girder at abutment 1 has a backed off anchor bolt nut. Original truss bearings: - Up to laminated rust on plates and components. - Up to 25% section loss to rivet heads at pier 1 bearings. - Bearings at pier 2 have up to 100% section loss at 3 of 4 spacers at anchor bolts. - Bearings at pier 2 have up to 50% section loss on anchor and/or drop bolt nuts. - Bearings at pier 2 also have anchor bolt nuts backed off up to 1". - Truss 1 bearing at abutment 2 has 100% section loss on spacers. - Up to heavy debris on bearings at abutment 2. Swing span screw jack bearings at abutment 1 and piers 1 and 2: - See 2020 Mechanical inspection report. See field sheets and photos 22-27.
Stringers:	N	
Girders:	6	Plate girders: - Random peeling paint and up to laminated rust with negligible section loss, typically near weeps. - Top and bottom of webs adjacent to weeps with up to 1' long x 4" high x 1/8" deep section loss. - Span 2, girder 7 bottom flange near mid-span has minor scrapes with light rust. - Span 1, girders 2-5 near abutment 1 are bowed +/- 1/8" over full height at welded splice (no change). Spans 1-2 girders with a common top plate (flange), continuous across all girders & across pier 1: - Random peeling paint. - Isolated 4" wide x 1/16" deep section loss along span 1, girder 7 top flange at abutment 1. - See "Rivets & Bolts" and "Welds-Cracks" items below. See field sheets and photos 2-3, 23-24 & 28-30.
Floor Beams:	5	Fracture critical end floorbeams (box girders) at abutment 1 and pier 2: - Exterior has up to laminated rust with negligible loss on bottom flanges and bottom 2" of webs. - Interior has random moderate to heavy rust at lower portions of box girders. - 10" diameter holes cut in both end diaphragms of girders, allowing pigeon access. - Construction debris and heavy accumulation of pigeon debris up to 3" high inside girders (pier 2). Fracture critical box girder at pier 1 (pivot girder for swing span): - Exterior has isolated light to moderate rust. - Interior has up to laminated rust along bottom flange, bottom 6" of stiffeners and webs. - Isolated 1/16" deep section losses. - See "Welds-Cracks" item below. See field sheets and photos 31-33 & 57-58.
Trusses - General:	2	Trusses were retained during the 1993 rehabilitation for ornamental purposes only and carry no live load, only their self-weight. Therefore, trusses are no longer considered fracture critical. Built-up truss members: General: - Up to 3/8" pack rust between plates. - Random severed, disconnected, cut-out and/or bent lattice bars (mostly above roadway level). - Batten plates and lattice bars with random laminated rust and up to 3/16" deep section loss. - Batten plates and lattice bars also have random rusted through holes. Bottom chords in spans 1-2: - Random laminated rust.

		- Bottom plates have losses, up to knife edge remaining & perforations up to 19" x 9" (truss 2, L5-L6). - Bottom chord webs adjacent to bottom plate losses have up to 6" high x 1/8" deep losses. Top chords: - Span 4, truss 2, U8-U9, south edge of top plate has a 9" long horizontal split with 3/16" pack rust. Verticals & diagonals: - Several members with bent, dented, torn and cracked areas, typically along roadway level. - Several members have bolted plates covering/protecting these areas. - Members are bent up to 1" over 2' and tears are up to 2" long. Eyebars & pins: - Up to 1/2" pack rust between adjacent eyebar heads and/or plates. - Up to 1/2" gap between pin nuts and eyebar heads and/or truss web plates. - Eyebar heads have random laminated rust with up to 1/4" deep section loss. - Span 1, truss 1, diagonal L3-U2 eyebar heads at L3 have losses up to 50%; mostly painted. - Span 2, truss 2 at U7-L8 connection to L7-U8 is loose and bars have as little as 5/8" remaining. - Bottom chord eyebars are bowed up to 1". - Vertical and diagonal eyebars bent/bowed up to 4". - Several eyebars are loose (can be moved by hand). - Spans 1-2, U4-U6 members at both trusses are bent/bowed vertically & laterally up to 10". - Span 3, truss 2, L4-U5, south bar is broken at the bottom, near L4. See "Rivets & Bolts" and "Welds-Cracks" items below. See field sheets and photos 4-7, 10 & 34-48.
Trusses - Portals:	5	Strut with sway bracing: - Most members with angle legs dented up to 2" (typically 1/2") due to vehicle impacts. - Isolated angles are bent west, up to 2". - Isolated 1/4" pack rust between portal brace connection plate to top chord in span 3, truss 1. - Span 1, U3 strut has two cracks in the west angle, up to 6" long. See field sheets and photos 6-7 & 48-51.
Trusses - Bracing:	4	Top chord lateral bracing: - Four top chord lateral bracing members have been removed in spans 1 & 2. - Random rods are slightly bent. - Span 1, panel 1, rod is sagged +/-3.5". - Span 2, truss 1 U8 to truss 2 U9 member has up to 50% section loss for 4" long. - Same member has a 1" long crack around the circumference. Bottom chord lateral bracing: - Moderate rust on rods in span 4. - Random cables and rods are loose and sagging up to 2". - Span 3, L3 brace near truss 2 has a half circumference x 1/16" wide crack; no change. See field sheets and photos 48 & 52-56.
Paint:	5	- Less than 25% of painted surfaces are rusting; also, see above items.
Rust:	5	- Based on the condition of "Girders" & "Floor Beams" items above.
Machinery Movable Span:	5	- Rating based on the attached 2020 Mechanical/Electrical inspection reports.
Rivets & Bolts:	6	- Random rivets replaced with bolts at truss members. - Random mis-drilled holes. - Random rivet heads and/or bolts/nuts with up to 90% section loss; typically at bottom chord losses. - Span 1 at 2nd intermediate diaphragm, near girder 7, there is a missing bolt nut at truss retrofit. - Span 2 has two missing bolts at the deck plate near pier 1 between girders 4 & 5. - Span 1, truss 1, U4-L5 near bottom is missing three bolts. - Random connection bolts at the intersection of truss diagonals are bent and/or loose.

		- Marine signs attached to trusses are missing random connection bolts, but are secure. See field sheets and photos 26-28, 35 & 37-38.
Welds - Cracks:	2	Field welded connections listed below are typically uneven, poor quality and not ground smooth: - Spans 1-2, longitudinal welded splice at top flange deck plate between girder 4-5. - Top flange deck plate, transverse splices at abutment 1, both sides of pier 1 & west side of pier 2. - Vertical splices at both ends of spans 1-2 and near pier 3 in span 3 have web cope holes. - Vertical welds at girder web connections to box girders in spans 1-2 have backer bars in-place. - Transverse welds at girder flange to box girder web connections have backer bars in-place. - Interior of pivot girder at south end has two tack welds at the top flange up to 3" long. - Span 4, truss 2, members L6-U7, L7-U8 & L8-U9 have an extra I-beam/plates welded to eyebars. Intersecting welds at the following locations (equivalent to Fatigue Category E): - Girder to pivot girder welded connections. - Previous intersecting welds at transverse beam connections for truss supports to fascia girders not found. Built-up truss member cracks due to impact damage (just above roadway level): - Several vertical & diagonal members have cracks & tears up to 21" long. - Several members have bolted plates covering/protecting these areas. - There are a total of twelve (12) members with cracks/tears without bolted plates. - Isolated cracks have stop holes drilled. Other built-up truss member cracks: - Span 1, truss 1, L0-U1 near U1: 3.5" long crack with stop holes at south channel. - Span 1, truss 1, L7-U7 near U7: 1.5" long crack at east angle (repair plate at north side). - Span 3, truss 2, L3-U3 at L3: 1" long crack at bottom of north vertical channel. - Span 4, truss 1, L6-U6 near U6: 12" long crack in web of south channel, north face. - Span 4, truss 1, L7-U7 near U7: 12" long crack with stop holes in web of south channel. - Random lattice bars with cracks, typically at tips to rivet head. Eyebar head cracks along forge lines: - Span 2, truss 1, L7-U8 at U8, north bar: 2" long crack at south face. - Span 2, truss 2, U8-L9 at L9, north bar: +/-1" long crack at south face. - Span 3, truss 1, L4-U5 at L4, south bar: 1-5/8" long crack at north face. - Span 3, truss 2, L4-U5 at L4, north bar: 15/16" long crack at south face. - Span 3, truss 2, L4-U5 at L4, south bar: 1-1/16" long crack at north face (this bar is broken). - Span 3, truss 2, U4-L5 at L5, north bar: 2-1/4" long crack at south face. - Span 3, truss 2, U4-L5 at L5, south bar: 1" long crack at north face. - Span 3, truss 2, L4-U5 at U5, south bar: 1-1/8" long crack at north face. - Spans 3-4, truss 1, U4-L5 & L5-U6 at L5: (4) cracks up to 2-1/16" long. - Span 4, truss 1, U5-L6 at L6, north bar: 1-7/8" long crack at south face. - Span 4, truss 1, U5-L6 at L6, south bar: 1" long crack at north face. - Span 4, truss 1, L5-U6 at U6, south bar: 1-7/8" long crack at north face. - Span 4, truss 2, U5-L6 at L6, north bar: 1-1/4" long crack at south face. - Span 4, truss 2, U5-L6 at L6, south bar: 3/4" long crack at south face. See field sheets and photos 57-71.
Timber Decay:	N	
Concrete Cracking:	N	
Collision Damage:	2	- See above items.
Member Alignment:	2	- See above items.
Deflection Under Load:	N	- Normal.
Vibration Under Load:	N	- Normal.

Stand Pipes:	N	
Catwalks:	N	
Movable Inspection System:	N	
Barrel Ladders:	N	

Are Barrel Ladders OSHA Compliant? NA

60. SUBSTRUCTURE:

Overall Rating: 4

	Rating	
Abutments - Stem:	6	Stone masonry abutment stems: - Up to 50% missing mortar and deteriorated patches at random locations. - Voids between stones up to 4' deep (mostly near water line). - 10" long crack through a stone near the swing machinery pedestal. Reinforced concrete bridge seats: - Random horizontal, vertical and map hairline cracks with random efflorescence. Reinforced concrete pedestals: - Random vertical and map hairline cracks with random efflorescence. - Abutment 1, north pedestal has an 8" x 6" x 1.5" deep spall. - Abutment 2, girder 4 pedestal has a 4" diameter x 1/2" deep spall. - Also, see BRI-58 for underwater portion. See field sheets and photos 72-73.
Abutments - Backwall:	7	- Random vertical and map hairline cracks with isolated efflorescence. - Abutment 1 has an isolated 8" x 3" x 3" deep void. See field sheets and photos 72-73.
Abutments - Footings:	N	- Not visible.
Abutments - Settlement:	7	- See BRI-58.
Abutments - Wingwalls:	5	Stone masonry return/retaining walls: - Up to 50% missing mortar and deteriorated patches at random locations. - Voids between stones up to 3' deep (mostly near water line). - North face of abutment 1/wingwall 1A has a 5' diameter x 2.5' deep area of missing/fallen stones. - Also, cracks up to 1/8" wide in stones at this location. - Also, see BRI-58. See photos 74-75.
Piers/Bents - Caps:	5	Reinforced concrete pier caps at piers 2 and 3: - Random vertical, diagonal and map hairline cracks with random efflorescence and isolated rust. - Previously noted 1/16" wide crack at pier 3 was hairline this inspection. - Previously noted hollow area at pier 3 not found this inspection. - North & south faces of pier 3 between truss & girders have spalls up to 18" long x 1' high x 2" deep. Steel cap beam at pier 2: - Underwater at time of inspection; see BRI-58. Transverse steel carrier beams at pier 2: - Underwater at time of inspection; see BRI-58. See field sheets and photos 76-79.

Piers/Bents - Pile Bent:	4	Concrete encased H-piles with fiberglass jackets at piers 2 and 3: - Underwater at time of inspection; see BRI-58. - Tops of encasements have extensive spalling with exposed rebar and steel H-piles. - H-pile flanges exposed up to 2.5' high with up to 1/16" deep loss. Steel diagonal and horizontal cross bracing members between pier 2 piles: - Underwater at time of inspection; see BRI-58. - Bracing members have extensive rusted out and/or missing sections. See field sheets and photos 96-104. Note the BRI-58 section continues to rate the piles at pier 2 a "5" since the spalled concrete at the piles is non-structural (considered protection), the exposed flanges of the H-piles do not have significant section loss, and the rusted out bracing members could be considered secondary members. However, overall rating of this item will remain a "4" per Bridge Safety Supervising Engineers.
Piers/Bents - Columns:	5	Pier 1 steel jacket at column/pier wall: - Heavy laminated rust up to full perimeter x 3' high with perforations up to 1' diameter. - Also, see BRI-58 for deficiencies in exposed concrete. Top of concrete column/pier wall: - Random linear and map hairline cracks. - Spalls up to 10" x 3" x 1/2" deep. - 1/2" pack rust between steel jacket and concrete at top north corner. See field sheets and photos 92-95.
Piers/Bents - Footings:	4	- See BRI-58. - Stone masonry footing on timber cribbing at pier 2. - Footing exposed up to full length x full height. - Footing undermined at two corners up to 2' deep.
Piers/Bents - Settlement:	7	- None noted. - Also, see BRI-58.
Erosion - Scour:	5	- See BRI-58.
Concrete Crack - Spall:	4	- See above items. - Rating based on extensive spalling of concrete encasements at pier 2. - Also, see BRI-58.
Steel Corrosion:	2	- See BRI-58. - Rating based on extensive section loss at pier 1 steel jacket and pier 2 bracing members.
Paint:	N	
Timber Decay:	N	
Collision Damage:	8	
Debris:	6	- Up to 6" high debris on abutment 1 seat. - Up to moderate debris on pier 2 cap. See field sheets and photos 25 & 76.

61. CHANNEL AND CHANNEL PROTECTION:

All ratings based on attached Underwater Inspection Report; see BRI-58. Overall Rating: 5

	Rating	
Channel - Scour:	5	- See BRI-58.
Embankment - Erosion:	6	- See BRI-58.
Debris:	7	- See BRI-58.
Vegetation:	8	- See BRI-58.

Channel Change:	7	- See BRI-58.
Fender - System:	5	- See BRI-58.
Spur Dikes and Jetties:	N	
Rip Rap:	7	- See BRI-58.

62. CULVERTS AND RETAINING WALLS:

Overall Rating: N

Rating		
Barrel:	N	
Concrete:	N	
Steel:	N	
Timber:	N	
Headwall:	N	
Cutoff Wall:	N	
Debris:	N	
Retaining Wall System:	N	
Footing:	N	

LOAD POSTING:

Rating		
Single Unit (Tons):		
Semi Trailer (Tons):		
4 Axle (Tons):		
3S2 (Tons):		
All Vechicles:	20	
Advanced Warning:	All Approaches	- Postings at northwest (Riverside Ave SB), southwest (Riverside Ave NB) and east approaches (three signs at intersection between Bridge St, Green Farms Road and Compo Road South).
Warning At Bridge:	All Approaches	- At west approach, +/- 100' from bridge. See photo 81. - At east approach, +/- 550' from bridge.
Legibility:	Adequate	
Visibility:	Adequate	

VERTICAL CLEARANCE POSTING

Min. Vert Under Clearance:	12	Ft	10	In	- See clearance diagram. - The minimum vertical clearance was modified by S. Keedy to be the vertical dimension taken vertically at the face of the MBR to the bottom of the electrical supply bracket.
Posted Clearence Under Bridge:		Ft		In	
Posted Clearence On Bridge:	12	Ft	7	In	- Advance vertical clearance is posted as 12'-7" at both approaches. See photos 81-82.

Advanced Warning:	Some Approaches	Only at east approach, before Imperial Avenue.
Warning At Bridge:	All Approaches	See photos 81-82.
Legibility:	Adequate	
Visibility:	Partially Blocked	- At east approach, +/- 250' from bridge, sign partially blocked by vegetation. - BS&E was notified of this condition via email on 9/17/20.

See photos 81-82.

NOTES / COMMENTS:

Character of Traffic: - Heavy / Mixed traffic.

Additional Notes:

- Bridge ID is in good condition.
- Bridge is logged from west to east with girder 1 and truss 1 at the north fascia which is consistent with the previous inspection reports and bridge plans.
- However, log direction is inconsistent with Route 136 log direction per CTDOT Highway Log; log direction left unchanged per BS&E.
- Bridge inspected with a 40' lift, raft and scaffolding, vendor and local police provided bridge closure with detour.
- Per Westport police, traffic was detoured at Riverside Avenue at west approach, and at Imperial Avenue at east approach.
- End box girders at abutment 1, pier 2 and the pivot girder at pier 1 are considered to be confined spaces; an air meter was used during inspection and the air quality was found to be acceptable and no ventilation was required.
- CTDOT Maintenance was on-site to provide access for Mechanical & Electrical inspectors; they also operated bridge openings.

Additional Comments:

National Bridge Elements
Inspection type: Fracture
Inspection Date: 9/16/2020
Inspected by: Baker Engineering

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
30 - Steel Deck Corrugated/Orthotropic/Etc.	Mod.	2840	sq. ft.	2690	50	50	50
1000 - Corrosion		150		0	50	50	50
510 - Wearing Surfaces		2808	sq. ft.	2248	280	280	0
3230 - Effectiveness (Wearing Surface)		560		0	280	280	0
60 - Other Deck	Mod.	2860	sq. ft.	2860	0	0	0
510 - Wearing Surfaces		2790	sq. ft.	2230	280	280	0
3230 - Effectiveness (Wearing Surface)		560		0	280	280	0
107 - Steel Open Girder/Beam	Mod.	1559	ft.	1461	68	30	0
1000 - Corrosion		90		0	60	30	0
1900 - Distortion		3		0	3	0	0
7000 - Damage		5		0	5	0	0
515 - Steel Protective Coating		17100	sq. ft.	15400	0	0	1700
3440 - Effectiveness (Steel Protective Coatings)		1700		0	0	0	1700
111 - Timber Open Girder/Beam	Mod.	574	ft.	469	103	2	0
1020 - Connection		5		0	3	2	0
1170 - Split/Delamination (Timber)		100		0	100	0	0
120 - Steel Truss	Mod.	574	ft.	342	70	60	102
1000 - Corrosion		90		0	30	30	30
1010 - Cracking		12		0	0	0	12
1020 - Connection		40		0	40	0	0
1900 - Distortion		60		0	0	0	60
7000 - Damage		30		0	0	30	0
515 - Steel Protective Coating		7825	sq. ft.	7433	0	0	392
3440 - Effectiveness (Steel Protective Coatings)		392		0	0	0	392
152 - Steel Floor Beam	Mod.	70	ft.	0	56	14	0
1000 - Corrosion		70		0	56	14	0
515 - Steel Protective Coating		1440	sq. ft.	1180	0	0	260
3440 - Effectiveness (Steel Protective Coatings)		260		0	0	0	260
161 - Steel Pin and Pin & Hanger Assembly or both	Mod.	88	each	73	15	0	0
1020 - Connection		15		0	15	0	0
515 - Steel Protective Coating		88	sq. ft.	80	0	0	8
3440 - Effectiveness (Steel Protective Coatings)		8		0	0	0	8
210 - Reinforced Concrete Pier Wall	Mod.	26	ft.	0	0	26	0
1080 - Delamination/Spall/Patched Area		20		0	0	20	0
1190 - Abrasion/Wear (PSC/RC)		6		0	0	6	0
213 - Masonry Pier Wall	Mod.	26	ft.	0	0	26	0
1610 - Mortar Breakdown (Masonry)		15		0	0	15	0
1620 - Split/Spall (Masonry)		3		0	0	3	0
6000 - Scour		8		0	0	8	0
217 - Masonry Abutment	Mod.	52	ft.	0	5	47	0

1610 - Mortar Breakdown (Masonry)		51		0	5	46	0
1620 - Split/Spall (Masonry)		1		0	0	1	0
220 - Reinforced Concrete Pile Cap/Footing	Mod.	26	ft.	0	19	7	0
1080 - Delamination/Spall/Patched Area		2		0	0	2	0
1120 - Efflorescence/Rust Staining		10		0	5	5	0
1130 - Cracking (RC and Other)		14		0	14	0	0
225 - Steel Pile	Mod.	14	each	11	0	3	0
1000 - Corrosion		3		0	0	3	0
300 - Strip Seal Expansion Joint	Mod.	20	ft.	0	0	0	20
2350 - Debris Impaction		20		0	0	0	20
304 - Open Expansion Joint	Mod.	39	ft.	37	2	0	0
7000 - Damage		2		0	2	0	0
310 - Elastomeric Bearing	Mod.	16	each	15	1	0	0
2230 - Bulging, Splitting, or Tearing		1		0	1	0	0
316 - Other Bearing	Mod.	7	each	3	4	0	0
1020 - Connection		4		0	4	0	0
330 - Metal Bridge Railing	Mod.	574	ft.	239	270	60	5
1000 - Corrosion		30		0	20	10	0
7000 - Damage		305		0	250	50	5
515 - Steel Protective Coating		100	sq. ft.	70	0	0	30
3440 - Effectiveness (Steel Protective Coatings)		30		0	0	0	30

UNDERWATER INSPECTION (BRI-59)

Bridge: 01349 Town: 83500 - WESTPORT Carried: ROUTE 136 Crossed: SAUGATUCK RIVER

Total Number of Piers:	3
Piers in the Water:	3
Boat Used?	Yes
Boat Size:	14'
Dive Station Used?	Yes
Access to Bridge:	Boat
Access/ Equipment Comments U/W:	Tethered scuba.
Type of water:	Brackish
Marine Growth:	Barnacles and oysters up to 1" thick
Max Water Depth:	10.4'
Max Water Depth at Pier Or Abutment:	9.6'
Current Strength:	1 fps
U/W Visibility:	1'
Bottom Composition:	Rip rap up to 3' diameter, sand, silt and natural debris with up to 3.0' penetrations into the channel bottom.

UNDERWATER INSPECTION

ITEM	*RATING*	*REMARKS*
60. SUBSTRUCTURE	4	
ABUTMENT 1:	6	Stone masonry stem with reinforced concrete cap.
STEM	6	The stone masonry stem has the following deficiencies: • 80% deteriorated / missing mortar with penetrations up to 3.5' between stones. • Up to 90% of grout-repair / epoxy coating has failed in the tidal zone. • Right (south) end has a broken stone 1.4' long x 10" high with 6" penetration. • 6th stone course from the top steps out 5" along the full length of the abutment. (See UW Drawing 3 and Photos 85 - 87)
FOOTING	N	Not exposed.
EROSION	6	Rating lowered from '7' to '6' due to deterioration and voiding in north return wall and channel walls. Refer to 61. 'Embankment - Erosion' item below.
SETTLEMENT	7	No evidence of settlement observed at the time of inspection.
SCOUR	7	Channel bottom elevations along the abutment have no significant changes (less than 0.8' variations) since the 2018 Underwater Inspection. (See UW Drawings 1 & 3)
WINGWALLS	5	The stone masonry return walls have the following deficiencies: • 80% deteriorated / missing mortar with penetrations up to 2.5' between stones. • Voids up to 1' diameter due to missing mortar and chinking stones. • North return wall 11' from the corner has a void 1.3' long x 2' high x 3' deep at the retaining wall interface. (See UW Drawing 3 and Photos 88 & 89)
General Remarks:		
ABUTMENT 2:	6	Stone masonry stem with reinforced concrete cap.
STEM	6	The stone masonry stem has the following deficiencies: • 90% deteriorated / missing mortar with penetrations up to 4' between stones. • Up to 90% of grout-repair / epoxy coating has failed in the tidal zone. (See UW Drawing 11 and Photos 90 & 91)
FOOTING	N	Not exposed.
EROSION	6	Rating lowered from '8' to '6' due to deterioration and voiding in retaining walls. Refer to 61. 'Embankment - Erosion' item below.
SETTLEMENT	8	No evidence of settlement observed at the time of inspection.
SCOUR	7	Channel bottom elevations along the abutment have no significant changes (less than 0.9' variations) since the 2018 Underwater Inspection. (See UW Drawings 1 & 11)
WINGWALLS	5	The stone masonry return walls have the following deficiency: • 90% deteriorated / missing mortar with penetrations up to 4' between stones.

(See UW Drawing 11)

General Remarks:

PIER NO. 1	5	Reinforced concrete pier with a steel protective jacket.
PILES	N	
STEM	5	The reinforced concrete stem with a steel jacket has the following deficiencies: • The steel jacket has moderate to severe corrosion with intermittent areas of section loss up to 100% throughout and a band of missing steel 4' high within the tidal zone. • Areas of exposed concrete have abrasion up to 3" deep with exposed and loose aggregate. • Extending from the west face to the east face around the upstream (north) face there is a spall 27' long x 1.8' high x 1.8' deep near the channel bottom. • East face has a spall 8' long x 1.5' high x 0.9' deep above channel bottom right (south) of the centerline. • East face has a void 5' long x 0.5' high x up to 2.3' deep below rubble fill along the channel bottom. (See UW Drawings 4 & 5 and Photos 92 - 95)
FOOTING	N	Not exposed.
SCOUR	7	Channel bottom elevations around the pier have no significant changes (less than 0.9' variations) since the 2018 Underwater Inspection with the following exception: • East side of the pier has an area of degradation 1.8' deep. (See UW Drawings 1, 4 & 5)
SETTLEMENT	8	No apparent settlement noted.

General Remarks:

PIER NO. 2	5	Original stone masonry pier stem on a stone masonry footing has a retrofitted concrete cap encasing steel beams on a steel framing plan. Framing plan is supported by (6) reinforced concrete encased steel H-piles (HP12x74) with fiberglass wraps and steel channel bracing.
PILES	5	The retrofitted piles are labelled left (north) to right (south) on the west and east face and have the following deficiencies: • The steel beams bearing on the piles have moderate corrosion with up to 1/8" section loss on the bottom flanges and areas of laminated rust up to 1/4" thick on the top flanges. • Fiberglass wraps on the piles are loose / missing throughout. • The exposed reinforced concrete encasement has abrasion up to 2.5" deep with exposed aggregate. • The diagonal steel channel cross-bracing has severe corrosion with areas of 100% section loss up to 5' long and random perforations. • The lower steel cross-braces on the west, south and east faces are missing with the lower brace on the north face missing the bottom flange and part of the web. • Pile 1W has a full perimeter spall 4.0' high x up to 6" deep with (4) exposed rebar with up to section loss up to 100% at the top of the encasement. • Pile 1W, spall has exposed (2) flanges up to 1.5' high and have minor corrosion with 1/16" deep pitting. • Pile 1W has a void 7" diameter x 1" deep on the east face near the channel bottom. • Pile 2W has a full perimeter spall 5.0' high x 8" deep with (5) exposed rebar with up to 30% section loss (steel H-pile not exposed) at the top of the encasement. • Pile 3W has a full perimeter spall 5.5' high x up to 7" deep with (6) exposed rebar with up to 30% section loss at the top of the encasement. • Piles 2E and 3E have elastomeric wraps up to 2.5' high at the top filled with grout. • Pile 1E elastomeric wrap is missing. • Pile 1E has a full perimeter spall 5.5' high x up to 15" deep with (7) exposed rebar that has up to 20% section loss at the top of the encasement. • Pile 1E spall has exposed (3) flanges up to 2.5' high around 80% of perimeter with moderate corrosion with up to 1/16" section loss.

		• Pile 3E has a full perimeter spall 2.5' high x up to 6" deep with (5) exposed rebar with up to 100% section loss at the top of the encasement. • Pile 3E spall has exposed (2) flanges 1.2' high with minor corrosion and up to 1/16" section loss. (See UW Drawing 6 - 8 and Photos 96 - 103)
STEM	5	The stone masonry stem has the follow deficiencies: • 80% deteriorated / missing mortar with penetrations up to 2.5' between stones. • Missing chinking stones. • Random stones have hairline cracks. • East face has a broken stone / void 3' long x 2' high x 10" deep between Piles 1E and 2E. (See UW Drawings 6 - 8 and Photos 96, 98 & 104)
FOOTING	4	The stone masonry footing on timber cribbing has the following deficiencies: • The footing is exposed full length by up to full height (1.5') around the perimeter, no change from the previous 2018 Underwater Inspection. • Northwest corner of the footing is undermined 5' long x up to 1' high x up to 2' penetration, previously undermined 4.5' long x 1.3' high x up to 4' penetration in 2018. • Southwest corner of the footing is undermined 3' long x up to 1' high x up to 2' penetration, previously undermined 4.5' long x up to 1.1' high x up to 2.2' penetration in 2018. (See UW Drawings 6 - 8)
SCOUR	5	Channel bottom elevations around the pier have no significant changes (less than 0.9' variations) since the 2018 Underwater Inspection with the following exception: • Area of aggradation up to 1.9' high on the west face. Refer to 'Footing' item above for more details. (See UW Drawings 1 & 6 - 8)
SETTLEMENT	7	No apparent settlement noted.
General Remarks:		

PIER NO. 3	7	Reinforced concrete cap supported by (8) reinforced concrete encased steel H-piles with fiberglass wraps.
PILES	7	The steel H-piles are encased in reinforced concrete and covered by fiberglass wraps. The reinforced concrete and fiberglass wraps have marine growth up to 1" thick and no significant deficiencies. (See UW Drawings 9 & 10 and Photos 105 & 106)
STEM	N	
FOOTING	N	
SCOUR	7	Channel bottom elevations around the pier have no significant changes (less than 0.8' variations) since the 2018 Underwater Inspection. (See UW Drawings 1, 9 & 10)
SETTLEMENT	8	No apparent settlement noted.
General Remarks:		

---

61. CHANNEL & CHANNEL PROTECTION:

	5	The Saugatuck River is a tidal saltwater body that flows beneath the structure.
CHANNEL SCOUR	5	Channel bottom elevations along the fascias have the following variations greater than 0.9' since the 2018 Underwater Inspection:

		• Areas of degradation 2.2' deep near Abutment 2. • Isolated area of degradation 1.0' deep north of Pier 1. (See UW Drawing 1 and Photos 107 & 108)
EMBANKMENT EROSION	6	Southwest and northwest embankments consist of dry-laid stone channel walls, the southeast and northeast embankments consist of dry-laid stone retaining walls with the following deficiencies: • Northwest channel wall has a void 3' long x 2' high x 3' deep adjacent to a discharge pipe. • Southeast and northeast retaining walls have penetrations up to 3' between stones. • Southeast retaining wall has (2) voids up to 3' high x 4' wide x up to 4' deep. Rating lowered from '7' to '6' due to voiding. (See UW Drawings 3 & 11 and Photos 109 - 114)
DEBRIS	7	• There is a concrete overpour and construction debris around Pier 1. • The remnants of an old pier in span 3 do not impede the navigable channel. (See UW Drawings 1, 4 & 5)
VEGETATION	8	
CHANNEL CHANGE	7	No apparent change in the channel orientation. (See UW Drawing 1 and Photos 107 & 108)
FENDER SYSTEM	5	The timber fender system around Pier 1 and on the west side of Pier 2 have the following deficiencies: • Piles and wales have splits / checks up to 3/4" wide. • The ends of wales have deterioration / rot up to 2' long x full height x up to 2" deep. • The hardware of wales 4, 5 and 6 from the top have heavy to severe corrosion within the tidal zone. • Pier 1 fender system, steel brackets at the upstream and downstream noses have moderate to heavy corrosion with areas of 100% section loss up to 8" long x up to 7" high. • Pier 1 fender system has a 5' long area of impact damage on the 6th wale from the top at the northwest corner. (See UW Drawing 1 and Photos 115 - 121)
SPUR DIKES & JETTIES	N	
RIP RAP	7	Rip rap up to 3' diameter along Abutment 2 and large rocks / rip rap at the northeast corner of Pier 3. (See UW Drawings 1, 10 & 11)

General Remarks:

FRACTURE CRITICAL MEMBERS / FRACTURE PRONE DETAILS

Inspectors:

Lead Inspector:	Albert Ho
Inspector:	Task:
Balboni,Michael	BSE - Inspector
Fadelici,Bryce	BSE - Inspector
Gentile,Jason	BSE - Inspector
Ho,Albert	BSE - Inspector
Hueber,Conor	BSE - Inspector
Kurasz,Tomasz	BSE - Inspector
Sirotko,Stephen	BSE - Inspector

Visits:

Visit Date:	Temp:	Start Time:	End Time:
09/16/2020	70	08:30 AM	03:15 PM
09/17/2020	70	08:30 AM	01:00 PM
09/24/2020	57	08:15 AM	01:45 PM

Fracture Critical Inspection Frequency: 24 Months

Fracture Critical Type Code: J Steel Pier Caps, welded box or plate girders

Structure Type: Highway Bridges Year Built: 1870 ADT: 14600 Year of ADT: 2017 % Truck: 5

Access Equipment Needed: Raft and scaffolding.

Traffic Control Required: None.

Reference to Plans: Project #158-150 (1989)

MEMBER/DETAIL TYPE # 1

Member/Details Type: C Steel bent caps sustaining tensile stresses Fracture Critical: Yes

Fatigue Category: C Steel Type: A-588 Fatigue Prone: Yes

Description: Transverse box girders at Abutment 1, Pier 1 (pivot girder) and Pier 2.

Inspection Procedure: 100% hands-on.

Condition Comments: See BRI-18.

Procedure Followed This Inspection? Yes If No please explain:

MEMBER/DETAIL TYPE # 2

Member/Details Type: H Highly fatique prone details in tension areas — Fracture Critical: No

Fatigue Category: E' — Steel Type: A-588 — Fatigue Prone: Yes

Description: Girders 1-7 bottom flange welded attachment to the bottom flange/web of box girders at Abutment 1, Pier 1 and Pier 2.

Inspection Procedure: 100% hands-on.

Condition Comments: See BRI-18.

Procedure Followed This Inspection? Yes If No please explain:

MEMBER/DETAIL TYPE # 3

Member/Details Type: H Highly fatique prone details in tension areas — Fracture Critical: No

Fatigue Category: D — Steel Type: A-588 — Fatigue Prone: Yes

Description: Open holes in longitudinal girder webs in tension areas.

Inspection Procedure: 100% hands-on.

Condition Comments: See BRI-18.

Procedure Followed This Inspection? Yes If No please explain:

MEMBER/DETAIL TYPE # 4

Member/Details Type: H Highly fatique prone details in tension areas — Fracture Critical: No

Fatigue Category: E — Steel Type: A-588 — Fatigue Prone: Yes

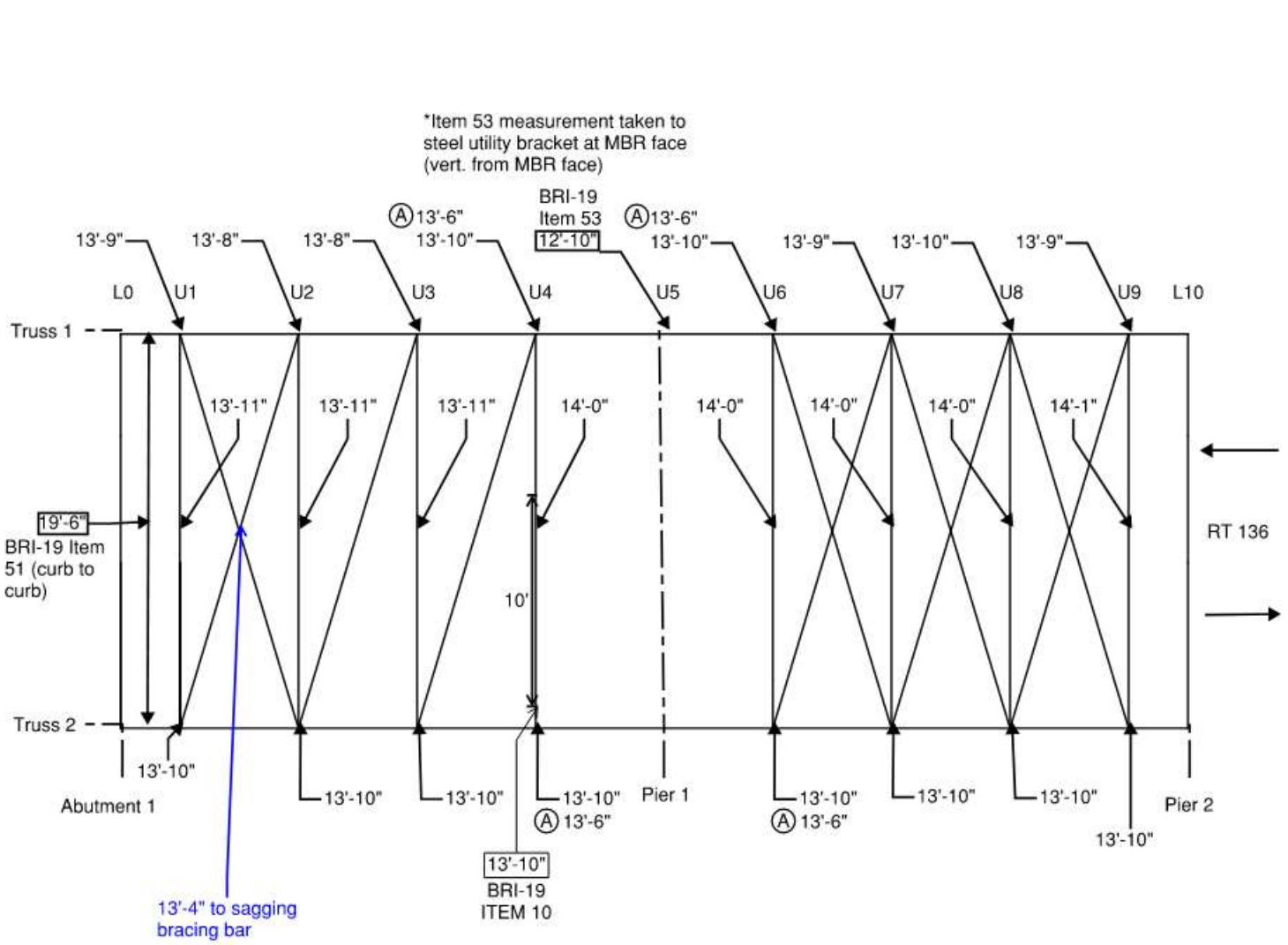
Description: Intersecting/nearly intersecting welds at longitudinal girder to pivot girder welded connections. Although not assigned a fatigue category by AASHTO, these are problematic details that were treated as fatigue category "E"

Inspection Procedure: 100% hands-on.

Condition Comments: See BRI-18.

Procedure Followed This Inspection? Yes If No please explain:

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



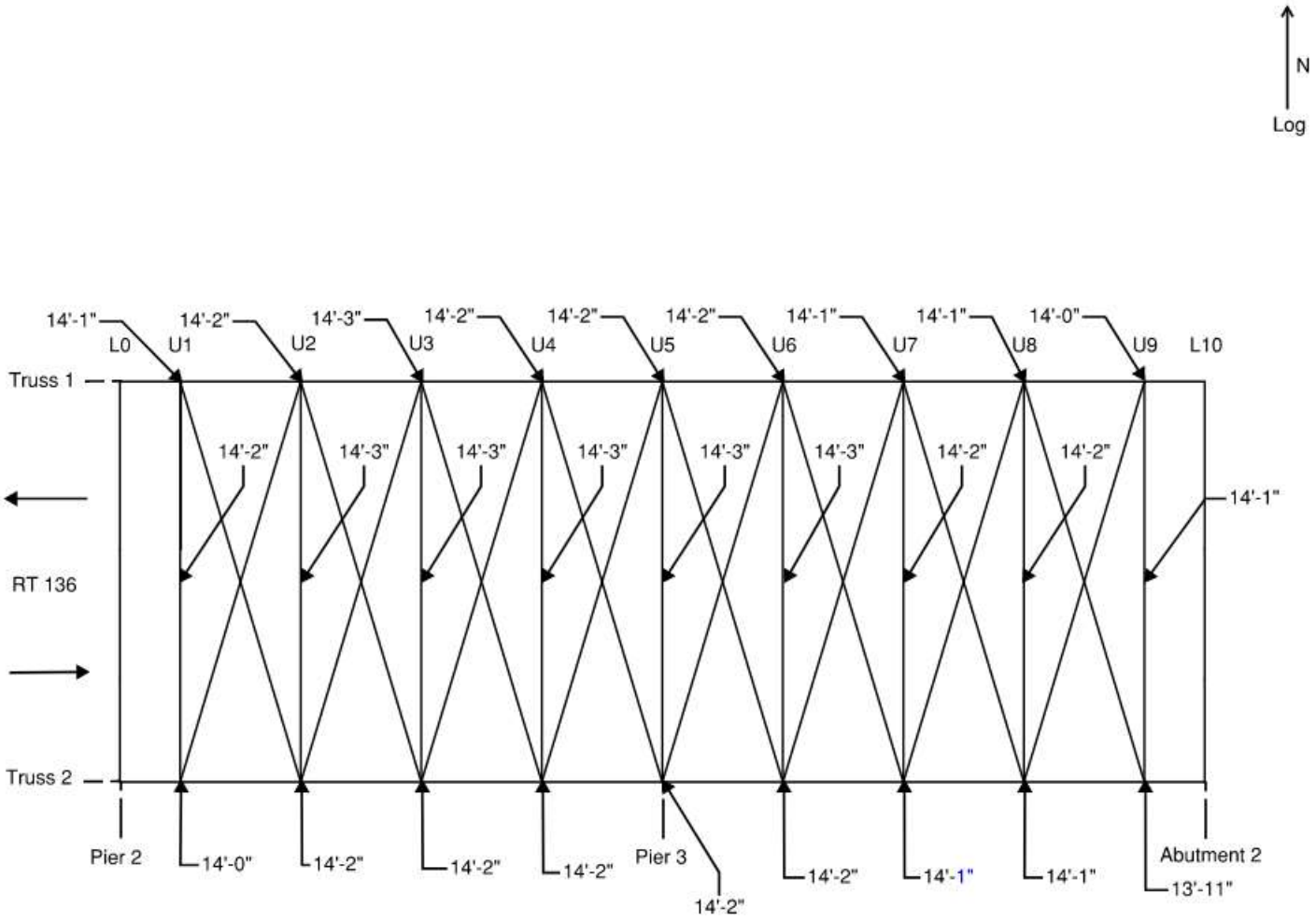
General Notes:
-All truss measurements are from pavement to bolt at the top chord web
-Vertical clearance posted 12'-7" at both ends (150'± from bridge)
-Past changes to clearances appear due to pavement heaving/rutting and impact damage on several truss members (continue to monitor)

Ⓐ MEASURED AT TOP PIN CONNECTION; behind MBR

CLEARANCE DIAGRAM SPANS 1-2

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: JG, AH (Baker)	REVISION 4	DATE:	CREW:

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349

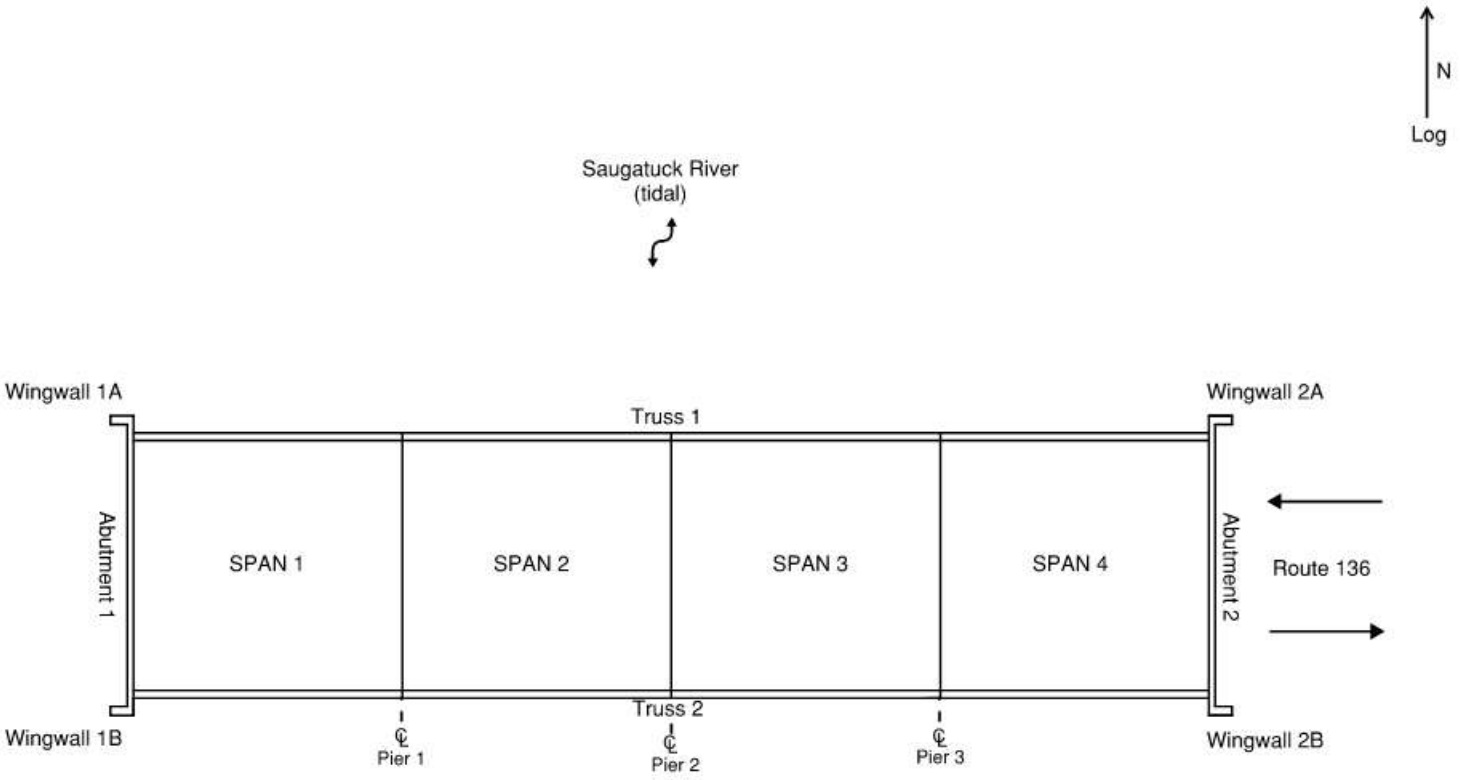


General Notes:
See clearance diagram for spans 1-2 for general notes

CLEARANCE DIAGRAM SPANS 3-4

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: JG, AH (Baker) - No change	REVISION 4	DATE:	CREW:

CREW: KHI, MMB (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



KEY PLAN

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, JG, BF (Baker) - No change	REVISION 4	DATE:	CREW:

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349

Top of Deck General Notes

Overlay:

- Heaving/wheel line rutting up to 2"H/D
- Random linear cracks up to 1/4"W (previous call-outs removed from sketch)
- Areas of raveling along curbs up to 6"W x 1/2"D

Curbs:

- Vertical deck plates and curb channels with moderate rust and isolated laminated rust with up to 1/8"D SL
- Random minor scrapes
- Average curb reveals at north & south = 7"

Timber sidewalk at north:

- Random planks misaligned and bent up at the ends up to 1/2"H
- Minor checks and wear

Railing:

- Isolated bridge guide rail post base plates with heavy laminated rust
- Metal bridge railing across bridge has random light to moderate impact damage
- 20' of guide rail attached directly to truss members above north rail to protect electrical box at pier 1.

Drains:

- Most scuppers 66% clogged; all down pipes are clear
- Some grates settled up to 1"D relative to the overlay

Expansion Joint:

- Steel headers with random nicks & gouges
- Strip seal joint at abut 2 with loose steel extrusion at bridge side; extrusion and seal removed at TOI by DOT Maintenance and area filled with bituminous

Approach railing:

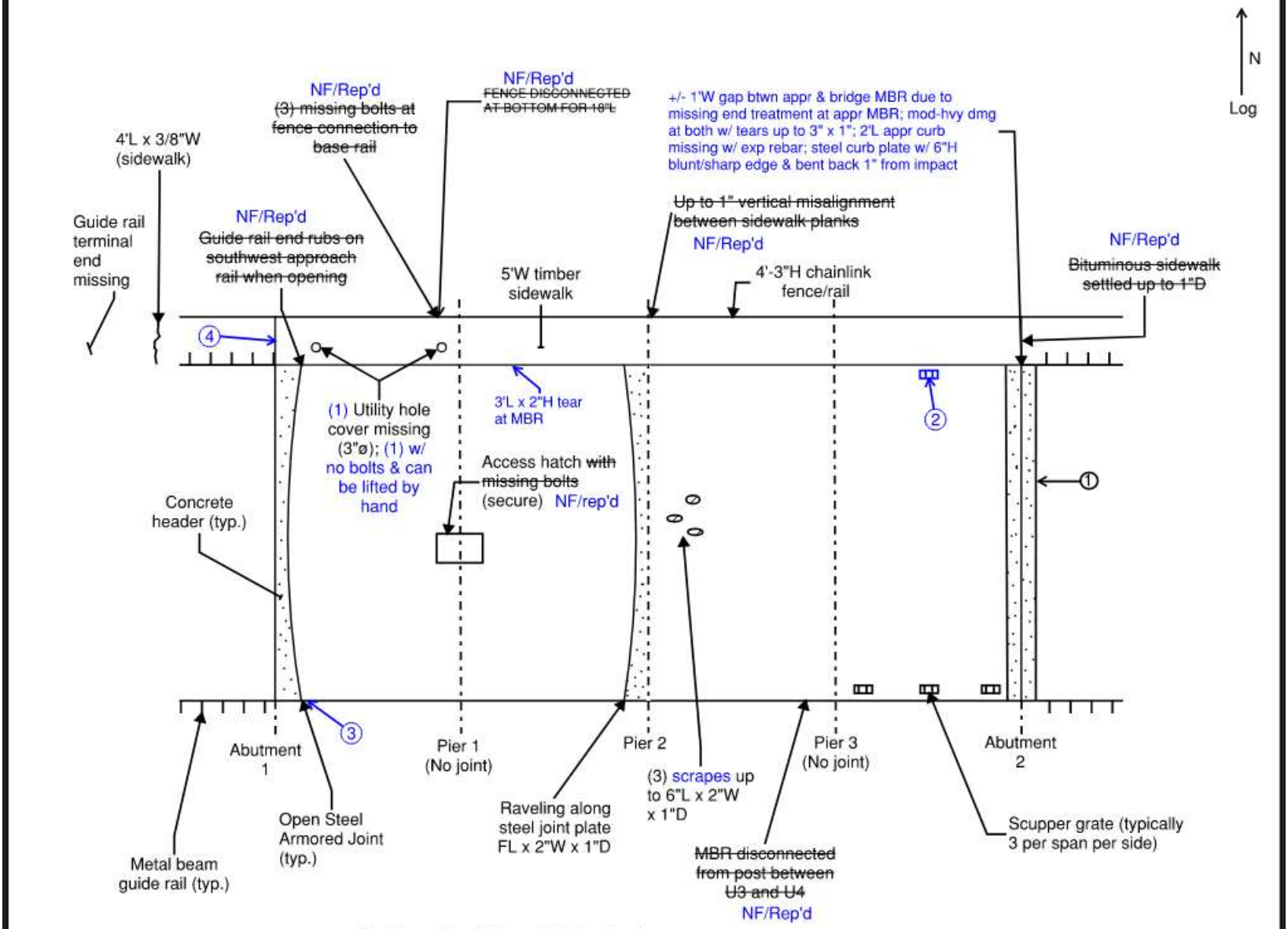
- Metal beam railings are not continuous onto bridge & have minor scrapes & dents
- Boxing glove ends at NW & SW with heavy impact damage

Approach pavement:

- Newer pavement at both approaches with no significant deficiencies; previous call-outs removed from sketch

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: JG, AH (Baker)	REVISION 4	DATE:	CREW:

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



- See Top of Deck General Notes sheet

Deterioration Legend:

① - Approach pavement w/ settlement up to 1"D, but w/ smooth transition, potholes rep'd
② - Scupper grate concrete header w/ 18"L x 6"W x 1"D spall; bit +/-2" higher than bot of spall
③ - MBR post bent east +/- 1' w/ hvy impact damage at MBR end
④ - Last two boards at timber approach sidewalk are loose; possible fall/trip hazard

LEGEND:
HOLLOW AREA
SHALLOW REBAR
SPALL AREA
SPALL AREA WITH EXPOSED REBAR
MAPCRACKS
HAIRLINE CRACKS
HONEYCOMB AREA
SCALE AREA
EFFLORESCENCE PRESENT

TOP OF DECK

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: JG, TK, AH, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: KHI, MMB (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349

Underside and Framing General Notes

Deck items:

- Spans 1 and 2 have a welded steel deck with areas of peeling paint (<15%) and isolated light rust.
- Spans 3 and 4 have an exodermic deck with random light rust.

Bearings:

- Sole plates are bowed/dished at random locations up to 1/2" (appears as-built).
- Bearing plates with light to moderate rust.
- Elastomeric bearings in neutral position with slight tilts (up to 1/4") at 70°F.

Girders:

- Girders with areas of peeling paint (<15%) with light to heavy rust and laminated rust.
- Top and bottom of girder webs at random weep locations with heavy laminated rust up to 1'L x 4"H and negligible section loss.
- Fascia girder connections to drains/weeps/trusses with moderate to heavy laminated rust and the nuts have up to 25% section loss.
- Girder bottom flanges with light pigeon debris and minor impact scrapes in span 2.
- Girder to pivot girder connections with intersecting welds.
- Random intersecting welds also between mechanical components & pivot girder
- Transverse beam connection at fascia girders for trusses with poor quality welds, intersecting welds not found
- Field welded splices not ground smooth.
- Transverse truss support beam connection at fascia girders with moderate to heavy laminated rust at truss connections with up to 3/16"D section loss on top flange connection plate (worst at spans 1 & 2).
- Transverse support beams at truss bottom chords with flame cut flanges at random locations.
- Box girder interior with 10" Ø flame cut hole in end plate/diaphragm (allows pigeon access) at each end of Abutment 1 box girder.

Timber Sidewalk Stringers:

- Connection angles and channels with random areas of moderate to heavy rust and laminated rust with negligible section loss, U.O.N.
- Stringers 1 and 2 are timber stringers with checks up to 1/4"W along the bottom.

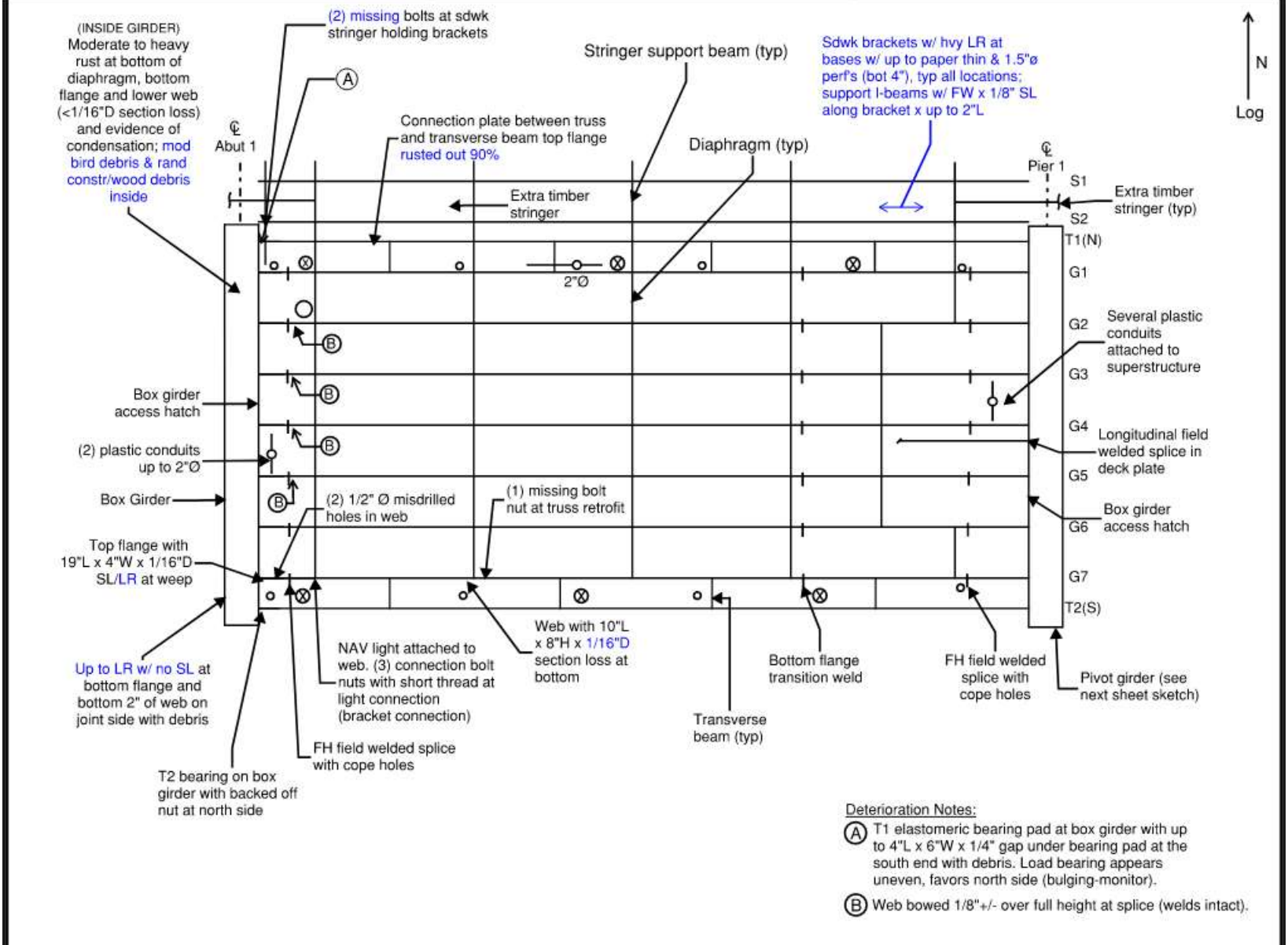
REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: TK, AH, BF, JG (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/16/2020
Inspected by: Baker Engineering

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: KHI, MMB (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



Deterioration Notes:

(A) T1 elastomeric bearing pad at box girder with up to 4"L x 6"W x 1/4" gap under bearing pad at the south end with debris. Load bearing appears uneven, favors north side (bulging-monitor).

(B) Web bowed 1/8"+/- over full height at splice (welds intact).

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- PVC Weep
- Scupper Downspout
- Conduit

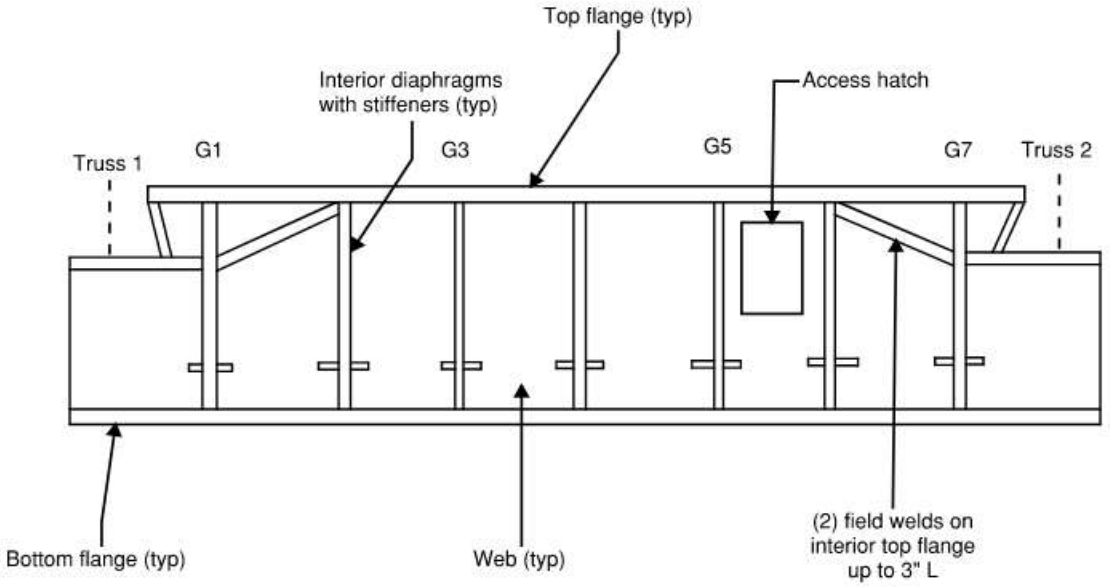
General Notes:

- See Underside and Framing General notes sheet
- Backer bars between girder & box girder connections in place at each girder location at abutment 1 (previous specific call-outs removed)

UNDERSIDE OF DECK & FRAMING PLAN - SPAN 1

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: TK, AH JG, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349

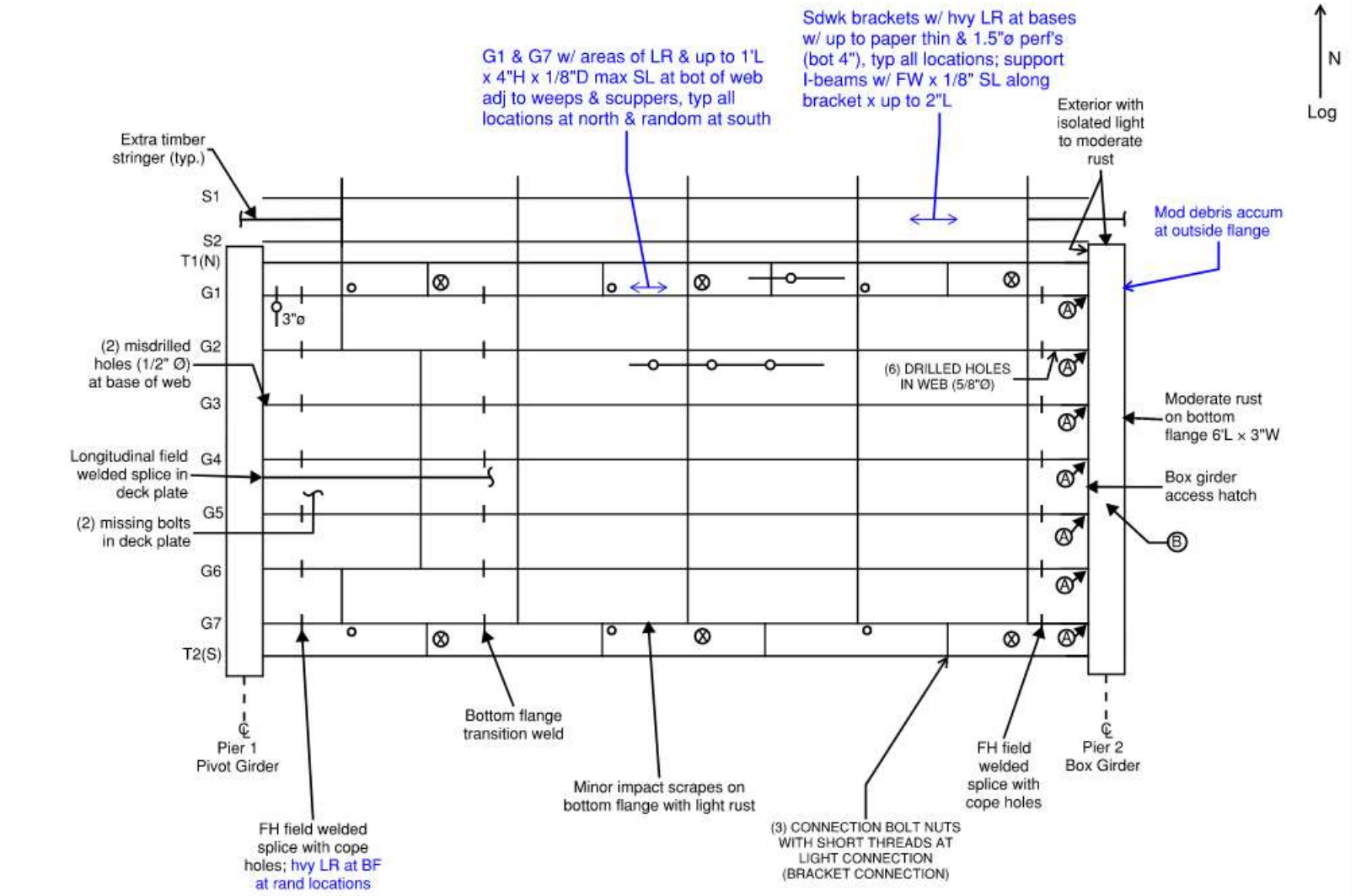


General Notes:
- Interior bottom flange with evidence of moisture throughout
- Heavy laminated rust on interior bottom flange FL x FW and at base of stiffeners and web with 6" H laminated rust (isolated section loss up to 1/16" D)
- Only one opening, no drains/ventilation inside
- Welds not ground smooth/uneven, backer bars remain in place with heavy laminated rust at bottom flange to web welds
- Swing machinery not shown for clarity
- Exterior with isolated light to moderate rust
- Poor quality welds at interior stiffeners with undercutting up to 1/16" D
- Debris accumulation under trusses

PIVOT GIRDER AT PIER 1 - WEST ELEVATION

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: TK, AH, JG, BF (Baker) - No change	REVISION 4	DATE:	CREW:

CREW: KHI, MMB (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



Deterioration Notes:

(A) Backer bars in place on web with sloppy welds.

(B) Heavy pigeon debris up to 3"D inside box girder. Bottom flange, web plates and stiffeners at both ends with moderate rust up to full width; random construction debris/wood boards inside

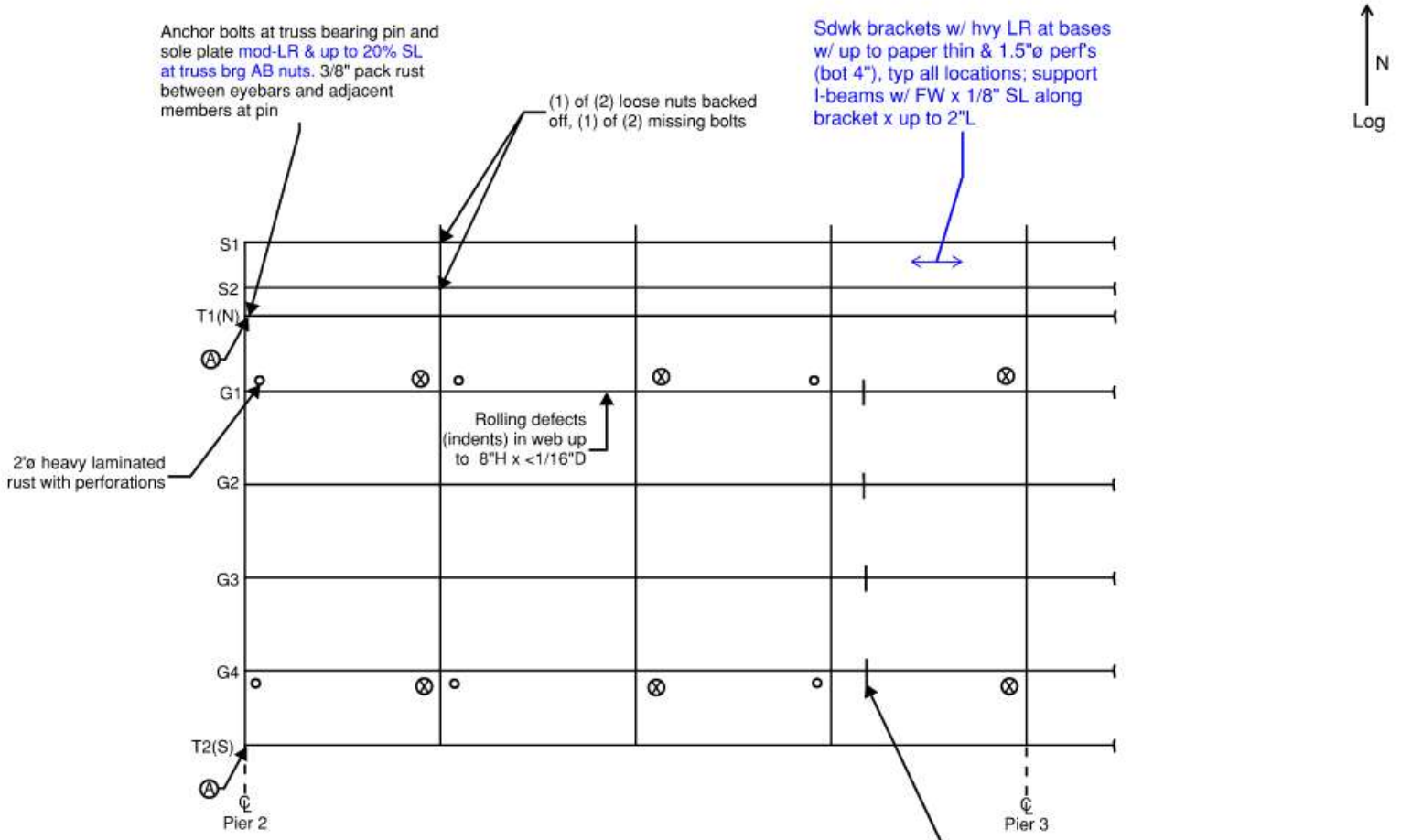
LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- PVC Weep
- Scupper Downspout
- Conduit

General Notes:
- See Underside and Framing General notes sheet
- Box girder interior with 10" Ø flame cut hole in end plate/diaphragm (allows pigeon access) at each end of Pier 2 box girder.

UNDERSIDE OF DECK & FRAMING PLAN - SPAN 2

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: TK, AH JG, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: KHI, WEA (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



Deterioration Notes:

(A) Up to 100% SL to (3) of (4) spacers at anchor bolts, missing washer on (2) of (4) spacers and moderate rust on bearing plates; brg drop down bolts w/ hvy LR & up to 50% SL at nuts

General Notes:

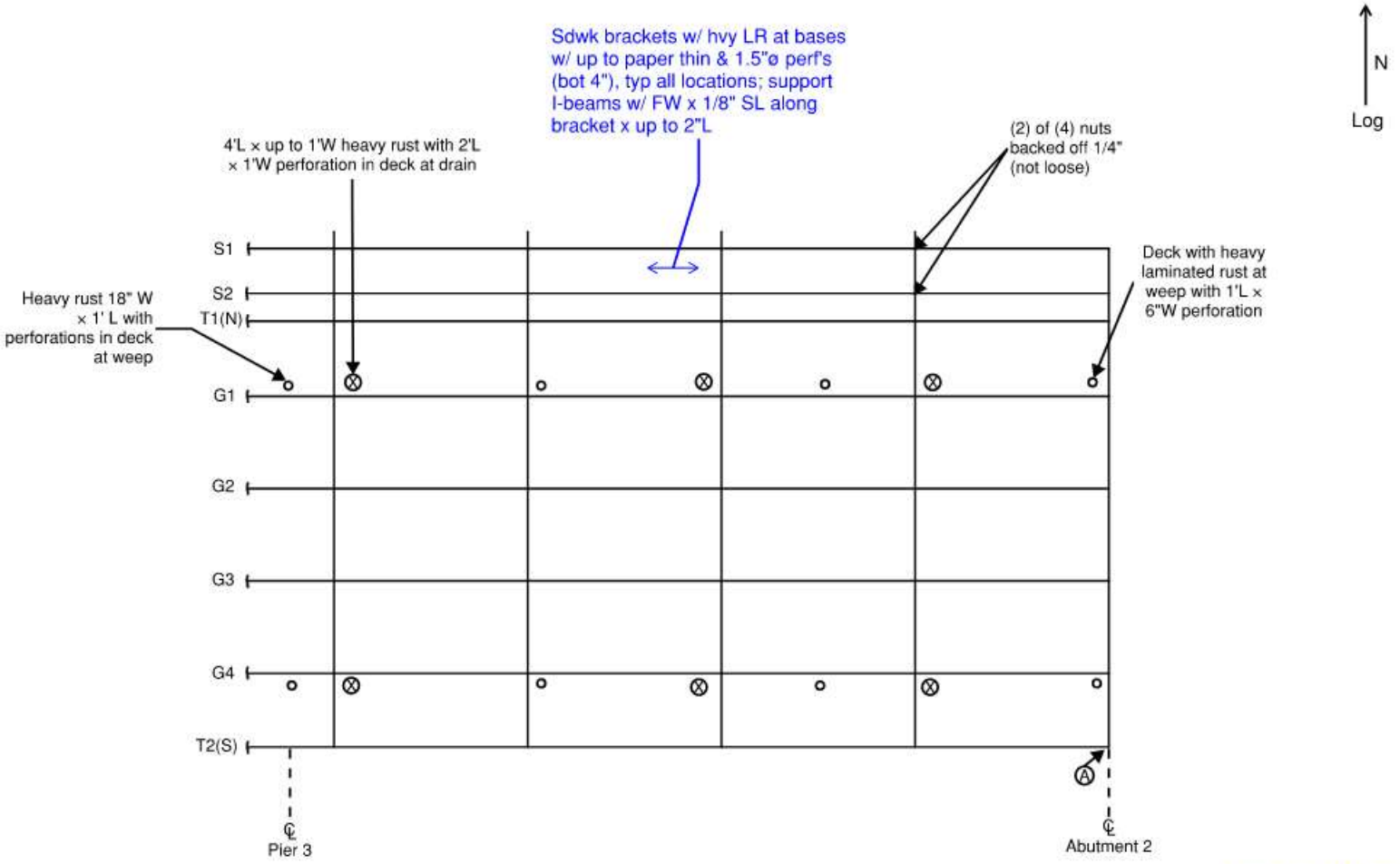
- See Underside and Framing General notes sheet
- Underside of deck has LR w/ perforations up to 2' x 1', typically adj to scuppers and weeps (bay btwn G4 & T2; specific call-outs removed from framing)
- TRUSS BEARINGS AT PIER 2 HAVE DOUBLE ANCHOR BOLT NUTS (single nut at North) AND ARE BACKED OFF UP TO 1"

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- PVC Weep
- Scupper Downspout

UNDERSIDE OF DECK & FRAMING PLAN - SPAN 3

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: TK, AH JG, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: KHI, WEA (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



Deterioration Notes:

Ⓐ Anchor bolt nut at truss bearing to diagonal bracing rod with heavy laminated rust and up to 15% section loss

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- PVC Weep
- Scupper Downspout

General Notes:

- See Underside and Framing General notes sheet
- Outside face of deck cover angle w/ heavy rust/LR
- Underside of deck has LR w/ perforations up to 2' x 1', typically adj to scuppers and weeps (bay btwn G4 & T2; specific call-outs removed)

UNDERSIDE OF DECK & FRAMING PLAN - SPAN 4

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: TK, AH JG, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349

Truss General Notes

Bearings:

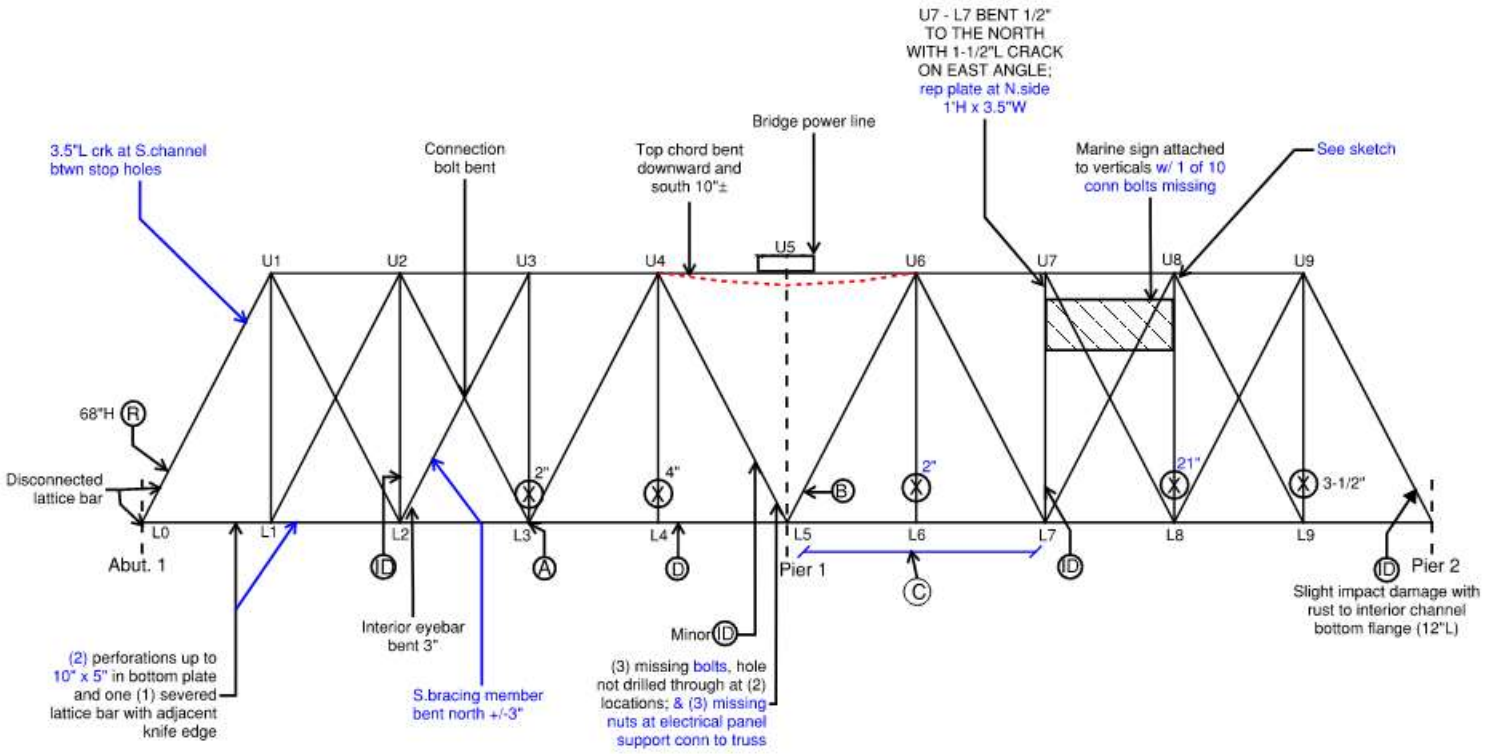
- Abutment 1 bearings with light rust.
- Pier 1 bearing plates with heavy laminated rust and rivet heads with up to 25% SL.

Trusses:

- Trusses are ornamental and support no live loads, only self weight.
- Rust on ±5% of surface of truss.
- Bottom chord with localized moderate to heavy rust with laminated rust up to 1' Ø.
- Bottom chord batten plates and lattice bars with random heavy laminated rust with up to 3/16"D section loss and up to 1/4" thick pack rust between lattice bars and bottom chord channel horizontal legs.
- Bottom chord top lattice bars cut out at MBR locations.
- Eyebar heads with light to moderate rust and random areas of pitting up to 1/8"D; mostly painted over.
- Bottom chord eyebars with pack rust up to 3/8" thick between adjacent eyebar heads and between eyebar heads and adjacent members.
- Bottom chord eyebars are bowed up to 1".
- Vertical plates at base of vertical members with full height poor quality welds with porosity and undercutting up to 1/16" deep.
- Light debris along bottom chord.
- Most truss verticals with minor bends and shifts due to impact damage.
- Areas with impact damage on trusses have bent angle legs up to 1" over 2'L with tears along the edges up to 1"L.
- Isolated 1/2" Ø misdrilled holes in bottom chord channel horizontal legs.
- Transverse portal braces at truss ends have bent flanges and angle legs.
- Typical up to 1/2" gap between pin cap and upper chord web at random locations.
- Top chord plates with up to 1/4" pack rust at edges in spans 3-4
- Random lattice bars with cracks at tips to rivet head
- Random rivets replaced with bolts; specific call-outs removed from sketches

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, BF, JG (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

(A) 8"L x 3"W perforation in bottom plate of bottom chord, up to 1/2" thick pack rust between eyebars (mostly painted at eyebars) and vertical members, 50% section loss in (1) of (4) diagonal eyebar heads, 30% section loss in another and remaining (2) with random pitting up to 3/16"D (worst at L3U2 diagonals bars)

NF

(B) Heavy impact damage to interior channel with ~~crack to top flange (6")~~, (2) cracks on the web - top crack (8") and bottom crack (20")

(C) Bottom flange plate with FL x FW x as little as 3/16" thick minimum remaining and up to 1/2"W knife edge around hole (4" ø); bolt nuts with up to 75% section loss, 1/8"± pack rust between bottom flange plates and entire section with heavy laminated rust at web channels (interior side) with up to 6"H x 1/8"D section loss (tight access to verify web loss)

(D) Bottom flange plate with laminated rust and 8"Ø perforation with adjacent areas of knife edge

(X) Impact damage with cracks in steel member (total length of cracks)

(ID) Impact damage with bent angle legs up to 1" over 2'L and no cracks

(R) BOLTED PLATES UP TO 12-1/2"W x 1/2"T AT THE NOTED LOCATIONS

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

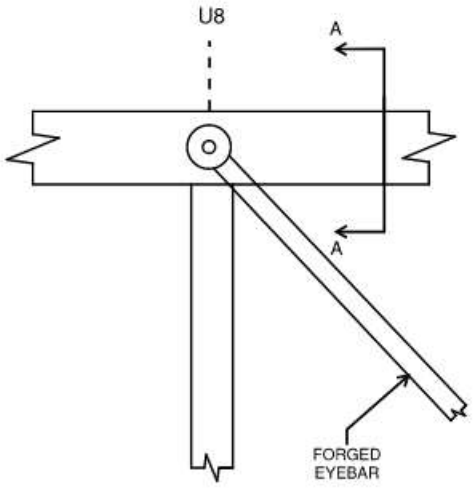
General Notes:

- See Truss general notes sheet

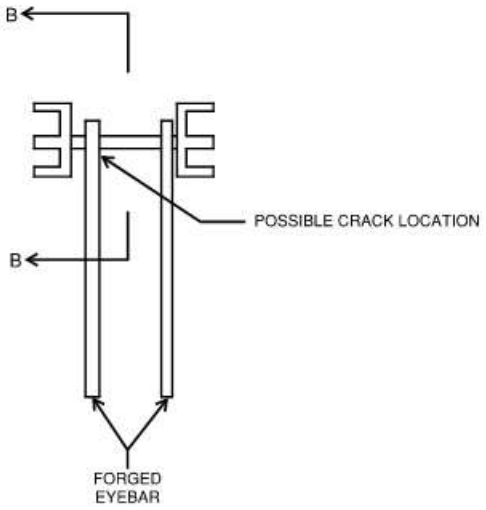
TRUSS 1 SOUTH ELEVATION - SPANS 1 & 2

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, JG, BF (Baker)	REVISION 4	DATE:	CREW:

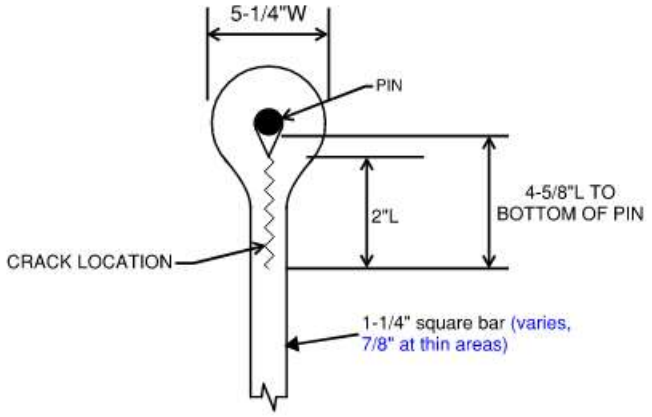
CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



SPAN 2, NORTH TRUSS, NORTH ELEVATION



SECTION A-A



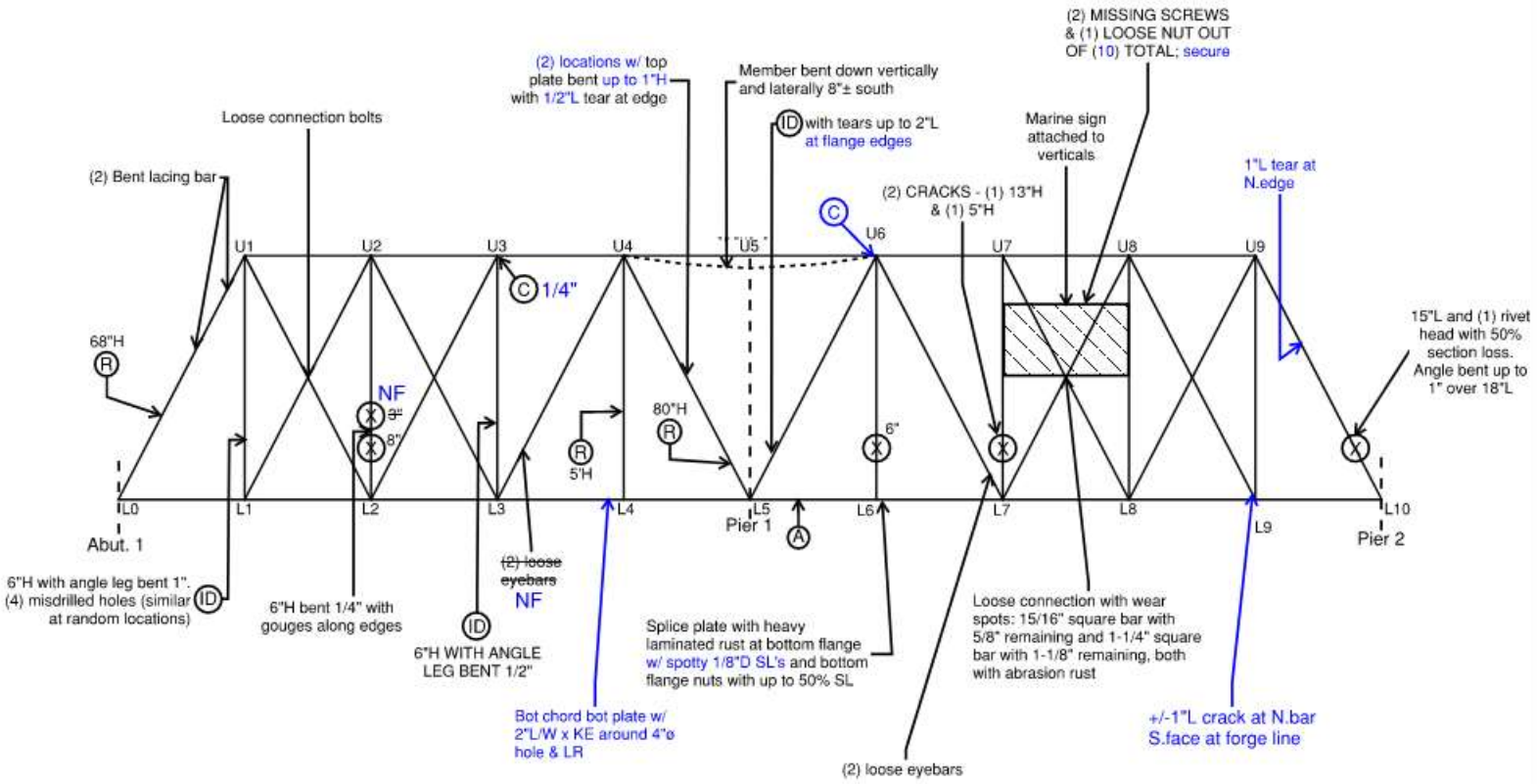
SECTION B-B (NORTH EYEBAR)

NOTE: EYEBAR DOES NOT CARRY LIVE LOAD, ONLY HAS TO SUPPORT ITS OWN WEIGHT.

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, JG, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

(A) Bottom chord flange plate with heavy laminated rust and 1/16"-1/8" avg REM x +/-12'L x FW & (2) perfs up to 19"L x 9"W, and bolt nuts with up to 90% SL and web channels (interior side) with up to 3"H × 1/8"D section loss

(X) Impact damage with cracks in steel member (total length of cracks)

(ID) Impact damage with bent angle legs up to 1" over 2'L and no cracks

(C) 1/2" GAP BETWEEN PIN CONNECTION

(R) BOLTED PLATES UP TO 12-1/2"W x 1/2"T AT THE NOTED LOCATIONS

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

General Notes:

- See Truss general notes sheet

TRUSS 2 SOUTH ELEVATION - SPANS 1 & 2

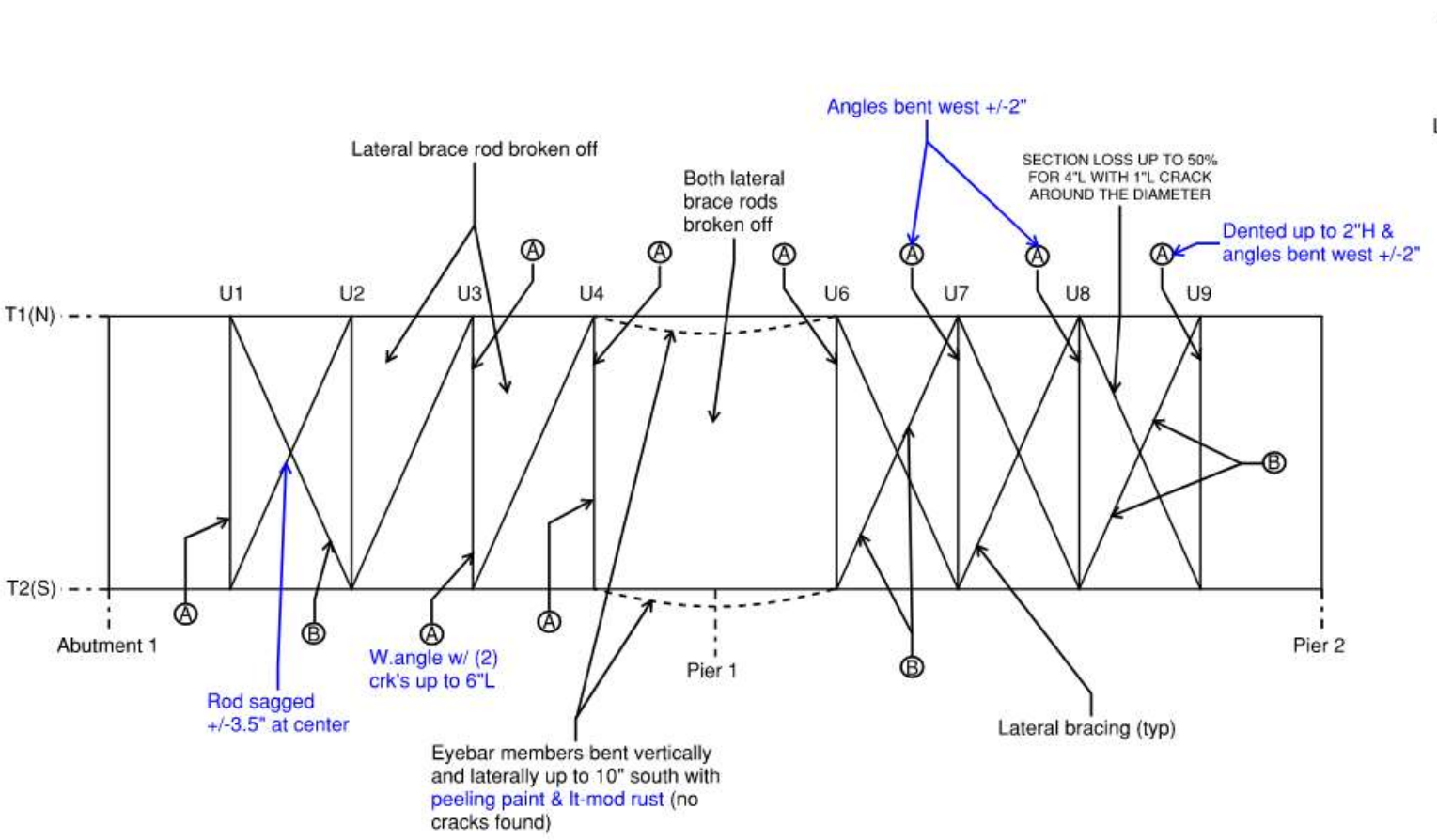
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, JG, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/16/2020
Inspected by: Baker Engineering

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



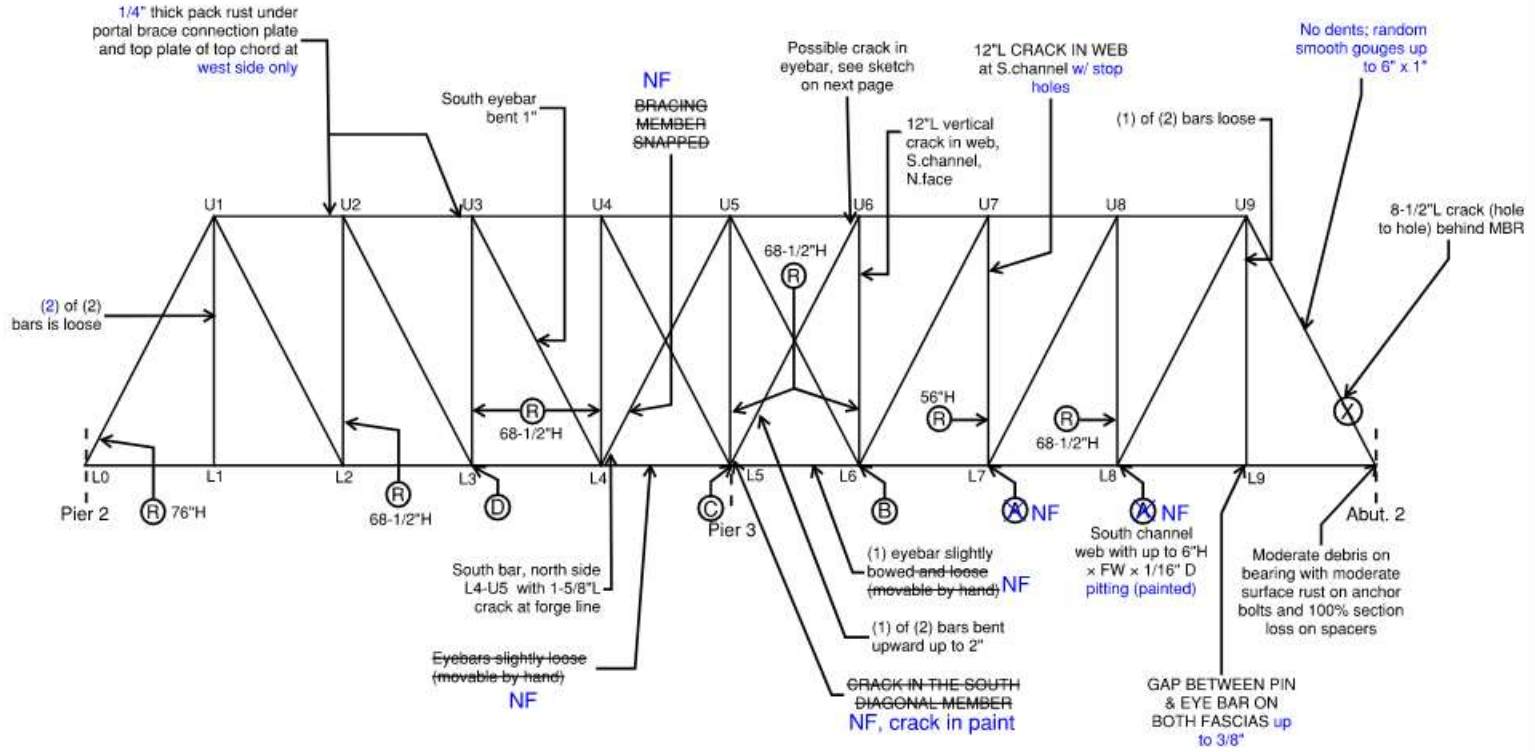
Deterioration Notes
Ⓐ- Impact damage to horizontal members (angle legs dented up to 1/2"
Ⓑ- Lateral bracing rod slightly bent

General Notes:
- See Truss general notes sheet

TOP CHORD LATERAL BRACING - SPANS 1 & 2

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, JG, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

Ⓐ Bottom flange plate with FL x FW x as little as 3/16" thick remaining and up to 1/2"W knife edge around hole (4" ø); bolts with up to 50% section loss, 1/8"± thick pack rust between bottom flange plates and web channels (interior side) with up to 6"H x 1/8"D section loss NF - eyebar locations

Ⓑ North U5-L6 with 1-7/8"L crack at forge line (south face), south U5-L6 (north face) with 1"L crack; bars with 2"W x 1"L/H x 3/16"D section loss/LR along shank

Ⓒ U4-L5 and L5-U6, north and south eyebars with cracks up to 2-1/16"L along forge line (4 cracks total)

Ⓓ 1/16" gap at bottom chord truss pin (south side) between nut and eyebar (nuts tight)

Ⓧ Vertical cracks to interior members of verticals from impact damage (typically members are bent up to 1" over 2'L) and cracks at lacing bar ends.

Ⓡ BOLTED PLATES UP TO 12-1/2"W x 1/2"T AT THE NOTED LOCATIONS
(damage at original truss sections difficult to see due to bolted plates)

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

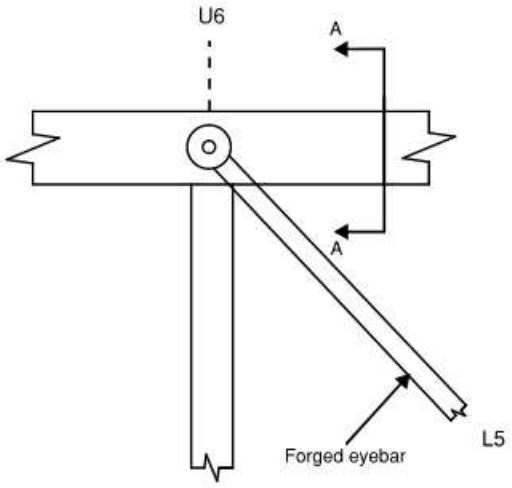
General Notes:

- See Truss general notes sheet

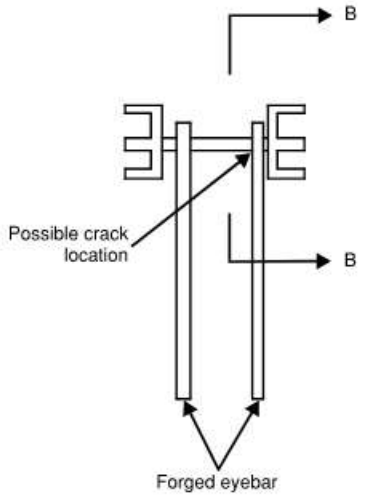
TRUSS 1 SOUTH ELEVATION - SPANS 3 & 4

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, JG, BF (Baker)	REVISION 4	DATE:	CREW:

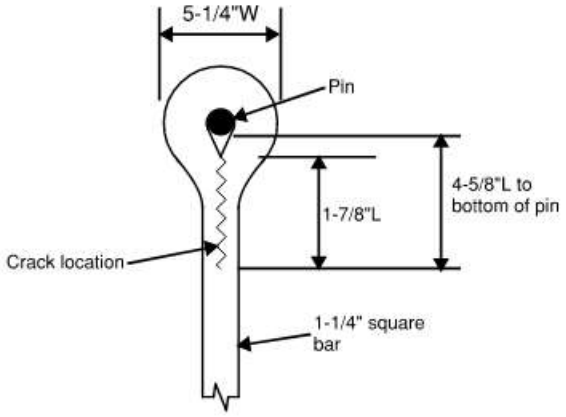
CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



SPAN 4, NORTH TRUSS, NORTH ELEVATION



SECTION A-A



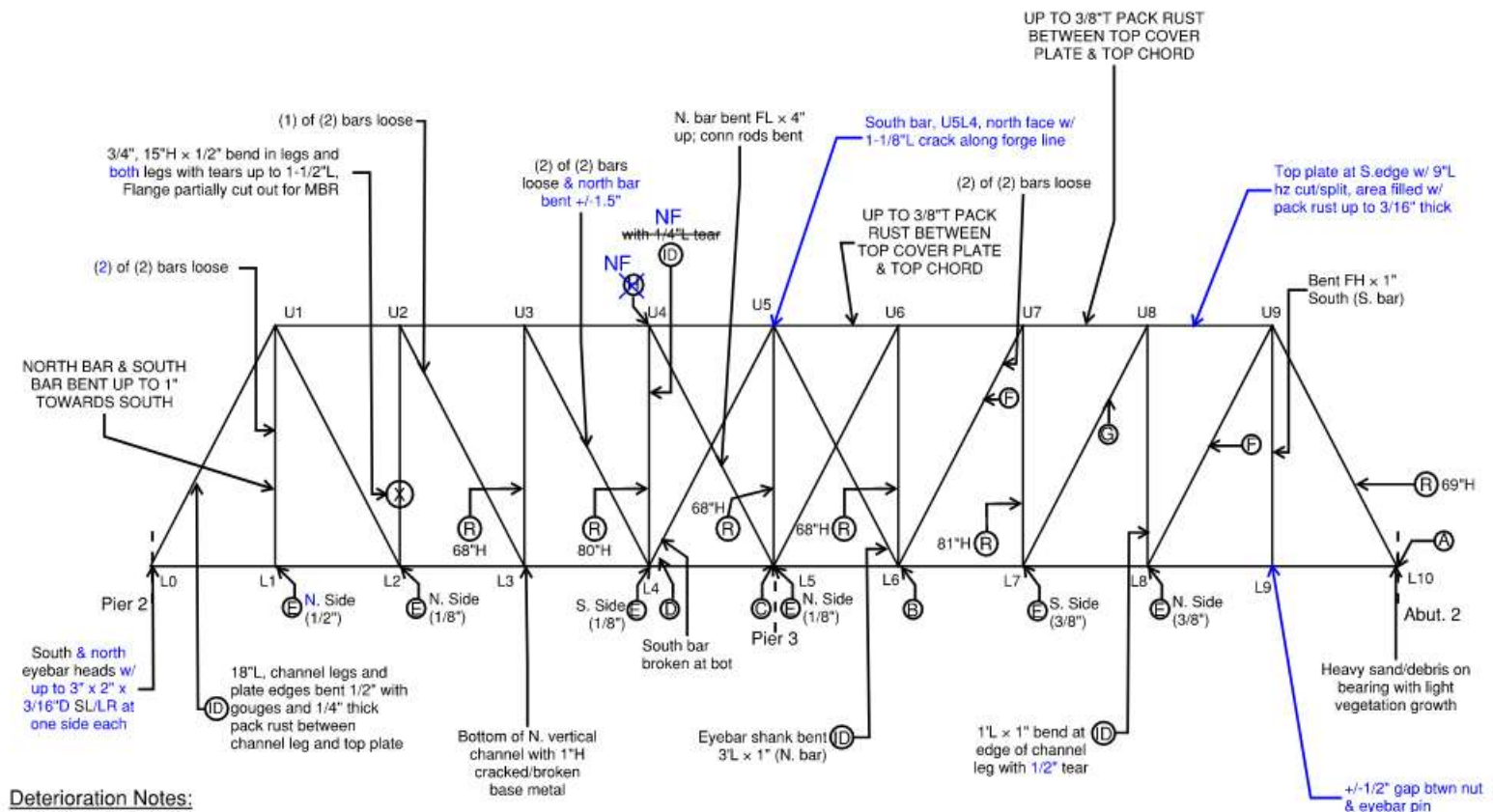
Note: Eyebar does not carry live load, only has to support its own weight.

SECTION B-B (SOUTH EYEBAR)

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, JG, BF (Baker) - No change	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

- (A) Anchor bolt with laminated rust (northwest)
- (B) North bar, south face of U5-L6 with 1-1/4"L crack. South bar, south face of U5-L6 with 3/4"L crack along forge line and up to 1/2" x 1/2" x1/4"D SL/LR on eyebar heads at forge
- (C) North bar, south face of U4-L5 with 2-1/4"L crack at forge line and up to 1/8"D pitting on eyebar heads. South bar, north face of U4-L5 with 1"L crack at forge line
- (D) South bar, north face of L4-U5 with 1-1/16"L crack at forge line (Bar Sheared). North bar, south face of L4-U5 with 15/16"L crack at eyebar head forge
- (E) Gap between pin nut and eyebar head (nuts typically not loose)
- (F) I-Beam section welded (longitudinal and transverse) to eyebars
- (G) (2) plates welded to eyebars (longitudinal)
- (H) ~~North bar, south face of U4-L5 with 1"L crack along forge line~~ NF
- (X) Impact damage with cracks (total length of cracks)
- (ID) Impact damage with bent angle legs up to 1" over 2'L and no cracks
- (R) BOLTED PLATES UP TO 12-1/2"W x 1/2"T AT THE NOTED LOCATIONS

LEGEND:
HOLLOW AREA
SHALLOW REBAR
SPALL AREA
SPALL AREA WITH EXPOSED REBAR
MAPCRACKS
HAIRLINE CRACKS
HONEYCOMB AREA
SCALE AREA
EFFLORESCENCE PRESENT

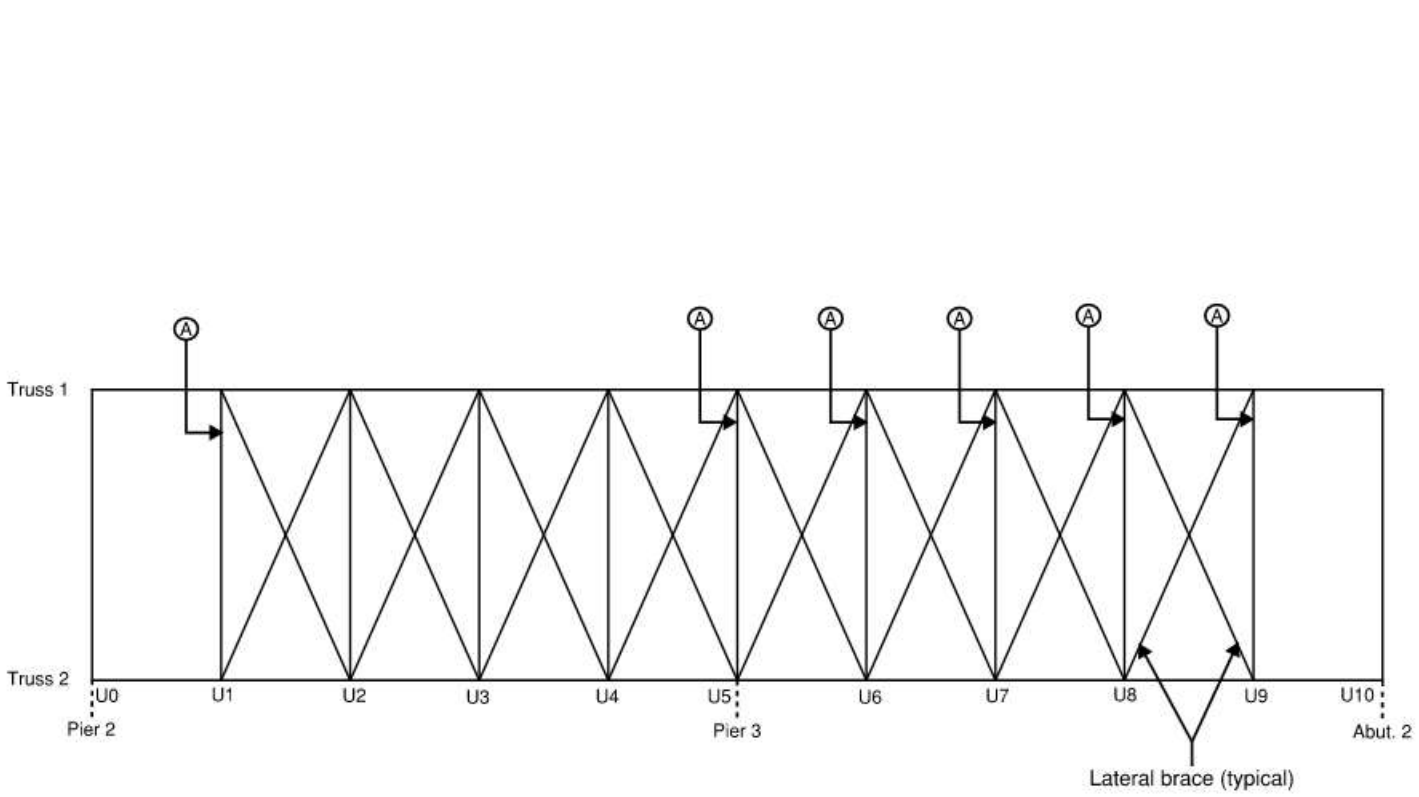
General Notes:

- See Truss general notes sheet

TRUSS 2 SOUTH ELEVATION - SPANS 3 & 4

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, JG, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

Ⓐ Impact damage to horizontal members (angle legs dented up to 1/2"); typ two spots each call-out

General Notes:

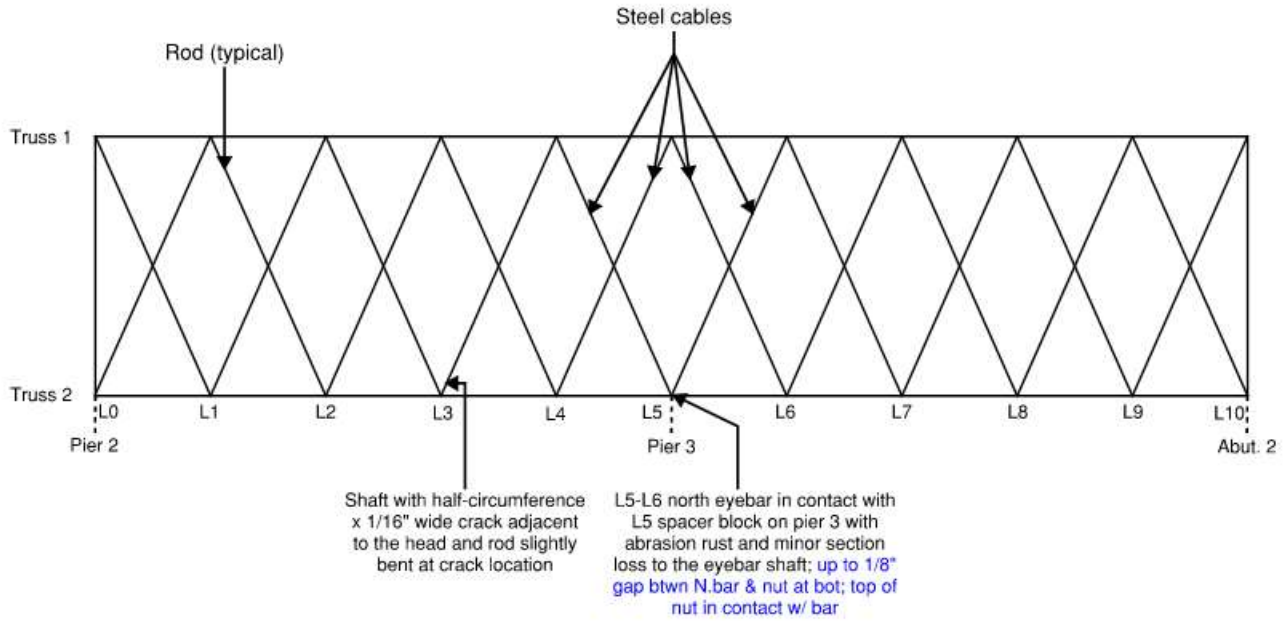
- See Truss general notes sheet
- Rods at center (point of contact) with up to 3/8" deep dents/wear

TOP CHORD LATERAL BRACING - SPANS 3 & 4

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, JG, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: KHI, WEA (TSC)	DATE: 11/17/16	BRIDGE NO.: 01349

N
Log



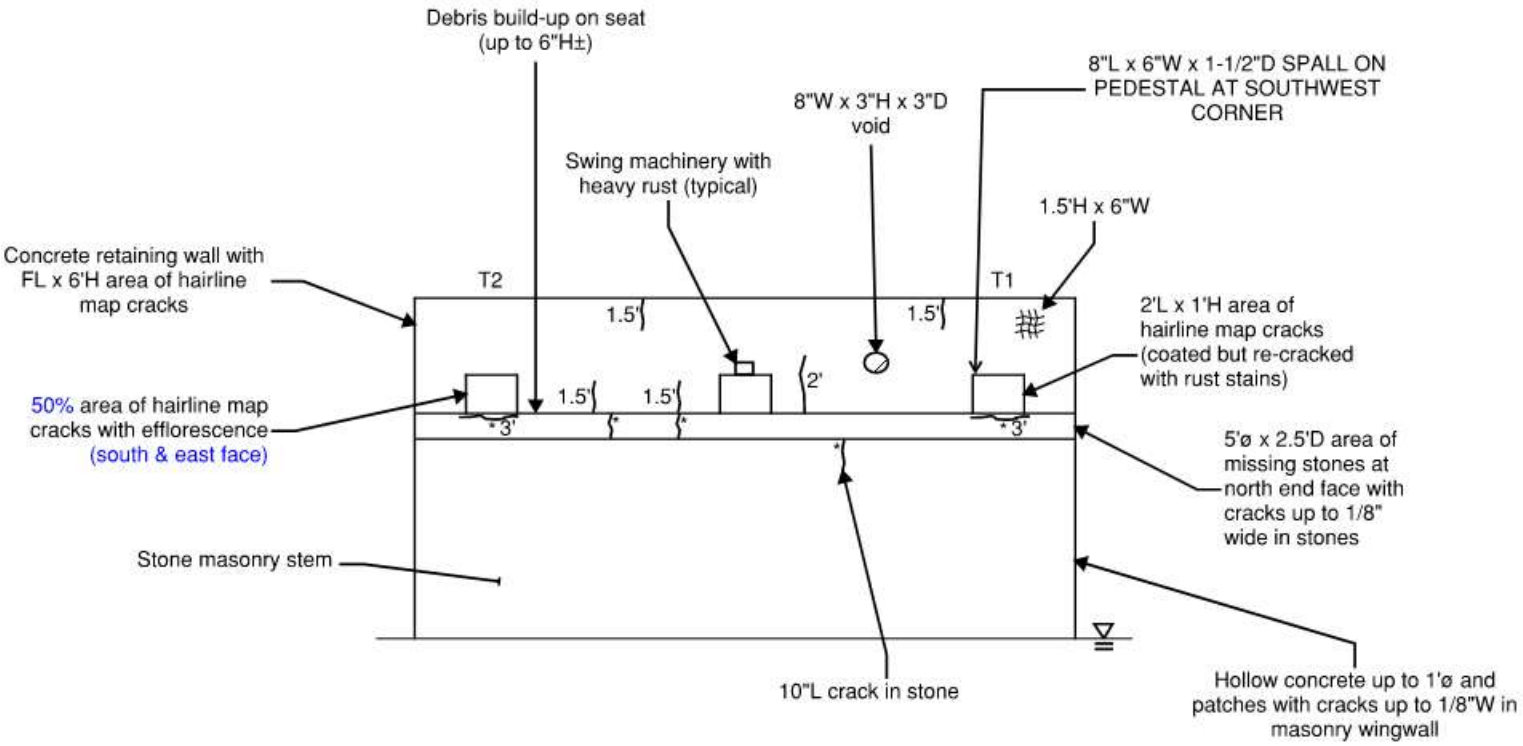
General Notes:

- See Truss general notes sheet
- Several diagonal cables and rods loose and sagging up to 2".
- Light rust on cables and rods.
- Moderate rust on rods in span 4.

BOTTOM CHORD LATERAL BRACING - SPANS 3 & 4

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: TK, AH, JG, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:

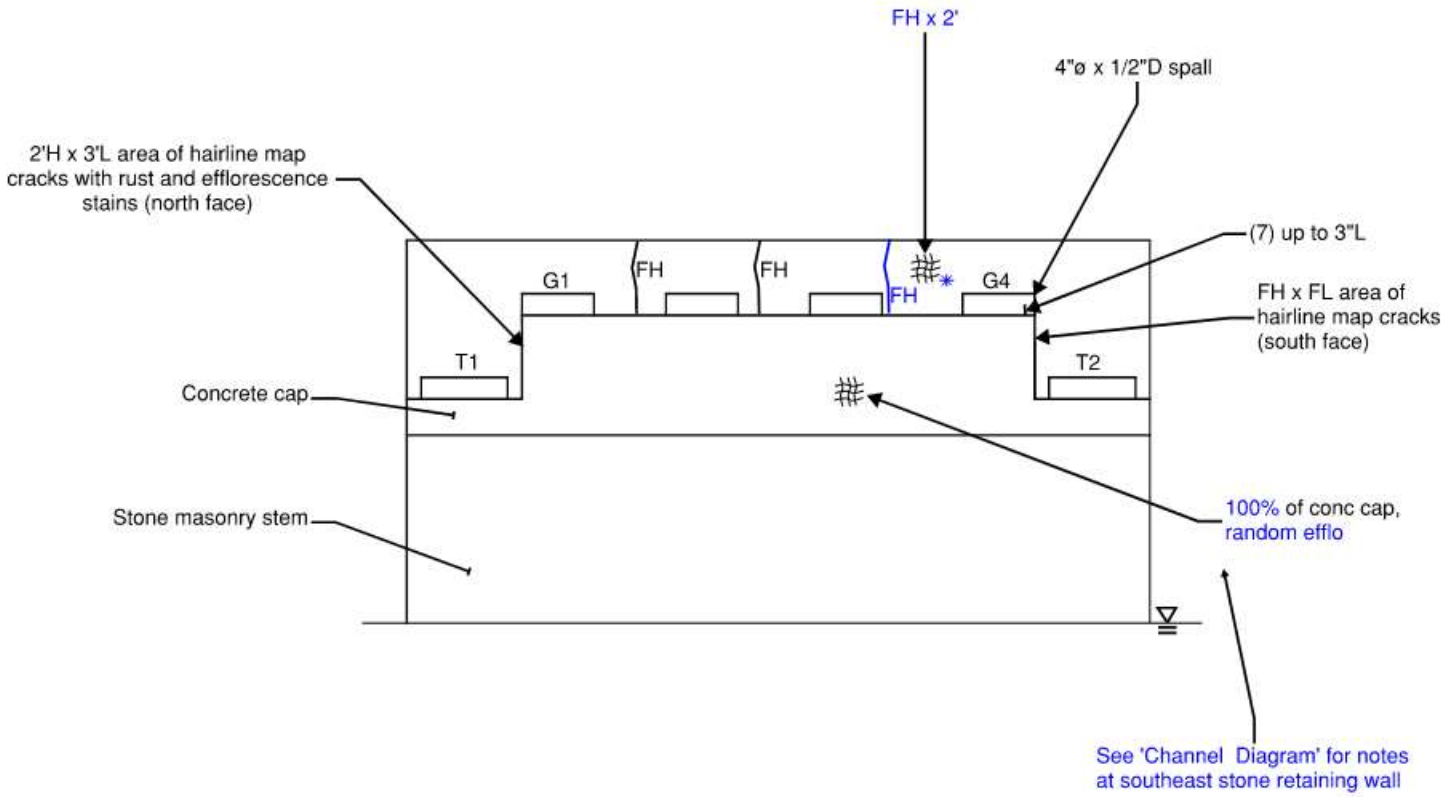
-Mortar joints with patch material separated from stone at random locations
-50%± of mortar pointing missing
-Voids between stones up to 4'D (mostly near water line)
-Timber platform attached to front face of stone masonry stem (not shown for clarity)
-Skim coat on backwall and pedestals beginning to peel
-Minor accumulation of debris on abutment seat and pedestals (unless otherwise noted)
-Efflorescence staining along construction joint between pedestal and seat
- Up to moderate scale on top of pedestals

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

ABUTMENT 1

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: BF, TK, JG, AH (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:

-Mortar joints with patch material separated from stone at random locations

-50%± of mortar pointing missing

-Evidence of leakage on backwall and concrete cap

- +/-50% map crack at top of cap w/ isolated efflorescence

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- FH Full Height

ABUTMENT 2

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: AH, TK, JG, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: KHI, MMB (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



General Notes:

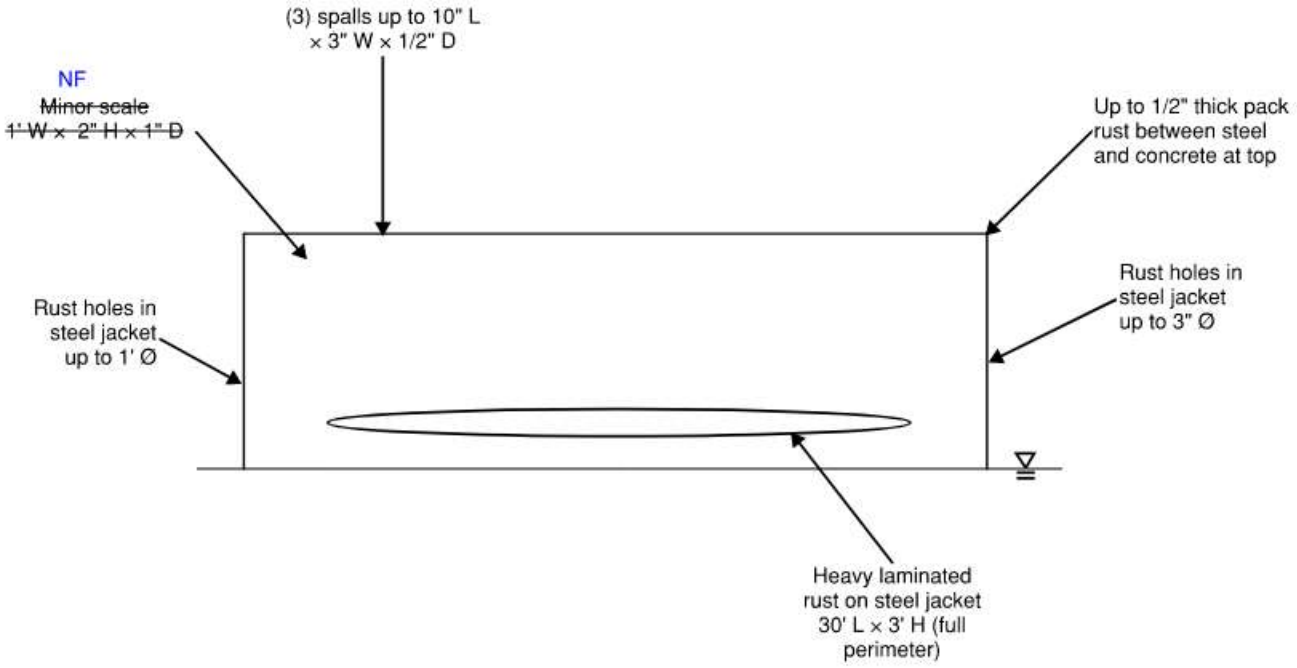
- Swing machinery and cap girder on top
- Fender system not shown for clarity (see channel sketch)
- Steel encasement of concrete pier is severely corroded below high water line (heavy laminated rust up to 3'H × full perimeter) and areas of 100% section loss with spalled concrete
- Top of concrete pier with isolated hairline cracks up to 3'L and widespread map cracks up to 3'W × 1'L
- Timber work platforms at north and south ends on top of fender
- Steel grate walkway at west end attached at top
- ~~Minor ponding water inside of circular steel member on top~~ Dry at TOI

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 1 - WEST ELEVATION

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: BF, TK, JG, AH (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



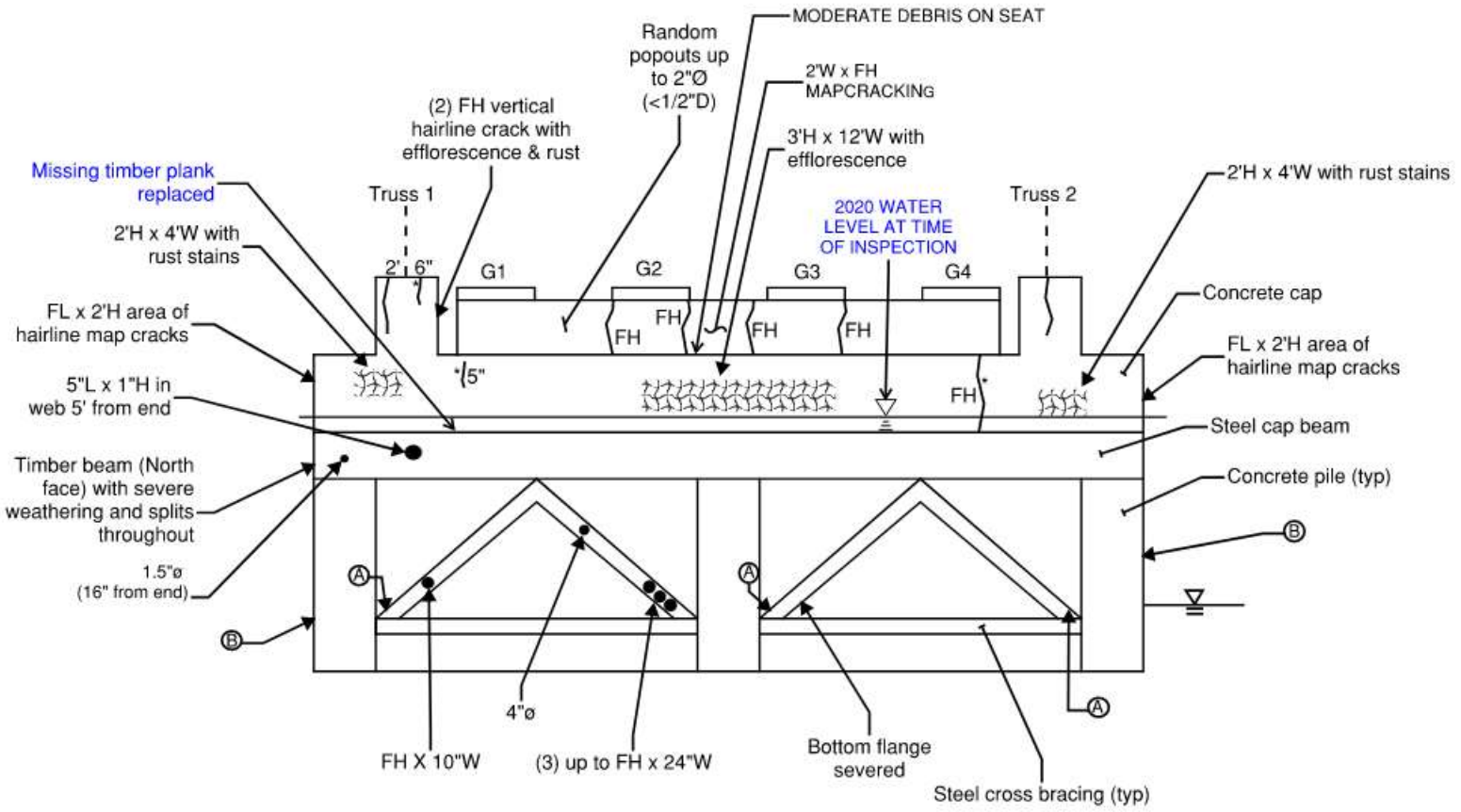
General Notes:
- See Pier 1, West Elevation

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 1 - EAST ELEVATION

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: BF, TK, JG, AH (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

Ⓐ- Steel cross bracing has several locations of 100% section loss x up to 3'W at the ends (disconnected from piles at these locations)

Ⓑ- Fiberglass shell missing, exposed concrete pile with heavy scale up to full perimeter x 3'H x up to 4"D with exposed rebar

General Notes:

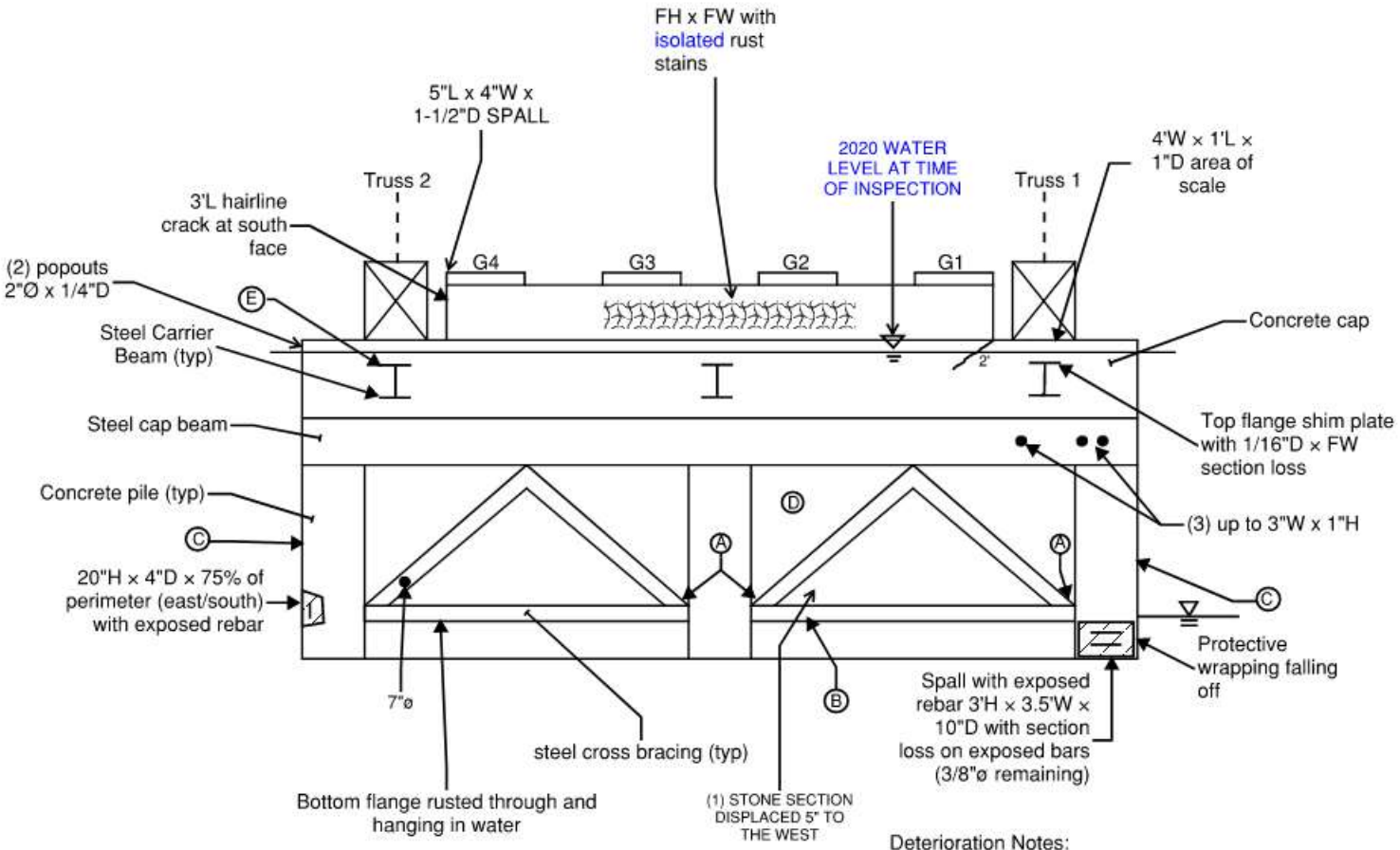
-Moderate sand accumulation on pier cap
-Concrete skimcoat peeling at random locations
-Moderate-Heavy rust on cap beam
- Only concrete portion of pier visible during 2020 inspection (high tide)
- See Underwater sketches for more detailed/updated notes at/below waterline

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- Holes in web

PIER 2 - WEST ELEVATION

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: BF, TK, JG, AH (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:
- Ⓐ- Steel cross bracing has several locations of 100% section loss x up to 2'W at the ends (disconnected from piles at these locations)
- Ⓑ- 100% bottom flange loss x 2'L
- Ⓒ- Fiberglass shell missing, exposed concrete pile with heavy scale up to full perimeter x 3'H x up to 4"D
- Ⓓ- 3'L x 1.5'W x 5"D chipped stone and 15"D mortar void in stone masonry pier wall behind steel cross bracing
- Ⓔ- Shim plate with 11"L x FW x 1/8" thick remaining with knife edge up to FW x 5"L at east end

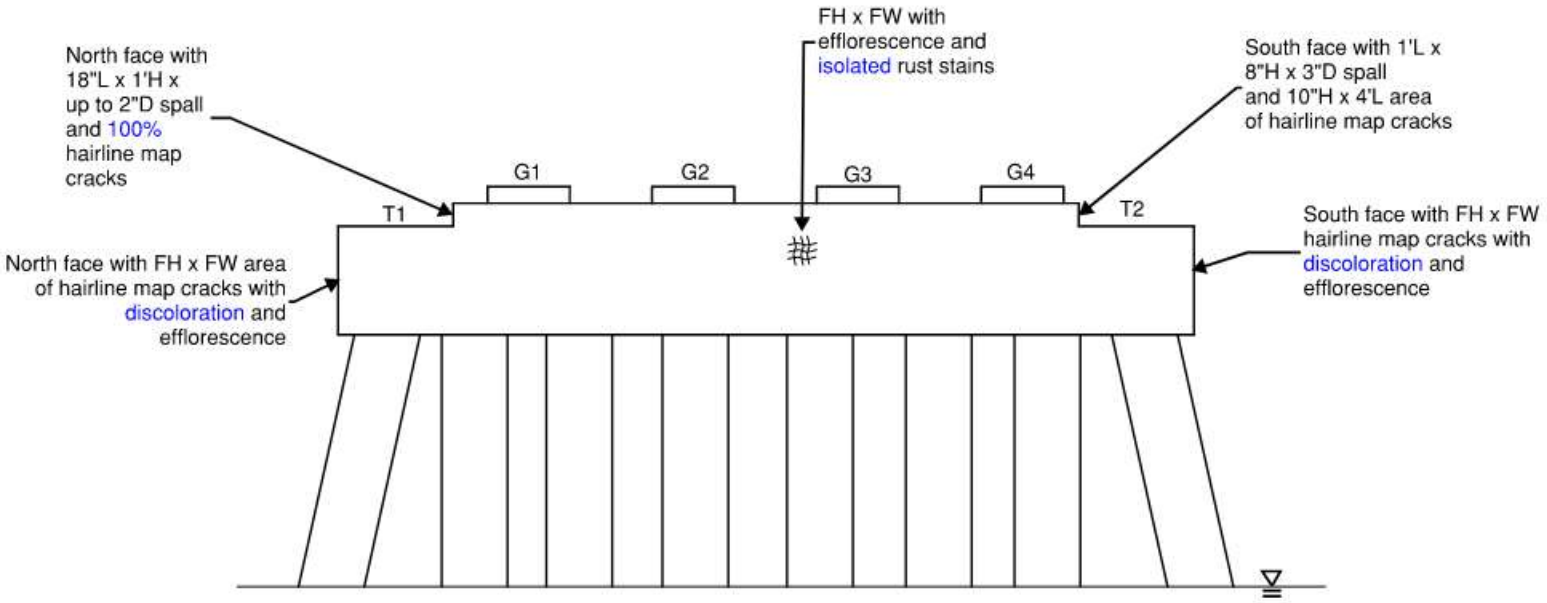
General Notes:
- Concrete skimcoat peeling at random locations
- Moderate sand accumulation on pier cap
- Moderate to heavy rust throughout steel cap beam and cross bracing
- Shim plates on top flanges of steel carrier beams with areas of laminated rust
- Only concrete portion of pier visible during 2020 inspection (high tide)
- See Underwater sketches for more detailed/updated notes at /below waterline

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- Holes in web

PIER 2 - EAST ELEVATION

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: BF, TK, JG, AH (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE:11/16/16	BRIDGE NO.: 01349



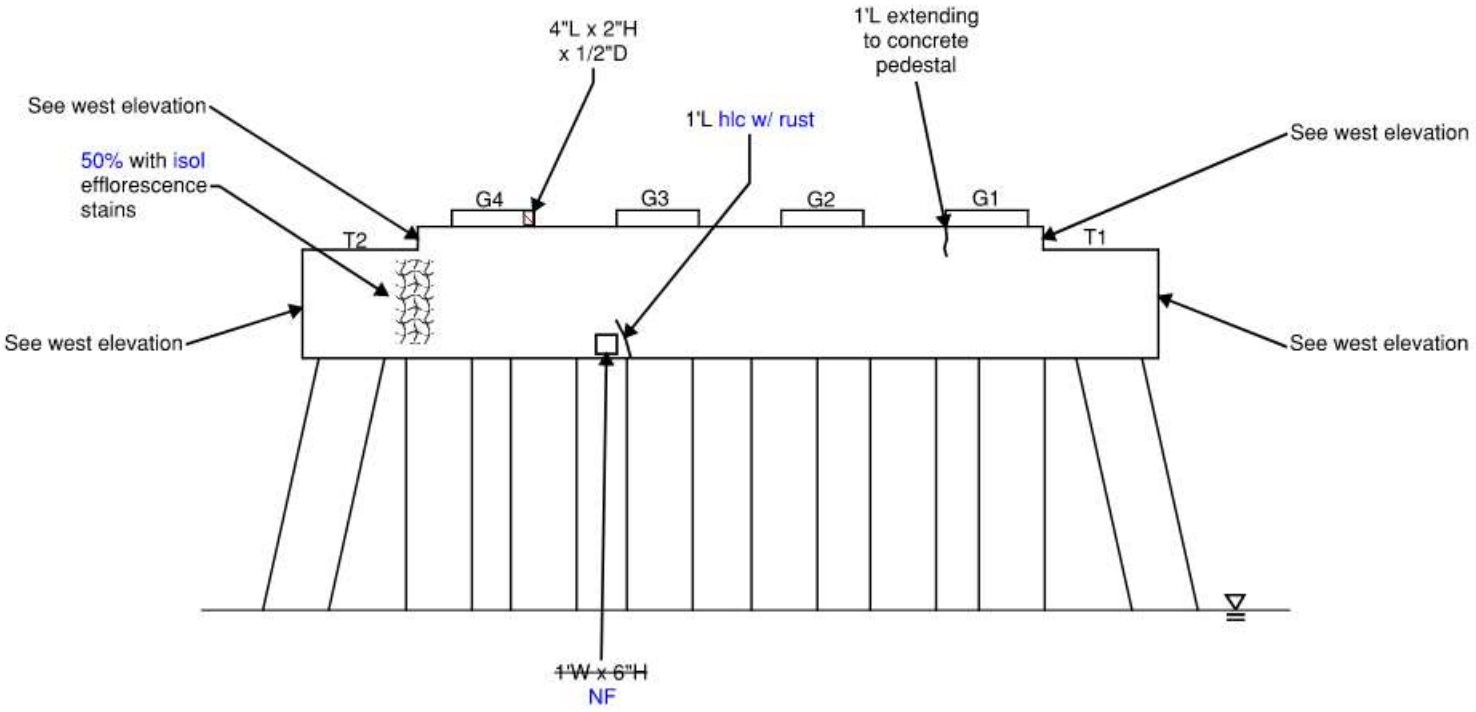
General Notes:
-Moderate silt and algae staining on concrete cap, full height under trusses and FW x 6"H along the bottom.
-Piles wrapped in fiberglass jacket.

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 3 - WEST ELEVATION

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: BF, TK, JG, AH (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



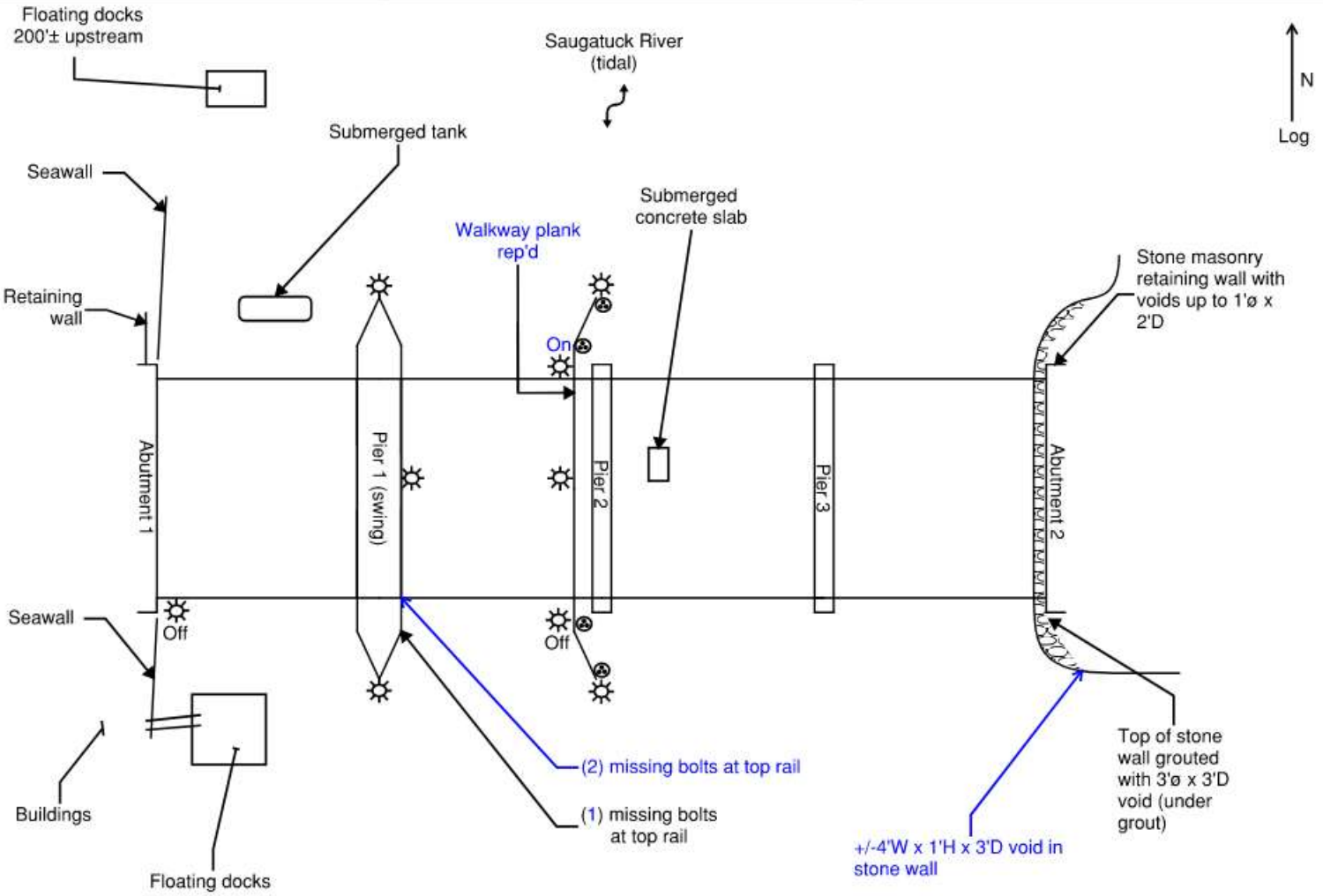
General Notes:
-See Pier 3, West Elevation sheet

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

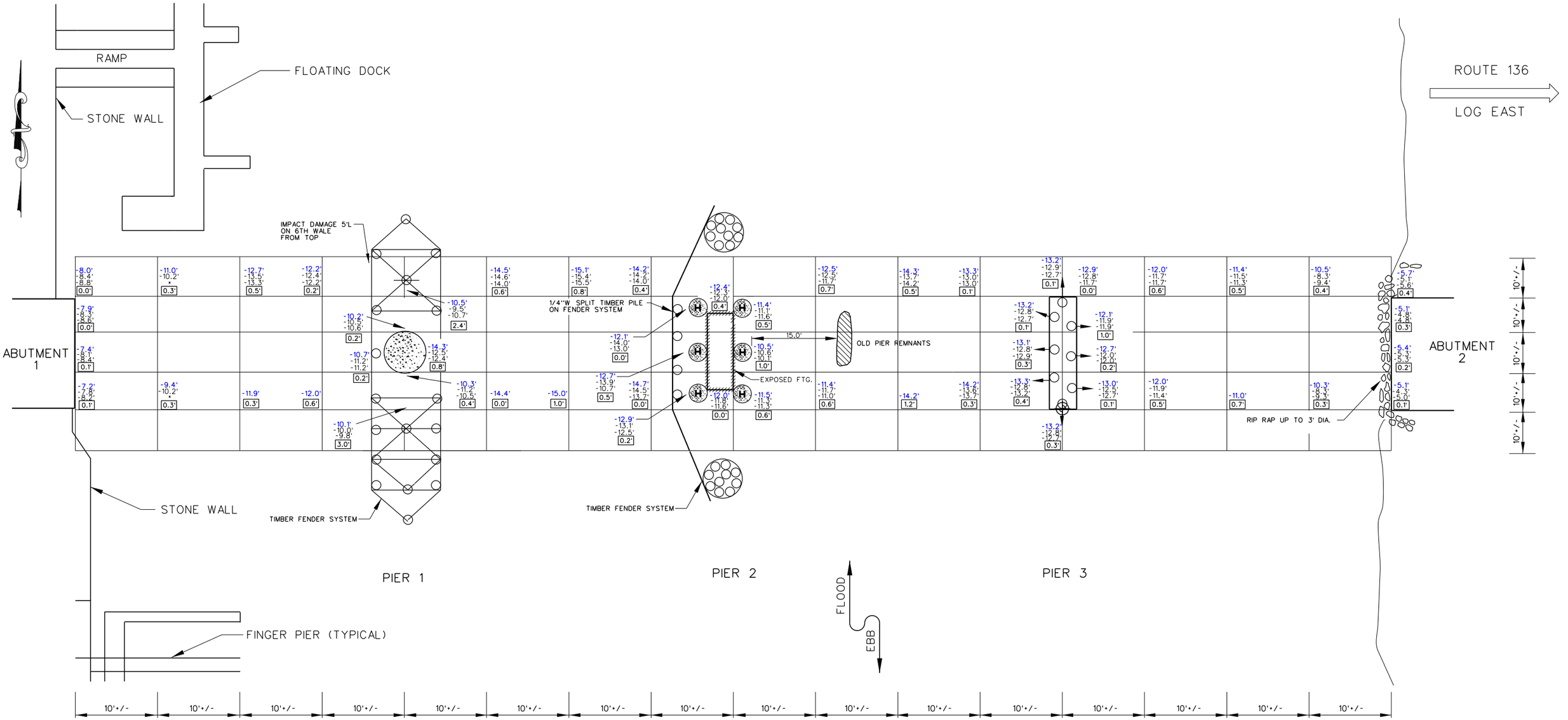
PIER 3 - EAST ELEVATION

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: BF, TK, JG, AH (Baker)	REVISION 4	DATE:	CREW:

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE:	CREW:
REVISION 2	DATE: 9/16/20	CREW: BF, TK, JG, AH (Baker)	REVISION 4	DATE:	CREW:



NOTES:

1. THERE ARE DRY-LAID STONE CHANNEL WALLS ALONG WEST SIDE OF CHANNEL AND DRY-LAID STONE RETAINING WALLS AT ENDS OF ABUTMENT 2.
2. TIMBER FENDER SYSTEM HAS PILES AND WALES WITH SPLITS AND CHECKS UP TO 3/4"W WIDE. ENDS OF WALES HAVE DETERIORATION/ROT UP TO 2'L x FH x UP TO 2"D. THE HARDWARE HAS HEAVY TO SEVERE CORROSION AT WALES 4, 5 & 6 WITHIN TIDAL ZONE.
3. PROBING WITH UP TO 3.0' PENETRATION INTO CHANNEL BOTTOM.
4. PIER 1 STEEL BRACKETS ON TIMBER FENDER SYSTEM HAVE MODERATE TO HEAVY CORROSION WITH AREAS OF 100% SECTION LOSS UP TO 8"L x UP TO 7"H.

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

SOUNDING PLAN

N.T.S.

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -4.7'
-6.5'
-8.0'

0.0' DEPTH OF PENETRATION

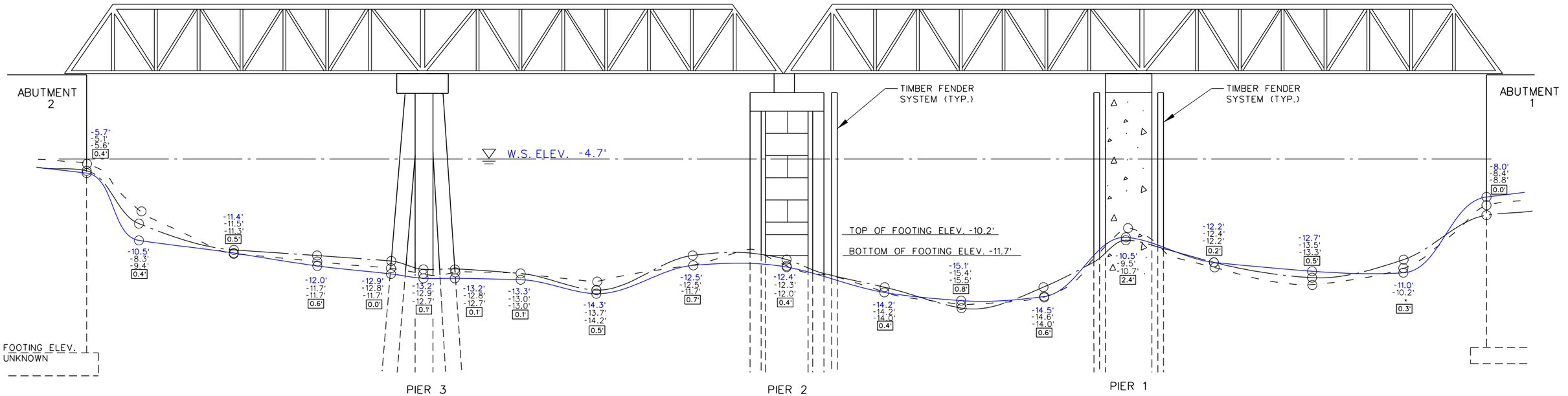
50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505
CONSOR

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

SOUNDING PLAN

INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 01349A

UW DRAWING 1



UPSTREAM (NORTH) ELEVATION

N.T.S.

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

LEGEND FOR MUDLINE CONTOURS

SEPT. 2020
OCT. 2018
SEPT. 2016

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -4.7'
-6.5'
-8.0'

[0.0'] DEPTH OF PENETRATION

50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505
CONSOR

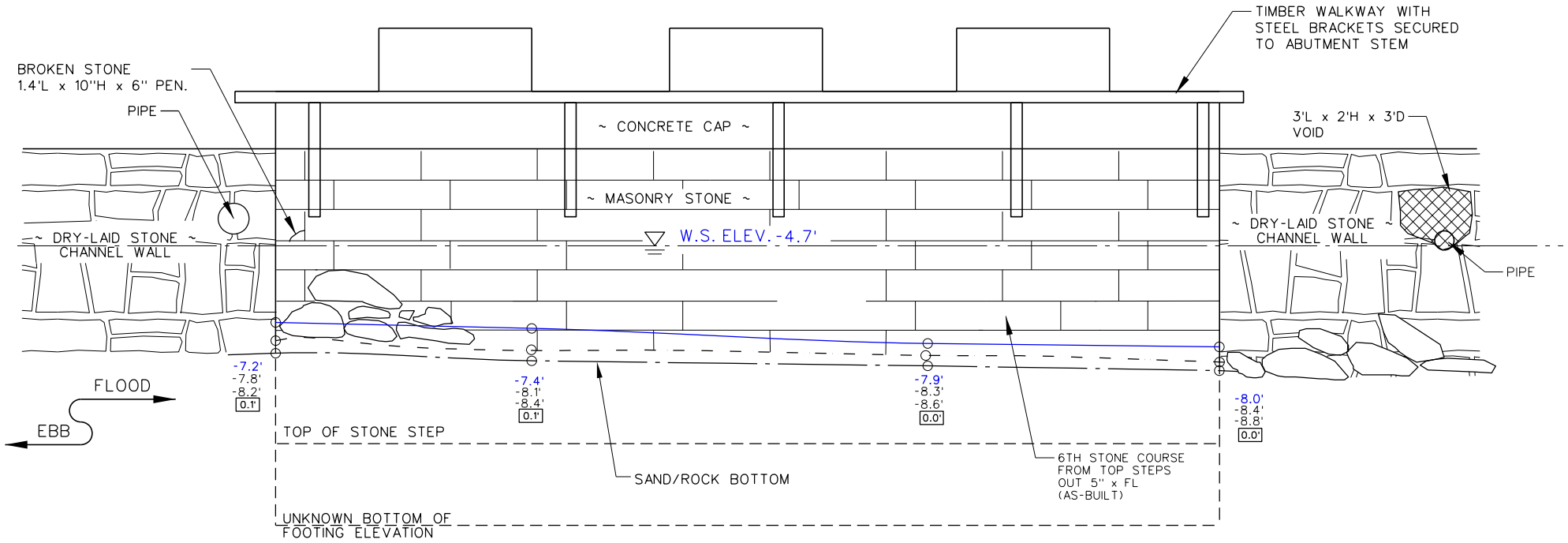
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

UPSTREAM (NORTH) ELEVATION

INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 01349B

UW DRAWING 2



NOTES:

1. GROUT-REPAIR / EPOXY COATING ON STONE MASONRY STEM HAS FAILED UP TO 90% IN TIDAL ZONE.
2. STONE MASONRY STEM HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 3.5' BETWEEN STONES.
3. STONE MASONRY RETURN WALL HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES WITH VOIDS UP TO 1' DIA. DUE TO MISSING MORTAR AND CHINK STONES.
4. DRY-LAID STONE CHANNEL WALLS HAVE PENETRATIONS UP TO 2.5' BETWEEN STONES.
5. NORTH RETURN WALL, 11' FROM CORNER AT RETAINING WALL INTERFACE HAS A 1.3'L x 2'H x 3'D VOID AT EL. -3.0'.

ABUTMENT 1

N.T.S.

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -4.7'
-6.5'
-8.0'

0.0' DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

LEGEND FOR MUDLINE CONTOURS

SEPT. 2020
OCT. 2018
SEPT. 2016

50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505

CONSOR

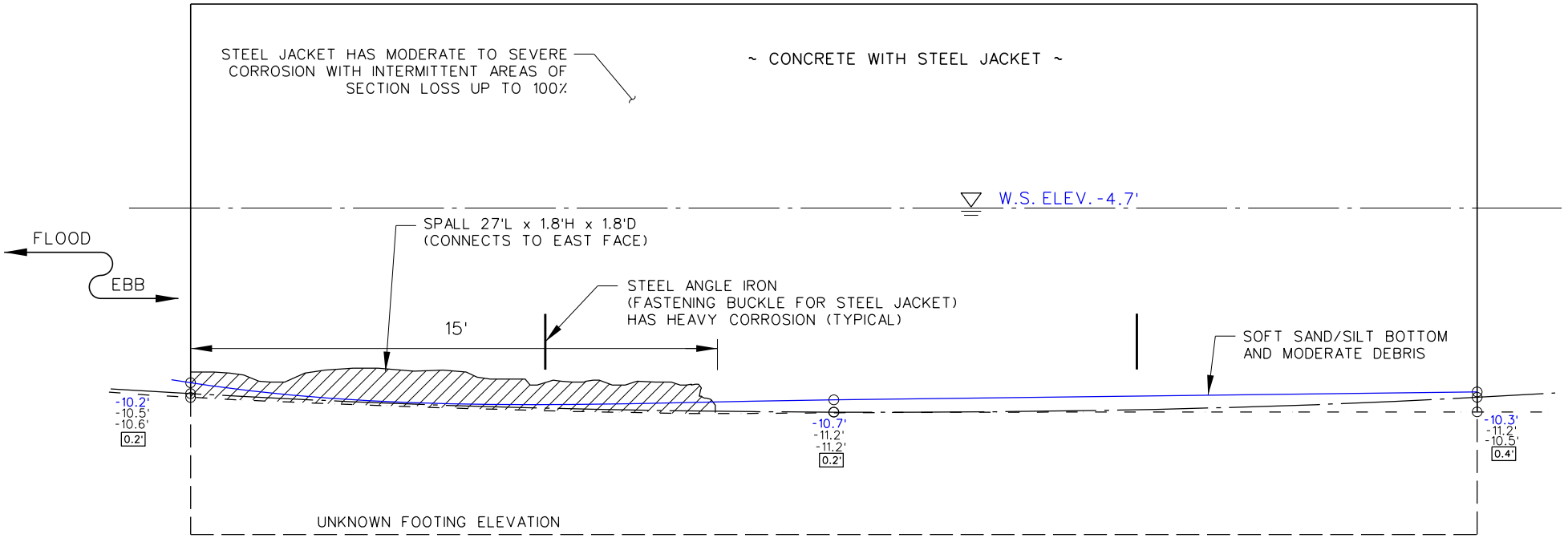
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

ABUTMENT 1

INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 01349C

UW DRAWING 3



PIER 1 (WEST ELEVATION)

N.T.S.

NOTES:

1. THERE IS A 4' HIGH BAND OF MISSING STEEL JACKET FROM 0.5' ABOVE WATER SURFACE TO 3.5' BELOW WATER SURFACE. AREAS OF EXPOSED CONCRETE HAVE MODERATE TO SEVERE ABRASION UP TO 3"D WITH EXPOSED / LOOSE AGGREGATE.
2. CONCRETE OVERPOUR AND CONSTRUCTION DEBRIS ALONG CHANNEL BOTTOM.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -4.7'
  -6.5'
  -8.0'
- [0.0'] DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

LEGEND FOR MUDLINE CONTOURS

- SEPT. 2020
- OCT. 2018
- SEPT. 2016

CONSOR
50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505

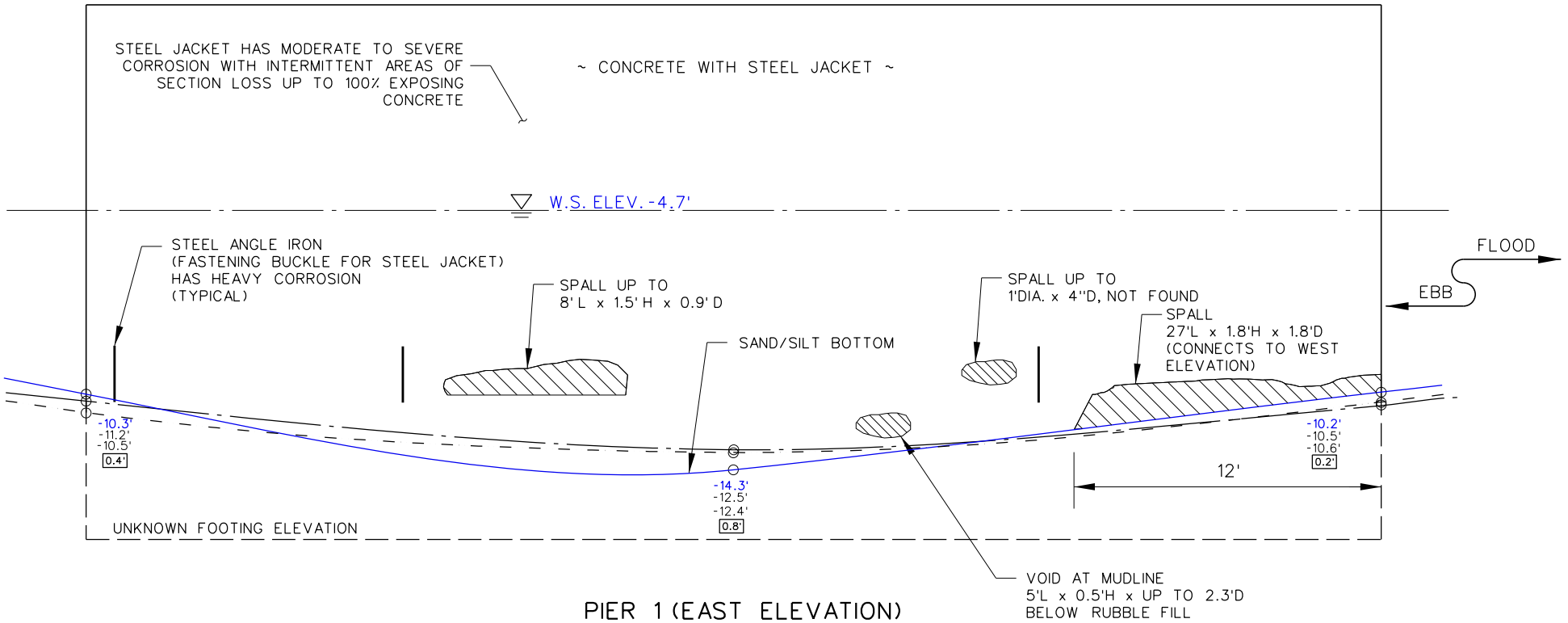
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 1 (WEST ELEVATION)

INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 01349D

UW DRAWING 4



PIER 1 (EAST ELEVATION)

N.T.S.

NOTES:

1. THERE IS A 4' HIGH BAND OF MISSING STEEL JACKET FROM 0.5' ABOVE WATER SURFACE TO 3.5' BELOW WATER SURFACE. AREAS OF EXPOSED CONCRETE HAVE MODERATE TO SEVERE ABRASION UP TO 3"D WITH EXPOSED / LOOSE AGGREGATE.
2. CONCRETE OVERPOUR AND CONSTRUCTION DEBRIS ALONG CHANNEL BOTTOM.

LEGEND FOR SYMBOLS

⊕ DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

▽ W.S. ELEV. -4.7'
-6.5'
-8.0'

[0.0'] DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

LEGEND FOR MUDLINE CONTOURS

——— SEPT. 2020
– – – – – – OCT. 2018
——— - ——— SEPT. 2016

50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505

CONSOR

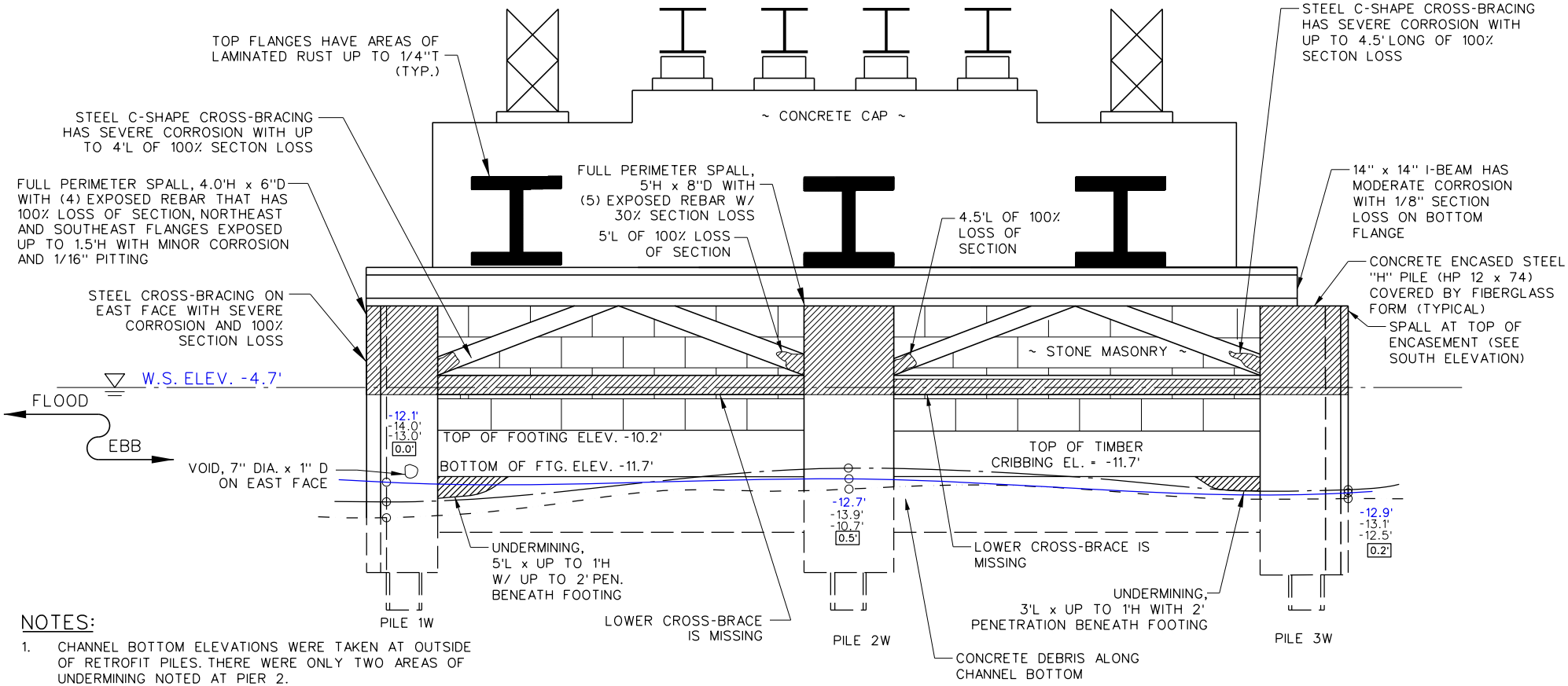
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 1 (EAST ELEVATION)

INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 01349E

UW DRAWING 5



PIER 2 (WEST ELEVATION)

N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. TIMBER CRIBBING WAS EXPOSED AT AREAS OF UNDERMINING AND HAS EVIDENCE OF MARINE BORER ACTIVITY WITH UP TO 20% LOSS OF SECTION.
3. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS ABRASION UP TO 2.5" DEEP WITH EXPOSED AGGREGATE.
4. STONE MASONRY PIER FACE HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES, MISSING CHINKING STONES, AND RANDOM STONES HAVE HAIRLINE CRACKS.
5. ALL JACKETS ON PILES EXTEND TO MUDLINE.
6. STEEL CAP BEAMS HAS MODERATE CORROSION WITH UP TO 1/8" SECTION LOSS ON THE BOTTOM FLANGE.

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

LEGEND FOR MUDLINE CONTOURS

SEPT. 2020
OCT. 2018
SEPT. 2016

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -4.7'
-6.5'
-8.0'

0.0' DEPTH OF PENETRATION

50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505
CONSOR

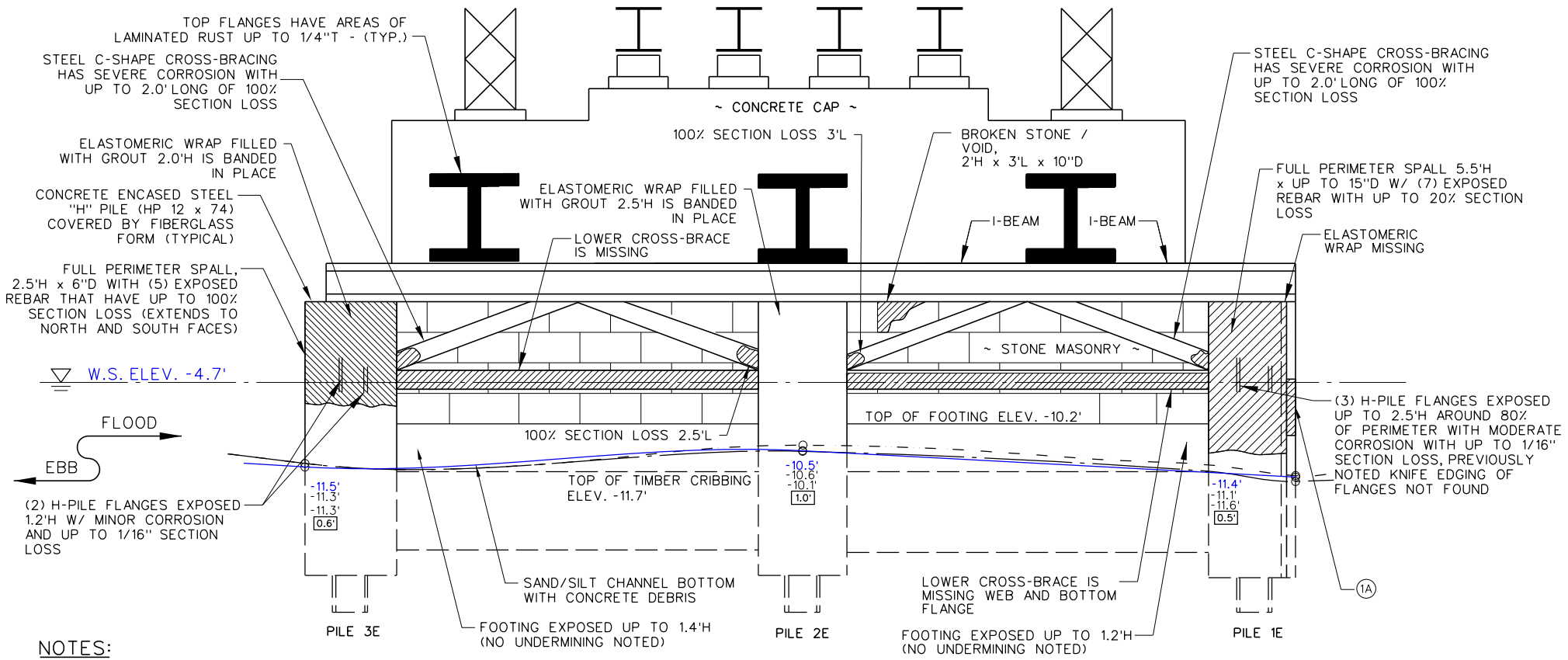
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 2 (WEST ELEVATION)

INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 01349F

UW DRAWING 6



PIER 2 (EAST ELEVATION)

N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS ABRASION UP TO 2.5" DEEP WITH EXPOSED AGGREGATE.
3. STONE MASONRY PIER FACE HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES AND RANDOM STONES HAVE HAIRLINE CRACKS.
4. ALL JACKETS ON PILES GO TO MUDLINE.
5. STEEL CAP BEAMS HAS MODERATE CORROSION WITH UP TO 1/8" SECTION LOSS ON THE BOTTOM FLANGE.

(1A) — STEEL BEAM WELDED TO STEEL "H" PILE HAS SEVERE CORROSION WITH UP TO 100% SECTION LOSS 2.5'H AT BOTTOM OF PLATE IN TIDAL ZONE

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -4.7' / -6.5' / -8.0'
- 0.0' DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

LEGEND FOR MUDLINE CONTOURS

- SEPT. 2020
- OCT. 2018
- SEPT. 2016

50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505
CONSOR

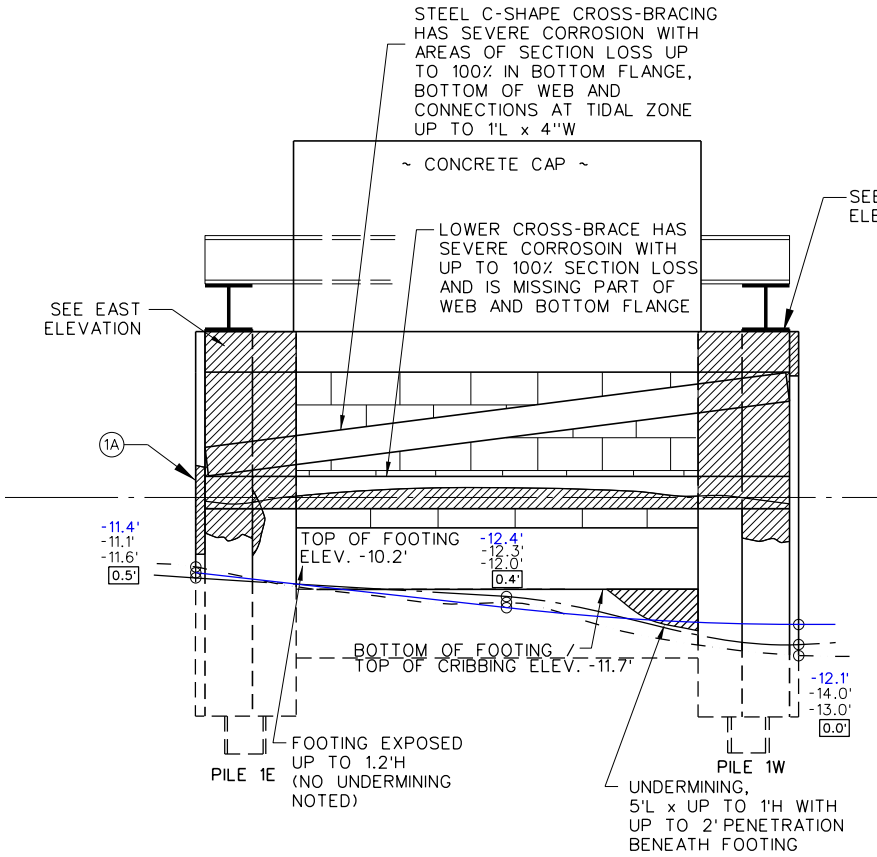
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

PIER 2 (EAST ELEVATION)

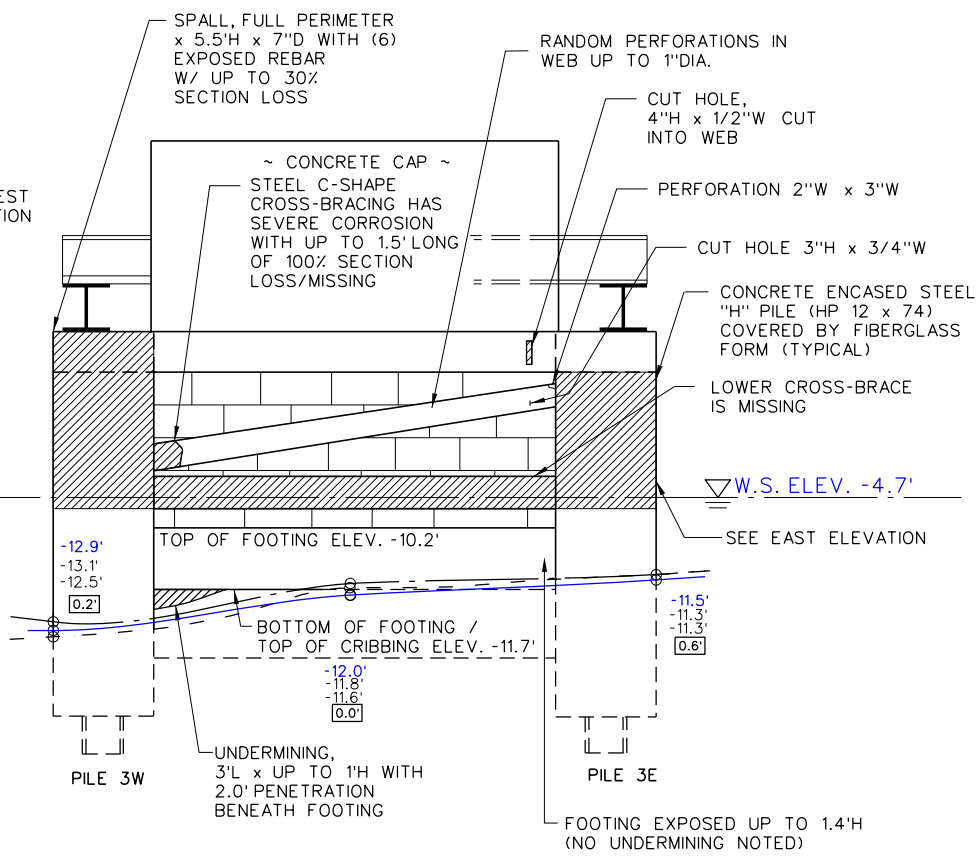
INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 01349G

UW DRAWING 7



PIER 2 (NORTH ELEVATION)

N.T.S.



PIER 2 (SOUTH ELEVATION)

N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. TIMBER CRIBBING WAS EXPOSED AT AREAS OF UNDERMINING AND HAS EVIDENCE OF MARINE BORER ACTIVITY.
3. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS ABRASION UP TO 2.5" DEEP WITH EXPOSED AGGREGATE.
4. STONE MASONRY PIER FACE HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES, MISSING CHINKING STONES, AND RANDOM STONES HAVE HAIRLINE CRACKS.

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

LEGEND FOR MUDLINE CONTOURS

SEPT. 2020
OCT. 2018
SEPT. 2016

(1A) – STEEL BEAM WELDED TO STEEL "H" PILE HAS SEVERE CORROSION WITH UP TO 100% SECTION LOSS 2.5'H AT BOTTOM OF PLATE IN TIDAL ZONE

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -4.7' / -6.5' / -8.0'
- 0.0' DEPTH OF PENETRATION

50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505
CONSOR

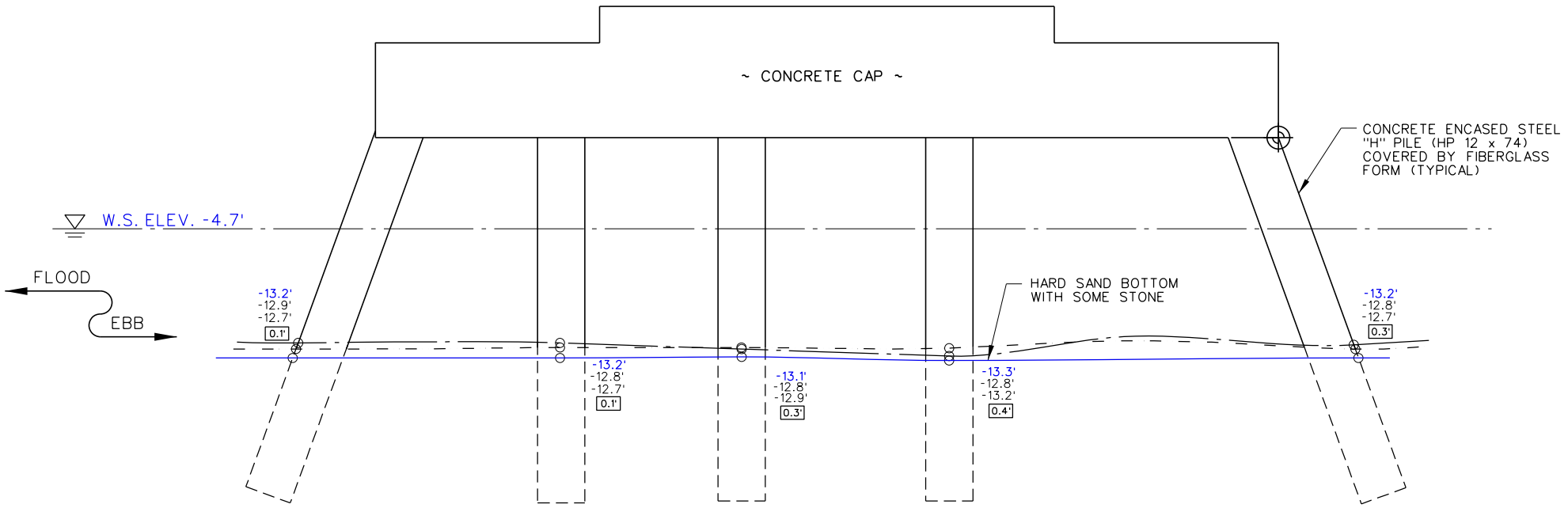
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 2 NORTH AND SOUTH ELEVATIONS

INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 01349H

UW DRAWING 8



PIER 3 (WEST ELEVATION)

N.T.S.

NOTES:

1. FIBERGLASS FORMS HAVE MARINE GROWTH (BARNACLES AND OYSTERS) UP TO 1" THICK.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -4.7'
  -6.5'
  -8.0'
- [0.0'] DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

LEGEND FOR MUDLINE CONTOURS

- SEPT. 2020
- OCT. 2018
- SEPT. 2016

50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505

CONSOR

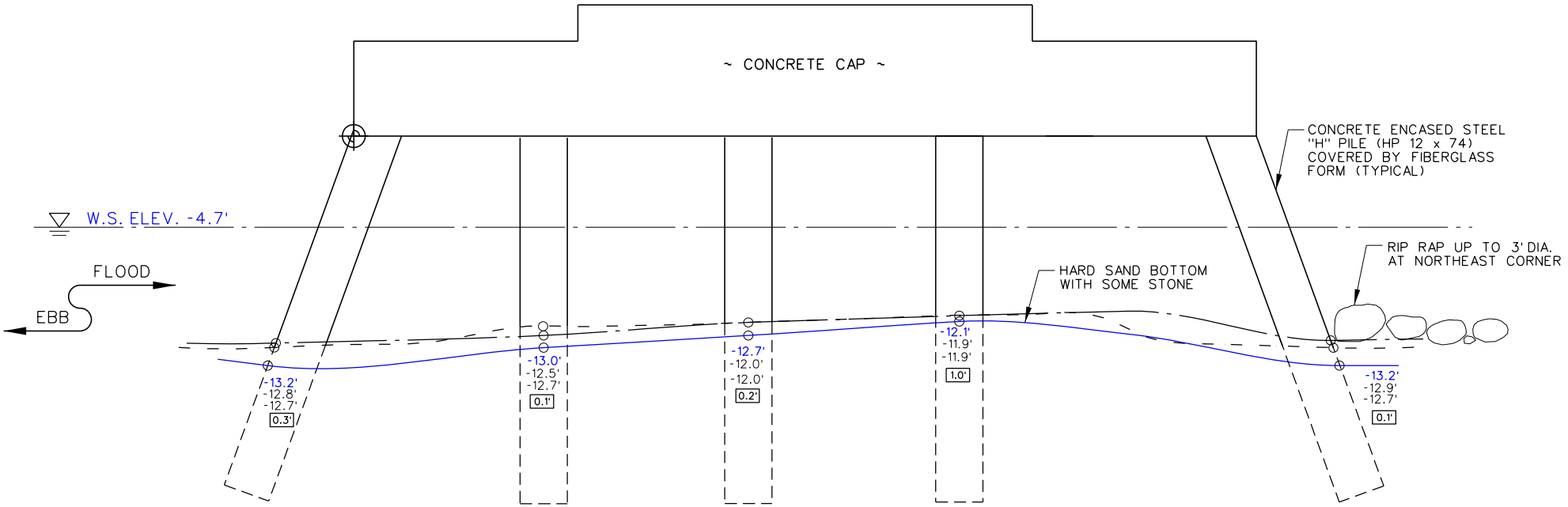
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 3 (WEST ELEVATION)

INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 013491

UW DRAWING 9



PIER 3 (EAST ELEVATION)

N.T.S.

NOTES:

1. FIBERGLASS FORMS HAVE MARINE GROWTH (BARNACLES AND OYSTERS) UP TO 1" THICK.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -4.7'
  -6.5'
  -8.0'
- [0.0'] DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

LEGEND FOR MUDLINE CONTOURS

- SEPT. 2020
- OCT. 2018
- SEPT. 2016

50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505

CONSOR

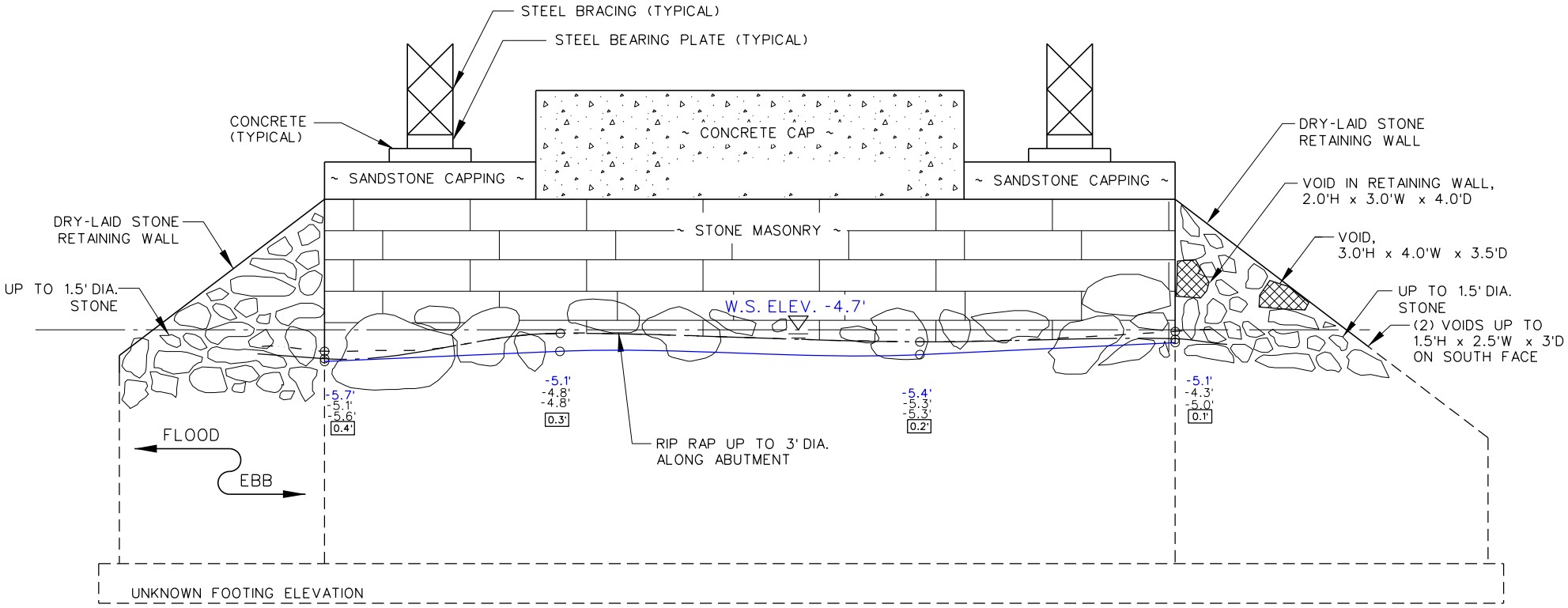
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 3 (EAST ELEVATION)

INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 01349J

UW DRAWING 10



ABUTMENT 2

N.T.S.

NOTES:

1. GROUT-REPAIR / EPOXY COATING ON STONE MASONRY HAS FAILED UP TO 90% IN TIDAL ZONE.
2. STONE MASONRY STEM AND RETURN WALLS HAVE 90% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 4' BETWEEN STONES.
3. DRY-LAID STONE RETAINING WALLS HAVE PENETRATIONS UP TO 3' BETWEEN STONES.

LEGEND FOR BOTTOM ELEVATIONS

SEPT. 2020: -0.0'
OCT. 2018: -0.0'
SEPT. 2016: -0.0'

LEGEND FOR MUDLINE CONTOURS

SEPT. 2020
OCT. 2018
SEPT. 2016

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -4.7'
-6.5'
-8.0'

0.0' DEPTH OF PENETRATION

50 Inwood Road, Suite 101
Rocky Hill, CT 06067
PH.: 860.840.2505

CONSOR

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

ABUTMENT 2

INSPECTED BY: SS, MB, CH REVISED BY: FH	SCALE: AS SHOWN	DATE OF INSPECTION 09 / 24 / 20	DRAWING NO. 01349K

UW DRAWING 11



Photo Number: 1 Photo Taken: 09/23/2020

Bridge ID.



Photo Number: 2 Photo Taken: 09/23/2020

Typical underside (span 1 shown), looking east.



Photo Number: 3 Photo Taken: 09/23/2020

Typical underside (span 4 shown), looking east.



Photo Number: 4 Photo Taken: 09/23/2020

North elevation.



Photo Number: 5 Photo Taken: 09/23/2020

South elevation.



Photo Number: 6 Photo Taken: 09/23/2020

Bridge from west approach.



Photo Number: 7 Photo Taken: 09/23/2020

Bridge from east approach.



Photo Number: 8 Photo Taken: 09/23/2020

West approach from bridge.



Photo Number: 9 Photo Taken: 09/23/2020

East approach from bridge.



Photo Number: 10 Photo Taken: 09/23/2020

Typical top of deck, looking east.



Photo Number: 11 Photo Taken: 09/23/2020

Span 4, south overhang: Typical laminated rust with perforations near deck weeps.



Photo Number: 12 Photo Taken: 09/23/2020

Span 2, north curb and metal beam railing: Tear in the metal beam railing.

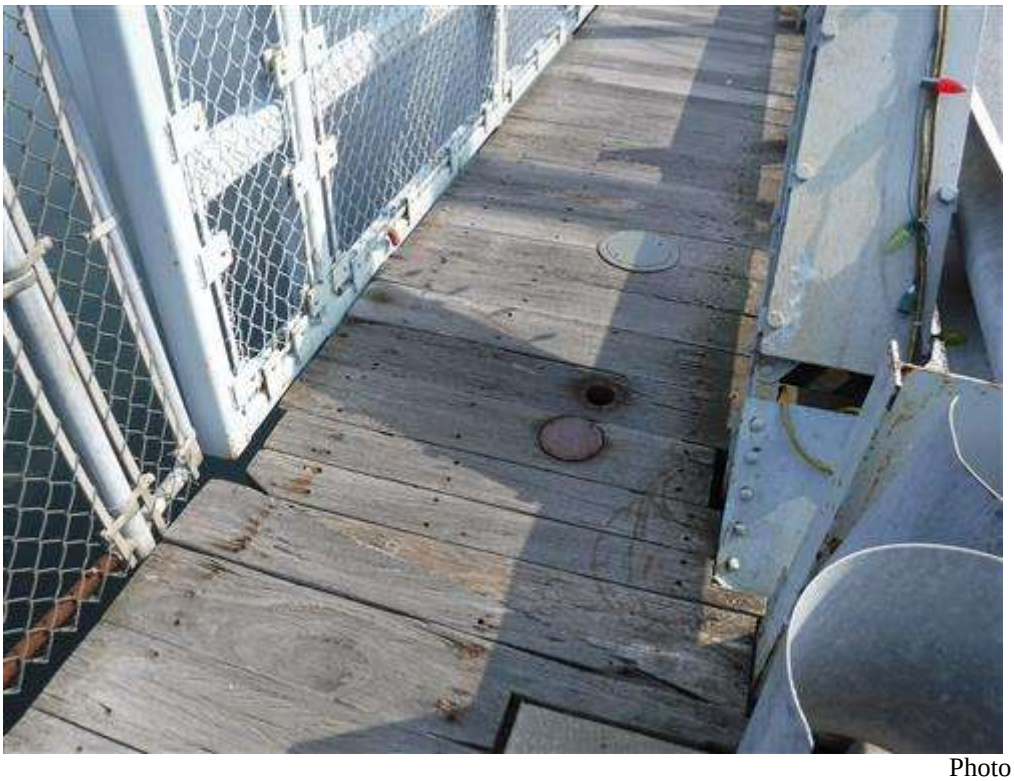


Photo Number: 13 Photo Taken: 09/23/2020

North timber sidewalk in span 1: Missing utility cover.



Photo Number: 14 Photo Taken: 09/23/2020

Northwest approach sidewalk: First two planks adjacent to bridge sidewalk are loose/disconnected.



Photo Number: 15 Photo Taken: 09/23/2020

Span 3, sidewalk bracket 2: Typical laminated rust on brackets and missing connection bolts.



Photo Number: 16 Photo Taken: 09/23/2020

Span 4, 3rd sidewalk support beam: Typical laminated rust with section loss adjacent to sidewalk brackets.



Photo Number: 17 Photo Taken: 09/23/2020

Span 4, north scupper grate: Concrete apron spall and typical partially clogged grate.



Photo Number: 18 Photo Taken: 09/23/2020

Pier 2 steel-armored open deck joint, looking south. Note the raveled overlay along the steel plate.



Photo Number: 19 Photo Taken: 09/23/2020

Abutment 2 strip seal joint, looking north. Note the loose steel extrusion and missing section of approach curb with exposed rebar. Also, note the missing end treatment at the approach railing.



Photo Number: 20 Photo Taken: 09/23/2020

Abutment 2 joint, looking south. Note that the remainder of the loose portion of strip seal was removed at time of inspection and filled with bituminous.



Photo Number: 21 Photo Taken: 09/23/2020

Northwest approach transition: Missing section connecting to concrete block and missing end treatment.



Photo Number: 22 Photo Taken: 09/23/2020

Typical bearings at pier 2 (span 3 shown).



Photo Number: 23 Photo Taken: 09/23/2020

Typical elastomeric bearing at pier 3 (girder 3 shown).



Photo Number: 24 Photo Taken: 09/23/2020

Span 4, girder 1 elastomeric bearing at abutment 2: Dishing and laminated rust on sole plate.



Photo Number: 25 Photo Taken: 09/23/2020

Span 1, truss 1 bearing at abutment 1: Previously noted gap difficult to see due to debris.



Photo Number: 26 Photo Taken: 09/23/2020

Span 3, truss 1 bearing at pier 2. Note backed off anchor bolt nuts.



Photo Number: 27 Photo Taken: 09/23/2020

Span 4, truss 2 bearing at abutment 2. Note typical condition.



Photo Number: 28 Photo Taken: 09/23/2020

Span 1, girder 7 at abutment 1: Laminated rust with section loss along top flange adjacent to weep.



Photo Number: 29 Photo Taken: 09/23/2020

Typical laminated rust with section loss along girder web bases near drains (span 2, girder 1 shown).



Photo Number: 30 Photo Taken: 09/23/2020

Span 2, girder 7 at west splice: Laminated rust with negligible section loss. Also, note weld is not ground smooth.



Photo Number: 31 Photo Taken: 09/23/2020

Span 1 box girder at abutment 1, looking south: Debris inside.



Photo Number: 32 Photo Taken: 09/23/2020

Span 2 box girder at pier 2, looking south: Bird debris.



Photo Number: 33 Photo Taken: 09/23/2020

Inside pivot girder at pier 1: Typical laminated rust inside.



Photo Number: 34 Photo Taken: 09/23/2020

Span 1, truss 1, L0-L1 at L1, looking east: Rusted out batten plate and lattice bar.



Photo Number: 35 Photo Taken: 09/23/2020

Span 2, truss 2, L5-L6: Heavy laminated rust with section losses and perforations along the bottom chord bottom plate.



Photo Number: 36 Photo Taken: 09/23/2020

Span 2, truss 1, L5-L6, looking east: Interior of bottom chord with debris and laminated rust with section losses along webs.



Photo Number: 37 Photo Taken: 09/23/2020

Typical pack rust between top chord plates (span 3, truss 1 shown).



Photo Number: 38 Photo Taken: 09/23/2020

Span 4, truss 1: Typical bolted plates along verticals.



Photo Number: 39 Photo Taken: 09/23/2020

Span 3, truss 2, L4-U4: Damaged member with bolted plates.



Photo Number: 40 Photo Taken: 09/23/2020

Span 2, truss 2, U9-L10: Impact damage.



Photo Number: 41 Photo Taken: 09/23/2020

Span 4, truss 1 at L7: Typical pack rust between eyebars and vertical plates.



Photo Number: 42 Photo Taken: 09/23/2020

Span 4, truss 2 at L9: Typical gap between pin nut and eyebar.



Photo Number: 43 Photo Taken: 09/23/2020

Span 4, truss 2 at U7: Typical gap between pin nut and top chord plate.



Photo Number: 44 Photo Taken: 09/23/2020

Span 1, truss 1 at L3: Eyebar heads with section losses and rusting.



Photo Number: 45 Photo Taken: 09/23/2020

Spans 1-2, truss 1, U4-U6, looking east: Eyebars bent/bowed vertically and laterally.



Photo Number: 46 Photo Taken: 09/23/2020

Spans 1-2, truss 2, U4-U6, looking east: Eyebars bent/bowed vertically and laterally.



Photo Number: 47 Photo Taken: 09/23/2020

Span 3, truss 2, L4-U5 at L4: South bar is broken.



Photo Number: 48 Photo Taken: 09/23/2020

Spans 1-2 top chord lateral bracing, looking west.



Photo Number: 49 Photo Taken: 09/23/2020

Span 3, top strut at U1: Typical dents due to impact damage.



Photo Number: 50 Photo Taken: 09/23/2020

Span 2, U7 strut, looking north: Strut bent west.



Photo Number: 51 Photo Taken: 09/23/2020

Span 1, top strut at U3 near truss 2, looking north: West angle has cracks along the bottom.



Photo Number: 52 Photo Taken: 09/23/2020

Span 1, truss 1, top lateral bracing rod at U2 is broken.

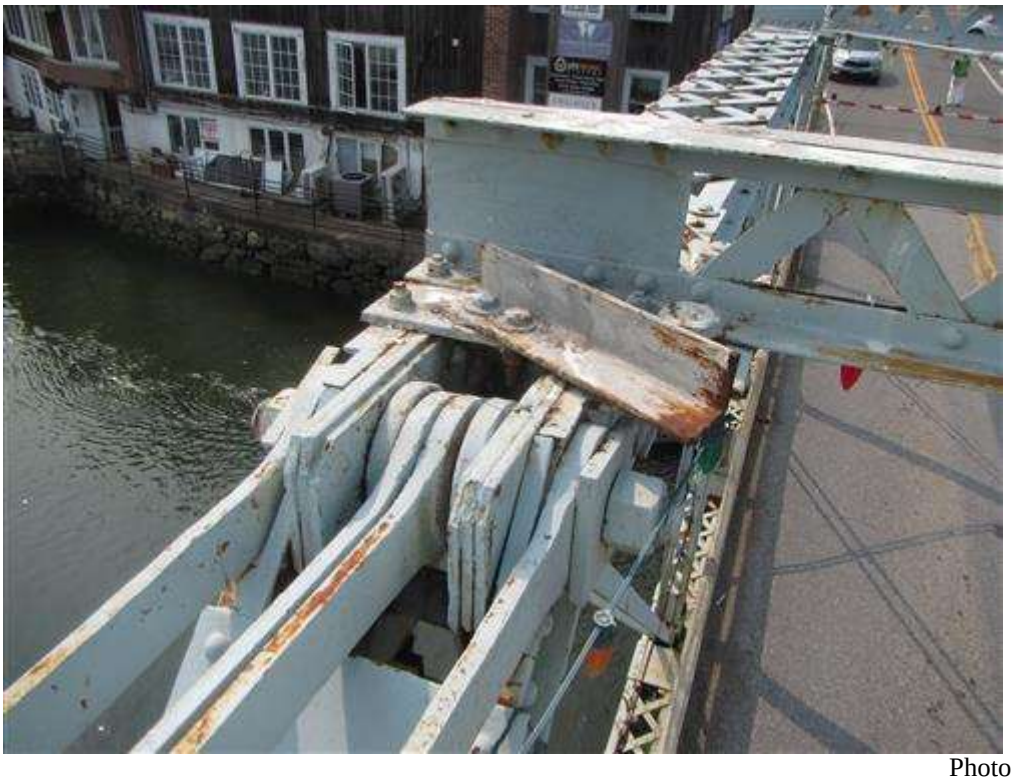


Photo Number: 53 Photo Taken: 09/23/2020

Span 1, truss 2, top lateral bracing at U4 is broken.



Photo Number: 54 Photo Taken: 09/23/2020

Typical wear/dents at top lateral bracing rods in spans 3 & 4.



Photo Number: 55 Photo Taken: 09/23/2020

Span 1, panel 1, top lateral bracing rods are sagged.



Photo Number: 56 Photo Taken: 09/23/2020

Span 3, truss 2 at L3: Bottom lateral bracing rod is partially cracked.



Photo Number: 57 Photo Taken: 09/23/2020

Typical intersecting welds between pivot girder (box girder) and girder 1 (plate girder).



Photo Number: 58 Photo Taken: 09/23/2020

Span 2, girder 2 connection to box girder at pier 2: Typical backer bar left-in-place.

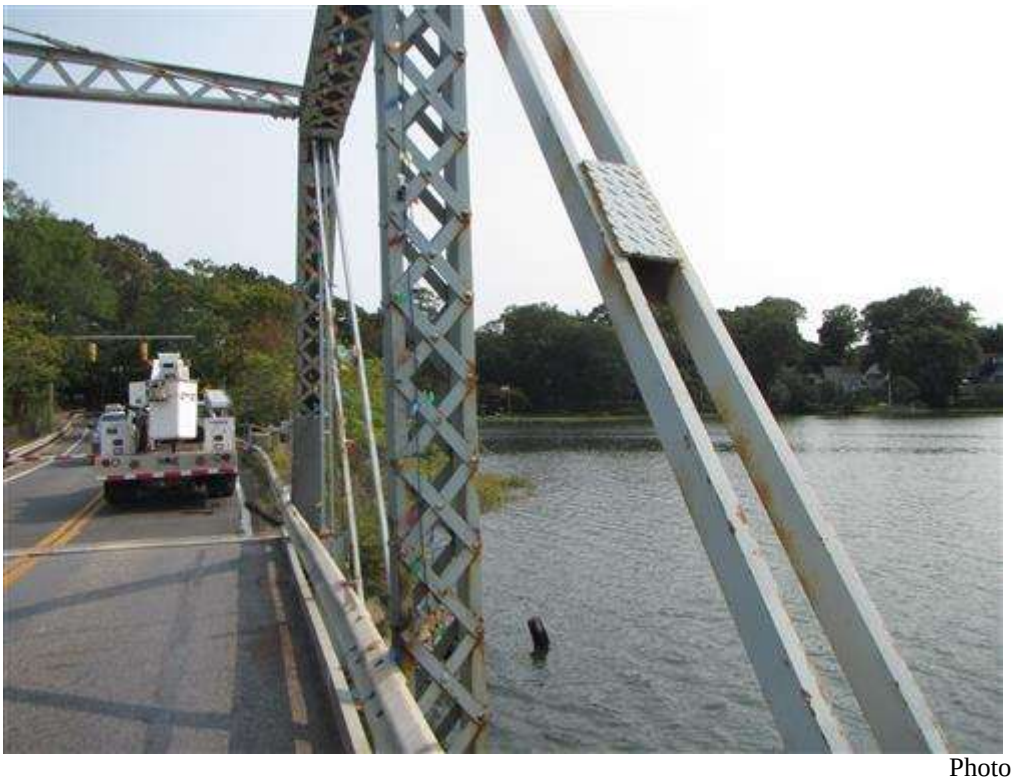


Photo Number: 59 Photo Taken: 09/23/2020

Span 4, truss 2, L7-U8: Additional welded plate between eyebars.



Photo Number: 60 Photo Taken: 09/23/2020

Span 3, truss 2, L2-U2: Impact damage with gouges/tears at edges.



Photo Number: 61 Photo Taken: 09/23/2020

Span 2, truss 1, L5-U6: Impact damage with cracks along interior of south channel.



Photo Number: 62 Photo Taken: 09/23/2020

Span 2, truss 1, L8-U8: Crack at southeast angle.



Photo Number: 63 Photo Taken: 09/23/2020

Span 4, truss 1, L7-U7: Crack with stop holes.



Photo Number: 64 Photo Taken: 09/23/2020

Span 4, truss 1, L6-U6: Crack at the south channel, north face.



Photo Number: 65 Photo Taken: 09/23/2020

Span 3, truss 2 at L3: Crack at bottom of vertical channel.



Photo Number: 66 Photo Taken: 09/23/2020

Span 3, truss 2, U5-L4 at U5: South bar, north face with crack along forge line.



Photo Number: 67 Photo Taken: 09/23/2020

Span 4, truss 1, L5-U6 at U6: South bar, north face with crack along forge line.



Photo Number: 68 Photo Taken: 09/23/2020

Same as previous photo.



Photo Number: 69 Photo Taken: 09/23/2020

Span 2, truss 2, U8-L9 at L9: North bar, south face with crack along forge line.



Photo Number: 70 Photo Taken: 09/23/2020

Span 4, truss 1, L5-U6 at L5: South bar, north face with crack along forge line.



Photo Number: 71 Photo Taken: 09/23/2020

Span 3, truss 2, U4-L5 at L5: North bar, south face with crack along forge line.



Photo Number: 72 Photo Taken: 09/23/2020

Abutment 1.



Photo Number: 73 Photo Taken: 09/23/2020

Abutment 2.



Photo Number: 74 Photo Taken: 09/23/2020

Northwest retaining wall/seawall.



Photo Number: 75 Photo Taken: 09/23/2020

Southeast wall. Note voids in rocks/stones.



Photo Number: 76 Photo Taken: 09/23/2020

West elevation of pier 2.



Photo Number: 77 Photo Taken: 09/23/2020

East elevation of pier 2.



Photo Number: 78 Photo Taken: 09/23/2020

West elevation of pier 3.



Photo Number: 79 Photo Taken: 09/23/2020

Pier 3, north face of cap adjacent to girders: Large spall.



Photo Number: 80 Photo Taken: 09/23/2020

Load posting at east approach, +/- 1/2 mile from bridge.



Photo Number: 81 Photo Taken: 09/23/2020

Load and vertical clearance posting at west approach.



Photo Number: 82 Photo Taken: 09/23/2020

East approach vertical clearance posting: Sign partially blocked by vegetation.



Photo Number: 83 Photo Taken: 09/24/2020

Upstream (North) Bridge Elevation



Photo Number: 84 Photo Taken: 09/24/2020

Downstream (South) Bridge Elevation



Photo Number: 85 Photo Taken: 09/24/2020

Abutment 1 Elevation



Photo Number: 86 Photo Taken: 09/24/2020

Abutment 1 Near Right (South) End

Note: Broken stone.



Photo Number: 87 Photo Taken: 09/24/2020

Abutment 1

Note: Mortar loss with penetration.



Photo Number: 88 Photo Taken: 09/24/2020

Northwest Return Wall and Dry-Laid Retaining Wall



Photo Number: 89 Photo Taken: 09/24/2020

Northwest Return Wall / Dry-Laid Retaining Wall Interface

Note: Void.



Photo Number: 90 Photo Taken: 09/24/2020

Abutment 2 Elevation



Photo Number: 91 Photo Taken: 09/24/2020

Abutment 2

Note: Mortar loss with penetration.



Photo Number: 92 Photo Taken: 09/24/2020

Pier 1 West Face



Photo Number: 93 Photo Taken: 09/24/2020

Pier 1 East Face



Photo Number: 94 Photo Taken: 09/24/2020

Pier 1 at North End

Note: Spall along channel bottom.



Photo Number: 95 Photo Taken: 09/24/2020

Pier 1, East Face

Note: Areas of heavy corrosion.



Photo Number: 96 Photo Taken: 09/24/2020

Pier 2 West Face



Photo Number: 97 Photo Taken: 09/24/2020

Pier 2, Pile 1W

Note: Spall in concrete encasement with exposed H-pile flange.



Photo Number: 98 Photo Taken: 09/24/2020

Pier 2, East Face



Photo Number: 99 Photo Taken: 09/24/2020

Pier 2, Pile 1E

Note: Spall with exposed rebar with section loss and H-pile flanges exposed.



Photo Number: 100 Photo Taken: 09/24/2020

Pier 2, Pile 1E

Note: Spall with exposed rebar with section loss and H-pile flanges exposed.



Photo Number: 101 Photo Taken: 09/24/2020

Pier 2, Pile 1E, Vertical Bracing Member

Note: 100% section loss.



Photo Number: 102 Photo Taken: 09/24/2020

Pier 2, Pile 3E

Note: Spall in concrete encasement with exposed H-pile flange.



Photo Number: 103 Photo Taken: 09/24/2020

Pier 2, East Face

Note: Cross bracing with 100% section loss.



Photo Number: 104 Photo Taken: 09/24/2020

Pier 2, East Face between Piles 1E and 2E

Note: Broken stone / void in stone masonry.



Photo Number: 105 Photo Taken: 09/24/2020

Pier 3, West Face



Photo Number: 106 Photo Taken: 09/24/2020

Pier 3, East Face



Photo Number: 107 Photo Taken: 09/24/2020

Channel Looking Upstream (North) From the Bridge



Photo Number: 108 Photo Taken: 09/24/2020

Channel Looking Downstream (South) From the Bridge



Photo Number: 109 Photo Taken: 09/24/2020

Southwest Dry-Laid Retaining Wall



Photo Number: 110 Photo Taken: 09/24/2020

Northwest Dry-Laid Retaining Wall

Note: Void adjacent to discharge pipe.



Photo Number: 111 Photo Taken: 09/24/2020

Southeast Dry-Laid Retaining Wall



Photo Number: 112 Photo Taken: 09/24/2020

Southeast Dry-Laid Retaining Wall

Note: Void.



Photo Number: 113 Photo Taken: 09/24/2020

Northeast Dry-Laid Retaining Wall



Photo Number: 114 Photo Taken: 09/24/2020

Northeast Dry-Laid Retaining Wall

Note: Penetrations up to 3' between stones.



Photo Number: 115 Photo Taken: 09/24/2020

Pier 1 Fender System, West Face



Photo Number: 116 Photo Taken: 09/24/2020

Pier 1 Fender System, East Face



Photo Number: 117 Photo Taken: 09/24/2020

Pier 1, West Fender System

Note: Steel brackets with moderate to heavy corrosion and areas of 100% section loss.



Photo Number: 118 Photo Taken: 09/24/2020

Pier 2, West Timber Fender System

Note: Split/check.



Photo Number: 119 Photo Taken: 09/24/2020

Pier 1 Fender at Northwest Corner 6th Wale from Top

Note: Impact damage.



Photo Number: 120 Photo Taken: 09/24/2020

Pier 2 Fender System West Face



Photo Number: 121 Photo Taken: 09/24/2020

Pier 2, Navigation Light

Note: On at the time of inspection.

ROUTINE MECHANICAL INSPECTION
BRIDGE SAFETY INSPECTION
BRIDGE NO. 01349
Feature Carried: Route 136
Feature Crossed: Saugatuck River
Westport, Connecticut



State Project No. 170-3414

September 16, 2020

Prepared for:
Connecticut Department of Transportation

Prepared by:

MODJESKI and MASTERS
Experience great bridges.

Michael Baker INTERNATIONAL 80 YEARS

Bridge No. 01349, Route 136 over Saugatuck River, Westport, CT

Inspected By: Modjeski and Masters, Inc. Date: 09/16/2020



Modjeski and Masters, Inc.
100 Sterling Parkway, Suite 302
Mechanicsburg, PA 17050

Professional Certification: I hereby certify that this report, including all of its contents, has been approved by me, and that I am a duly licensed professional engineer under the laws of the State of Connecticut.



Signature:

License No.: PEN. 0030622 *Date:* October 22, 2020

EXECUTIVE SUMMARY

MECHANICAL INSPECTION REPORT

ConnDOT, BRIDGE NO. 01349

A routine mechanical inspection of the Westport swing bridge over the Saugatuck River was performed between September 16-17, 2020 by Mr. L.R.Lentz, P.E. and Ms. S.M. Christie, E.I.T. of Modjeski and Masters, Inc.

The AASHTO Movable Bridge Inspection, Evaluation and Maintenance Manual, 2017 Edition, and the ConnDOT Bridge Inspection Manual were utilized as the guidelines for the inspection. The "routine inspection" guidelines were utilized as the basis for equipment evaluation and testing. Equipment listed herein was examined and photographed, and observed deficiencies were documented. Additionally, items classified as deficient in the previous inspection report were inspected for compliance with the recommendations for repair and/or replacement listed therein.

This report is written from the perspective of the dates of the inspection described herein; the use of present tense herein in no way implies that the descriptions presented are accurate as of any subsequent date.

The general condition of the mechanical system is fair. When the following priority repair items have been addressed and assuming proper maintenance is provided, long term reliable operation is anticipated:

SPAN DRIVE MACHINERY

1. Replace gear reducer drain plug with ¼-turn ball valve to allow for easy removal. Use the drain to collect an oil sample for testing.
2. Replace pinion shaft bearing seals that are causing leaks and clean the pinion shaft. Monitor ticking noise during operation.
3. Remove the corroded plug on the lower pinion bearing lubrication port and install a fitting.
4. Replace gear reducer desiccant.

SPAN SUPPORT AND ALIGNMENT

1. Reduce the balance wheel bearing bushing clearance by removing liner shims to achieve an RC6 fit as designed.
2. Install limit switches at all screw jacks (center and end) to disable the motors when they are being manually operated.
3. Drain, flush, and refill north center screw jack reducers with new oil. Check for source of water entry and repair. Monitor annually by repeating oil testing.
4. Drain, flush, and refill the northeast end screw jack reducers with new oil. Check for source of water entry for all end screw jack reducers and repair. Monitor annually by repeating oil testing.

5. Install lubrication fittings at all screw jack couplings.
6. Clean grease from the leak at the center pivot bearing. Monitor for future leakage. Confirm maintenance practices for lubrication.
7. Replace the centering device limit switch mount and guides.

MISCELLANEOUS

1. Clean all oil/seal leaks and repair the source of the leak. Monitor these areas for future leaks.

TABLE OF CONTENTS
ConnDOT Bridge No: 01349

EXECUTIVE SUMMARY iii
GENERAL DESCRIPTION 1
OBSERVATIONS AND FINDINGS 3
SPAN DRIVE COMPONENTS 3
Motor 3
Motor Brake 3
Span Control 3
Couplings 3
Enclosed Gear Reducer 4
Pinion Shaft 4
Pinion Shaft Bearings 4
Open Gearing 4
SPAN SUPPORT AND ALIGNMENT 5
Balance Wheels and Track 5
Center Screw Jacks 5
End Screw Jacks 6
Center Pivot Bearing 7
Rigid Stops 8
Centering Device 8
TRAFFIC BARRIER GATES 8
MISCELLANEOUS 8
SPAN OPERATION 8
RECOMMENDATIONS 9
APPENDIX I: MACHINERY SCHEMATICS
APPENDIX II: INSPECTION PHOTOGRAPHS
APPENDIX III: OIL ANALYSIS REPORTS
APPENDIX IV: NUMERICAL CONDITION REPORT
APPENDIX V: FIELD NOTES
APPENDIX VI: TIME AT BRIDGE SITE

GENERAL DESCRIPTION

ConnDOT Bridge No. 01349 is a center bearing swing span which carries one lane, in each direction, of Route 136 vehicular traffic and one pedestrian sidewalk on the north side over the Saugatuck River in Westport, Connecticut. The swing span is 141 feet and 2 inches long between the centers of the end jacks. The swing span is 21 feet and 3 inches wide between truss centers and is oriented generally east to west. The operator control console is located on the north sidewalk at roadway level above the center pier. Machinery in this report is identified by compass direction and are referenced to the center pivot bearing. The bridge opens approximately 83.5 degrees only in one direction to allow passage of marine traffic.

The machinery was rehabilitated in 2013 but is otherwise original and dates back to 1989. The machinery for this bridge consists of components assembled into two major functional subsystems:

1. Span drive, which includes:
    a. Main motor
    b. Motor brake
    c. Span control
    d. Couplings
    e. Enclosed gear reducer
    f. Pinion shaft
    g. Bearings
    h. Drive pinion and rack
2. Span support and alignment, which includes:
    a. Balance wheels and track
    b. Center jacks
    c. End jacks
    d. Center pivot bearing
    e. Rigid stops
    f. Centering device

The movable span is rotated by one span drive. The drive consists of a 3 hp, 900 rpm electric motor with an integral disc brake, coupled to a right-angle enclosed gear reducer and then to a rack-engaging pinion via a vertically mounted pinion shaft. The rear motor shaft is coupled to span control equipment which consists of a gear reducer and rotary cam limit switch. Bridge rotation is realized when motor rotation and torque is transferred through the right-angle reducer and pinion. The pinion torque reacting on the rack (with integral track), which is fixed to the pivot pier (pier 1), causes the span to rotate about the center bearing which is mounted to the pivot pier. Figures 1 and 2 of Appendix I present the machinery layout. As shown in Appendix I, the major span drive elements highlighted above are connected and supported by appropriate couplings and bearings.

The span drive machinery is located below the roadway level and is accessible from the center pier. The space available for the machinery is limited, resulting in difficult access for both maintenance and inspection. Components on the output shaft side of the right angle reducers are more readily accessible than those on the respective input side.

During rotation, the entire weight of the bridge is supported by the center pivot bearing, which is comprised of a base casting, spherical roller thrust bearing, top casting, and dust cover. The base casting is secured to the center pier and the top casting to the span. The sliding surfaces are lubricated through lubrication ports and the dust cover surrounds the upper portion of the assembly.

Eight balance wheels are distributed radially about the center bearing to provide stability for imbalance and external loads such as wind and ice. The balance wheels are not intended to support either dead or live loads in the bridge closed position. The track for the balance wheels is integral with the rack gear.

For stability under live loads, in the closed position, there are two center screw jack and four end screw jack assemblies. The center jack assemblies are located on the center pier at the north and south pivot girders. The end jack assemblies are located at each corner of the movable span. The end jacks also support the dead load of the swing span along with the center pivot bearing. Each screw jack assembly consists of a base, which is anchored to the pier, and an independent operating machinery system, which is secured to the movable structure. The screw jack operating machinery consists of a 3.3 hp, 1800 rpm electrical motor with and integral disc brake, two right angle gear reducers, couplings, a floating shaft (only for the center jacks), an actuator, protective boot, and limit switches.

In the engaged position, the screw jacks are driven in contact with the bases to level the road surfaces of the swing span with the road surfaces of the approaches, and transfer the live loads to the piers. The center jacks allow for 3” travel while the end jacks allow for 5” travel to accommodate deflection. When withdrawn, the screw jacks retract from their bases on the rest piers so that the span can rotate. Each screw jack is located directly beneath the lower chord of the movable span truss. Figure 3 of Appendix I presents a schematic diagram of the screw jack machinery.

To prevent overtravel in both directions, the bridge has a fully open and a fully closed rigid stop. The fully open rigid stop is located on the center pier and consists of a strike plate mounted to the span and a spring bumper mounted to the pier. The fully closed rigid stop is located on the west pier at the center of the span. The fully closed rigid stop consists of a strike plate mounted to the span and a bumper block mounted to the pier. A manual centering device is also located at the center of the west pier. A vertical rod is accessed from the roadway level and is lowered by hand to engage a receiver mounted to the west pier.

OBSERVATIONS AND FINDINGS

During the course of the inspection, all machinery components were visually inspected statically and during operation. Various measurements were taken to monitor wear compared to previous inspections. Couplings and bearings were visually inspected but not opened for an internal inspection. Enclosed gear reducer inspection covers were not removed due to lack of access; however, representative oil samples were taken, and oil levels were checked where possible.

SPAN DRIVE COMPONENTS

Motor

The main drive motor is generally in fair condition. It is a Reuland 3 hp, 900 rpm electric motor with a 215 TENV frame. The mounting bolts do not have double nuts, but the fasteners are not corroded. There are no signs of fresh lubrication. See the Electrical Inspection report for additional details.

Motor Brake

The main Stearns disc brake is integral with the main span drive motor. Brake covers were not removed during the inspection. The manual release operates smoothly. A socket head screw has worked out from the rear portion of the housing.

Span Control

Located behind the main motor, the span instrumentation components consist of a gear reducer and rotary cam limit switch. The gear reducer is generally in fair condition. The gear reducer has single nuts on the mounting bolts with some corrosion on the fasteners and a minor leak from the shaft seals. There is a light coating of debris and lubrication under the reducer. The limit switch has been replaced since the last inspection and is in a “like new” condition.

Couplings

There are four span drive couplings. C1 is a Falk double engagement gear type coupling connecting the right angle reducer and pinion shaft. It has a seal leak on the channel side causing a light to moderate coating of grease on the lower half of the coupling. C1 also has moderate paint failure and significant corrosion on the top half of the coupling (see Photograph M1) . Lubrication is leaking through the lower hub to shaft interface and keyway.

C2 is a Falk grid coupling connecting the main motor and right angle reducer. There is a gap at the split of this coupling with lubrication leaking from the split (see Photograph M2). It is possible that an after-market liquid gasket is currently in place. The lubrication ports are painted over with no signs of lubrication. Only lubrication port plugs are provided and no fittings. Moderate paint failure is exhibited on the housing.

Couplings C3 and C4 are the span instrumentation couplings. These couplings are in good condition. Coupling C3 is noisy during operation and has wear marks showing signs that it is scraping against the span control reducer (see Photograph M3). It appears that the torn gasket has been repaired since the last inspection.

Enclosed Gear Reducer

The main drive reducer is generally in fair condition. The oil plug at the drain pipe is not able to be removed and there is no overhead access. A failed attempt at an oil sample was made through the breather port with a hand pump kit. The oil level is halfway up the portal style site glass with no level nameplate. There is corrosion and debris buildup on top of the reducer and on the mounting surface (see Photograph M4). The manual input shafts have minor widespread corrosion and chipped paint. The desiccant breather has expired.

Pinion Shaft

The pinion shaft is generally in good condition. It is painted and has not developed corrosion due to grease leaking past seals of the adjacent pinion bearing. The leaking seals should be replaced, and the shaft should be cleaned.

Pinion Shaft Bearings

The pinion shaft Torrington spherical roller bearings are generally in good condition. The mounting bolts have single nuts and the heads of the bolts are unpainted. It appears that the purge plugs on the top of the bearings are not being used. The lower bearing lubrication port contains a corroded plug and does not appear to be used (see Photograph M5). The upper bearing exhibits significant corrosion at the support interface. Both bearings have a layer of grease on them with minor corrosion and paint failure. Seals exhibit grease purge or leakage. A minor ticking noise was observed during operation at this location. This noise could be coming from either or both bearings.

Open Gearing

The pinion and rack are in fair condition. There is little to no lubrication on the teeth and moderate surface corrosion, especially on the rack (see Photograph M6). The gear teeth have smooth surfaces and the rack opening face has a slight pitch line depression. Operation is generally smooth.

Chordal tooth thickness measurements for both the pinion and the rack were taken at the top and bottom of the tooth face. The single tooth caliper has an addendum stop setting in order to get the thickness of the tooth at the pitch line. The addendums and original tooth thicknesses were calculated from the information on the original machinery drawings. The results of the gear tooth measurements are included in Appendix V.

Minimal wear has occurred according to the measurements taken. Cleaning and relubrication of rack and pinion teeth should be a part of the regular maintenance procedures.

The rack bolts are generally in good condition. The northern most section of the segment for rack bolts exhibits clogged drain holes (see Photograph M9). The bolts in this region exhibit significant corrosion. Minor to moderate corrosion is occurring on isolated areas along the inside face of the rack. One split bolt is severely corroded with minor section loss. (see Photograph M8).

SPAN SUPPORT AND ALIGNMENT

Balance Wheels and Track

The track is generally in good condition with no sign of recent lubrication on the rolling surfaces. There is minor debris buildup and minor corrosion near the anchor bolts. Several isolated areas of grout have begun to break away at the pier interface (see Photographs M7).

The eight balance wheels are in fair condition. Some of the balance wheel contacting surfaces exhibit minor surface corrosion. The structural supports above each balance wheel and the balance wheel assembly mounting bolts exhibit new paint since the last inspection. 4 of 8 balance wheels could not be rotated by hand (wheels 2 through 4 and wheel 7). Wheel 8 was hard to rotate by hand. All wheel bearing lubrication fittings show signs of fresh lubrication. Wheels 5 through 8 have slight lubrication buildup at the shaft and journal interface.

The balance wheel clearance with the track when the jacks are engaged ranges from 0.012 to 0.220 inches. A table of these values can be seen on page 9 of the Field Notes in Appendix V. Most of the balance wheels do not contact the track during operation. When they do contact the track, they often slide against it instead of rotating.

The original balance wheel bearing clearance was designed to be an RC6 fit. Except for the bushings for wheels 4 and 6 and wheel 7 inboard bushing, the clearance measurements show that all other bushings are outside of the 0.003 inch to 0.009 inch range for an RC6 fit. Measurements can be seen on page 11 of the Field Notes in Appendix V.

Center Screw Jacks

The two center screw jack assemblies overall are in fair condition and operate smoothly. The motor is a Reuland 3.3 hp, 1800 rpm, 184 TENV frame electric motor with a Stearns integral disc brake. The main motor is connected to the upper right angle reducer with a Falk grid 1020T10D coupling. The upper right angle reducer is a Falk 1020 FC83 with a ratio of 7.669:1. The upper reducer is coupled to a floating shaft and then the lower reducer with Falk single engagement couplings. The lower reducer is a

Foote-Jones Maxi-Power reducer, model 7SBV, with a ratio of 4.125:1. The lower reducer is coupled to a Duff-Norton machine screw actuator rated at 50 tons with 3 inches of travel.

There is no limit switch to disable the motors during manual operation which presents a hazard. The north motor lubrication purge is not being used and the south motor does not show signs of recent lubrication.

The north upper reducer shows signs of delamination localized at the housing split and the south upper and lower reducers do not show signs of recent lubrication at the fittings. All reducer desiccants were in good condition and were replaced since the last inspection. The lower reducers appear to have recent bearing fitting lubrication.

Couplings do not appear to have been lubricated recently as they do not have any fittings and the plugs are painted over. The south upper floating shaft coupling has a small leak at the flex hub.

Open gears for the rotary cam limit switch show no signs of recent lubrication, exhibit minor surface corrosion, and make a minor amount of noise during operation. The gears and keys appear to be tight on their shafts.

The screw jack actuators do not appear to have been lubricated recently. The protective boots on the jacks are typically in good condition with minor debris and grease buildup. Bearing surfaces for the screw jacks are generally dry with moderate to severe corrosion and delamination (see Photographs M10 and M11).

Overall, the assemblies have varying degrees of surface corrosion ranging from minor to severe. The couplings and floating shafts show minor to severe paint failure as well (see Photograph M12).

Representative oil samples were taken from the north upper and lower reducers. The results can be found in Appendix III. The upper reducer oil is in “severe” condition and the lower reducer oil is in “severe” condition due to high levels of ferrous material. All reducers should be drained, flushed, and filled with new oil. Also, check for a source of water entry to prevent further contamination.

End Screw Jacks

The four end screw jack assemblies overall are in fair condition and operate smoothly. The motor is a Reuland 3.3 hp, 1800 rpm, 184 TENV frame electric motor with a Stearns integral disc brake. The main motor is connected to the upper right angle reducer with a Falk grid 1020T10D coupling. The upper right angle reducer is a Falk 1020 FC83 with a ratio of 7.669:1. The upper reducer is coupled to the lower reducer with a Falk double engagement coupling. The lower reducer is a Foote-Jones Maxi-Power reducer, model 7SBV, with a ratio of 4.125:1. The lower reducer is coupling

connected to a Duff-Norton machine screw actuator rated at 150 tons with 5 inches of travel.

There is no limit switch to disable the motors during manual operation which presents a hazard. The southwest motor shows no signs of recent lubrication.

Almost all upper and lower reducers have no signs of fresh lubrication on all fittings and the northwest and southeast upper reducer oil levels are low on the dipsticks. The northeast upper and lower reducers have very minor oil leaks at the drains. The southeast upper reducer has a minor leak at the input shaft and the manual shaft is corroded. The southwest upper reducer has excess lubrication leaking from the bearing seal region. The desiccant style breathers were in good condition and therefore likely replaced since the last inspection.

Couplings do not appear to have been lubricated recently as they do not have any fittings and the plugs are painted over. The northeast motor coupling has a leak at the split and the northwest motor coupling gasket is starting to work itself out.

Open gears for the rotary cam limit switch show no signs of recent lubrication, exhibit minor surface corrosion, and make a minor amount of noise during operation. The gears and keys appear to be tight on their shafts.

The northwest and southwest jacks have a buildup of excess grease. The protective boots on the jacks are typically in good condition with minor debris and grease buildup. The northwest and southeast jacks have slight gaps when fully driven (see Photograph M13). This gap is not present around the entire jack. The bearing surfaces are corroded but have fresh lube on them.

Overall, the assemblies have varying degrees of surface corrosion ranging from minor to severe. The couplings show minor to severe paint failure as well.

Representative oil samples were taken from the northwest and northeast end jack lower and upper reducers. The results can be found in Appendix III. The upper and lower reducers for the northeast end jack assembly exhibit oil is in “severe” and “abnormal” conditions respectively due to high levels of water. Both of these reducers should be drained, flushed, and filled with new oil. Also, check for a source of water entry to prevent further contamination. The northwest upper and lower end jack reducer oil samples tested normal.

Center Pivot Bearing

The center bearing assembly is in fair condition. There is minor isolated corrosion at the base. There is minor to moderate corrosion on the upper casting and the upper casting bolts. There is evidence of a lubrication leak at the northeast corner purging out over the top of the strip seal. One cover bolt is missing (see Photograph M14).

Rigid Stops

The center pier fully open rigid stop is in good condition with some minor corrosion at the base plate (see Photograph M15).

The end pier fully closed rigid stop is in fair condition with minor to moderate corrosion on the strike plate, base, and mounting bolts (see Photograph M16). The rigid stop is deformed likely from impact with the span in the past.

Centering Device

The centering device rod, limit switch mount, and guides have moderate paint failure, corrosion, and debris buildup (see Photographs M17 and M18). The pier mounted receiver has minor corrosion and heavy debris buildup. This system is completely manual and the maintenance personnel had some minor issues with positioning the rod and making consistent limit switch trip points.

TRAFFIC BARRIER GATES

Both traffic barrier gates are operated manually. No lights were functioning during the inspection. The west traffic barrier arm does not fully seat into the anchorage on the toe end making it impossible to lock in the lowered position. The east traffic barrier gate limit switch is frozen in the tripped condition, and the energy absorption cable anchor bolts are misaligned with the receiver on the heel end.

MISCELLANEOUS

It should be noted that the space available for the main drive machinery is limited, resulting in difficult access for both maintenance and inspection.

SPAN OPERATION

Modjeski and Masters coordinated with Michael Baker International and CTDOT directly to organize bridge operations for Westport. A district maintenance crew of 3 personnel were at the bridge site for operations. A police officer and patrol car stopped traffic at both ends of the bridge. The operation included manual traffic gates, the manual centering device, and electric operation of the screw jacks and the main drive motor.

Operation of the bridge is generally smooth. The abrupt span stopping behavior noted previously was not observed. The main pinion shaft upper and lower bearings made a minor ticking noise. Coupling C3 rubs against the span control reducer during operation. The rotary cam limit switch open gears at the screw jacks are not lubricated and make noise during operation.

RECOMMENDATIONS

		Priority
SPAN DRIVE MACHINERY		
1.	Replace the gasket and tighten all bolts on couplings C1 and C2 to eliminate leaking at the split.	Routine Repair
2.	Replace gear reducer drain plug with ¼-turn ball valve to allow for easy removal. Use the drain to collect an oil sample for testing.	Priority Repair
3.	Spot clean and paint the top of the right angle reducer.	Routine Repair
4.	Replace gear reducer desiccant.	Priority Repair
5.	Replace pinion shaft bearing seals that are causing leaks and clean the pinion shaft. Monitor ticking noise during operation.	Priority Repair
6.	Remove the corroded plug on the lower pinion bearing lubrication port and install a fitting.	Priority Repair
7.	Clean pinion and rack teeth of old lube and apply fresh lubricant regularly.	Routine Repair
8.	Clean northernmost rack section drain holes to prevent water collection.	Routine Repair
9.	Investigate and repair motor brake housing screw that is working out.	Routine Repair
SPAN SUPPORT AND ALIGNMENT		
1.	Adjust the balance wheel clearance with the track to achieve 1/16 inch when all screw jacks are driven. Adjust the center screw jack stroke as necessary. Test operate and verify that there is no hard contact between the balance wheels and track in one quadrant for the full operation. Seal and re-grout inside edge.	Routine Repair
2.	Reduce the balance wheel bearing bushing clearance by removing liner shims to achieve an RC6 fit as designed.	Priority Repair
3.	Install limit switches at all screw jacks (center and end) to disable the motors when they are being manually operated.	Priority Repair
4.	Drain, flush, and refill north center screw jack reducers with new oil.	Priority Repair

	Check for source of water entry and repair. Monitor annually by repeating oil testing.	
5.	Drain, flush, and refill the northeast end screw jack reducers with new oil. Check for source of water entry for all end screw jack reducers and repair. Monitor annually by repeating oil testing.	Priority Repair
6.	Install a sight glass or dipstick at all screw jack lower reducers to monitor oil level.	Routine Repair
7.	Install lubrication fittings at all screw jack couplings.	Priority Repair
8.	Clean and lubricate all center and end screw jack bearing surfaces as a part of the routine maintenance. Adjust the screw jack stroke to ensure firm contact when driven.	Routine Repair
9.	Clean grease from the leak at the center pivot bearing. Monitor for future leakage. Confirm maintenance practices for lubrication.	Priority Repair
10.	Monitor the fully closed rigid stop for increased deformation or damage.	Routine Repair
11.	Replace the centering device limit switch mount and guides.	Priority Repair

MISCELLANEOUS

1.	Ensure all components that require lubrication (i.e. couplings, open and enclosed gearing, bearings, etc.) are being lubricated at the frequency based upon movable bridge industry standard practice/manufacturer recommendations. Create, or verify current, lubrication procedure for all components to allow grease to purge through purge ports.	Routine Repair
2.	Spot clean and repair paint components throughout the mechanical systems, with emphasis on connecting bolts and machinery couplings. The paint system used should be suitable for the service environment and be applicable to rusted surfaces cleaned only with solvent and hand tools.	Routine Repair
3.	Clean all oil/seal leaks and repair the source of the leak. Monitor these areas for future leaks.	Priority Repair

4.	Rework the traffic barrier gates under the supervision of the manufacturer in the event bridge operations without roadway shutdown by police detail are reinstituted.	None

APPENDIX I
MACHINERY SCHEMATICS

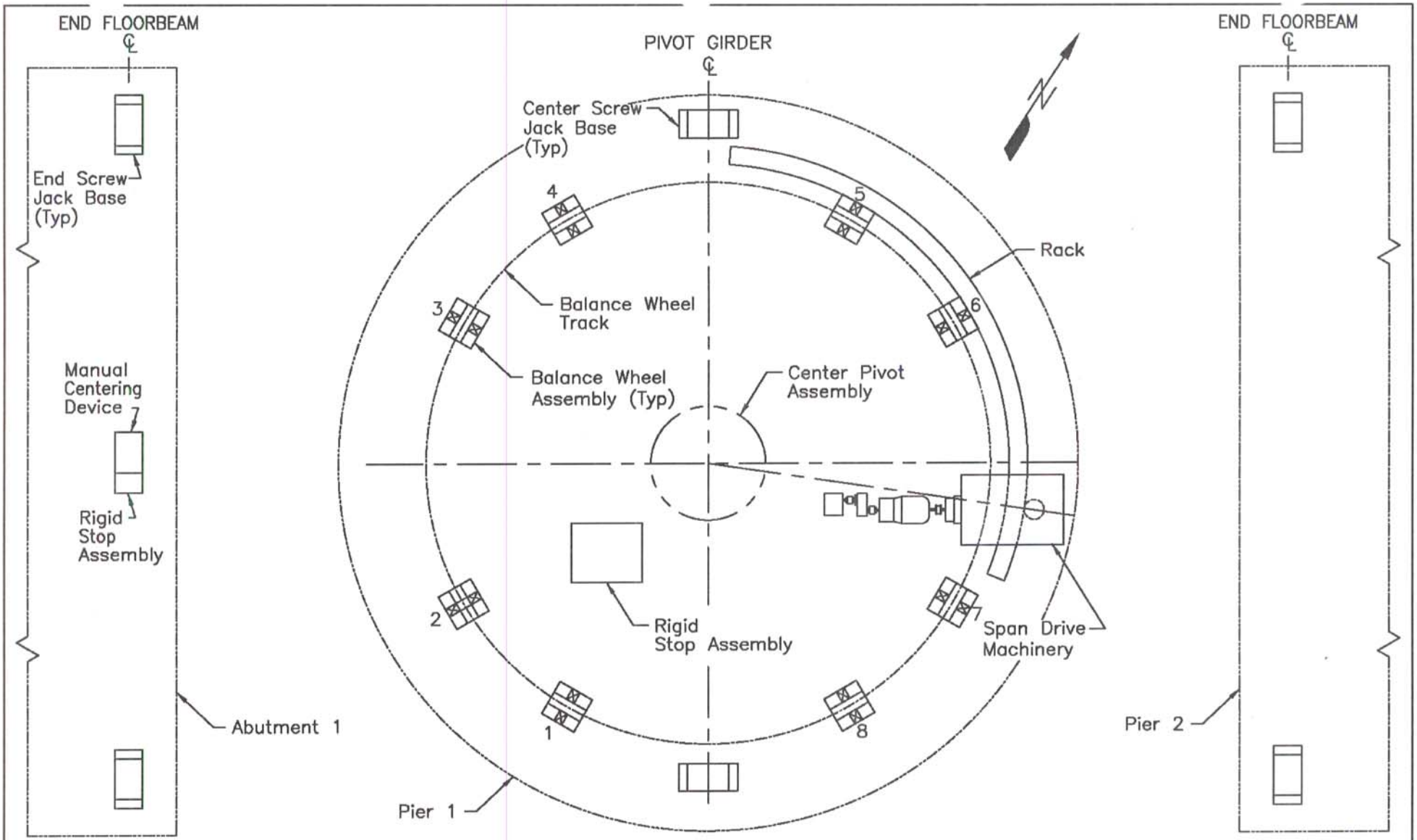


Figure 1. Plan View of Span Drive Machinery and Span Support Machinery

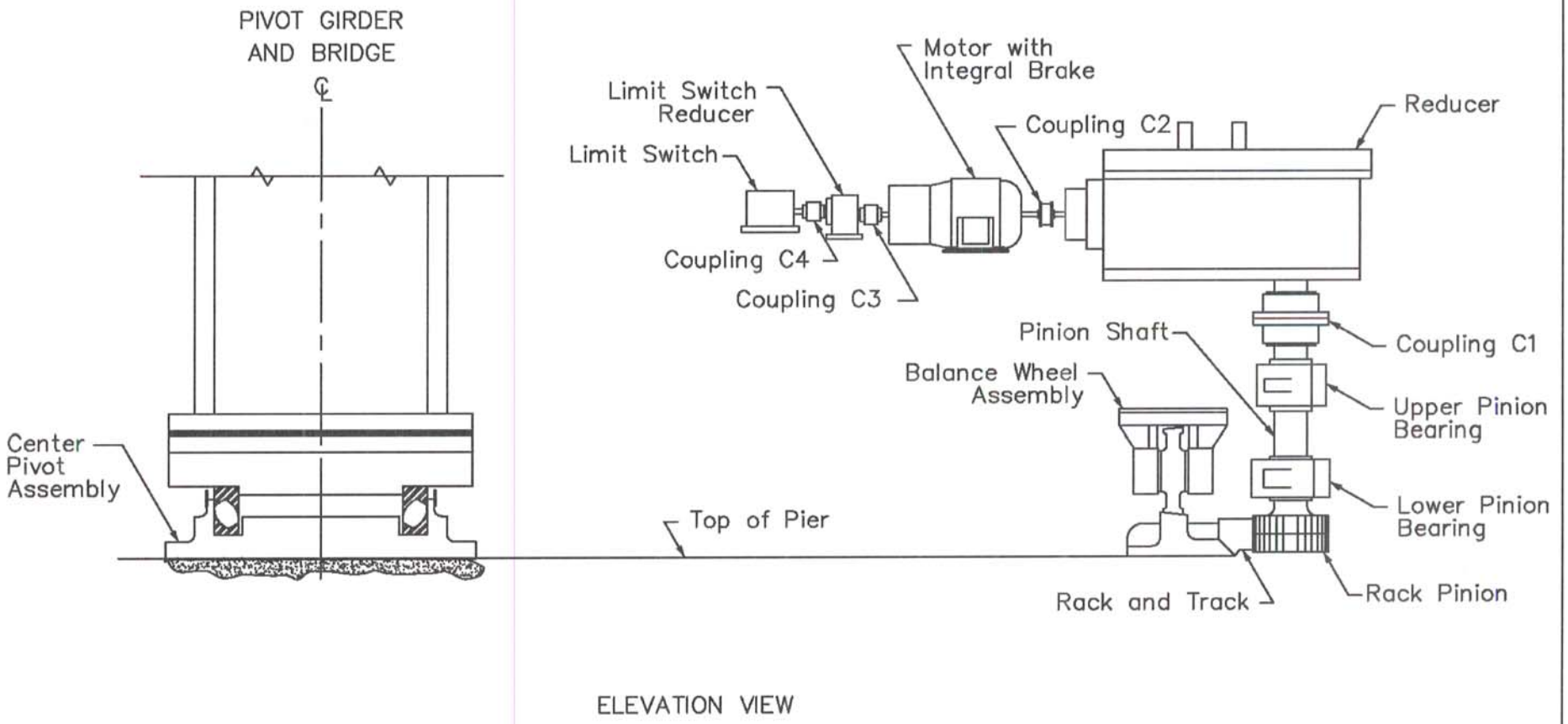


Figure 2. Span Drive Machinery

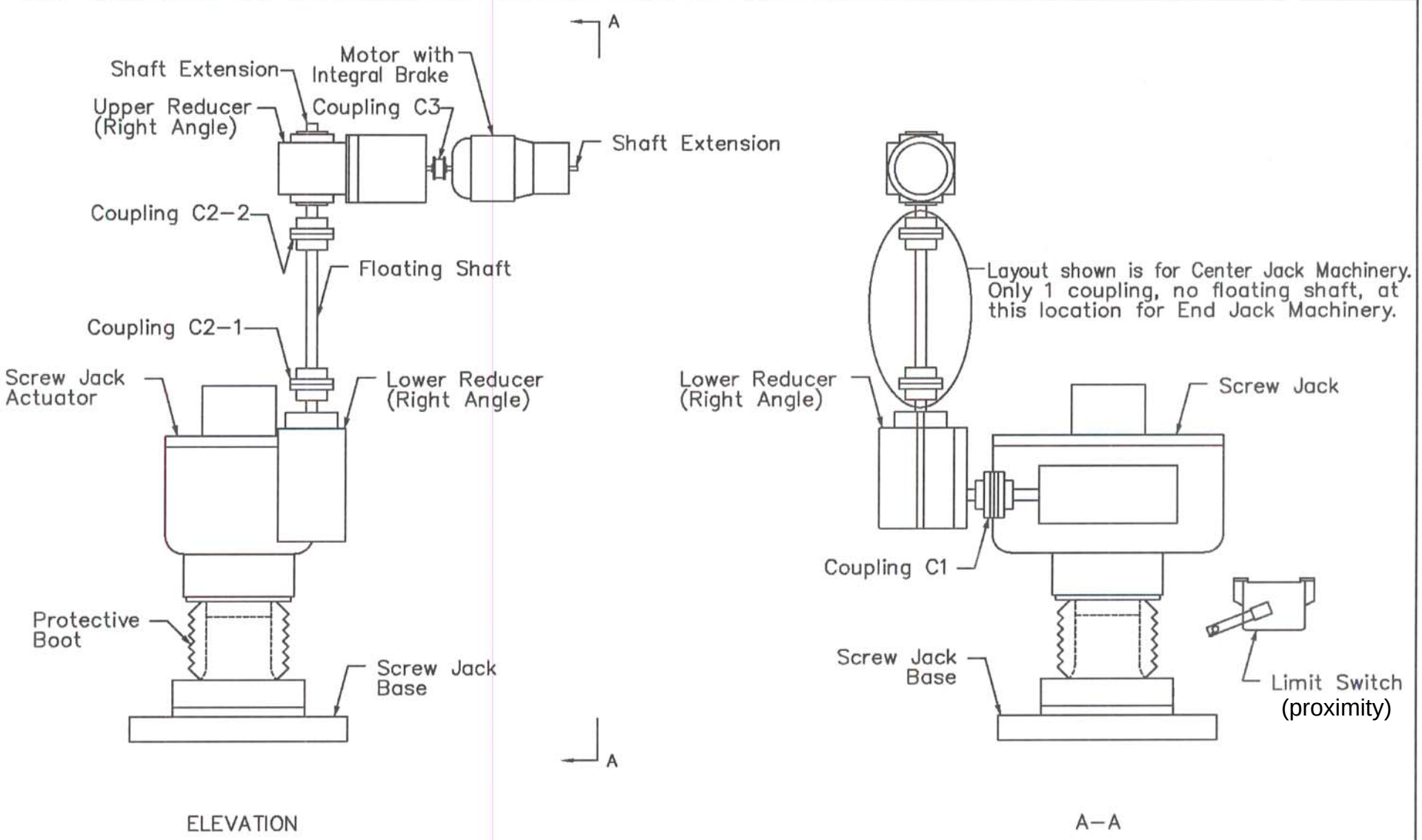


Figure 3. Screw Jack Machinery
Typical Arrangement

APPENDIX II
INSPECTION PHOTOGRAPHS

Bridge No.	01349	**Inspected by:**	L. R. Lentz, S. M. Christie
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	September 16-17, 2020
Feature Crossed:	Saugatuck River		



Photo M1:
Coupling C1 with lubricant leakage, moderate paint failure and corrosion.

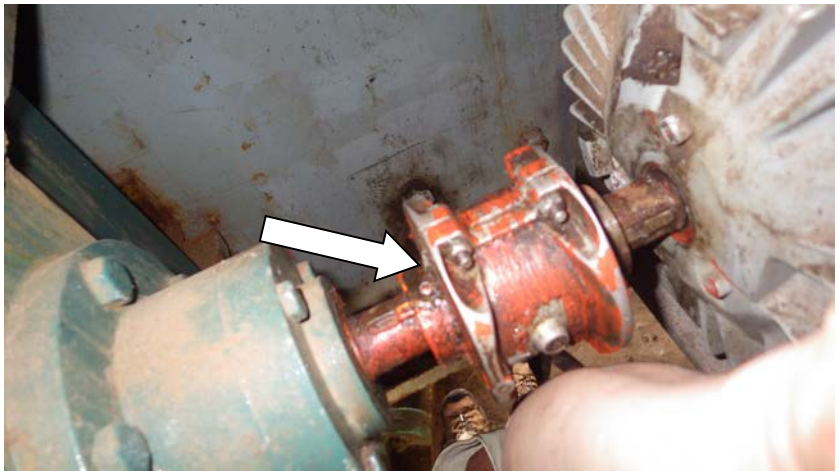


Photo M2:
Coupling C2 with a gap at the split and lubrication leak (arrow).

Bridge No.	01349	**Inspected by:**	L. R. Lentz, S. M. Christie
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	September 16-17, 2020
Feature Crossed:	Saugatuck River		

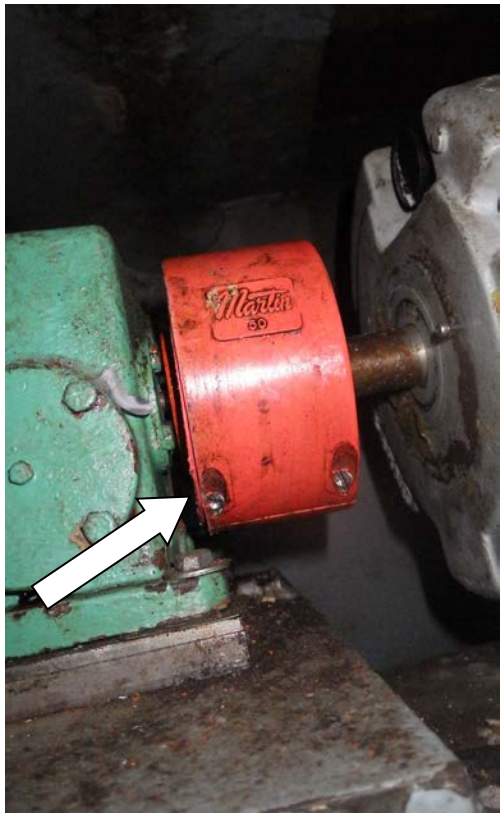


Photo M3:
Coupling C3 with wear marks from scraping reducer (white arrow) .



Photo M4:
The top of the main right angle gear reducer with typical heavy dirt/debris accumulation causing corrosion.

Bridge No.	01349	**Inspected by:**	L. R. Lentz, S. M. Christie
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	September 16-17, 2020
Feature Crossed:	Saugatuck River		



Photo M5:
Lower pinion bearing with corroded plug in lubrication port (circle).



Photo M6:
Rack teeth with typical moderate surface corrosion and lack of lubrication.

Bridge No.	01349	**Inspected by:**	L. R. Lentz, S. M. Christie
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	September 16-17, 2020
Feature Crossed:	Saugatuck River		



Photo M7:
Grout pad failure at inboard face of track connection to pivot pier.



Photo M8:
Rack split bolt with moderate to significant corrosion.

Bridge No.	01349	**Inspected by:**	L. R. Lentz, S. M. Christie
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	September 16-17, 2020
Feature Crossed:	Saugatuck River		



Photo M9:
North rack bolt pocket dry at the time of inspection but drains in this area appear to be clogged.



Photo M10:
North Center screw jack bearing surfaces with typical corrosion and delamination.

Bridge No.	01349	**Inspected by:**	L. R. Lentz, S. M. Christie
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	September 16-17, 2020
Feature Crossed:	Saugatuck River		



Photo M11:
Center screw jack bearing surface with typical corrosion and delamination.



Photo M12:
Center screw jack typical coupling and floating shaft condition with paint failure and surface corrosion.

Bridge No.	01349	**Inspected by:**	L. R. Lentz, S. M. Christie
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	September 16-17, 2020
Feature Crossed:	Saugatuck River		



Photo M13:
Southeast end screw jack gap on east and west sides with 0.003” feeler.



Photo M14:
Center pivot bearing upper cover missing one bolt. (see oval)

Bridge No.	01349	**Inspected by:**	L. R. Lentz, S. M. Christie
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	September 16-17, 2020
Feature Crossed:	Saugatuck River		



Photo M15:
Fully open rigid stop with minor to moderate corrosion at the mounting base.



Photo M16:
Fully closed rigid stop with moderate corrosion and deformation from impact.

Bridge No.	01349	**Inspected by:**	L. R. Lentz, S. M. Christie
Town:	Westport		
Feature Carried:	Route 136	**Date Inspected:**	September 16-17, 2020
Feature Crossed:	Saugatuck River		



Photo M17:
Manual centering device rod and guides with moderate corrosion, paint failure, and debris buildup.



Photo M18:
Manual centering device receiver with minor to moderate corrosion and debris buildup. The centering device rod contacts the receiver on the south side.

APPENDIX III
OIL ANALYSIS REPORTS

UIN 08375F0

Gearbox

Unit No. North Center Jack Up

Unit:
Make
Model
Serial No.

Site CTDOT - Westport

Compartment:
Name North Center Jack Upper Gearbox
Make
Model
Serial No.
Capacity: 0.0

Customer:

MODJESKI & MASTERS INC
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

DIAGNOSIS

All wear levels appear within acceptable limits for first sample. Heavy concentration of water present. Unable to obtain accurate viscosity result at 100C due to presence of water in sample. Action: Check for source of water entry. Advise water drain off procedure/off-line purification. Resample next service interval to monitor and establish wear trend.

ANALYST: Jon.Sowers

Severe

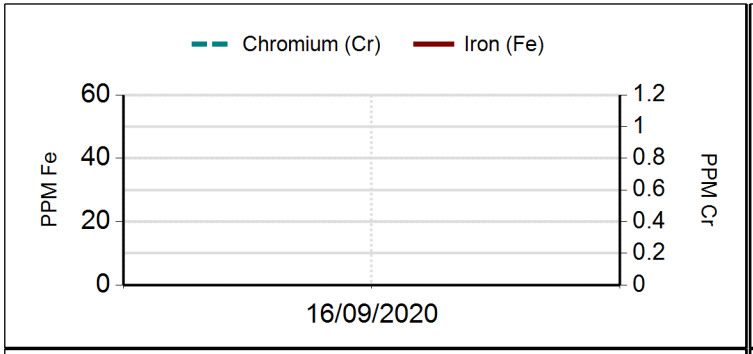
LEGEND: Severe | Abnormal | Caution | Normal

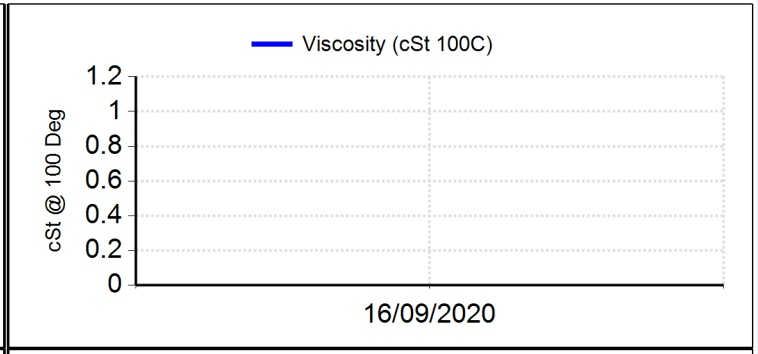
DATE SAMPLED		16-Sep-20
DATE RECEIVED		07-Oct-20
DATE REPORTED		09-Oct-20
LAB NO.		41022586572
SIF NO.		36648719
TIME ON UNIT	Hrs	
TIME ON OIL	Hrs	
OIL BRAND		Unidentified
OIL TYPE		Unidentified
OIL GRADE		Unknown
OIL ADDED		
FILTER	Hrs	Not Applicable
OIL CHANGED		
WO NUMBER		
Metals (ppm)		
Iron (Fe)		55
Chromium (Cr)		<1
Lead (Pb)		<1
Copper (Cu)		3
Tin (Sn)		<1
Aluminium (Al)		1
Nickel (Ni)		<1
Silver (Ag)		<1
Titanium (Ti)		<1
Vanadium (V)		<1
Contaminants (ppm)		
Silicon (Si)		4
Sodium (Na)		3
Potassium (K)		<1
Additives (ppm)		
Magnesium (Mg)		1
Calcium (Ca)		113
Barium (Ba)		<1
Phosphorus (P)		536
Zinc (Zn)		663
Molybdenum (Mo)		<1
Boron (B)		<5
Contaminants		
Water (%)		9.29
Physical Tests		
Viscosity (cSt 100C)		N/A
Solids (%)		0.1
Additional		
PQ Index		<10

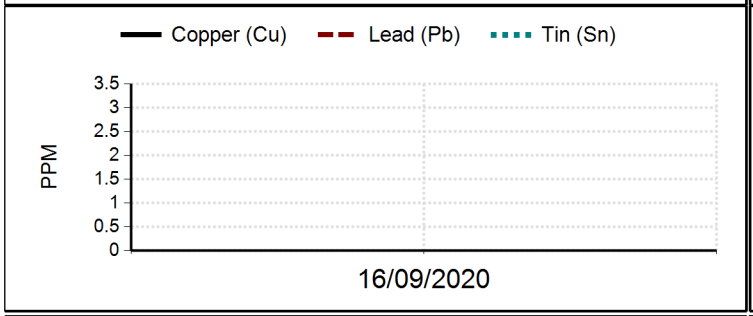
Right Solutions • Right Partner

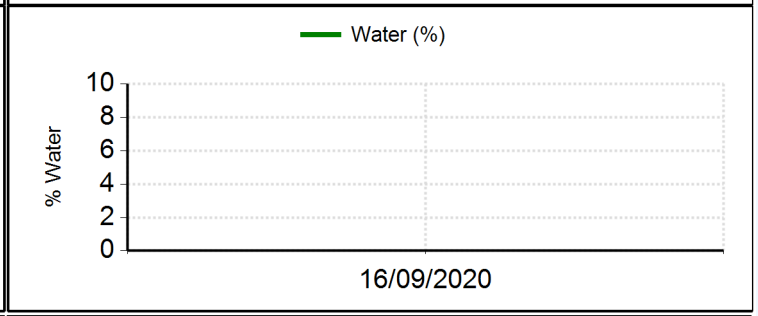
Right Solutions • Right Partner

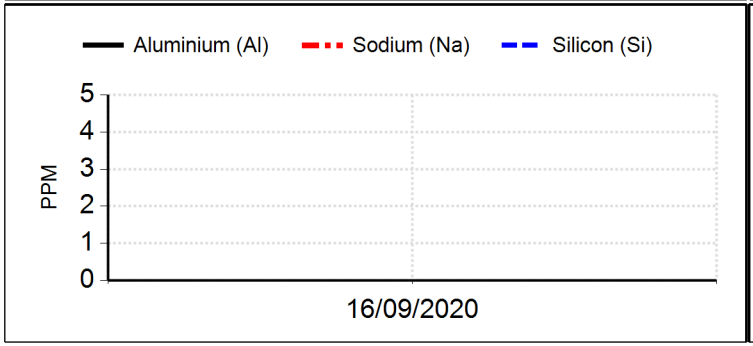
UIN 08375F0











Filter Image

Filter patch test is not performed Contact laboratory for more information

Since services are based on samples and information supplied by others, and since corrective actions, if any, are necessarily taken by others, these services are rendered without any warranty or liability of any kind beyond the actual amount paid to ALS Tribology for the services. Reported recommendations are based on interpretations of the generated test results and historical data. Certain test results appearing in this report may have been tested at other ALS laboratories within the Tribology divisional network.

Modjeski & Masters Inc
Attn: Andrew Brodsky
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

163 0002 v1.9

U.S. Laboratories

Atlanta, Georgia - 420
5300 OakBrook Parkway
Building 200 Suite 245
Norcross, GA 30093
800.394.3669

Valley View, Ohio - 410
6180 Halle Dr. Suite D
Valley View, OH 44125
800.726.5400

Kansas City, Kansas - 430
935 Sunshine Road
Kansas City, KS 66115
800.332.8055

Phoenix, Arizona - 440
3319 West Earll Drive
Phoenix, AZ 85017
800.445.7930

Portland, Oregon - 401
4943 NW Front Avenue
Portland, OR 97210
800.770.4128

Canadian Laboratories

Burlington, Ontario - 450
5036 South Service Rd.
Burlington, ON L7L5Y7
905 332 9559

Edmonton, Alberta - 402
9450 17 Ave NW
Edmonton, AB T6N 1M9
888.489.0057

Sales & Marketing

Houston, Texas
10450 Stancliff Road, Suite 210
Houston, TX 77099
877.835.8437

International Locations

Australia
Brisbane, Perth, Sydney, Muswellbrook

South America
Santiago de Chile, Belo Horizonte, Brazil

New Zealand
Wellington

Southeast Asia
Kuala Lumpur, Singapore

Europe
Prague

TEST METHODS:

Acid Number:	ASTM D974/D664 (*M)
Base Number:	ASTM D4739 (*M)
Base Number (Perchloric):	ASTM D2896 (*M)
Fuel Dilution by GC:	ASTM D7593
Fuel Dilution Visc/Setaflash	In House
Fuel Soot ATR/IR:	ASTM D7686 (*M)
Soot by FTIR:	ASTM D7844
Glycol:	In House
Metals by ICP AES:	ASTM D5185 (*M)
Ox, NOx, SOx, FTIR:	ASTM E2412/D7418/D7414 D7415
PQ Index:	ASTM D8120 (*M)
Particle Count:	ASTM D7647 (*M) / ISO 4406
Viscosity:	ASTM D445 (*M) / D7279 (*M)
Water KF:	D6304 / E203 (*M)
Water Crackle:	In House

*M - Modified Method

UIN 08375F5

Gearbox

Unit No. North Center Jack Lo

Unit:
Make
Model
Serial No.

Site CTDOT - Westport

Compartment:
Name North Center Jack Lower Gearbox
Make
Model
Serial No.
Capacity: 0.0

Customer:

MODJESKI & MASTERS INC
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

DIAGNOSIS

PQ Index number (ferrous material) at a severe level. All other wear rates normal. Silicon level (dirt/sealant material) satisfactory. Water content acceptable. Viscosity within specified operating range. Action: Advise inspect filter/strainer/magnetic plug for abnormal wear metal (if applicable). Resample at a reduced service interval to further monitor.

ANALYST: Jon.Sowers

STOP
Severe

LEGEND
STOP Severe | Abnormal | Caution | Normal

DATE SAMPLED		16-Sep-20
DATE RECEIVED		07-Oct-20
DATE REPORTED		09-Oct-20
LAB NO.		41022586573
SIF NO.		36648717
TIME ON UNIT	Hrs	
TIME ON OIL	Hrs	
OIL BRAND		Unidentified
OIL TYPE		Unidentified
OIL GRADE		Unknown
OIL ADDED		
FILTER	Hrs	Not Applicable
OIL CHANGED		
WO NUMBER		
Metals (ppm)		
Iron (Fe)		175
Chromium (Cr)		<1
Lead (Pb)		<1
Copper (Cu)		1
Tin (Sn)		<1
Aluminium (Al)		2
Nickel (Ni)		<1
Silver (Ag)		<1
Titanium (Ti)		<1
Vanadium (V)		<1
Contaminants (ppm)		
Silicon (Si)		30
Sodium (Na)		19
Potassium (K)		<1
Additives (ppm)		
Magnesium (Mg)		3
Calcium (Ca)		160
Barium (Ba)		<1
Phosphorus (P)		518
Zinc (Zn)		679
Molybdenum (Mo)		<1
Boron (B)		<5
Contaminants		
Water (%)		<0.05
Physical Tests		
Viscosity (cSt 100C)		18.2
Solids (%)		0.1
Additional		
PQ Index		1154

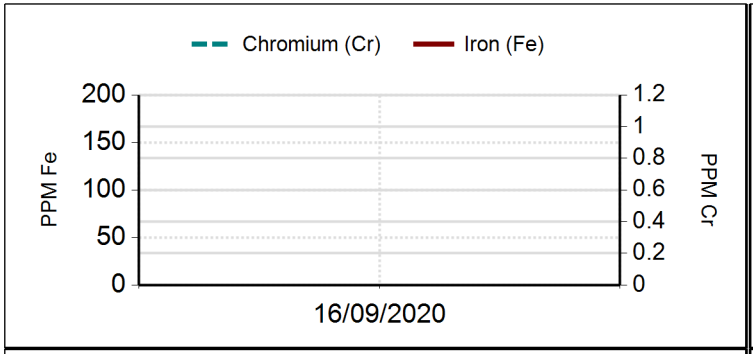
STOP

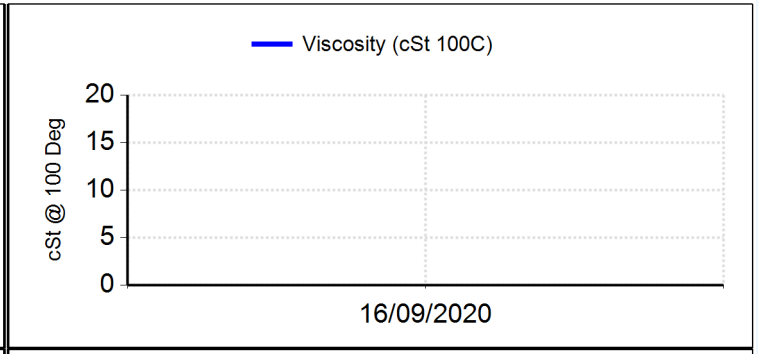
Right Solutions • Right Partner

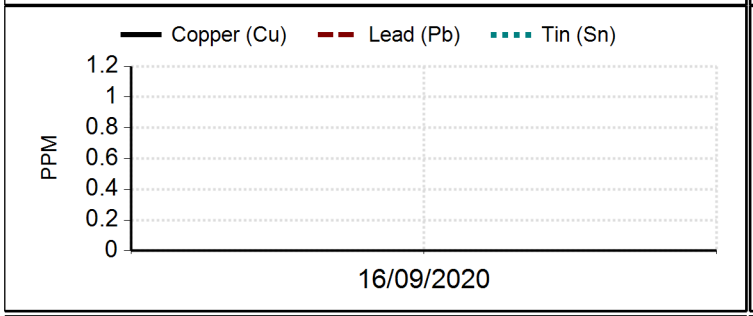
164

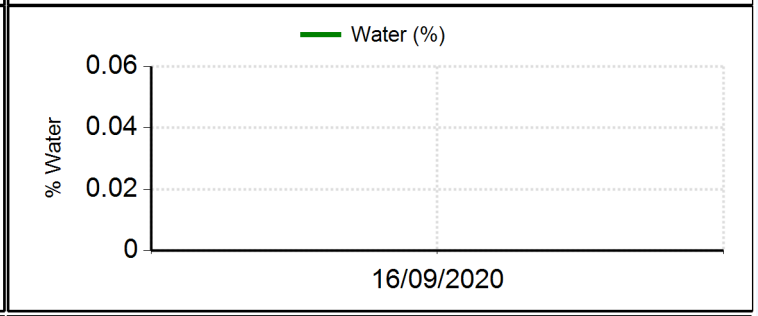
Right Solutions • Right Partner

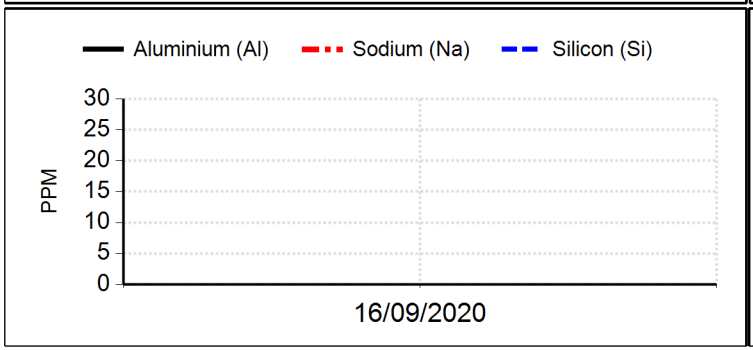
UIN 08375F5











Filter Image

Filter patch test is not performed Contact laboratory for more information

Since services are based on samples and information supplied by others, and since corrective actions, if any, are necessarily taken by others, these services are rendered without any warranty or liability of any kind beyond the actual amount paid to ALS Tribology for the services. Reported recommendations are based on interpretations of the generated test results and historical data. Certain test results appearing in this report may have been tested at other ALS laboratories within the Tribology divisional network.

Modjeski & Masters Inc
Attn: Andrew Brodsky
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

165 0002 v1.9

U.S. Laboratories

Atlanta, Georgia - 420
5300 OakBrook Parkway
Building 200 Suite 245
Norcross, GA 30093
800.394.3669

Valley View, Ohio - 410
6180 Halle Dr. Suite D
Valley View, OH 44125
800.726.5400

Kansas City, Kansas - 430
935 Sunshine Road
Kansas City, KS 66115
800.332.8055

Phoenix, Arizona - 440
3319 West Earll Drive
Phoenix, AZ 85017
800.445.7930

Portland, Oregon - 401
4943 NW Front Avenue
Portland, OR 97210
800.770.4128

Canadian Laboratories

Burlington, Ontario - 450
5036 South Service Rd.
Burlington, ON L7L5Y7
905 332 9559

Edmonton, Alberta - 402
9450 17 Ave NW
Edmonton, AB T6N 1M9
888.489.0057

Sales & Marketing

Houston, Texas
10450 Stancliff Road, Suite 210
Houston, TX 77099
877.835.8437

International Locations

Australia
Brisbane, Perth, Sydney, Muswellbrook

South America
Santiago de Chile, Belo Horizonte, Brazil

New Zealand
Wellington

Southeast Asia
Kuala Lumpur, Singapore

Europe
Prague

TEST METHODS:

Acid Number:	ASTM D974/D664 (*M)
Base Number:	ASTM D4739 (*M)
Base Number (Perchloric):	ASTM D2896 (*M)
Fuel Dilution by GC:	ASTM D7593
Fuel Dilution Visc/Setaflash	In House
Fuel Soot ATR/IR:	ASTM D7686 (*M)
Soot by FTIR:	ASTM D7844
Glycol:	In House
Metals by ICP AES:	ASTM D5185 (*M)
Ox, NOx, SOx, FTIR:	ASTM E2412/D7418/D7414 D7415
PQ Index:	ASTM D8120 (*M)
Particle Count:	ASTM D7647 (*M) / ISO 4406
Viscosity:	ASTM D445 (*M) / D7279 (*M)
Water KF:	D6304 / E203 (*M)
Water Crackle:	In House

*M - Modified Method

UIN 08375DD

Gearbox

Unit No. NE End Jack Upper

Unit:
Make
Model
Serial No.

Site CTDOT - Westport

Compartment:
Name NE End Jack Upper Gearbox
Make
Model
Serial No.

Capacity: 0.0

Customer:

MODJESKI & MASTERS INC
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

DIAGNOSIS

All wear levels appear within acceptable limits for first sample. Heavy concentration of water present. Other contaminant levels acceptable. Unable to obtain accurate viscosity result at 100C due to presence of water in sample. Action: Check for source of water entry. Advise water drain off procedure/off-line purification. Resample after corrective action to further monitor.

ANALYST: Jon.Sowers

Severe

LEGEND: Severe | Abnormal | Caution | Normal

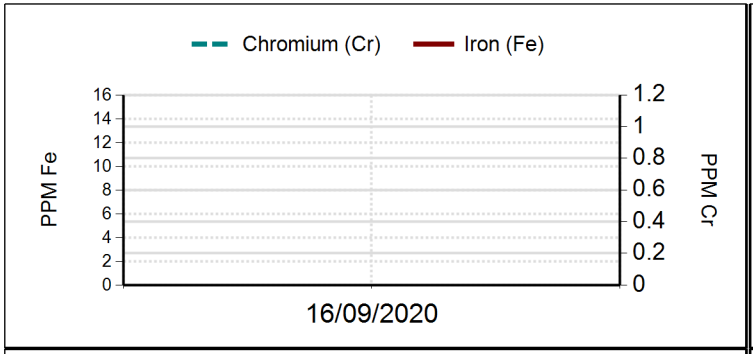
DATE SAMPLED		16-Sep-20
DATE RECEIVED		07-Oct-20
DATE REPORTED		09-Oct-20
LAB NO.		41022586569
SIF NO.		36648721
TIME ON UNIT	Hrs	
TIME ON OIL	Hrs	
OIL BRAND		Unidentified
OIL TYPE		Unidentified
OIL GRADE		Unknown
OIL ADDED		
FILTER	Hrs	Not Applicable
OIL CHANGED		
WO NUMBER		
Metals (ppm)		
Iron (Fe)		14
Chromium (Cr)		<1
Lead (Pb)		<1
Copper (Cu)		<1
Tin (Sn)		<1
Aluminium (Al)		1
Nickel (Ni)		<1
Silver (Ag)		<1
Titanium (Ti)		<1
Vanadium (V)		<1
Contaminants (ppm)		
Silicon (Si)		8
Sodium (Na)		9
Potassium (K)		<1
Additives (ppm)		
Magnesium (Mg)		2
Calcium (Ca)		149
Barium (Ba)		<1
Phosphorus (P)		517
Zinc (Zn)		693
Molybdenum (Mo)		<1
Boron (B)		<5
Contaminants		
Water (%)		2.19
Physical Tests		
Viscosity (cSt 100C)		N/A
Solids (%)		<0.1
Additional		
PQ Index		<10

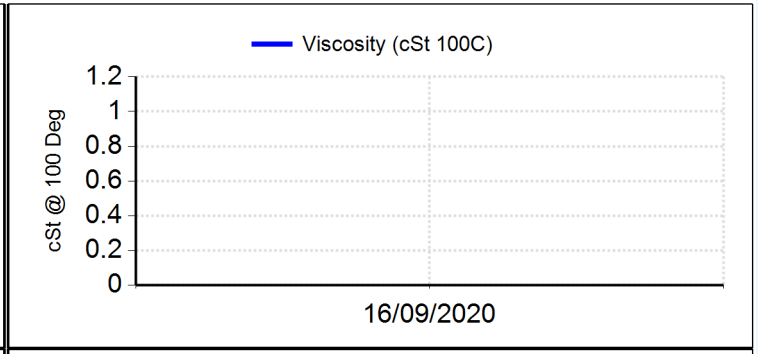
Right Solutions • Right Partner

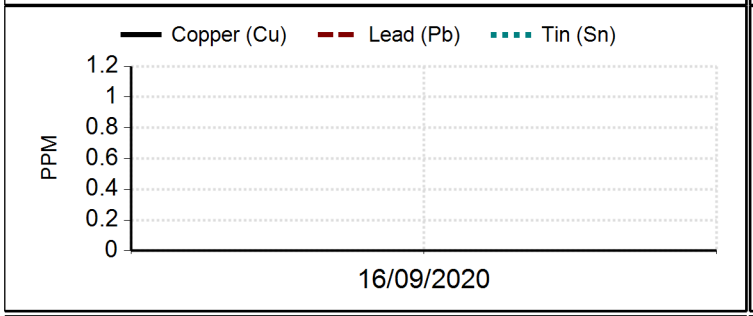
166

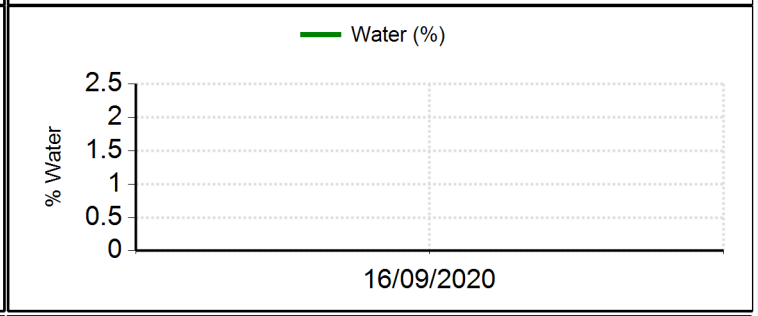
Right Solutions • Right Partner

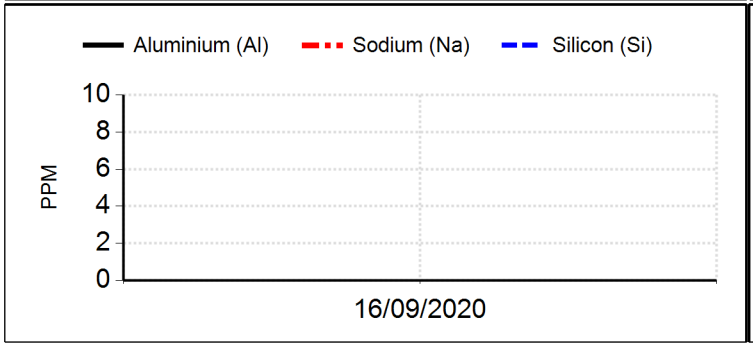
UIN 08375DD











Filter Image

Filter patch test is not performed Contact laboratory for more information

Since services are based on samples and information supplied by others, and since corrective actions, if any, are necessarily taken by others, these services are rendered without any warranty or liability of any kind beyond the actual amount paid to ALS Tribology for the services. Reported recommendations are based on interpretations of the generated test results and historical data. Certain test results appearing in this report may have been tested at other ALS laboratories within the Tribology divisional network.

Modjeski & Masters Inc
Attn: Andrew Brodsky
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

167 0002 v1.9

U.S. Laboratories

Atlanta, Georgia - 420
5300 OakBrook Parkway
Building 200 Suite 245
Norcross, GA 30093
800.394.3669

Valley View, Ohio - 410
6180 Halle Dr. Suite D
Valley View, OH 44125
800.726.5400

Kansas City, Kansas - 430
935 Sunshine Road
Kansas City, KS 66115
800.332.8055

Phoenix, Arizona - 440
3319 West Earll Drive
Phoenix, AZ 85017
800.445.7930

Portland, Oregon - 401
4943 NW Front Avenue
Portland, OR 97210
800.770.4128

Canadian Laboratories

Burlington, Ontario - 450
5036 South Service Rd.
Burlington, ON L7L5Y7
905 332 9559

Edmonton, Alberta - 402
9450 17 Ave NW
Edmonton, AB T6N 1M9
888.489.0057

Sales & Marketing

Houston, Texas
10450 Stancliff Road, Suite 210
Houston, TX 77099
877.835.8437

International Locations

Australia
Brisbane, Perth, Sydney, Muswellbrook

South America
Santiago de Chile, Belo Horizonte, Brazil

New Zealand
Wellington

Southeast Asia
Kuala Lumpur, Singapore

Europe
Prague

TEST METHODS:

Acid Number:	ASTM D974/D664 (*M)
Base Number:	ASTM D4739 (*M)
Base Number (Perchloric):	ASTM D2896 (*M)
Fuel Dilution by GC:	ASTM D7593
Fuel Dilution Visc/Setaflash	In House
Fuel Soot ATR/IR:	ASTM D7686 (*M)
Soot by FTIR:	ASTM D7844
Glycol:	In House
Metals by ICP AES:	ASTM D5185 (*M)
Ox, NOx, SOx, FTIR:	ASTM E2412/D7418/D7414 D7415
PQ Index:	ASTM D8120 (*M)
Particle Count:	ASTM D7647 (*M) / ISO 4406
Viscosity:	ASTM D445 (*M) / D7279 (*M)
Water KF:	D6304 / E203 (*M)
Water Crackle:	In House

*M - Modified Method

UIN 08375EF

Gearbox

Unit No. NE End Jack Lower

Unit:
Make
Model
Serial No.

Site CTDOT - Westport

Compartment:
Name NE End Jack Lower Gearbox
Make
Model
Serial No.

Capacity: 0.0

Customer:

MODJESKI & MASTERS INC
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

DIAGNOSIS

All wear levels appear within acceptable limits for first sample. Moderate concentration of water present. Silicon level (dirt/sealant material) satisfactory. Unable to obtain accurate viscosity result at 100C due to presence of water in sample. Action: Check for source of water entry. Drain oil from unit if not already changed. Resample at a reduced service interval to monitor and establish wear trend.

ANALYST: Eric.Dunlap



LEGEND



Severe


Abnormal


Caution

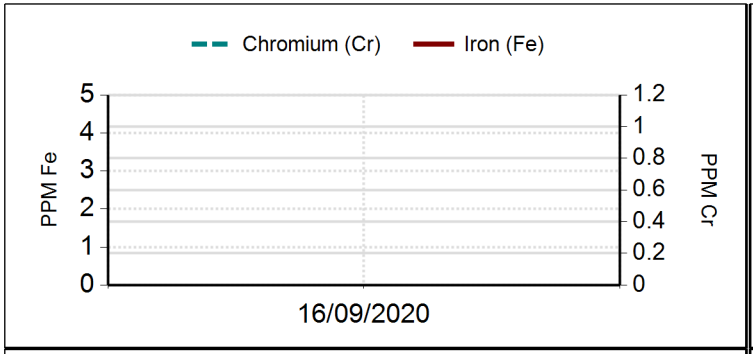

Normal

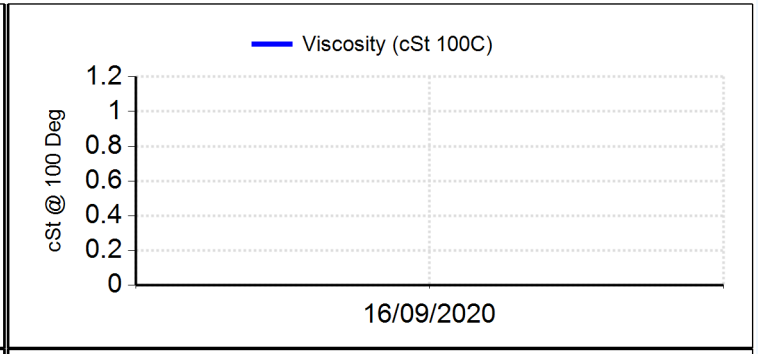
DATE SAMPLED		16-Sep-20
DATE RECEIVED		07-Oct-20
DATE REPORTED		12-Oct-20
LAB NO.		41022586571
SIF NO.		36648713
TIME ON UNIT	Hrs	
TIME ON OIL	Hrs	
OIL BRAND		Unidentified
OIL TYPE		Unidentified
OIL GRADE		Unknown
OIL ADDED		
FILTER	Hrs	Not Applicable
OIL CHANGED		
WO NUMBER		
Metals (ppm)		
Iron (Fe)		5
Chromium (Cr)		<1
Lead (Pb)		<1
Copper (Cu)		<1
Tin (Sn)		<1
Aluminium (Al)		<1
Nickel (Ni)		<1
Silver (Ag)		<1
Titanium (Ti)		<1
Vanadium (V)		<1
Contaminants (ppm)		
Silicon (Si)		14
Sodium (Na)		10
Potassium (K)		<1
Additives (ppm)		
Magnesium (Mg)		1
Calcium (Ca)		131
Barium (Ba)		<1
Phosphorus (P)		539
Zinc (Zn)		709
Molybdenum (Mo)		<1
Boron (B)		<5
Contaminants		
Water (%)		0.89
Physical Tests		
Viscosity (cSt 100C)		--
Solids (%)		<0.1
Additional		
PQ Index		114

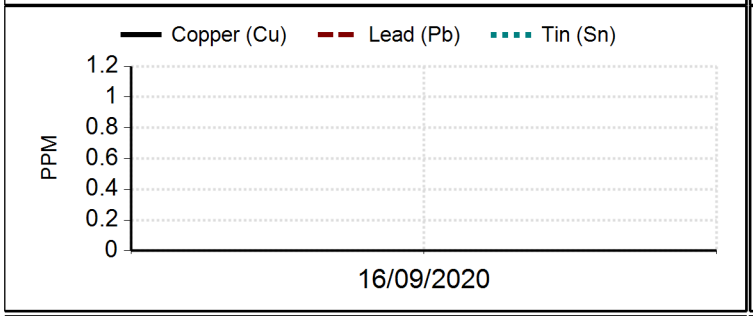


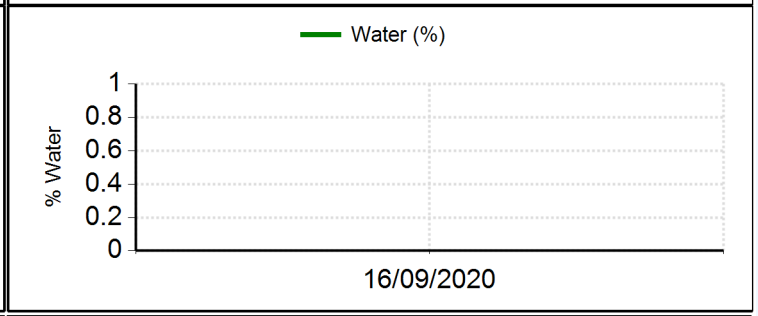
Right Solutions • Right Partner

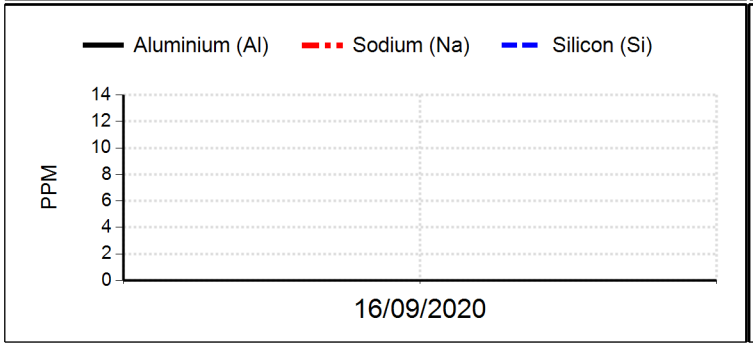
UIN 08375EF











Filter Image

Filter patch test is not performed Contact laboratory for more information

Since services are based on samples and information supplied by others, and since corrective actions, if any, are necessarily taken by others, these services are rendered without any warranty or liability of any kind beyond the actual amount paid to ALS Tribology for the services. Reported recommendations are based on interpretations of the generated test results and historical data. Certain test results appearing in this report may have been tested at other ALS laboratories within the Tribology divisional network.

Modjeski & Masters Inc
Attn: Andrew Brodsky
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

169 0002 v1.9

U.S. Laboratories

Atlanta, Georgia - 420
5300 OakBrook Parkway
Building 200 Suite 245
Norcross, GA 30093
800.394.3669

Valley View, Ohio - 410
6180 Halle Dr. Suite D
Valley View, OH 44125
800.726.5400

Kansas City, Kansas - 430
935 Sunshine Road
Kansas City, KS 66115
800.332.8055

Phoenix, Arizona - 440
3319 West Earll Drive
Phoenix, AZ 85017
800.445.7930

Portland, Oregon - 401
4943 NW Front Avenue
Portland, OR 97210
800.770.4128

Canadian Laboratories

Burlington, Ontario - 450
5036 South Service Rd.
Burlington, ON L7L5Y7
905 332 9559

Edmonton, Alberta - 402
9450 17 Ave NW
Edmonton, AB T6N 1M9
888.489.0057

Sales & Marketing

Houston, Texas
10450 Stancliff Road, Suite 210
Houston, TX 77099
877.835.8437

International Locations

Australia
Brisbane, Perth, Sydney, Muswellbrook

South America
Santiago de Chile, Belo Horizonte, Brazil

New Zealand
Wellington

Southeast Asia
Kuala Lumpur, Singapore

Europe
Prague

TEST METHODS:

Acid Number:	ASTM D974/D664 (*M)
Base Number:	ASTM D4739 (*M)
Base Number (Perchloric):	ASTM D2896 (*M)
Fuel Dilution by GC:	ASTM D7593
Fuel Dilution Visc/Setaflash	In House
Fuel Soot ATR/IR:	ASTM D7686 (*M)
Soot by FTIR:	ASTM D7844
Glycol:	In House
Metals by ICP AES:	ASTM D5185 (*M)
Ox, NOx, SOx, FTIR:	ASTM E2412/D7418/D7414 D7415
PQ Index:	ASTM D8120 (*M)
Particle Count:	ASTM D7647 (*M) / ISO 4406
Viscosity:	ASTM D445 (*M) / D7279 (*M)
Water KF:	D6304 / E203 (*M)
Water Crackle:	In House

*M - Modified Method

UIN 08375CE

Gearbox

Unit No. NW End Jack Upper

Unit:
Make
Model
Serial No.

Site CTDOT - Westport

Compartment:
Name NW End Jack Upper Gearbox
Make
Model
Serial No.

Capacity: 0.0

Customer:

MODJESKI & MASTERS INC
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

DIAGNOSIS

All wear levels appear within acceptable limits for first sample. Silicon level (dirt/sealant material) satisfactory. Water content acceptable. Please provide missing oil information; we need manufacturer, type, and grade to evaluate the oil data. Action: Resample at next recommended interval to monitor and establish wear trend.

ANALYST: Eric.Dunlap

Normal

LEGEND

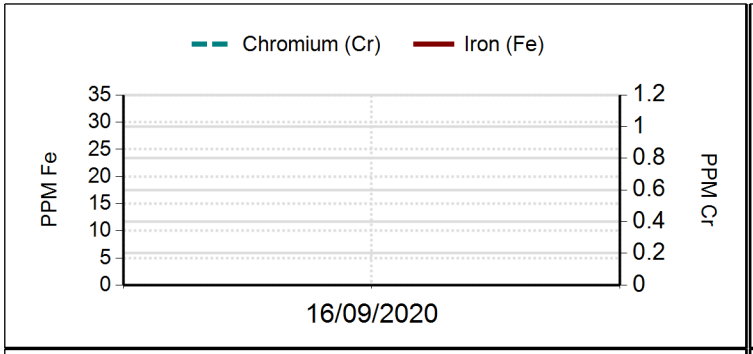
Severe | Abnormal | Caution | Normal

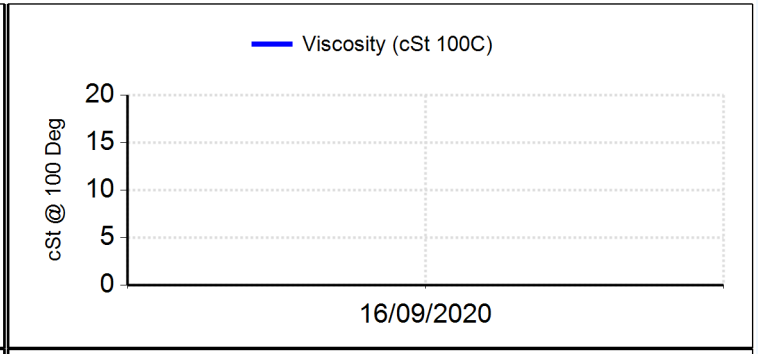
DATE SAMPLED	16-Sep-20
DATE RECEIVED	07-Oct-20
DATE REPORTED	08-Oct-20

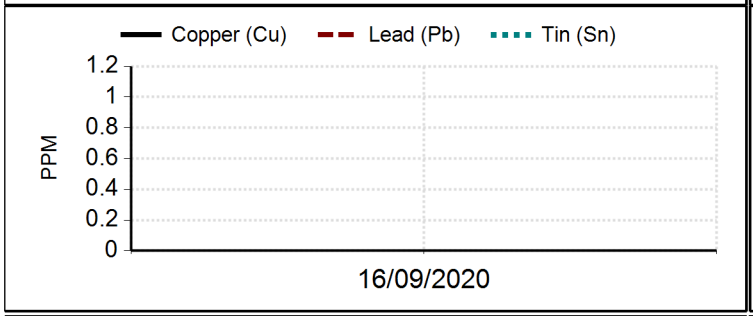
LAB NO.		41022586568
SIF NO.		37646914
TIME ON UNIT	Hrs	
TIME ON OIL	Hrs	
OIL BRAND		Unidentified
OIL TYPE		Unidentified
OIL GRADE		Unknown
OIL ADDED		
FILTER	Hrs	Not Applicable
OIL CHANGED		
WO NUMBER		

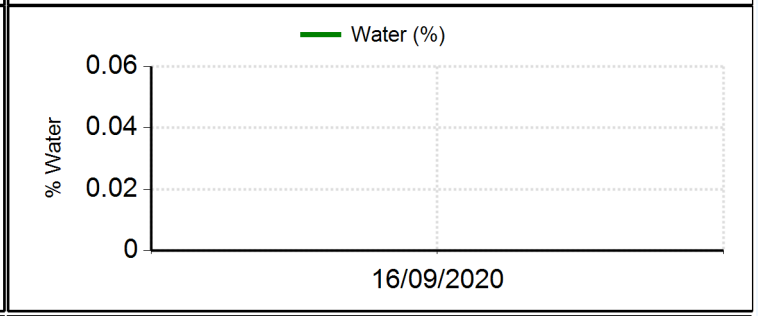
Metals (ppm)	
Iron (Fe)	31
Chromium (Cr)	<1
Lead (Pb)	<1
Copper (Cu)	1
Tin (Sn)	<1
Aluminium (Al)	2
Nickel (Ni)	<1
Silver (Ag)	<1
Titanium (Ti)	<1
Vanadium (V)	<1
Contaminants (ppm)	
Silicon (Si)	22
Sodium (Na)	16
Potassium (K)	<1
Additives (ppm)	
Magnesium (Mg)	4
Calcium (Ca)	150
Barium (Ba)	<1
Phosphorus (P)	516
Zinc (Zn)	696
Molybdenum (Mo)	<1
Boron (B)	<5
Contaminants	
Water (%)	<0.05
Physical Tests	
Viscosity (cSt 100C)	19.5
Solids (%)	<0.1
Additional	
PQ Index	104

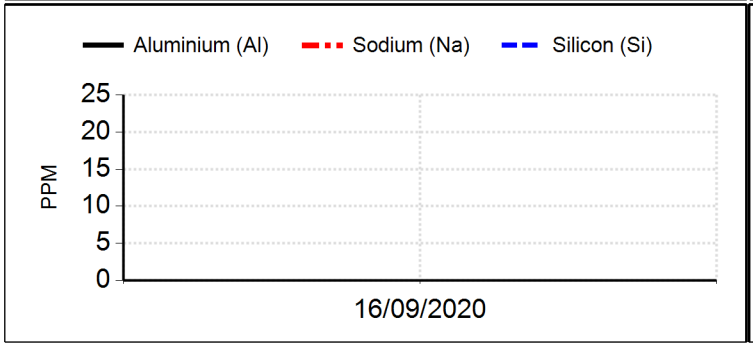
UIN 08375CE











Filter Image

Filter patch test is not performed Contact laboratory for more information

Since services are based on samples and information supplied by others, and since corrective actions, if any, are necessarily taken by others, these services are rendered without any warranty or liability of any kind beyond the actual amount paid to ALS Tribology for the services. Reported recommendations are based on interpretations of the generated test results and historical data. Certain test results appearing in this report may have been tested at other ALS laboratories within the Tribology divisional network.

Modjeski & Masters Inc
Attn: Andrew Brodsky
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

171 0002 v1.9

U.S. Laboratories

Atlanta, Georgia - 420
5300 OakBrook Parkway
Building 200 Suite 245
Norcross, GA 30093
800.394.3669

Valley View, Ohio - 410
6180 Halle Dr. Suite D
Valley View, OH 44125
800.726.5400

Kansas City, Kansas - 430
935 Sunshine Road
Kansas City, KS 66115
800.332.8055

Phoenix, Arizona - 440
3319 West Earll Drive
Phoenix, AZ 85017
800.445.7930

Portland, Oregon - 401
4943 NW Front Avenue
Portland, OR 97210
800.770.4128

Canadian Laboratories

Burlington, Ontario - 450
5036 South Service Rd.
Burlington, ON L7L5Y7
905 332 9559

Edmonton, Alberta - 402
9450 17 Ave NW
Edmonton, AB T6N 1M9
888.489.0057

Sales & Marketing

Houston, Texas
10450 Stancliff Road, Suite 210
Houston, TX 77099
877.835.8437

International Locations

Australia
Brisbane, Perth, Sydney, Muswellbrook

South America
Santiago de Chile, Belo Horizonte, Brazil

New Zealand
Wellington

Southeast Asia
Kuala Lumpur, Singapore

Europe
Prague

TEST METHODS:

Acid Number:	ASTM D974/D664 (*M)
Base Number:	ASTM D4739 (*M)
Base Number (Perchloric):	ASTM D2896 (*M)
Fuel Dilution by GC:	ASTM D7593
Fuel Dilution Visc/Setaflash	In House
Fuel Soot ATR/IR:	ASTM D7686 (*M)
Soot by FTIR:	ASTM D7844
Glycol:	In House
Metals by ICP AES:	ASTM D5185 (*M)
Ox, NOx, SOx, FTIR:	ASTM E2412/D7418/D7414 D7415
PQ Index:	ASTM D8120 (*M)
Particle Count:	ASTM D7647 (*M) / ISO 4406
Viscosity:	ASTM D445 (*M) / D7279 (*M)
Water KF:	D6304 / E203 (*M)
Water Crackle:	In House

*M - Modified Method

UIN 08375EE

Gearbox

Unit No. NW End Jack Lower

Unit:
Make
Model
Serial No.

Site CTDOT - Westport

Compartment:
Name NW End Jack Lower Gearbox
Make
Model
Serial No.
Capacity: 0.0

Customer:

MODJESKI & MASTERS INC
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

DIAGNOSIS

All wear levels appear within acceptable limits for first sample. Silicon level (dirt/sealant material) satisfactory. Water content acceptable. Please provide missing oil information; we need manufacturer, type, and grade to evaluate the oil data. Action: Resample at next recommended interval to monitor and establish wear trend.

ANALYST: Eric.Dunlap

Normal

LEGEND

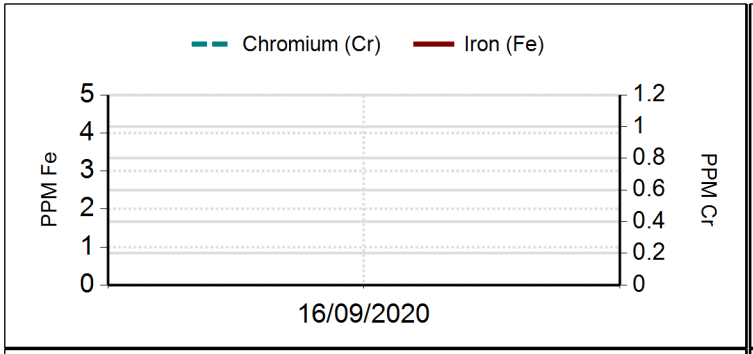
Severe | Abnormal | Caution | Normal

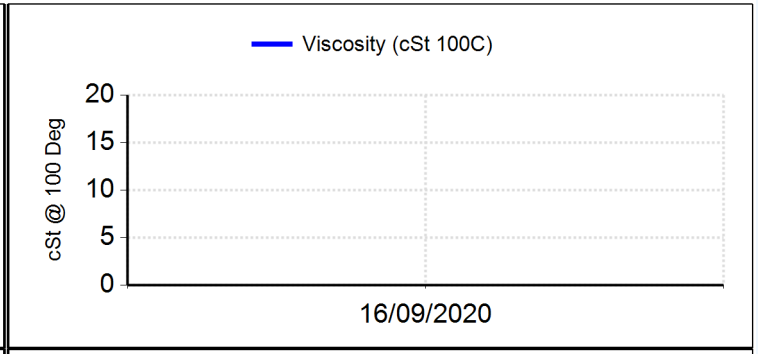
DATE SAMPLED	16-Sep-20
DATE RECEIVED	07-Oct-20
DATE REPORTED	08-Oct-20

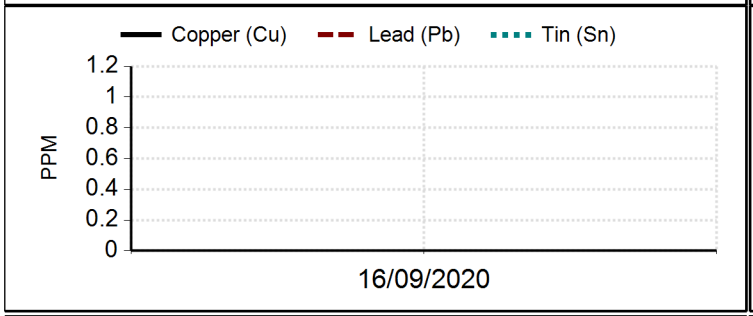
LAB NO.		41022586570
SIF NO.		36648715
TIME ON UNIT	Hrs	
TIME ON OIL	Hrs	
OIL BRAND		Unidentified
OIL TYPE		Unidentified
OIL GRADE		Unknown
OIL ADDED		
FILTER	Hrs	Not Applicable
OIL CHANGED		
WO NUMBER		

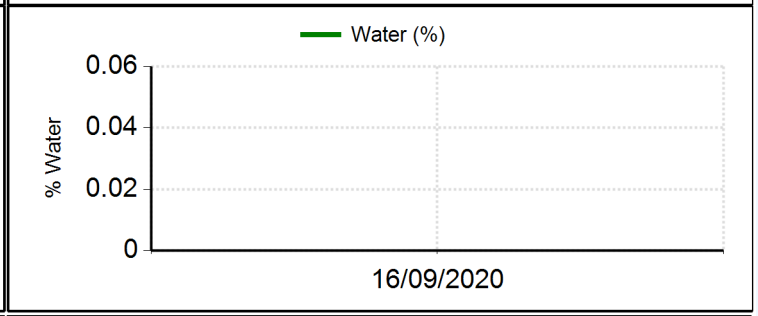
Metals (ppm)	
Iron (Fe)	4
Chromium (Cr)	<1
Lead (Pb)	<1
Copper (Cu)	<1
Tin (Sn)	<1
Aluminium (Al)	<1
Nickel (Ni)	<1
Silver (Ag)	<1
Titanium (Ti)	<1
Vanadium (V)	<1
Contaminants (ppm)	
Silicon (Si)	8
Sodium (Na)	11
Potassium (K)	<1
Additives (ppm)	
Magnesium (Mg)	1
Calcium (Ca)	145
Barium (Ba)	<1
Phosphorus (P)	521
Zinc (Zn)	692
Molybdenum (Mo)	<1
Boron (B)	<5
Contaminants	
Water (%)	<0.05
Physical Tests	
Viscosity (cSt 100C)	19.5
Solids (%)	<0.1
Additional	
PQ Index	<10

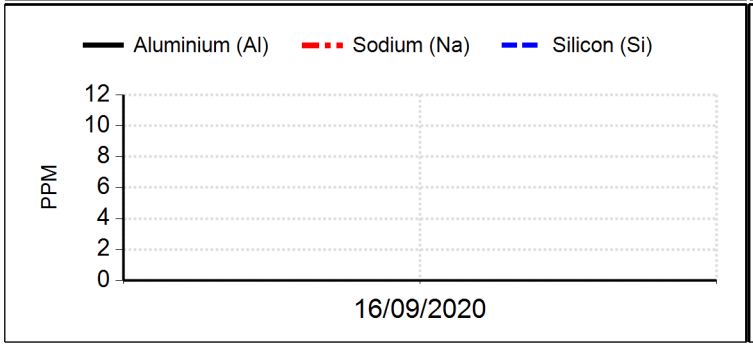
UIN 08375EE











Filter Image

Filter patch test is not performed Contact laboratory for more information

Since services are based on samples and information supplied by others, and since corrective actions, if any, are necessarily taken by others, these services are rendered without any warranty or liability of any kind beyond the actual amount paid to ALS Tribology for the services. Reported recommendations are based on interpretations of the generated test results and historical data. Certain test results appearing in this report may have been tested at other ALS laboratories within the Tribology divisional network.

Modjeski & Masters Inc
Attn: Andrew Brodsky
100 Sterling Pkwy, Ste 302
Mechanicsburg PA 17050
USA

173 /002 v1.9

U.S. Laboratories

Atlanta, Georgia - 420
5300 OakBrook Parkway
Building 200 Suite 245
Norcross, GA 30093
800.394.3669

Valley View, Ohio - 410
6180 Halle Dr. Suite D
Valley View, OH 44125
800.726.5400

Kansas City, Kansas - 430
935 Sunshine Road
Kansas City, KS 66115
800.332.8055

Phoenix, Arizona - 440
3319 West Earll Drive
Phoenix, AZ 85017
800.445.7930

Portland, Oregon - 401
4943 NW Front Avenue
Portland, OR 97210
800.770.4128

Canadian Laboratories

Burlington, Ontario - 450
5036 South Service Rd.
Burlington, ON L7L5Y7
905 332 9559

Edmonton, Alberta - 402
9450 17 Ave NW
Edmonton, AB T6N 1M9
888.489.0057

Sales & Marketing

Houston, Texas
10450 Stancliff Road, Suite 210
Houston, TX 77099
877.835.8437

International Locations

Australia
Brisbane, Perth, Sydney, Muswellbrook

South America
Santiago de Chile, Belo Horizonte, Brazil

New Zealand
Wellington

Southeast Asia
Kuala Lumpur, Singapore

Europe
Prague

TEST METHODS:

Acid Number:	ASTM D974/D664 (*M)
Base Number:	ASTM D4739 (*M)
Base Number (Perchloric):	ASTM D2896 (*M)
Fuel Dilution by GC:	ASTM D7593
Fuel Dilution Visc/Setaflash	In House
Fuel Soot ATR/IR:	ASTM D7686 (*M)
Soot by FTIR:	ASTM D7844
Glycol:	In House
Metals by ICP AES:	ASTM D5185 (*M)
Ox, NOx, SOx, FTIR:	ASTM E2412/D7418/D7414 D7415
PQ Index:	ASTM D8120 (*M)
Particle Count:	ASTM D7647 (*M) / ISO 4406
Viscosity:	ASTM D445 (*M) / D7279 (*M)
Water KF:	D6304 / E203 (*M)
Water Crackle:	In House

*M - Modified Method

APPENDIX IV
NUMERICAL CONDITION REPORT

MOVABLE SPANS
NUMERICAL CONDITION INSPECTION REPORT
MECHANICAL COMPONENTS

BRIDGE NUMBER: 01349 **INSPECTION DATES: 09/16/20**

COMMON COMPONENTS		BASCULE SPANS		LIFT SPANS	
COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*
OPEN GEARING	6	RACK & RACK PINION	N	RING GEARS	N
REDUCERS	6	TRUNNION ASSY.	N	SHEAVES	N
SHAFTS	7	SPAN LOCKS	N	DRUMS	N
BEARINGS	7	TAIL LOCKS	N	SHEAVE TRUNNION ASSY.	N
COUPLINGS	5	CURVED TREAD PLATES	N	DRUM BEARING ASSY.	N
FASTENERS	6	STRAIGHT TREAD PLATES	N	WIRE ROPES AND FITTINGS	N
MACHINERY SUPPORTS	7	**SWING SPANS**		SPAN GUIDES	N
CENTERING DEVICE ASSY.	5	CENTER BEARING ASSY.	6	BALANCE CHAINS	N
BUFFER CYLINDERS	N	CIRCULAR RACK	6	**MISC. COMPONENTS**	
STRIKE PLATES	N	BALANCE WHEEL ASSY.	6	END SCREW JACKS	6
EMERGENCY DRIVES	6	CIRCULAR TRACK	7	CENTER SCREW JACKS	6
LIVE LOAD SHOES	N	RIM-BEARING ASSY.	N	FULLY OPENED RIGID STOP	7
BRAKES	7	CENTER WEDGE ASSY.	N	FULLY CLOSED RIGID STOP	6
		END WEDGE ASSY.	N		

MECHANICAL CONDITION OVERALL RATING: 6

* NCR IS AN ACRONYM FOR NUMERICAL CONDITION RATING; SEE BELOW:

NUMERICAL CONDITION RATING INFORMATION

9 NEW: Displays no wear and/or deterioration: excellent functional performance.

8 EXCELLENT: Displays insignificant wear and/or deterioration: performs intended function with very high degree of reliability and effectiveness.

7 GOOD: Very early wear/deterioration: performs with high degree of reliability and/or effectiveness.

6 FAIR: Early measurable wear/deterioration: performs with little reduction in reliability and/or effectiveness.

5 ADEQUATE: Moderate wear/deterioration: performs with moderate reduction in reliability and/or effectiveness.

4 MARGINAL: Advanced wear/deterioration: performance marginal: corrective action required within one year.

3 POOR: Severe wear/deterioration: performance poor and/or unreliable: corrective action required within six months.

2 URGENT: Movable span operation highly unreliable or dangerous and should be restricted: corrective action required as soon as possible.

1 CRITICAL: Movable span operation prohibited pending replacement or repair.

0 FAILURE: Movable span will not operate without replacement or repair.

N Not Applicable

APPENDIX V
FIELD NOTES

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 1 of 37

SPAN DRIVE MOTOR:

Motor Identification per Schematic:	Span Drive Motor	
Name Plate Info.:	Manufacturer: Reuland	Type: A000
	Serial No: 13-1103A-1	Code: M
	Prod. No: 0030F-1AAB-0020	Style: ABR
	Horsepower: 3HP	Encl.: TENV
	SF: 1.15	RPM: 900 RPM
	Amps: 12.4	HZ: 60
	Volts: 208	Frame: 215
	Phase: 3	Time Rating: 30
Brake:	Integral disc brake with manual release; Manual release operates smoothly. Observed a socket head screw worked out approx. ½"	
Shafts:	Coated in grease, minor corrosion and no paint	
Lubrication:	No recent lube on lube port	
Bolts:	Do not have double nuts (would typically recommend double); Not corroded (maybe stainless steel). Tight.	
Supports:	Small amount of debris	
General Comments:	Paint is in good condition	

SPAN INSTRUMENTATION:

Worm Gear Reducer:	Parallel offset reducer; Light coating of debris; Paint in good condition; Single nuts on bolts with some corrosion on fasteners; Grease leak from bearing
Span Position Limit Switch:	Good
General:	Light debris

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C1**
Nameplate Data:	NA
Coupling Type:	Falk Flex-Flex Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Lower hub seal leak on channel side
Cap & Housing Bolts:	No paint, minor to moderate corrosion, tight
Cover Condition:	Moderate corrosion and paint failure
Hubs and Keys:	Grease seeping through lower keyway and hub to shaft interface
Alignment:	Good
Lubrication:	Light to moderate coating of grease on lower half of coupling; Grease leaking out of seal on lower half on channel side. Plugs present and no fittings
Comments:	Moderate paint failure and corrosion

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C2**
Nameplate Data:	NA
Coupling Type:	Falk Grid 1030T10D
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Torn and possibly missing, may even be liquid aftermarket gasket
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good, set screw found over keyway on reducer half
Alignment:	Gap in the split most likely from not being tightened completely
Lubrication:	Lube coming out of gap in split; No fresh lubrication found, no fittings, just plugs
Comments:	Light coating of grease; Moderate paint failure but no corrosion yet

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C3**
Nameplate Data:	NA
Coupling Type:	Martin 50
Grid/Gear Condition:	IA
Seal/Gasket Condition:	
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Key and keyway are in good condition
Alignment:	Good
Lubrication:	Good
Comments:	Overall good condition; Light coating of debris; ~1/32” away from the reducer; Scraping against limit switch reducer as it rotates causing it to wear in that location and make noise during operation

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C4**
Nameplate Data:	NA
Coupling Type:	Martin 40 (similar to coupling C3)
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Gasket is in good condition
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	Good
Comments:	Overall good condition; Small amount of grease buildup

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SPAN DRIVE PINION SHAFT:

Shaft Identification per Schematic:	Pinion Shaft
Surface Condition:	Paint is in good condition – excess lubrication on surface is preventing it from corroding
Hubs and Keys:	Pinion is integral with shaft
Alignment:	Good
General:	Covered in grease

PINION SHAFT BEARING - UPPER:

Bearing Identification per Schematic:	SPAN DRIVE – UPPER BEARING
Bearing Type:	Spherical Roller Bearing (smaller size than lower bearing)
Journal Diameter:	NM
Clearance:	NM
Lubrication:	Appear to be only using purge on bottom and not the top; The fitting on the cap has fresh lube
Bolts:	Single mounting nuts (should be double)
Support:	Significant corrosion at bearing and support interface with beginning of delamination in isolated areas
Comments:	Minor paint failure and minor corrosion; Layer of grease and debris Ticking noise observed during operation from one or both of the pinion shaft bearings.

PINION SHAFT BEARING - LOWER:

Bearing Identification per Schematic:	SPAN DRIVE – LOWER BEARING
Bearing Type:	Torrington SAFS 528; Spherical Roller Bearing
Journal Diameter:	NM
Clearance:	NM
Lubrication:	Appear to be only using purge on bottom and not the top; Not using the lower lube port (there is a corroded plug in there)
Bolts:	Heads of bolts are unpainted and exhibit moderate corrosion; Single mounting nuts
Support:	Good
Comments:	Silicone sealant around the base; Shaft is in good condition; A lot of grease buildup between lower bearing and pinion Ticking noise observed during operation from one or both of the pinion shaft bearings.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SPAN DRIVE ENCLOSED GEARING:

Item:	Span Drive Primary Reducer		
Nameplate:	Manufacturer: Horsburgh and Scott	Ser. No.: 1000Bv	
	Size/Type: Spiral Bevel	HP: 3.7	Ratio: 363:1
	Repair Order No.: NA	Input RPM: 900	
		Service Factor: NM	
Lubrication:	Plug will not come off at drain pipe and no overhead access – cannot get oil sample; Oil level is halfway on site glass. Attempts to retrieve oil sample with manual pump kit and tubing failed		
Seals:	Good		
Housing:	Paint is in good condition (looks more recent than other components); Corrosion and debris buildup on top of reducer and mounting surface		
Shafts:	Chipped paint and minor widespread corrosion on manual input shafts		
Bearings:	Good		
Bolts:	Good		
General:	Desiccant is expired		

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 7 of 37

RACK AND PINION:

			Chordal Tooth Thickness Measurements (all dimensions in inches)			
		Addendum	Original	2018	2020	Tooth Measured
Pinion	Top	0.660	0.999	0.995	0.956	5 from most engaged tooth (toward opening direction)
	Bottom			0.996	0.955	
Rack	Top	0.638	1.000	0.983	0.931	8 from most engaged tooth (toward opening direction)
	Bottom			0.997	0.942	

Observations: Pinion

Opening Face	Surface corrosion; dry, no fresh lubrication; minor pitting from corrosion, full face contact
Closing Face	Surface corrosion; dry, no fresh lubrication; minor pitting from corrosion, full face contact

Observations: Rack

Opening Face	Surface corrosion (heavier in the addendum than pinion); Almost no lube but some hardened lube; Slight pitch line depression, full face contact
Closing Face	Surface corrosion (heavier than pinion); Almost no lube but some hardened lube, full face contact heavier at top 2/3^{rds}

Observations During Operation:	Smooth operation; Minor to moderate corrosion observed on the inside faces of the rack assembly. Grout is failed in several areas. One split bolt exhibited severe corrosion and minor section loss.

RACK AND TRACK CONDITION:

Bolts:	North End Rack Bolts -> Last cut out for bolts on rack segment is dry but the drains appear to be clogged; The bolts in this section exhibit significant corrosion Rack Bolts -> Most of them are studs but some are bolts; All bolts painted with light debris. A small amount of mounting bolts exhibited minor paint failure Track Bolts -> Good condition; Debris buildup especially near the rack segments; Significant corrosion on the North most bolt washer
General Notes:	2 long segments with rack teeth, 7 short segments Track -> Minor debris buildup; No significant defects; Minor corrosion on inside where the segment mounts to concrete; No sign of hard metal contact after cleaning hardened lubrication, minor pitting from corrosion, original machined reference arcs appear to be visible

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 9 of 37

BALANCE WHEELS:

Wheel Number	Lubrication:	Bolts:	Free Movement? Yes/No	General:	Clearance with Jacks Engaged (design clearance 0.063"):	Clearance with Jacks Retracted:
1	Good, fresh grease	Good paint, Mounting bolt heads corroded, old lube and debris	Yes	Some corrosion on wheel tread	0.038"	Not Measured
2	Good, fresh grease	Paint in good condition	No	Some corrosion on wheel tread	0.012"	Not Measured
3	Marginal	Good	No	Very minor corrosion on wheel tread	0.116"	Not Measured
4	Marginal	Minor surface corrosion, Upper have moderate corrosion	No	Wheel tread good	0.195"	Not Measured
5	Good, fresh grease, Slight buildup	Good	Yes	Wheel tread good	0.220"	Not Measured
6	Good, fresh grease, Slight buildup	Good	Yes	Minor corrosion on wheel tread	0.201"	Not Measured
7	Good, fresh grease, buildup on wheel	Upper minor to moderate paint failure and corrosion	No	Very minor bearing cap paint failure	0.120"	Not Measured
8	Fresh, Minor excess grease	Upper bolts minor/moderate paint failure, Lower bolt heads minor paint failure/corrosion, debris buildup	Yes (harder to rotate than others)	Minor corrosion on wheel tread, Cap very minor corrosion, debris	0.078"	Not Measured

(All balance wheel bearing bolts have single nuts)

Observations During Operation:	Balance wheel 1 and 2 roll during a majority of the opening direction. In the closing direction balance wheel 1 is clear and 2 has intermittent contact that appears to be light. Balance wheels 3 and 5 rotated during operation in the NW quadrant of the track. This area also exhibited debris buildup on the track) Balance wheels 4 and 6 were clear of the track for the entire operation. Balance wheel 7 was clear of the track a majority of the operation but when it came in contact it slid instead of rolled. Balance wheel 8 slid from near closed to closed position. Balance wheel 8 rolled from near open to fully open.

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 11 of 37

BALANCE WHEEL BEARING CLEARANCE:

Wheel Number	Inboard (in):	Location:	Outboard (in):	Location:
1	0.013	Top	0.016	Top
2	0.032	Bottom	0.032	Top
3	0.024	Bottom	0.014	Bottom
4	<0.003	NA	0.007	Bottom
5	0.047	Top	0.011	Top
6	0.003	4:00	0.004	Top
7	0.006	Bottom	0.035	Top
8	0.024	Top	0.030	Bottom

Shaft Dia~3 ½”
Design clearance RC6= 0.003” to 0.009”.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

CENTER PIVOT BEARING:

General Notes:	Good condition, one bolt missing on the cover, two drain ports in the base, one fill on east side Minor isolated corrosion at base Minor corrosion at upper mounting surface Evidence of lube leak in NE corner

CENTER RIGID STOP (fully open):

General Notes:	Good condition Some minor to moderate corrosion at base plate to pier interface

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 13 of 37

NORTH CENTER JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Stearns, Hand release functional, 10 ft-lb	
Housing:	Minor isolated corrosion, Minor corrosion mounting surface	
Bearings:	Some grease present	
Fasteners:	Minor corrosion	
Lubrication:	Fresh at fittings	
Comments:	Heater is functioning	

NORTH CENTER JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	**C3**
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Minor/Moderate corrosion
Cover Condition:	Minor isolated paint failure
Hubs and Keys:	Not visible
Alignment:	Good
Lubrication:	No signs of fresh lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 14 of 37

NORTH CENTER JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Isolated minor corrosion, delamination		
Bearings:	Fresh lube		
Fasteners:	Minor corrosion		
Lubrication:	Oil level low according to dip-stick, oil sample taken, water under drain plug		
Operation:	Smooth		
Comments:	Minor/moderate corrosion on mounting surface		

NORTH CENTER JACK MACHINERY: UPPER REDUCER COUPLING

Identification per Figures:	**C2-2**
Nameplate Data:	NA
Coupling Type:	Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks
Cap & Housing Bolts:	Minor/moderate corrosion
Cover Condition:	Significant/severe corrosion
Hubs and Keys:	Paint failure
Alignment:	Good
Lubrication:	No sign of lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTH CENTER JACK MACHINERY: FLOATING SHAFT

Identification per Schematic:	
Surface Condition:	Minor surface corrosion and paint failure with isolated significant corrosion
Hubs and Keys:	NA
Alignment:	Good
General:	NA

NORTH CENTER JACK MACHINERY: LOWER REDUCER COUPLING

Identification per Figures:	**C2-1**
Nameplate Data:	NA
Coupling Type:	Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cap & Housing Bolts:	Severe corrosion
Cover Condition:	Severe corrosion
Hubs and Keys:	Severe corrosion
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

NORTH CENTER JACK MACHINERY: COUPLING C1

Identification per Figures:	**C1**
Nameplate Data:	Martin 50
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTH CENTER JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data (not found this inspection cycle)	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Minor surface corrosion		
Bearings:	Good		
Fasteners:	Mounting: Moderate corrosion; Split: Very minor corrosion		
Lubrication:	Good, took oil sample from bottom drain on west side		
Operation:	Smooth		
Comments:	Desiccant is good; Oil fill/level plug has severe corrosion		

NORTH CENTER JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Duff Norton 8k-1850-1x
Protective Boot:	Good; grease and debris buildup
Base:	Moderate corrosion and paint failure; Bolts in good condition
Limit Switches:	Proximity switches good; Gears for RCLS are dry and minor noise during operation from backlash but tight on respective shafts.
Operation:	Smooth
Comments:	Good lube; Upper bolts have minor corrosion Bearing surfaces are dry and have moderate to severe corrosion with delamination. When driven contact appears tight with no gaps

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTH CENTER JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Manual release appears to function but will not remain in the released position. Could still rotate shaft when brake was reset	
Housing:	Very minor isolated corrosion and corrosion at manual operating shaft	
Bearings:	Good	
Fasteners:	Very minor isolated corrosion and single nuts used	
Lubrication:	Dry lube at fittings	
Comments:	Heater appears to be functioning	

SOUTH CENTER JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	**C3**
Nameplate Data:	Falk
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Grease purge at reducer side
Cap & Housing Bolts:	Minor paint failure and corrosion
Cover Condition:	Moderate paint failure especially on the motor side
Hubs and Keys:	Good, debris buildup, some old minor grease purge
Alignment:	Good
Lubrication:	No sign of fresh lube with ports painted over
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 18 of 37

SOUTH CENTER JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Very minor corrosion at split, paint is good with minor isolated corrosion		
Bearings:	Fresh lube on all fittings, 4 fittings, no plugs, purge at seal		
Fasteners:	Mounting bolts have minor corrosion with single nuts, one bolt head that was visible had moderate corrosion		
Lubrication:	Level looks full, oil appears foamy		
Operation:	Smooth		
Comments:	Drain has buildup from past leak? Silicone seal at base. Hand crank shaft exhibits corrosion		

SOUTH CENTER JACK MACHINERY: UPPER REDUCER COUPLING

Identification per Figures:	**C2-2**
Nameplate Data:	NA
Coupling Type:	Gear.
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Small leak at flex hub, grease from the reducer reaching the top of the coupling
Cap & Housing Bolts:	Okay with minor grease and debris buildup
Cover Condition:	Moderate corrosion, Lube buildup, moderate to significant paint failure
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of lubrication at port, excess lube from reducer reaching this coupling
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 19 of 37

SOUTH CENTER JACK MACHINERY: FLOATING SHAFT

Identification per Schematic:	
Surface Condition:	Good; Minor corrosion at bottom
Hubs and Keys:	Good
Alignment:	Good
General:	NA

SOUTH CENTER JACK MACHINERY: LOWER REDUCER COUPLING

Identification per Figures:	**C2-1**
Coupling Type:	Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Minor corrosion but paint in good condition
Cover Condition:	Moderate to significant corrosion and severe paint failure
Hubs and Keys:	Good, keys not visible
Alignment:	Good
Lubrication:	No sign of lube at port
Comments:	NA

SOUTH CENTER JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Service Factor: 1.17	Output Torque: NM	
Housing:	Good; Very minor corrosion at bottom, silicone seal at the base		
Bearings:	Fresh lube on fitting		
Fasteners:	Mounting: 1 with minor corrosion, paint failure, both upper bolts not fully engaged with nut, minor paint failure and corrosion at the bolt heads		
Lubrication:			
Operation:	Smooth		
Comments:	Desiccant is good, corrosion at the oil drain/level check plug		

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTH CENTER JACK MACHINERY: COUPLING C1

Identification per Figures:	**C1**
Nameplate Data:	Martin 50
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

SOUTH CENTER JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Duff Norton 8k-1850-1x
Protective Boot:	Good; Slight grease buildup
Base:	Minor to moderate corrosion, single nuts on mounting bolts, minor isolated paint failure
Limit Switches:	Proximity switches good; Gears for RCLS are dry and minor noise during operation from backlash but tight on respective shafts.
Operation:	Smooth
Comments:	Upper bolts: Moderate corrosion, moderate corrosion on upper mounting surface Bearing surfaces are dry and have moderate to severe corrosion with delamination The actuator lubrication fitting is dry

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 21 of 37

NORTHEAST END JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland Motor with Stearns Brake	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800 rpm
Brake:	Good, manual release good	
Housing:	Minor isolated corrosion; Minor paint failure on mounting feet	
Bearings:	Good	
Fasteners:	Minor corrosion	
Lubrication:	Fresh grease on fittings	
Comments:		

NORTHEAST END JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Leak at split
Cap & Housing Bolts:	Minor/moderate corrosion
Cover Condition:	Good
Hubs and Keys:	Not visible
Alignment:	Good
Lubrication:	No signs of fresh lubrication
Comments:	

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 22 of 37

NORTHEAST END JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Minor isolated corrosion; Moderate at shims and at bottom, caulk has been added in this area		
Bearings:	Some recent lube on both bearings		
Fasteners:	Minor/moderate corrosion		
Lubrication:	Oil sample taken. Very minor leak at drain, access cover mounted to sidewalk with square socket head fastener, not removed		
Operation:	Smooth		
Comments:	The dip-stick cap exhibited severe corrosion and section loss		

NORTHEAST END JACK MACHINERY: REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Same as cover
Cover Condition:	Moderate paint failure and corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of lube
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHEAST END JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data (not found this inspection cycle)	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Minor/moderate isolated corrosion		
Bearings:	Not fresh lubrication		
Fasteners:	Minor corrosion on East bolts, Moderate corrosion on West bolts		
Lubrication:	Oil sample taken. Very minor oil leak at bottom (drain or split)		
Operation:	Smooth		
Comments:	Desiccant is good; Moderate isolated corrosion on parts and fasteners		

NORTHEAST END JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Grease dripping from shaft (remote lube); Minor isolated corrosion
Protective Boot:	Grease buildup; Good condition
Base:	Grease buildup; Good condition; Minor corrosion
Limit Switches:	Open gears dry and minor surface corrosion.
Operation:	Smooth
Comments:	Upper bolts: Minor corrosion. Shims: Moderate corrosion. LL shoes exhibit minor corrosion and no fresh lube. No gap when driven. ½" of droop at screw jack when all ends retracted. No handrail at end of lower maintenance walkway.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHEAST END JACK MACHINERY: COUPLING C1

Identification per Figures:	**C1**
Nameplate Data:	NM
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 25 of 37

SOUTHEAST END JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland Motor with Stearns Brake	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Good, manual release functions	
Housing:	Paint in good condition, minor corrosion on isolated areas	
Bearings:	Good	
Fasteners:	Good; Very minor corrosion, all have single nuts with lock washers on some	
Lubrication:	Appears recent with some isolated areas of dry buildup even at the fittings	
Comments:	Very minor corrosion at foot, heater appears to be working	

SOUTHEAST END JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good, keys not visible
Alignment:	Good
Lubrication:	Grease/debris from reducer input shaft bearing No sign of recent lube, grease ports painted over
Comments:	Isolated minor paint failure

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 26 of 37

SOUTHEAST END JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Good paint, isolated areas of very minor paint failure and corrosion especially at the mounting feet		
Bearings:	Good		
Fasteners:	Very minor corrosion		
Lubrication:	Leak at output shaft, minor leak at input shaft; Oil Barely at dipstick; lower fittings in use top fittings dry		
Operation:	Smooth		
Comments:	Corrosion at upper mounting shim		

SOUTHEAST END JACK MACHINERY: REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good; lube at top coming from reducer
Cap & Housing Bolts:	Good
Cover Condition:	Minor/moderate paint failure
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	Buildup on top half
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHEAST END JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Good paint		
Bearings:	Some grease (dry), fitting is dry		
Fasteners:	1 unpainted		
Lubrication:	Minor buildup of oil and debris at the drain		
Operation:	Smooth		
Comments:	Desiccant is good		

SOUTHEAST END JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Lube leak (remote fittings); Corrosion at upper mounting shims and botls
Protective Boot:	Good
Base:	Bolts in good condition; Minor corrosion on plate; Grease/debris
Limit Switches:	Corrosion
Operation:	Smooth
Comments:	0.003” feeler fits under on East/West sides LL shoes are corroded and have some fresh lube 1 3/16” droop observed at this location when all jacks are retracted

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOTHEAST END JACK MACHINERY: COUPLING C1

Identification per Figures:	**C1**
Nameplate Data:	NM
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHWEST END JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland Motor with Stearns Brake	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Manual release functional	
Housing:	Minor corrosion on rear manual shaft. Hand cranks stored at maintenance garage.	
Bearings:	OK	
Fasteners:	Minor to moderate corrosion at upper 2 bolts	
Lubrication:	Adequate	
Comments:	Manual shaft key taped in place.	

NORTHWEST END JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Gasket starting to come out, no leaks observed
Cap & Housing Bolts:	Minor corrosion
Cover Condition:	Good
Hubs and Keys:	Good; Isolated areas with no paint and minor corrosion, Keys IA
Alignment:	NM
Lubrication:	No sign of recent lubrication (since painting) 2 plugs present with no lubrication fittings. One plug was removed and observed good amount of dark grease but grid was visible.
Comments:	

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 30 of 37

NORTHWEST END JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Minor corrosion		
Bearings:	Adequate lube at grease fitting		
Fasteners:	Moderate to significant corrosion of fasteners		
Lubrication:	Oil level low on dipstick, oil sample taken		
Operation:	Smooth		
Comments:	Very slight oil leak at output shaft		

NORTHWEST END JACK MACHINERY: REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Significant to severe corrosion
Cover Condition:	Moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication, pulled 1 of 4 plugs and looks full
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 31 of 37

NORTHWEST END JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data (not found this inspection cycle)	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Minor corrosion		
Bearings:	Dry grease fitting		
Fasteners:	Minor corrosion		
Lubrication:	Okay, oil sample taken		
Operation:	Smooth		
Comments:	NA		

NORTHWEST END JACK MACHINERY: SCREW JACK

Identification per Figures:	
Nameplate:	Duff Norton LM-20150-41B MUBAZ4BR005ZA
Actuator:	Minor/moderate corrosion on upper mounting bolts; Excess grease on shaft; Good paint
Protective Boot:	Good; Covered in grease
Base:	Significant corrosion at mounting bolts; Grease buildup
Limit Switches:	Good
Operation:	Smooth
Comments:	Slight gap less than 0.010” on the north half and Southwest quadrant LL shoes are corroded and have some fresh lube 1” of droop trial #1, 5/16” of droop trial #2. Measured one end at a time.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHWEST END JACK MACHINERY: COUPLING C1

Identification per Figures:	**C1**
Nameplate Data:	NM
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHWEST END JACK MACHINERY: MOTOR

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland Motor with Stearns Brake	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Manual release functional	
Housing:	Minor corrosion, good paint condition	
Bearings:	Dry fittings	
Fasteners:	Good condition, single nuts with very minor paint failure	
Lubrication:	No sign of fresh lube	
Comments:	Heater appears to be working	

SOUTHWEST END JACK MACHINERY: MOTOR COUPLING

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good hubs, keys not visible
Alignment:	Good
Lubrication:	Grease/debris from reducer input shaft bearing, no fresh lube
Comments:	Grease ports are painted over

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MECHANICAL FIELD NOTES	BRIDGE: Westport, CT	JOB NO.: 3970
PREPARED BY: MODJESKI AND MASTERS, INC.	BRIDGE NUMBER: 01349	DATE: Sept 2020
FOR: **MICHAEL BAKER**	CREW: LRL, SMC	SHEET: 34 of 37

SOUTHWEST END JACK MACHINERY: UPPER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Good; Lube leak, minor corrosion		
Bearings:	No grease on upper; Excess grease leaking from seal		
Fasteners:	Good condition; Minor corrosion		
Lubrication:	Over “full” line on dipstick, dipstick area exhibits minor corrosion, bearing lube fittings dry		
Operation:	Smooth		
Comments:	NA		

SOUTHWEST END JACK MACHINERY: REDUCER COUPLING

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good, some debris buildup
Cover Condition:	Grease from reducer on top half
Hubs and Keys:	Hubs good, keys not visible
Alignment:	Good
Lubrication:	No sign of lube at ports and painted over
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHWEST END JACK MACHINERY: LOWER REDUCER

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: NM	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Good condition with minor paint failure in lower front region		
Bearings:	Lube fittings dry		
Fasteners:	Good condition, minor paint failure and single nuts with some lockwashers		
Lubrication:	Oil not tested		
Operation:	Smooth		
Comments:	Desiccant is expired		

SOUTHWEST END JACK MACHINERY: SCREW JACK

Identification per Figures:	
Actuator:	Excessive grease buildup at upper bolts and shims and the fittings are dry
Protective Boot:	Good condition; Covered in grease
Base:	Good condition; Covered in grease/debris; Some minor corrosion; the bolts only have single nuts and exhibit minor paint failure
Limit Switches:	Good, minor corrosion and dry with respect to lubrication
Operation:	Smooth
Comments:	Upper bolts: minor/moderate corrosion No gap on base LL shoes are corroded and have some fresh lube 7/8” of droop measured when all jacks were retracted

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHWEST END JACK MACHINERY: COUPLING C1

Identification per Figures:	**C1**
Nameplate Data:	NM
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MANUAL CENTERING DEVICE:

Identification per Figures:	
Comments:	Isolated corrosion on base with heavy debris buildup Rod and guides have moderate paint failure, corrosion, and debris buildup Rod in contact with the receiver on the south side Rod appears to be bent Two limit switches found in this area. Maintenance personnel had minor issues with the retract and set positions being recognized by the control system The limit switch mounting plate has moderate surface corrosion, fasteners have severe corrosion with debris buildup.

END RIGID STOP ASSEMBLY (fully closed):

Identification per Figures:	
Comments:	Minor/moderate corrosion on the strike plates, base and mounting bolts, limit switch and span mounted assembly Does not contact when fully closed Deformed from impact, bent plate touching the limit switch

TRAFFIC BARRIER GATES:

Comments:	Both the east and west Traffic gates are fully manual. No lights were working at the time of the inspection. The west barrier does not seat fully into the anchorage at the toe and the heel locking clasp for fully lowered cannot be engaged. Maintenance personnel reported that bridge operation is not attempted without police detail blocking the oncoming lanes. The east barrier gate limit switch is frozen in the tripped condition. The cable anchor bolts are twisted and misaligned with the receiver at the heel.

APPENDIX VI
TIME AT BRIDGE SITE

TIME AT BRIDGE SITE

BRIDGE NUMBER: 01349

INSPECTION DATE: 9/16/20 to 9/17/20

Mechanical Personnel:

Personnel	Wednesday (9/16/20)	Thursday (9/17/20)
Lee Lentz	7:30 AM to 6:00 PM	7:30 AM to 10:30 AM
Shannon Seitz	7:30 AM to 6:00 PM	7:30 AM to 10:30 AM

ROUTINE ELECTRICAL INSPECTION

BRIDGE SAFETY INSPECTION
BRIDGE NO. 01349

Feature Carried: Route 136
Feature Crossed: Saugatuck River
Westport, Connecticut



State Project No. 170-3414

September 16, 2020

Prepared by:

Prepared for:
Connecticut Department of Transportation

Michael Baker International
500 Enterprise Drive | Suite 2B | Rocky Hill, CT 06067 | P: 860 563 3044

Bridge No. 01349, Route 136 over Saugatuck River, Westport, CT

Inspected By: Modjeski and Masters, Inc. Date: 09/16/2020



Modjeski and Masters, Inc.
100 Sterling Parkway, Suite 302
Mechanicsburg, PA 17050

Professional Certification: I hereby certify that this report, including all of its contents, has been approved by me, and that I am a duly licensed professional engineer under the laws of the State of Connecticut.

Signature:

License No.: PEN. 0030622 *Date:* October 22, 2020

EXECUTIVE SUMMARY

ELECTRICAL INSPECTION REPORT

ConnDOT BR. NO. 01349

A routine Electrical inspection of the Westport swing bridge over the Saugatuck River was performed on September 16, 2020 by Mr. K.M. Gable, P.E. of Modjeski and Masters, Inc.

The AASHTO Movable Bridge Inspection, Evaluation and Maintenance Manual, 2017 Edition, and the ConnDOT Bridge Inspection Manual were utilized as the guidelines for the inspection. The "routine inspection" guidelines were utilized as the basis for equipment evaluation and testing. Equipment listed herein was examined and photographed, and observed deficiencies were documented. Additionally, items classified as deficient in the previous inspection report were inspected for compliance with the recommendations for repair and/or replacement listed therein.

This report is written from the perspective of the dates of the inspection described herein; the use of present tense herein in no way implies that the descriptions presented are accurate as of any subsequent date.

The general condition of the electrical system is adequate (Overall Rating = ‘5’). When all recommendation items have been addressed and assuming the current level of maintenance is continued, long term reliable operation is anticipated. The following priority repair items should be addressed within the next six months for reliable operation:

1. The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02.
2. The seated/open white indicator light is always ON when the bridge is seated, during operation, and when the bridge is fully open.
3. The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
4. The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
5. The southwest and southeast span navigation lights were not operational.
6. The east approach traffic signals and gong were not operational.
7. Barrier gates are not interlocked with control system.
8. Centering device is not interlocked with jack control.
9. The “bypass center jacks” and “bypass end jacks” keyed bypass switches must be ON to operate and the jacks are not interlocked with span movement.

Several deficiency items have been addressed since the previous inspection. These item are listed below along with the action taken.

1. Minor corrosion on the span rotary cam limit switch. The rotary cam limit switch has been replaced.
2. Moderate corrosion and a damaged gasket on the SW jack rotary cam limit switch. The rotary cam limit switch has been replaced.
3. Moderate corrosion and the cover could not be opened on the NW jack rotary cam limit switch. The rotary cam limit switch has been replaced.
4. Moderate corrosion on the SE and NE jack rotary cam limit switch. The rotary cam limit switches have been replaced.
5. Moderate corrosion and a damaged gasket on the north center jack rotary cam limit switch. The rotary cam limit switch has been replaced.
6. Moderate corrosion, damaged gasket, and the bottom cover bolt is damaged on the south center jack rotary cam limit switch. The rotary cam limit switch has been replaced.

TABLE OF CONTENTS
ConnDOT Bridge No. 01349

EXECUTIVE SUMMARY ii
GENERAL DESCRIPTION 1
OBSERVATIONS AND FINDINGS 3
- ELECTRICAL SERVICE 3
- BRIDGE CONTROLS & CONTROL PANELS 4
- MOVABLE SPAN DRIVE MOTOR & BRAKE 5
- LIMIT SWITCHES AND FEEDBACK DEVICES 6
- JACKS 7
- SPAN LOCK 8
- CONDUIT, RACEWAYS, AND JUNCTION BOXES 8
- NAVIGATION LIGHTS AND HORN 9
- TRAFFIC SIGNALS 9
- TRAFFIC GATES 9
- BARRIER GATES 10
- GENERAL LIGHTING AND RECEPTACLES 10
- INTERLOCK TESTING 10

CONCLUSION 11
RECOMMENDATIONS 12

APPENDICES:

APPENDIX A ELECTRICAL MEASUREMENTS
APPENDIX B ELECTRICAL PHOTOGRAPHS
APPENDIX C FIELD NOTES
APPENDIX D NUMERICAL CONDITION REPORT
APPENDIX E CRITICAL FINDING PRIORITY MEMOS

GENERAL DESCRIPTION

ConnDOT Bridge No. 01349 carries one lane of traffic of Route 136 in each direction over the Saugatuck River in Westport, Connecticut. The overall length of the bridge is 287 feet consisting of two fixed spans and a swing span measuring approximately 141 feet. The bridge is oriented in a west to east direction. There is no operator's house at the bridge; instead, the bridge is controlled from the cabinets located along the sidewalk on the north side of the bridge at the center of the movable span. The bridge opens approximately 83.5 degrees to allow passage of marine traffic in the one navigable channel located to the east of the center pier.

The electrical systems consist of a 208/120 volt, three phase, 60 Hz service on the east shore, a 240/120 volt single phase, 60Hz service on the west shore, one 3 HP span drive motor with integral motor brake, limit switches, center and end jacks, fender and span navigation lighting, traffic signal and gong on the east approach, wiring, conduit, cables and raceways, disconnect switches, and control cabinets located along the sidewalk at the center of the movable span. The control cabinets contain the operator station, relay control system, circuit breakers, and motor starters for the end wedges and span drive motor.

There are no traffic gates present at the bridge. There are barrier gates on both approaches that are manually operated. The barrier gate position is not interlocked with the operation of the bridge. A center pin is equipped with a limit switch that is interlocked with the controls for the movement of the span.

Modjeski and Masters performed a static field and operational inspection of the electrical systems on the Westport Bridge over the Saugatuck River (ConnDOT Bridge No. 01349) in Westport, Connecticut on September 16, 2020. The electrical field inspector was Mr. K.M. Gable, P.E. The inspection was conducted as part of ConnDOT's biennial inspection program. The scope of the assignment consisted of visual inspection and quantitative measurements. This included functional operation of the bridge electrical systems, insulation resistance measurements, and current measurements with sufficient depth to highlight problem areas that could affect the continued safe and reliable operation of the bridge.

The following codes and standards were considered for this inspection and report:

American Association of State Highway and Transportation Officials (AASHTO)
NFPA 70, National Electric Code (NEC)
NFPA 101, Life Safety Code (LSC)
National Electrical Manufacturers Association (NEMA)
Manual on Uniform Traffic Control Devices (MUTCD)
Code of Federal Regulation, Title 33 (CFR)
American Railway Engineering and Maintenance-of-Way Association (AREMA)

This report provides visual inspection findings, testing findings, evaluation, conclusions, and recommendations. Appendices are provided for photographs, field notes, and the Numerical Condition Inspection Report.

This report is written from the perspective of the dates of the inspection described herein; the use of present tense in no way implies that the descriptions presented are accurate as of any subsequent date. There is no warranty that all defects were discovered during the inspection or that defects will not later appear.

OBSERVATIONS AND FINDINGS

ELECTRICAL SERVICE

The bridge has two electrical services, one on each shore.

The west shore electrical service is 208/120 VAC, 3-phase, 60 HZ, 4-wire, supplied by three pole mounted transformers located on the west side of Riverside Ave. The service point is located in a weatherproof freestanding cabinet on top of a concrete pad. The service supplies power to the main span via an aerial cable, and the west approach barrier gate lights. Control logic for the west approach traffic signal, that has been removed, remain in the service cabinet.

There is a second service located in the same general area as the west shore bridge service that supplies power to the holiday lights on the bridge and the trees along the north side of the west approach. This service does not interface with the bridge and is excluded from this inspection.

The east shore electrical service is 240/120 VAC, single phase, 60 HZ, 3-wire, supplied from a pole mounted transformer on the NW corner of the Bridge St (Route 136) and Imperial Ave intersection. The service point is located in a weatherproof freestanding cabinet on top of a concrete pad. The service supplies power to the east fender navigation lights, east approach traffic signal and barrier gate lights. Control logic for the east approach traffic signal and cabinet containing the signal preemption controls for the Westport fire department are also located within the cabinet.

Voltage measurements were made of each phase to phase and phase to ground of both services. Measurements were made with the bridge open to vehicular traffic with the control and drive systems off. The measurements are within utility allowable tolerances for the services provided.

Utility Service	Nominal Voltage (Volts)	Phase A to B / Phase A to Gnd. (Volts)	Phase B to C / Phase B to Gnd. (Volts)	Phase C to A / Phase C to Gnd. (Volts)
East	120/240	244.9 / 122.3	NA / 122.3	NA / NA
West	208/120	208.4 / 120.8	208.1 / 120.2	208.9 / 120.0

Table E1: Utility Voltage Measurements

Deficiencies regarding the utility service were recorded as follows:

- There is minor corrosion on the east meter cabinet (see Photograph E1) and the west meter cabinet (see Photograph E2) (as noted in previous inspection reports).
- There is minor corrosion on the interior terminals and conduits in the east (see Photographs E3 & E4) and west (see Photograph E5) service cabinets (as noted in previous inspection reports).

- The electric space heaters in the east (see Photograph E3) and west (see Photograph E5) service cabinets are not functioning (as noted in previous inspection reports).
- The GFCI test and reset buttons are not functioning in the east (see Photograph E4) and west (see Photograph E5) service cabinets.
- The west service cabinet door gasket is damaged (see Photograph E6) (as noted in previous inspection reports).

BRIDGE CONTROLS & CONTROL PANELS

The bridge control relays, motor starters, circuit breakers, and control panel are housed in three cabinets along the sidewalk at the center of the movable span.

The left cabinet contains circuit breakers and motor starters for the southeast end jack and the south, and north center jacks. Wiring within the cabinet is in a neat and workmanlike fashion.

The center cabinet contains an interior control panel consisting of selector switches for jack group control, center jack control, and end jack control; key switches for center jack bypass, end jack bypass, screw jack bypass, and span motor brake auto/manual; pushbuttons for open span, close span, horns and stop; and indicators for the status of the bridge systems. Located behind the interior control panel are circuit breakers, fuses, control relays, and the soft starter for the main span motor. Wiring within the cabinet is in a neat and workmanlike fashion.

The right cabinet contains circuit breakers and motor starters for the northwest, southwest, and northeast end jacks. Wiring within the cabinet is in a neat and workmanlike fashion.

Deficiencies regarding the bridge controls and control panels were recorded as follows:

- There are miscellaneous items stored in the bottom of the left cabinet (see Photograph E7) and the center cabinet (see Photograph E8) (as noted in previous inspection reports).
- There are splices made with wire nuts in violation of AASHTO Article 8.9.2 within the left cabinet (see Photograph E7) and on the backside of the interior panel in the center cabinet (see Photograph E9) (as noted in previous inspection reports).
- The bottom of the center cabinet is corroded (see Photograph E8) (as noted in previous inspection reports) and there is minor corrosion on various terminals within the cabinet (see Photograph E10).
- The southwest end jack legend plate is missing (see Photograph E11) (as noted in previous inspection report).
- The center jack control switch is damaged and not usable (see Photograph E12).

- The seated/open white indicator light is always ON when the bridge is seated, during operation, and when the bridge is fully open.
- The screw jack retracted light does not come on when all jacks are retracted.

MOVABLE SPAN DRIVE MOTOR & BRAKE

One span drive motor is responsible for the span movement. The motor is provided with an integral motor brake. The primary shaft of the motor is connected to a gearbox which has an auxiliary shaft for manual operation. The secondary shaft of the motor is connected to a rotary cam limit switch for span position.

A limit switch is installed on the brake to prevent operation of the main motor when the brake is manually released.

The span motor is provided with a 120V 50 watt heater and the brake has a 120V 25 watt heater.

The disconnect for the span motor also disconnects the power to the brake. A separate disconnect is provided for the motor heaters and brake limit switch.

Nameplate data for the main motor & brake was recorded as follows:

Main Motor	
Manufacturer:	Reuland
Serial No.:	13-1103A-1
Horsepower:	3 HP
Phase:	3
Frequency:	60 Hz
Voltage:	208 V
Full Load Amps:	12.4 A
Speed:	900 RPM
Frame:	215
Encl:	TENV

Brake	
Manufacturer:	Stearns
Serial No.:	41041M001
Model No.:	108704200324B
Torque:	35 lb-ft
Frequency:	60
Voltage:	200
Inrush Amps:	10.3
Holding Amps:	0.7
Mounting:	Horiz/V.Below

Phase ‘B’ motor currents were measured while the span was moving. The main motor currents were measured from the load side of the reversing starter. The current readings show that the motors are operating within the nameplate ratings. See Appendix A for graphs showing main motor currents.

During closing, the span stops at near closed, and then the operator jogs the motor until the fully closed position is reached by pressing the ‘jog’ pushbutton. This jogging is indicated on the graph in Appendix A and is above motor nameplate current due to the inrush of repeated starts and stops of the motor in a short period of time.

The insulation resistance level of phase B of the span drive motor was measured with respect to ground. These readings were taken from the load side of the motor disconnect switch. The insulation resistance values are acceptable. The readings were taken after 60 seconds with the meter voltage set at 500V. See Table E1 for tabulated data regarding insulation resistances. The temperature (67°F) and relative humidity (63%) were recorded at the time of measurement. The differences in values between last inspection and this inspection are due to the different weather conditions on the days the tests were performed.

Motor	**Previous Inspection October 16, 2018**	**Current Inspection September 16, 2020**
	Motor Phase B to Ground	**Motor Phase B to Ground**
Span Drive Motor	4.70 GΩ	485 MΩ

Table E1: Main Drive Motor Insulation Resistance Measurements

Deficiencies regarding the main motors were recorded as follows:

- The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked (as noted in previous inspection reports).

LIMIT SWITCHES AND FEEDBACK DEVICES

Limit switches are provided for different electrical components for sending feedback signals to the bridge control system. Rotary cam limit switches are provided for span movement at the main motor and the end and center jacks. Lever arm limit switches are provided for the barrier gates lowered position, centering device installed, and fully open position. Proximity limit switches are provided for the raised and lowered position of the end and center jacks.

Deficiencies regarding the limit switches were recorded as follows:

- The NE jack rotary cam limit switch is missing the gasket along top of door (see Photograph E13).
- It was reported in the previous inspection report that the west barrier gate arm lever arm limit switch can seize in the actuated position and there is minor corrosion on the conduit fitting (see Photograph E14). During the current inspection, the limit switch did not seize, but could still occur.
- The east barrier gate arm lever arm limit switch is permanently seized in the actuated position (see Photograph E15) (as noted in previous inspection reports).

JACKS

The swing span is equipped with four end jacks, one at each corner, and two center jacks. The motors are provided with integral motor brakes. The primary shaft of the motor is connected to a gearbox which has an auxiliary shaft for manual operation. The secondary shaft of the motor is not in use.

The motors are provided with a 120V 50 watt heater and the brake has a 120V 25 watt heater.

The disconnect for the jack motor disconnects power to the motor and brake and has an auxiliary contact that disconnects power to the heaters.

Nameplate data for the end wedge motors was recorded as follows:

Main Motor		**Brake**	
Manufacturer:	Reuland	**Manufacturer:**	Stearns
Horsepower:	3.3 HP	**Model No.:**	108701200111B
Phase:	3	**Torque:**	10 lb-ft
Frequency:	60 Hz	**Frequency:**	60
Voltage:	208 V	**Voltage:**	200
Full Load Amps:	10.6 A	**Inrush Amps:**	4.3
Speed:	1800 RPM	**Holding Amps:**	0.3
Frame:	184	**Mounting:**	Horiz/V.Below
Encl:	TENV		

Phase ‘B’ jack motor currents were measured while the jacks were being retracted and driven. The jack motor currents were measured from the load side of the overload in the jack starter cabinet. The current readings show jack motors are operating below their respective nameplate ratings. See Appendix A for graphs regarding jack motor currents.

The insulation resistance level of phase B of each jack drive motor was measured with respect to ground. These readings were taken from the load side of the local motor disconnect. The recorded insulation resistance values are acceptable. The readings were taken after 60 seconds with the meter voltage set at 500V. See Table E3 for tabulated data regarding insulation resistances. The temperature (69-72°F) and relative humidity (58-67%) were recorded at the times of measurement. The differences in values between last inspection and this inspection are due to the different weather conditions on the days the tests were performed.

Motor	Previous Inspection October 16, 2018	Current Inspection September 16, 2020
	Motor Phase B to Ground	Motor Phase B to Ground
SW End Jack Motor	>10 GΩ	>10 GΩ
NW End Jack Motor	>10 GΩ	2.6 GΩ
SE End Jack Motor	>10 GΩ	>10 GΩ
NE End Jack Motor	852 MΩ	9.0 GΩ
North Center Jack Motor	>10 GΩ	>10 GΩ
South Center Jack Motor	>10 GΩ	>10 GΩ

Table E3: End Wedge Motor Insulation Resistance Measurements

Deficiencies regarding the end wedge motors were recorded as follows:

- The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked (as noted in previous inspection reports).
- The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for both center jack locations and the NE and SW end jacks (see Photographs E16-19) (as noted in previous inspection reports).
- Water was present in the bottom of the NE end jack motor disconnect during the previous inspection. No water was present during the current inspection (see Photograph E20).
- Missing nameplate and minor corrosion on cover and conduit fitting of the SE end jack motor disconnect (see Photograph E21) (as noted in previous inspection report).

SPAN LOCK

A manual span locking pin is provided at the center of the west end of the span.

No deficiencies regarding span lock were recorded.

CONDUIT, RACEWAYS, AND JUNCTION BOXES

The conduit throughout the bridge structure is primarily PVC coated Rigid Galvanized Steel and wiring is stranded copper. The condition of the conduit and wiring ranges from adequate to good.

Deficiencies regarding conduit, raceways, and junction boxes were recorded as follows:

- Minor to moderate corrosion on conduit clamps throughout bridge (see Photographs E22-23) (as noted in previous inspection reports).

- Moderate corrosion on flexible conduit fittings to north center jack rotary cam limit switch and disconnect switch (see Photograph E24).
- Severe corrosion on underground conduit at the east shore service cabinet (see Photograph E25) (as noted in previous inspection reports).
- The PVC coating is peeling and worn on the conduit near the air horn and aerial connection at the center of the span (see Photograph E26).

NAVIGATION LIGHTS AND HORN

3 navigation lights are installed on the east fender and controlled by a photo control at the base of the east barrier gate. The center pier fender system has a navigation light at each end and one at the center of the east channel. The center fender navigation lights are always on.

The span is equipped with 3 alternating green and red navigation lights – two on the south ends of the span and one on the north east end under the sidewalk.

The navigation horn is mounted on the center north truss above the control cabinets.

Deficiencies regarding navigation lights and horn were recorded as follows:

- The southwest and southeast span navigation lights were not operational (see Photographs E27 and E28). A critical finding priority memo has been created for this deficiency.

TRAFFIC SIGNALS

Only the east approach has traffic signals and they are manually activated by a switch on the traffic signal pole. The west approach traffic signals have been removed. Normal operating procedure is to have traffic stopped by local police on both approaches for all bridge operations.

Deficiencies regarding traffic signals were recorded as follows:

- The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02 (as noted in previous inspection report).
- The east approach traffic signals and gong were not operational (as noted in previous inspection report).

TRAFFIC GATES

No traffic gates are installed on either approach. Manual pedestrian gates are provided close to the receiver end of the barrier gates to block the sidewalk on the north side of the bridge.

Deficiencies regarding the traffic gates were recorded as follows:

- Striping on the west pedestrian gates stops before the end of the gate (see Photograph E29) (as noted in previous inspection report).

BARRIER GATES

Manually operated (no motor) barrier gates are installed at both approaches. The barrier gates have three warning lights each. During the operational testing, none of the barrier gate lights were functional.

Deficiencies regarding the traffic gates were recorded as follows:

- The west barrier gate was not fully engaged in the receiver when lowered (see Photograph E30) (as noted in previous inspection reports).
- None of the barrier gate lights were operational (as noted in previous inspection report).

GENERAL LIGHTING AND RECEPTACLES

No maintenance lighting or receptacles are provided on the bridge.

Deficiencies regarding general lighting and receptacles were recorded as follows:

- No lighting or receptacles for maintenance are provided on the bridge (as noted in previous inspection reports).

INTERLOCK TESTING

Interlock testing is typically performed to determine whether all AASHTO required safety interlocks are incorporated into the bridge control system.

There is no control connection between approaches and the movable span resulting in the barrier gates not interlocked with the movement of the span. No test was needed to confirm the absence of this interlock.

Due to the center and end jack bypass use during operation and lack of operational updates since the previous inspection, the following interlock testing was not performed (the results listed are as documented in the previous inspection report):

1. With the span partially open (end clear of abutment) and the centering device vertical rod removed, attempt to drive an end jack.
   Result: FAIL – Jack was driven.

2. With the span partially open, centering device vertical rod removed, and one end jack fully driven, attempt to open and close the span.
   Result: FAIL – Span moved in both directions.

3. With the span partially open, all jacks retracted, and the centering device vertical rod installed, attempt to open and close the span.
   Result: PASS – Span did not move in either direction.

Deficiencies regarding interlock testing were recorded as follows:

- Barrier gates are not interlocked with control system (as noted in previous inspection report).
- Centering device is not interlocked with jack control (as noted in previous inspection report).
- The “bypass center jacks” and “bypass end jacks” keyed bypass switches must be ON to operate due to the issue with the jack interlock for span movement.

CONCLUSION

The bridge operated properly and without any incidents during the operational testing. The manual nature of the traffic control allows for safe operation even with the installed traffic control devices not operational, or not installed. The bridge is in adequate condition. Most deficiencies discovered will require a minor effort to correct and can be addressed by bridge maintenance personnel.

Modjeski and Masters coordinated with Michael Baker International and ConnDOT to organize bridge operations for Westport. Bridge operator from ConnDOT and a small maintenance crew were at the bridge site for operations. The bridge operator coordinated with police to stop traffic at both ends of the bridge. ConnDOT maintenance crew were able to provide the access required for this inspection by unlocking cabinets, gates, and platforms. They also provided all manpower and expertise necessary to operate the bridge including the manual traffic gates, the manual centering device, the screw jacks, and the main drive motor.

RECOMMENDATIONS

Based on this inspection, the following recommendations are made to ensure long-term safe and reliable operation of the bridge. These recommendations have been prioritized based on the ConnDOT Inspection Manual.

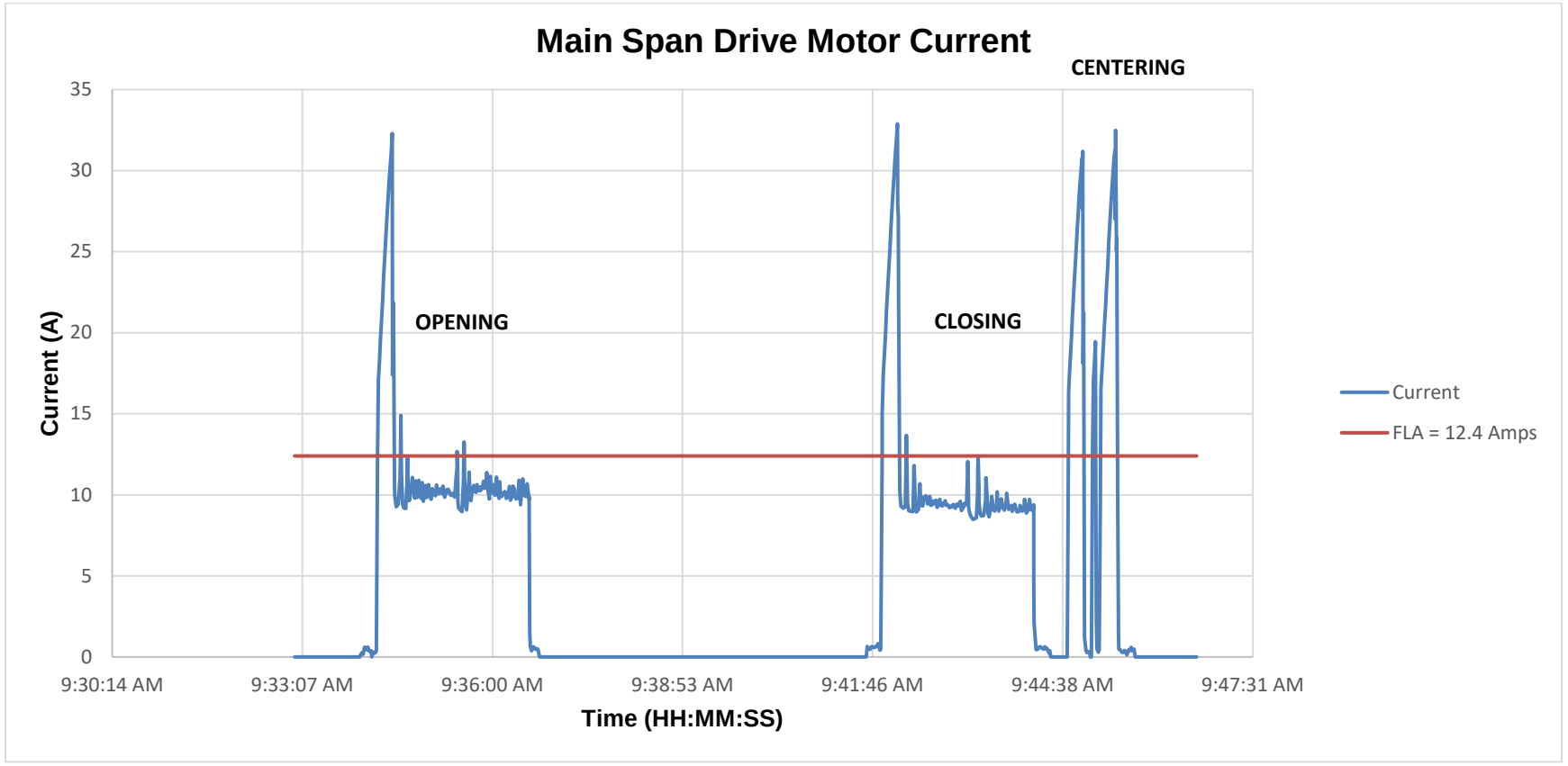
Item	Description	Priority
1	There is minor corrosion on the east meter cabinet and west meter cabinet. Remove the corrosion, coat with protective coating.	None
2	There is minor corrosion on the interior terminals and conduits in the east and west service cabinets. Remove the corrosion, coat with protective coating.	None
3	The electric space heaters in the east and west service cabinets are not functioning. Replace the space heaters.	None
4	The GFCI test and reset buttons are not functioning in the east and west service cabinets. Replace the GFCI receptacles.	None
5	The west service cabinet door gasket is damaged. Replace the door gasket.	None
6	There are miscellaneous items stored in the bottom of the left control cabinet and the center control cabinet. Remove miscellaneous items.	None
7	There are splices made with wire nuts in violation of AASHTO Article 8.9.2 within the left control cabinet and on the backside of the interior panel in the center control cabinet. Replace wire nut splices with crimp type splices.	None
8	The bottom of the center cabinet is corroded and there is minor corrosion on various terminals within the cabinet. Remove the corrosion, coat with protective coating.	None

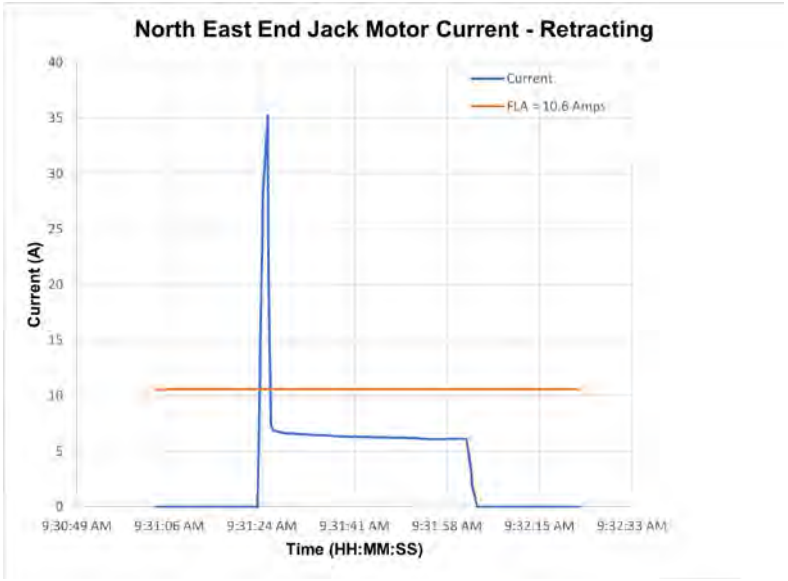
Item	Description	Priority
9	The southwest end jack legend plate is missing. Replace the legend plate.	None
10	The center jack control switch is damaged and not usable. Replace the control switch.	Routine Repair
11	The seated/open white indicator light is always ON when the bridge is seated, during operation, and when the bridge is fully open. Replace the fully open/seated limit switch and/or rewire the indicator light.	Priority Repair
12	The screw jack retracted indicator light does not come on when all jacks are retracted. Replace the indicator light.	None
13	The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked. Install limit switch and wire into control system.	Priority Repair
14	The NE jack rotary cam limit switch is missing the gasket along the top of the door. Install a new gasket where missing.	Routine
15	It was reported in the previous inspection report that the west barrier gate arm lever arm limit switch can seize in the actuated position and there is minor corrosion on the conduit fitting. During the current inspection, the limit switch did not seize, but could still occur. Replace limit switch.	Routine
16	The east barrier gate arm lever arm limit switch is permanently seized in the actuated position. Replace limit switch.	None

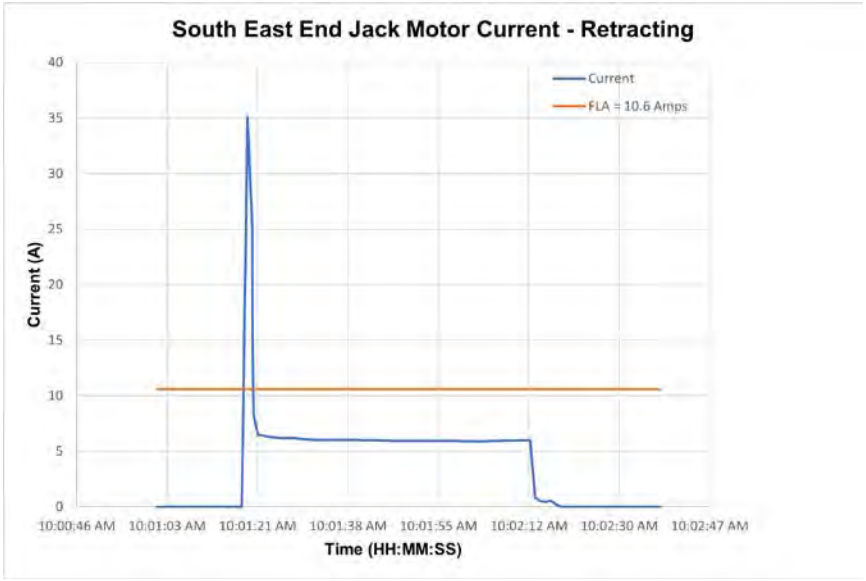
Item	Description	Priority
17	The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked. Install limit switch and wire into control system.	Priority Repair
18	The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for both center jack locations and the NE and SW end jacks. Swap conductors on both ends of the load side of the disconnect switches.	None
19	Water was present in the bottom of the NE end jack motor disconnect during the previous inspection. No water was present during the current inspection. Monitor inside of disconnect switch for signs of water and repair conduit system and or disconnect to prevent reoccurrence.	None
20	Missing nameplate and minor corrosion on cover and conduit fitting of the SE end jack motor disconnect. Replace nameplate, remove the corrosion, coat with protective coating.	None
21	Minor corrosion on conduit clamps throughout bridge. Remove the corrosion, coat with protective coating.	None
22	Moderate corrosion on flexible conduit fittings to north center jack rotary cam limit switch and disconnect switch. Remove the corrosion, coat with protective coating.	None
23	Severe corrosion on underground conduit at the east shore service cabinet. Replace corroded section of conduit.	Routine Repair
24	The coating is peeling and worn on the conduit near the air horn and aerial connection at the center of the span. Repair PVC coating following the conduit manufacturer's procedures.	None

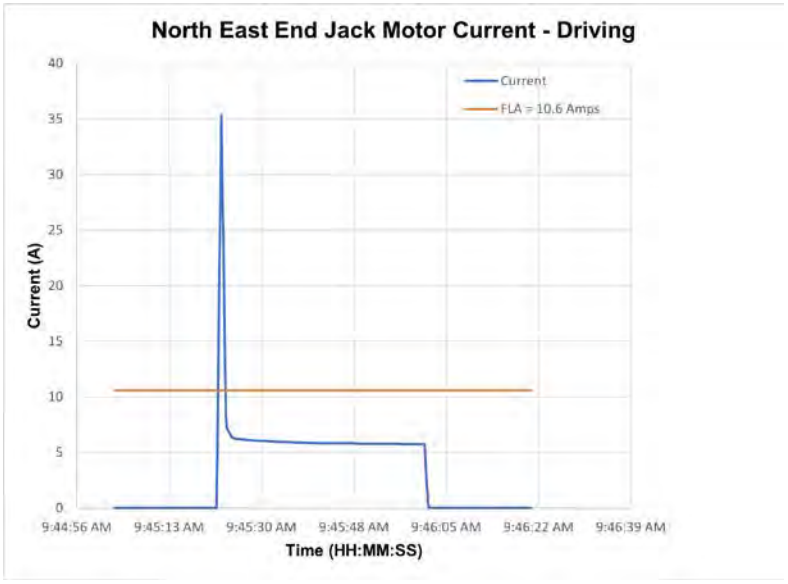
Item	Description	Priority
25	The southwest and southeast span navigation lights were not operational. Repair or replace span navigation lights.	Critical B
26	The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02. Install traffic signals.	Priority Repair
27	The east approach traffic signals and gong were not operational. Repair the east approach traffic signals and gong.	Priority Repair
28	Striping on the west pedestrian gates stops before the end of the gate. Replace striping on gate arm.	None
29	The west barrier gate was not fully engaged in the receiver when lowered. Repair barrier gate receiver.	Routine Repair
30	None of the barrier gate lights were operational. Repair barrier gate arm lights.	Routine Repair
31	No lighting or receptacles for maintenance are provided on the bridge. Install lighting and receptacles in maintenance and access areas.	Routine Repair
32	Barrier gates are not interlocked with control system. Interlock barrier gates with control system.	Priority Repair
33	Centering device is not interlocked with jack control. Interlock centering device with jack control.	Priority Repair
34	The “bypass center jacks” and “bypass end jacks” keyed bypass switches must be ON to operate due to the issue with the jack interlock for span movement. Interlock jack position with span movement.	Priority Repair

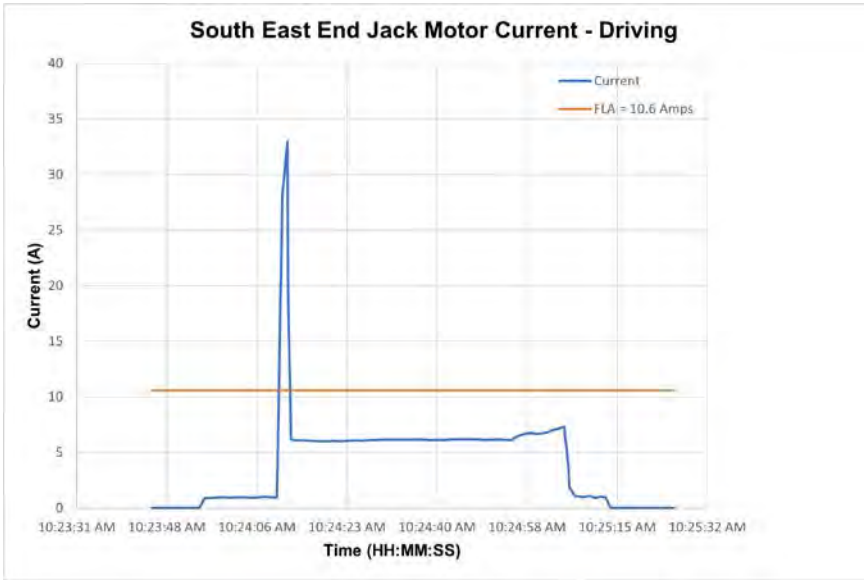
APPENDIX A: ELECTRICAL MEASUREMENTS

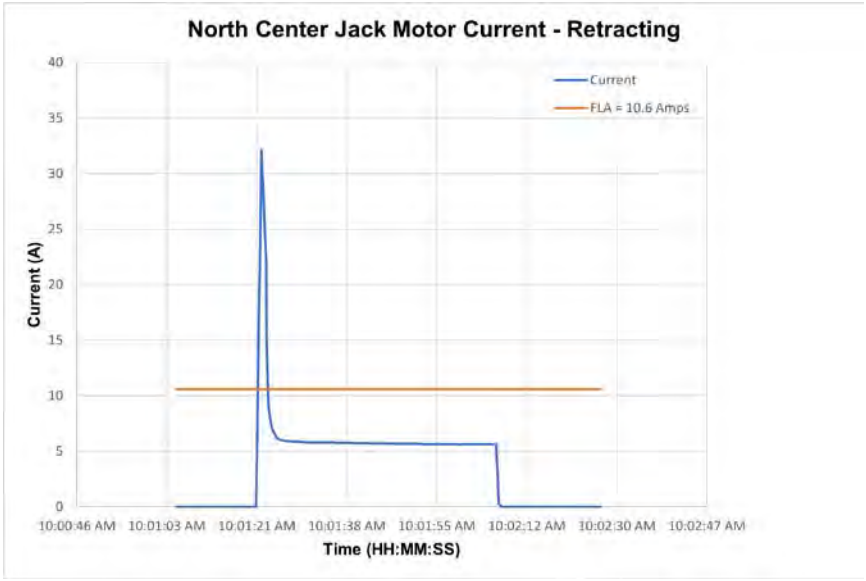

Main Span Drive Motor Current
CENTERING
OPENING
CLOSING
Current (A)
35
30
25
20
15
10
5
0
9:30:14 AM
9:33:07 AM
9:36:00 AM
9:38:53 AM
9:41:46 AM
9:44:38 AM
9:47:31 AM
Time (HH:MM:SS)
Current
FLA = 12.4 Amps

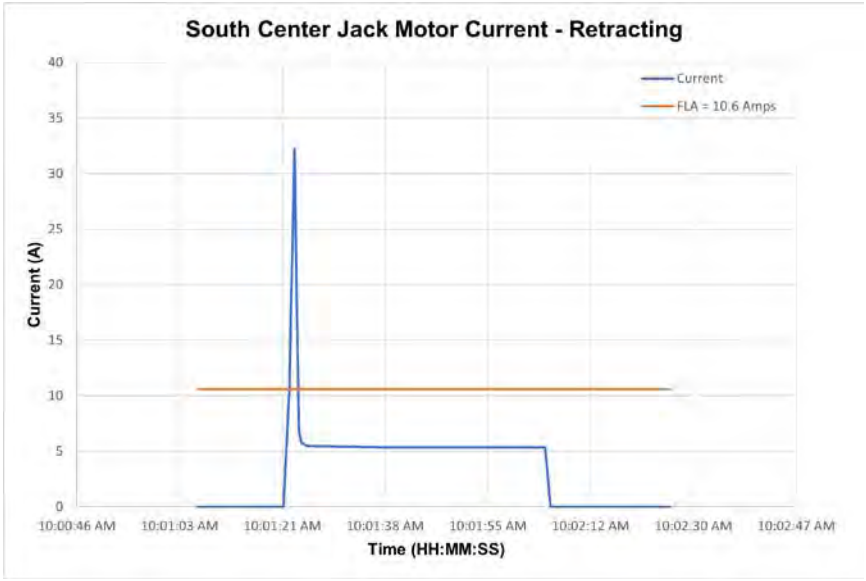

North East End Jack Motor Current - Retracting
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
9:30:49 AM
9:31:06 AM
9:31:24 AM
9:31:41 AM
9:31:58 AM
9:32:15 AM
9:32:33 AM
Time (HH:MM:SS)

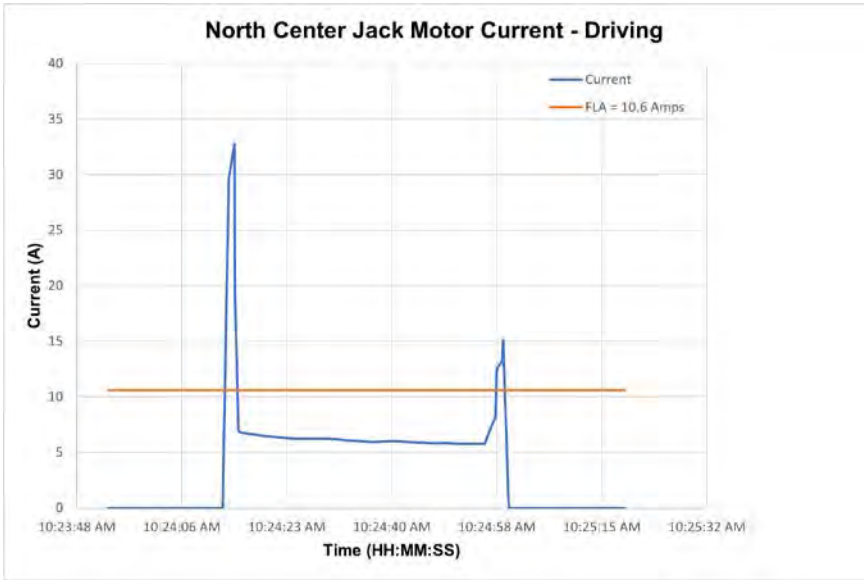

South East End Jack Motor Current - Retracting
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
10:00:46 AM
10:01:03 AM
10:01:21 AM
10:01:38 AM
10:01:55 AM
10:02:12 AM
10:02:30 AM
10:02:47 AM
Time (HH:MM:SS)

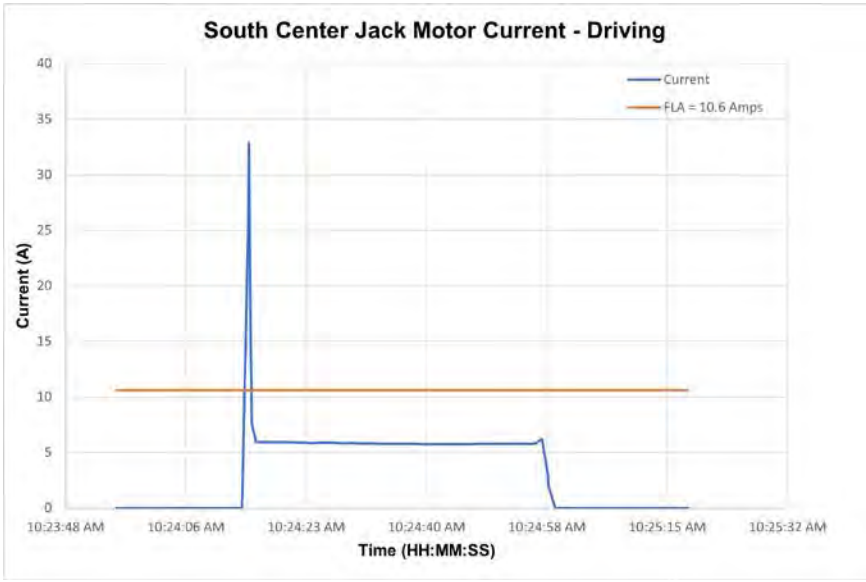

North East End Jack Motor Current - Driving
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
9:44:56 AM
9:45:13 AM
9:45:30 AM
9:45:48 AM
9:46:05 AM
9:46:22 AM
9:46:39 AM
Time (HH:MM:SS)

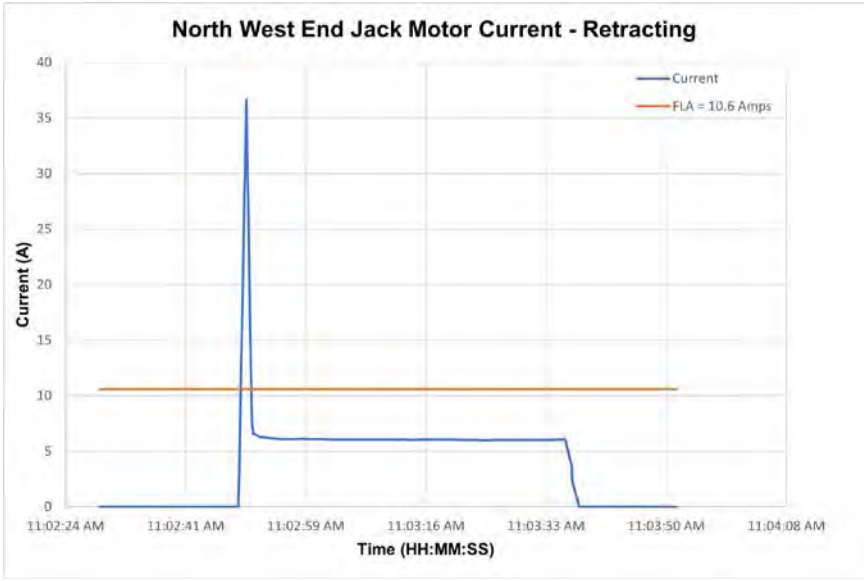

South East End Jack Motor Current - Driving
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
10:23:31 AM
10:23:48 AM
10:24:06 AM
10:24:23 AM
10:24:40 AM
10:24:58 AM
10:25:15 AM
10:25:32 AM
Time (HH:MM:SS)

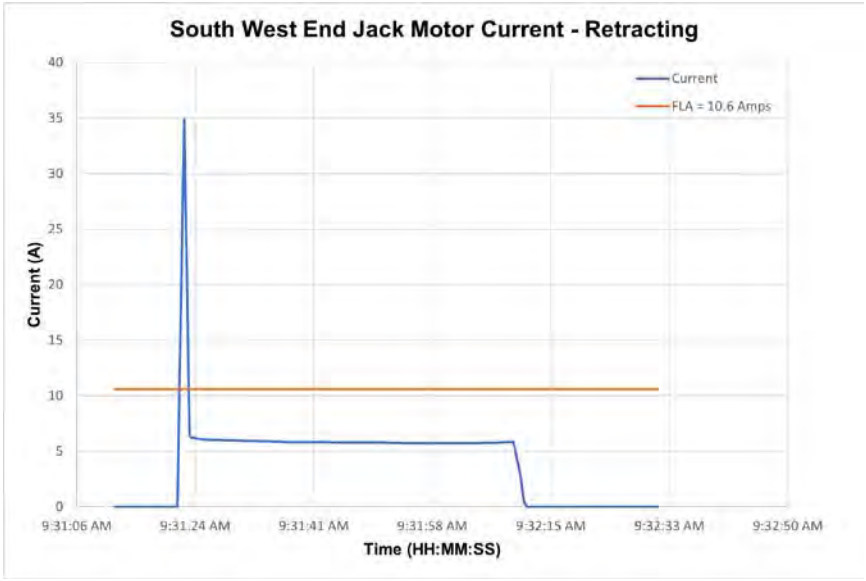

North Center Jack Motor Current - Retracting
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
10:00:46 AM
10:01:03 AM
10:01:21 AM
10:01:38 AM
10:01:55 AM
10:02:12 AM
10:02:30 AM
10:02:47 AM
Time (HH:MM:SS)

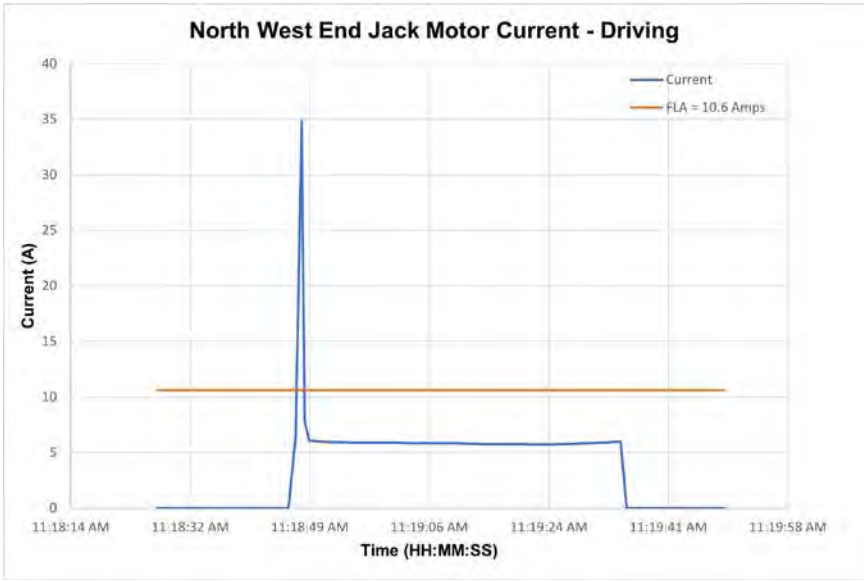

South Center Jack Motor Current - Retracting
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
10:00:46 AM
10:01:03 AM
10:01:21 AM
10:01:38 AM
10:01:55 AM
10:02:12 AM
10:02:30 AM
10:02:47 AM
Time (HH:MM:SS)

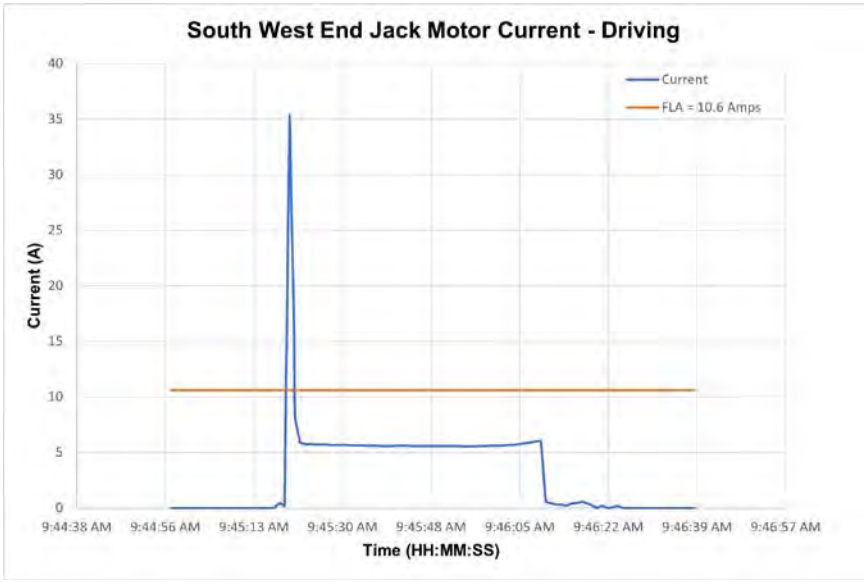

North Center Jack Motor Current - Driving
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
10:23:48 AM
10:24:06 AM
10:24:23 AM
10:24:40 AM
10:24:58 AM
10:25:15 AM
10:25:32 AM
Time (HH:MM:SS)


South Center Jack Motor Current - Driving
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
10:23:48 AM
10:24:06 AM
10:24:23 AM
10:24:40 AM
10:24:58 AM
10:25:15 AM
10:25:32 AM
Time (HH:MM:SS)


North West End Jack Motor Current - Retracting
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
11:02:24 AM
11:02:41 AM
11:02:59 AM
11:03:16 AM
11:03:33 AM
11:03:50 AM
11:04:08 AM
Time (HH:MM:SS)


South West End Jack Motor Current - Retracting
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
9:31:06 AM
9:31:24 AM
9:31:41 AM
9:31:58 AM
9:32:15 AM
9:32:33 AM
9:32:50 AM
Time (HH:MM:SS)


North West End Jack Motor Current - Driving
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
11:18:14 AM
11:18:32 AM
11:18:49 AM
11:19:06 AM
11:19:24 AM
11:19:41 AM
11:19:58 AM
Time (HH:MM:SS)


South West End Jack Motor Current - Driving
Current
FLA = 10.6 Amps
Current (A)
0
5
10
15
20
25
30
35
40
9:44:38 AM
9:44:56 AM
9:45:13 AM
9:45:30 AM
9:45:48 AM
9:46:05 AM
9:46:22 AM
9:46:39 AM
9:46:57 AM
Time (HH:MM:SS)

APPENDIX B: ELECTRICAL PHOTOGRAPHS

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		



Photo No. E1:
East Service Meter
Minor corrosion



Photo No. E2:
West Service Meter
Minor corrosion

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		

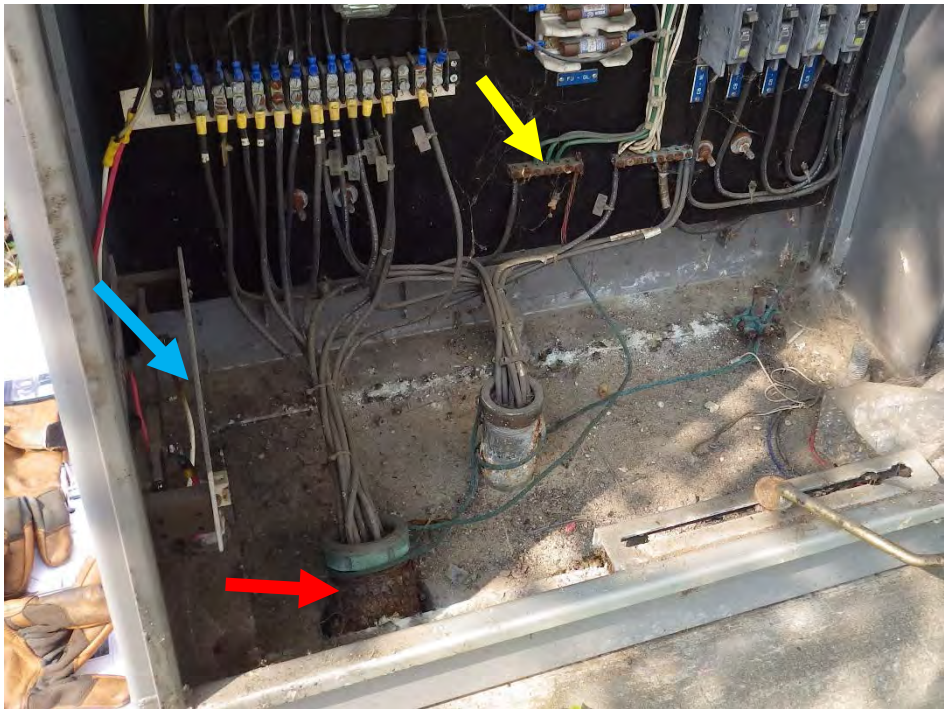


Photo No. E3:
East Service Meter Interior
Minor corrosion on conduits (red arrow) and terminals (yellow arrow)
Nonfunctioning enclosure heater (blue arrow)

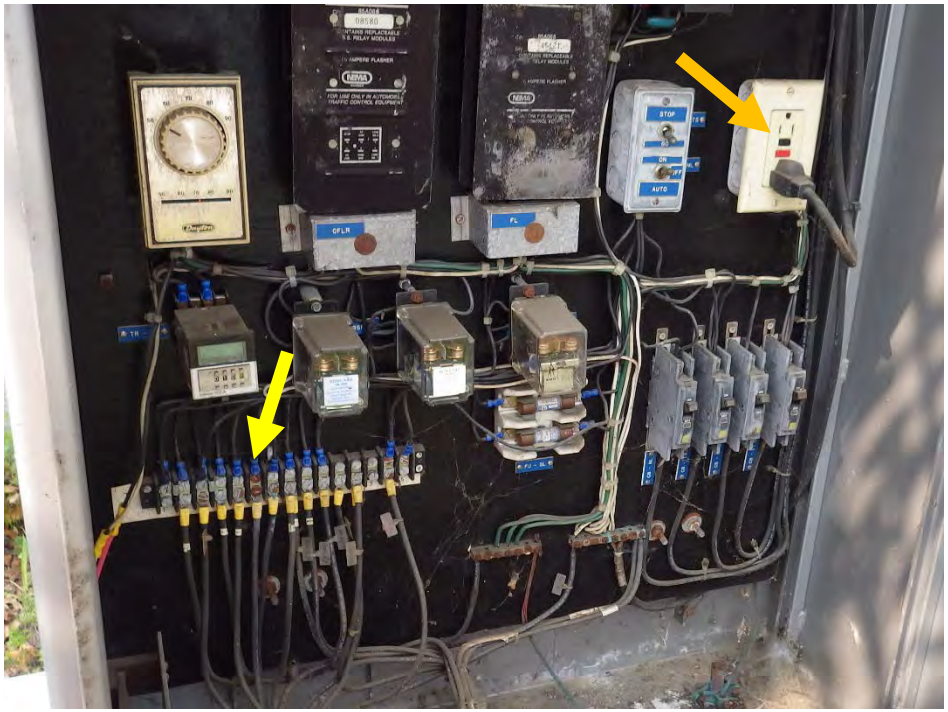


Photo No. E4:
East Service Meter Interior
Minor corrosion on terminals (yellow arrow)
Nonfunctioning test/reset buttons on GFCI (orange arrow)

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		

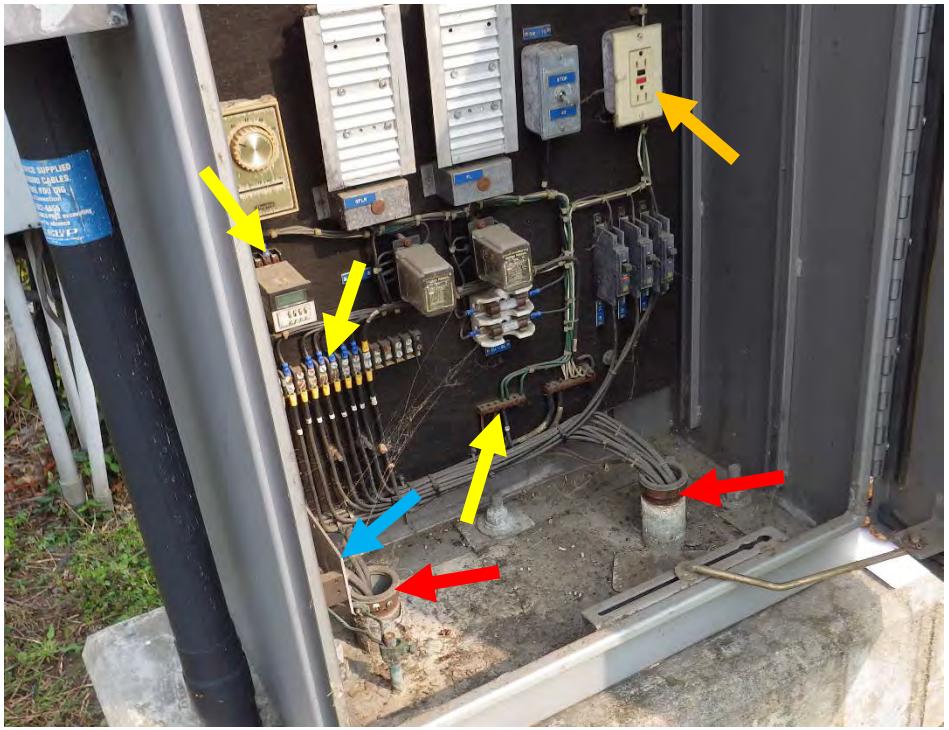


Photo No. E5:
West Service Meter Interior
Minor corrosion on conduits (red arrow) and terminals (yellow arrow)
Nonfunctioning enclosure heater (blue arrow)
Nonfunctioning test/reset buttons on GFCI (orange arrow)



Photo No. E6:
West Service Meter Interior
Damaged door gasket

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		

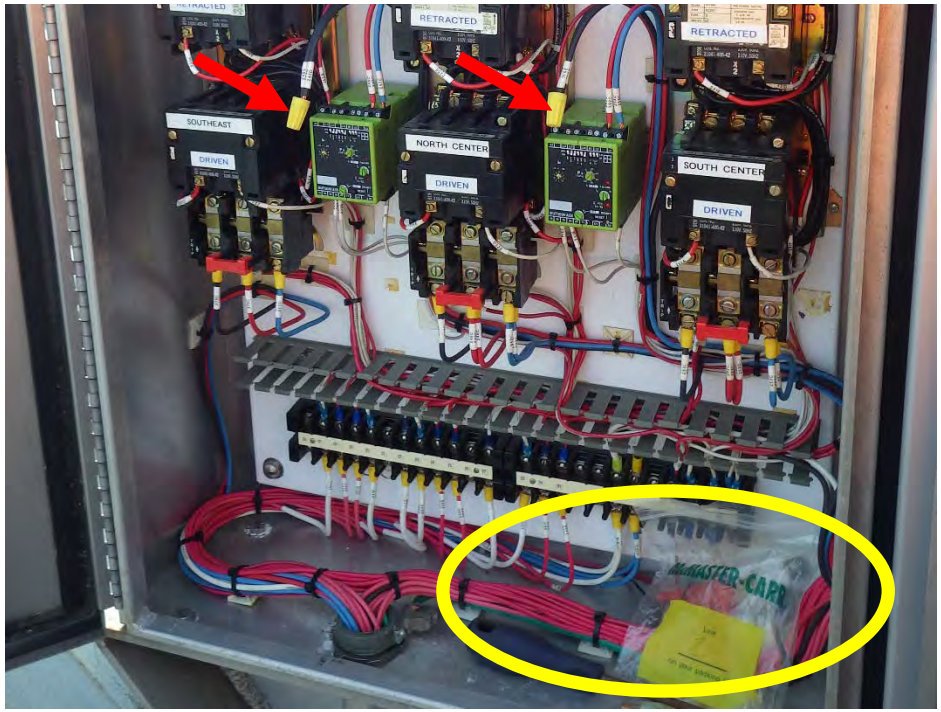


Photo No. E7:
Left Control Cabinet
Miscellaneous items stored in bottom (yellow circle)
Wire nut splices (red arrow)

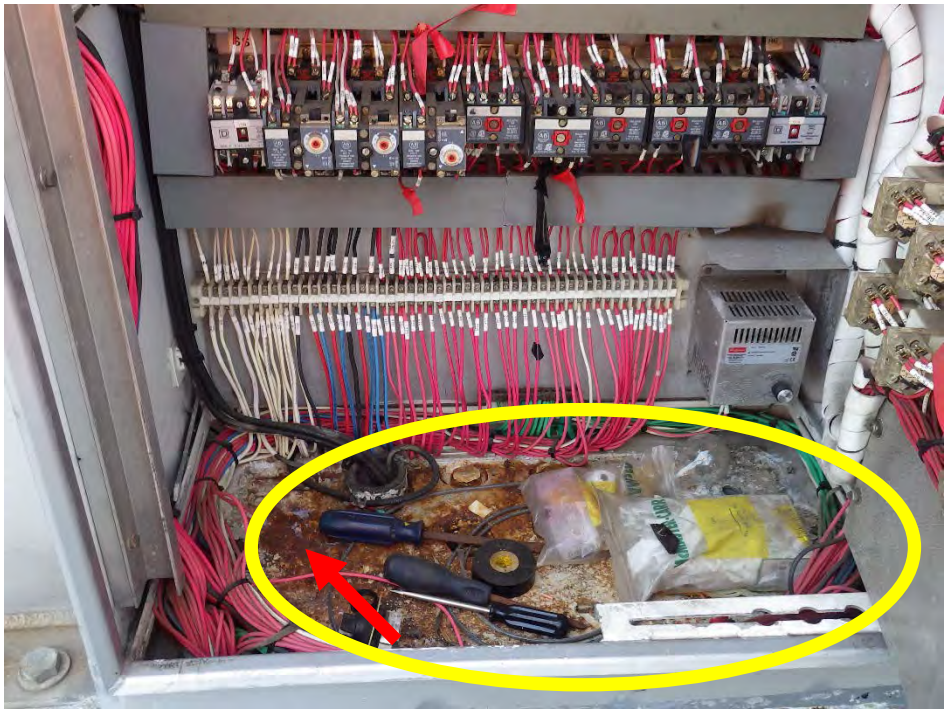


Photo No. E8:
Center Control Cabinet
Miscellaneous items stored in bottom (yellow circle)
Corrosion on the bottom of the enclosure (red arrow)

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		

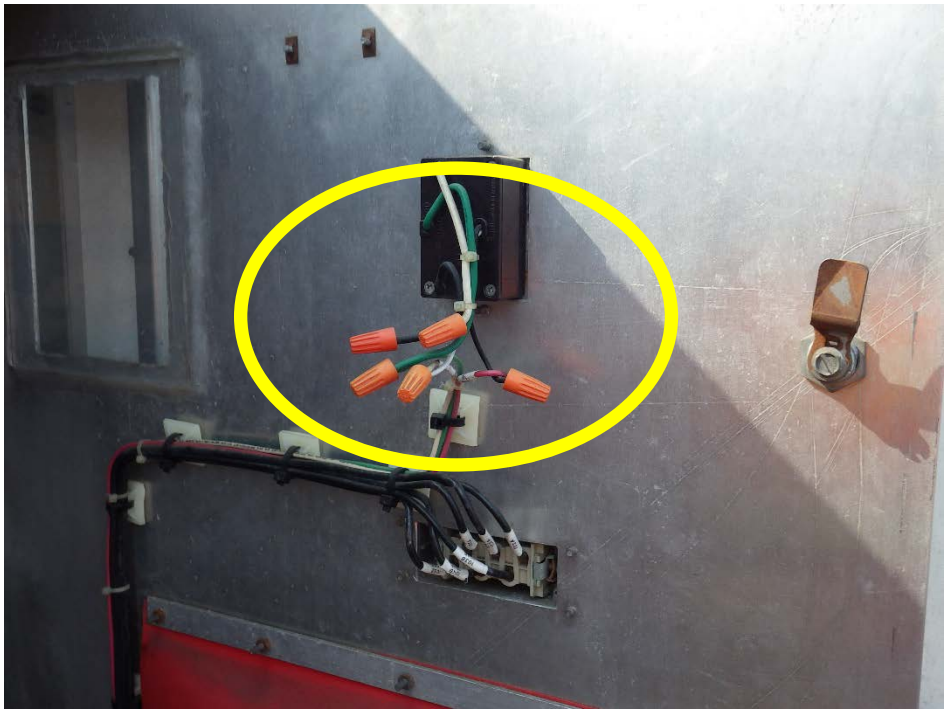


Photo No. E9:
Center Control Cabinet
Wire nut splice behind interior control panel



Photo No. E10:
Center Control Cabinet
Minor corrosion on various terminals

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		

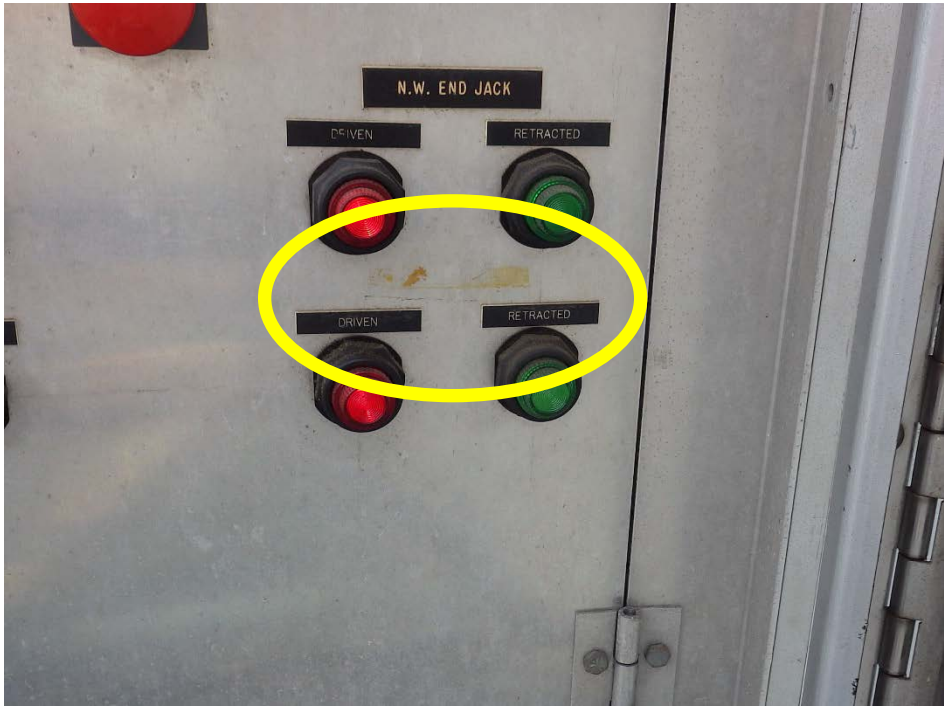


Photo No. E11:
Center Control Cabinet
Missing southwest end jack legend plate

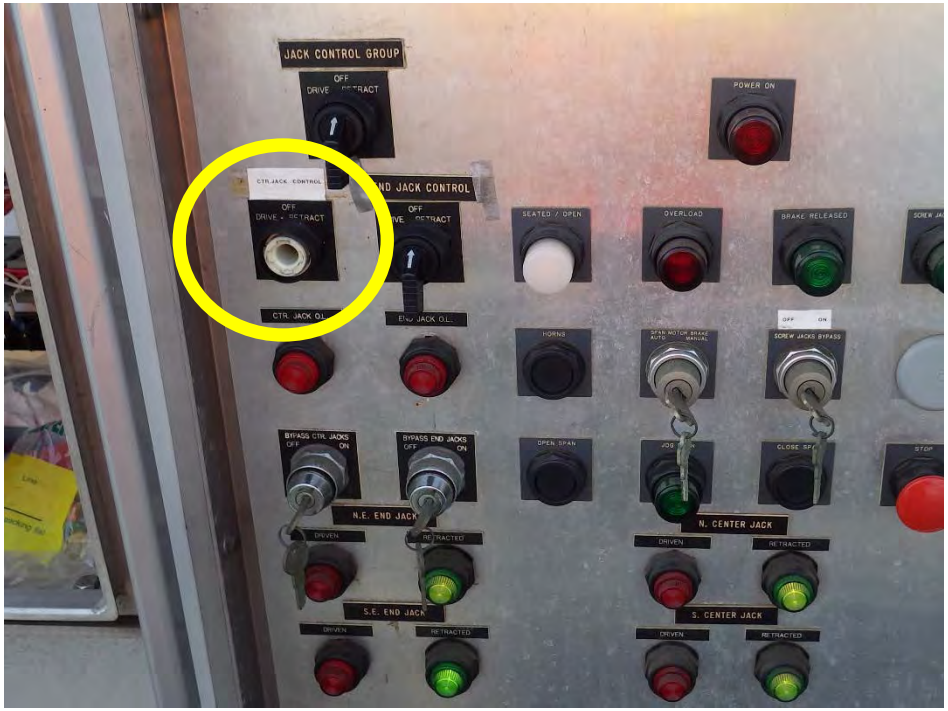


Photo No. E12:
Center Control Cabinet
Center jack control switch damaged and not usable

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		

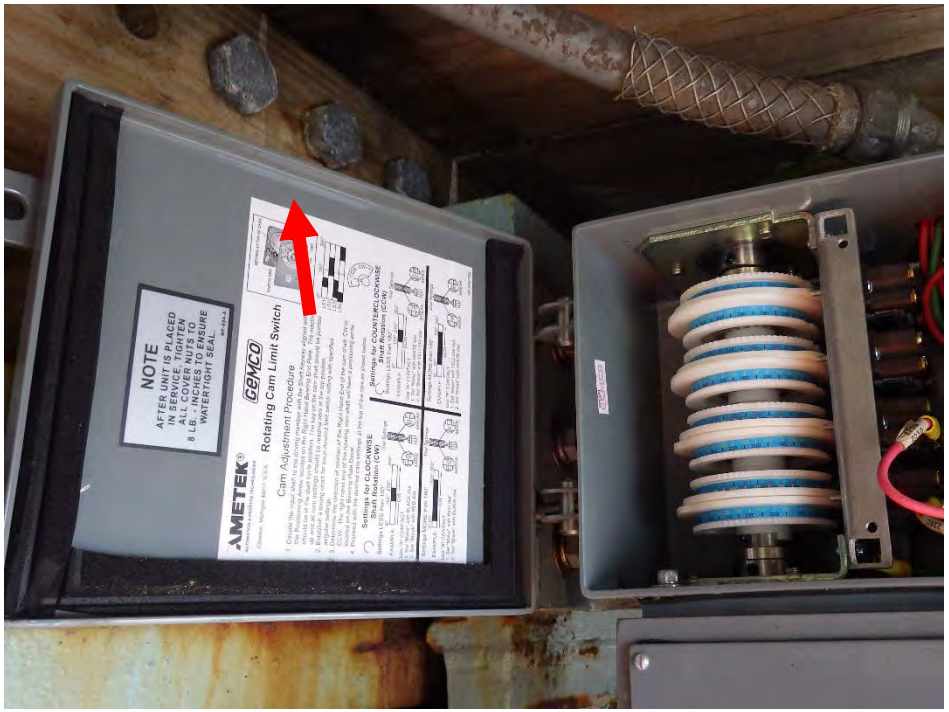


Photo No. E13:
NE Jack Rotary Cam Limit Switch
Missing gasket along top of door



Photo No. E14:
West Barrier Gate Lever Arm Limit Switch
Reported in previous report to seize in the actuated position
Minor corrosion on conduit fitting

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		

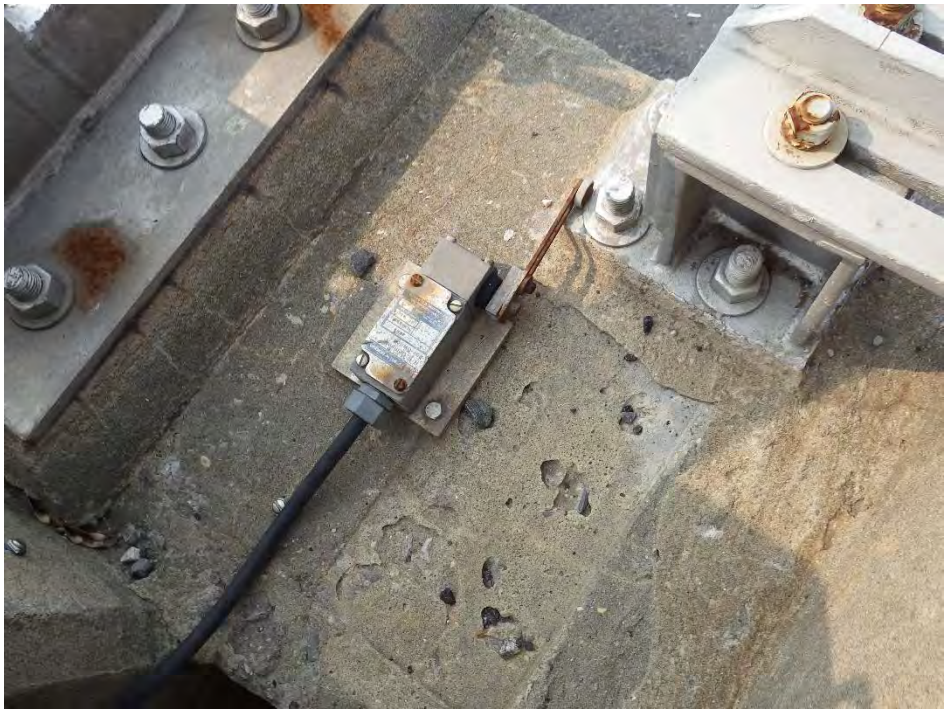


Photo No. E15:
East Barrier Gate Lever Arm Limit Switch
Permanently seized in the actuated position

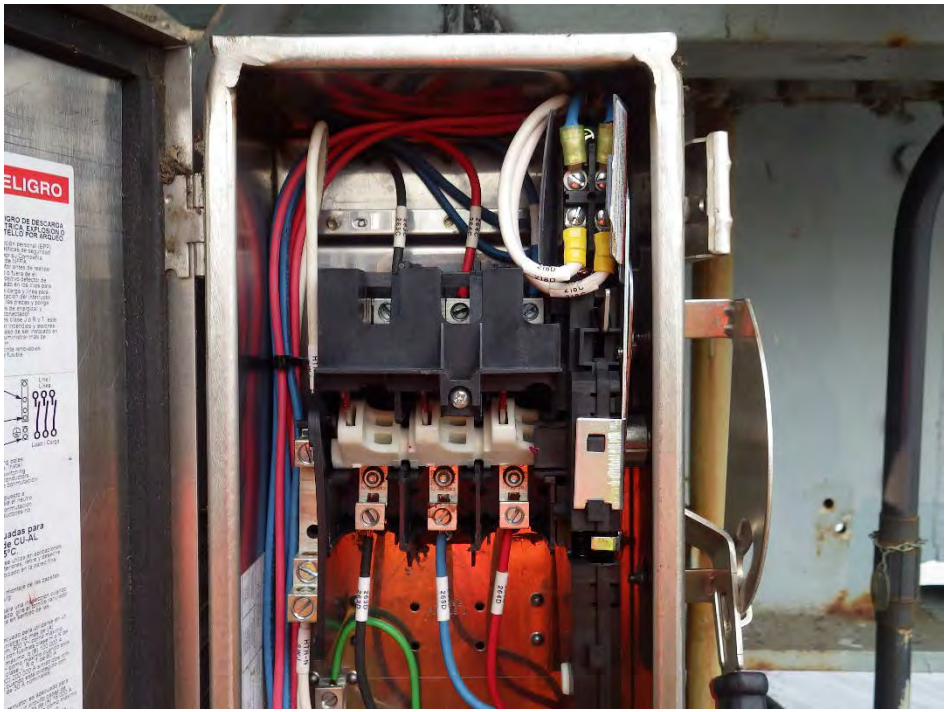


Photo No. E16:
SW End Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		

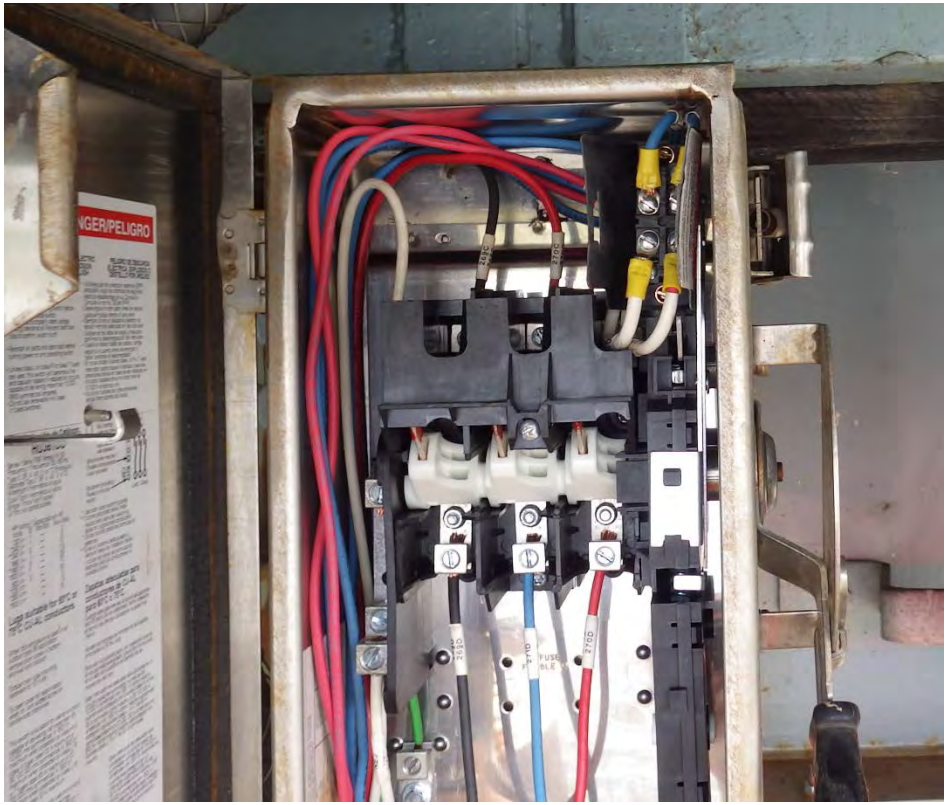


Photo No. E17:
NE End Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

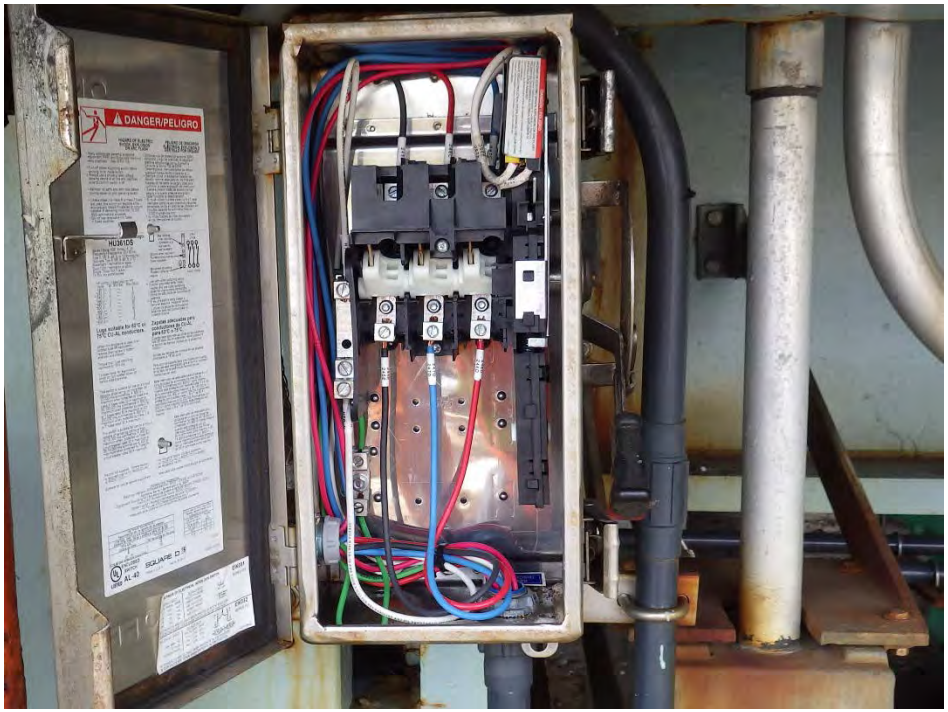


Photo No. E18:
North Center Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		

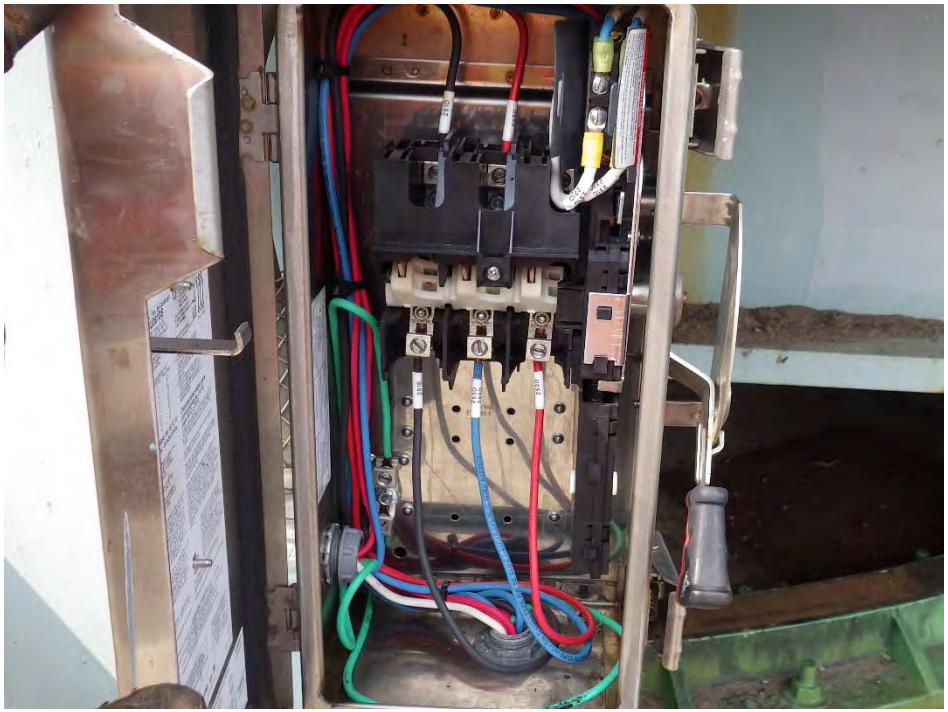


Photo No. E19:
South Center Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

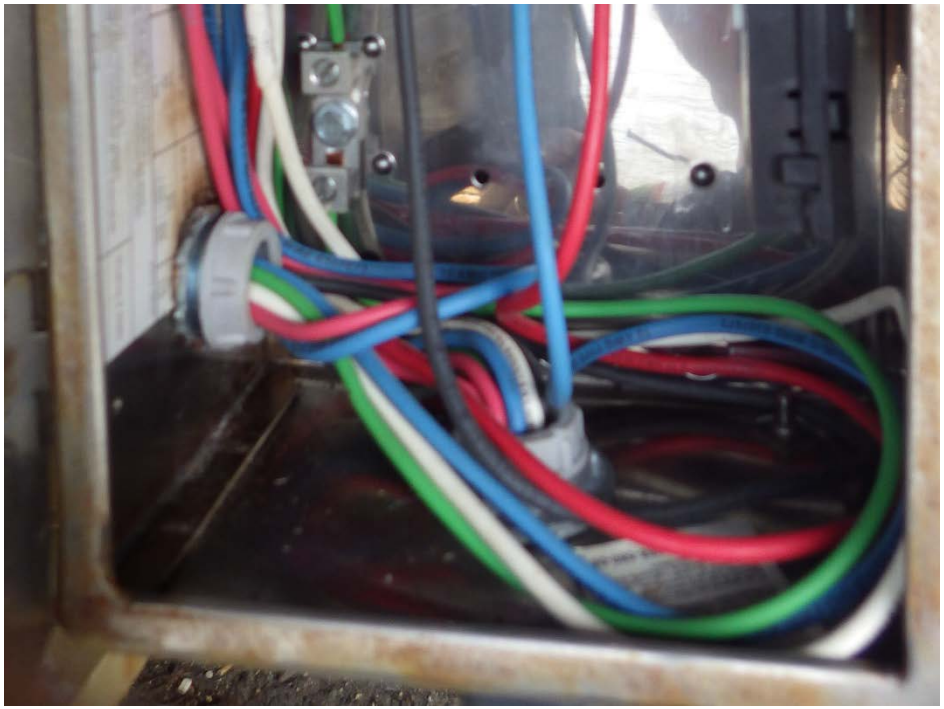


Photo No. E20:
NE End Jack Disconnect Switch
No water present during current inspection

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		



Photo No. E21:
SE End Jack Motor Disconnect
Missing nameplate
Minor corrosion on cover and conduit fitting



Photo No. E22:
Conduit and Conduit Clamp
Typical corroded conduit clamp and corrosion on conduit

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		



Photo No. E23:
Main Power Conduit On Span
Minor corrosion on conduit clamp (typical throughout bridge)



Photo No. E24:
North Center Jack Disconnect Switch and Rotary Cam Limit Switch
Corroded flexible conduit fittings

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		



Photo No. E25:
East Shore Service Conduit
Severe corrosion

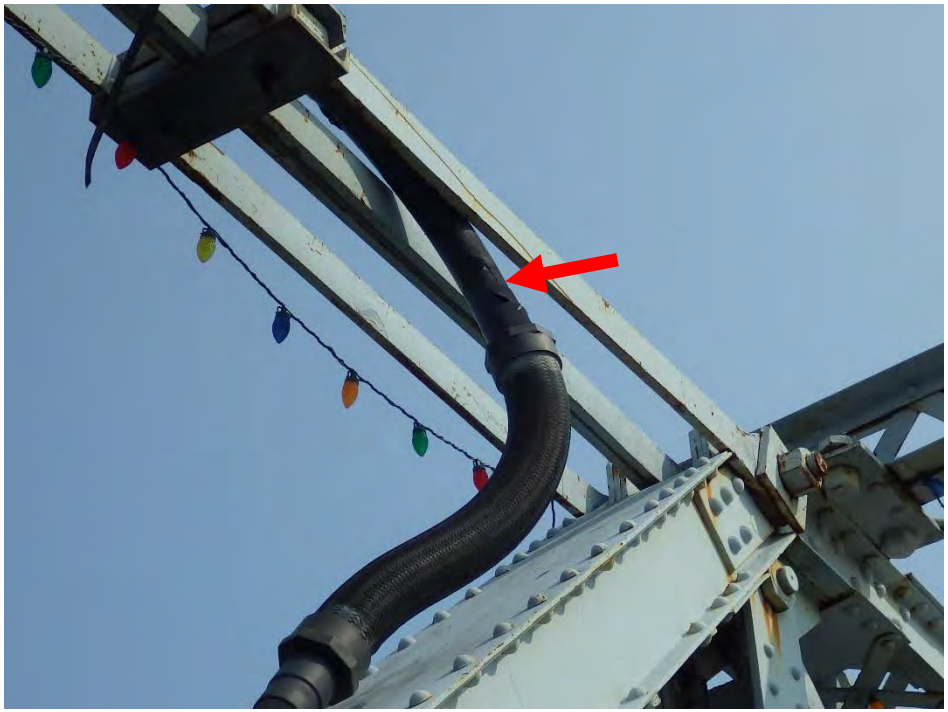


Photo No. E26:
Conduit Near Air Horn and Aerial Connection
PVC coating is peeling

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		

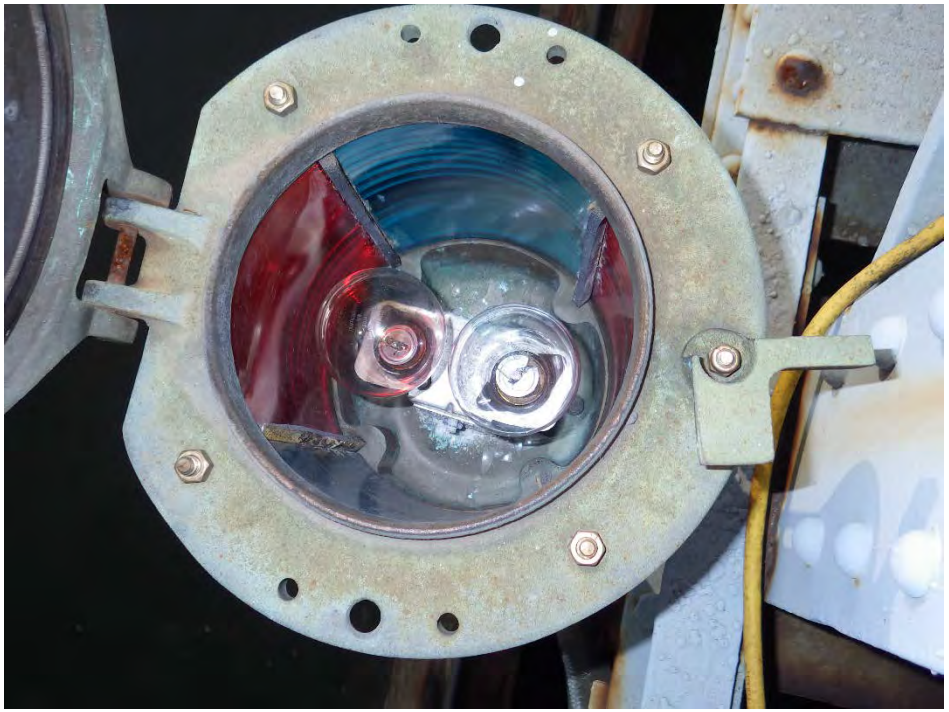


Photo No. E27:
SE Span Navigation Light
Non-functional

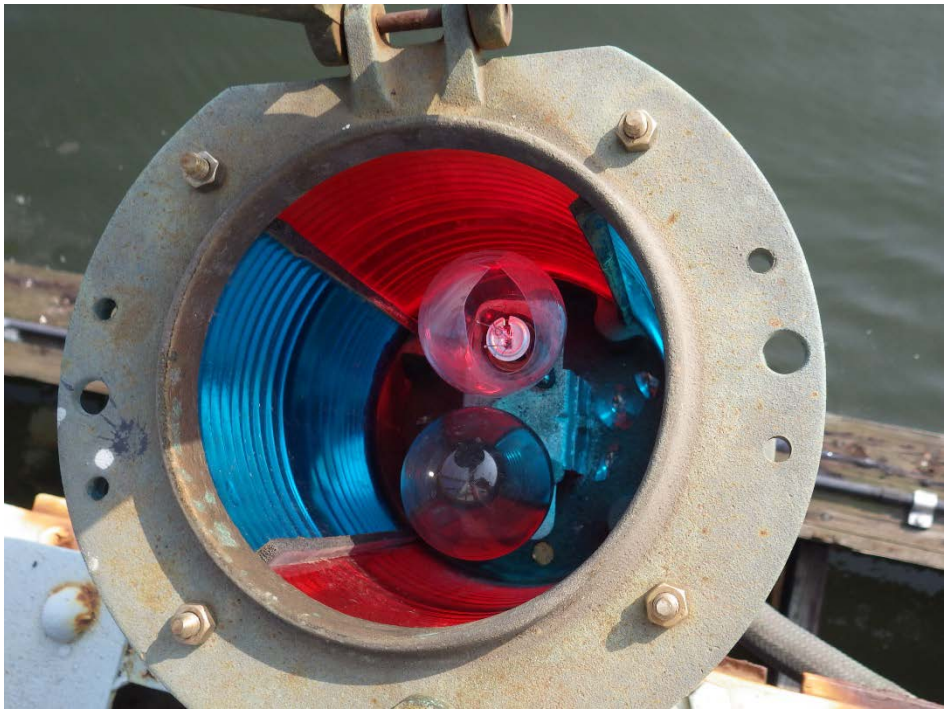


Photo No. E28:
SW Span Navigation Light
Non-functional

Bridge No.	01349	Inspected by:	K.M. Gable
Town:	Westport	Date Inspected:	September 16, 2020
Feature Carried:	Route 136		
Feature Crossed:	Saugatuck River		



Photo No. E29:
West Pedestrian Gate
Striping stops before end of gate



Photo No. E30:
West Barrier Gate
Gate not fully engaged in receiver

APPENDIX C: FIELD NOTES

EXECUTIVE SUMMARY

ELECTRICAL INSPECTION REPORT

ConnDOT BR. NO. 01349

A routine Electrical inspection of the Westport swing bridge over the Saugatuck River was performed between October 16-17, 2018 by Mr. J.E. Gerhart, P.E. of Modjeski and Masters, Inc. and operational inspection was performed on November 5, 2018 by Ms. N.K. Bhinge and Mr. K.M. Gable of Modjeski and Masters, Inc.

The AASHTO Movable Bridge Inspection, Evaluation and Maintenance Manual, 2017 Edition, and the ConnDOT Bridge Inspection Manual were utilized as the guidelines for the inspection. The "routine inspection" guidelines were utilized as the basis for equipment evaluation and testing. Equipment listed herein was examined and photographed, and observed deficiencies were documented. Additionally, items classified as deficient in the previous inspection report were inspected for compliance with the recommendations for repair and/or replacement listed therein.

This report is written from the perspective of the dates of the inspection described herein; the use of present tense herein in no way implies that the descriptions presented are accurate as of any subsequent date.

The general condition of the electrical system is good (Overall Rating = '7'). When these items have been addressed and assuming the current level of maintenance is continued, long term reliable operation is anticipated:

1. There is minor corrosion on the east meter cabinet and also on the west meter cabinet. same
2. There is minor corrosion on the interior terminals and conduits in the east and west service cabinets. same
3. The electric space heaters in the east and west service cabinets are not functioning. same
4. The GFCI test and reset buttons are not functioning in the east and west service cabinets. same
5. The west service cabinet door gasket is damaged. same control
6. There are miscellaneous items stored in the bottom of the left cabinet and the center cabinet. control same
7. There are splices made with wire nuts in violation of AASHTO Article 8.9.2 within the left cabinet and on the backside of the interior panel in the center cabinet. control control same
8. The bottom of the center cabinet ~~has moderate corrosion~~. is corroded
9. The southwest end jack legend plate is missing. same
10. The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked. same
11. Minor corrosion on the span rotary cam limit switch. replaced

12. Moderate corrosion and a damaged gasket on the SW jack rotary cam limit switch. replaced
13. Moderate corrosion and the cover could not be opened on the NW jack rotary cam limit switch. replaced
14. Moderate corrosion on the SE jack rotary cam limit switch. replaced
15. Moderate corrosion and a damaged gasket on the north center jack rotary cam limit switch replaced
16. Moderate corrosion, damaged gasket, and the bottom wingnut is missing on the south center jack rotary cam limit switch. replaced
17. The west barrier gate arm lever arm limit switch can seize in the actuated position and there is minor corrosion on the conduit fitting.
18. The east barrier gate limit switch is permanently seized in the actuated position.
19. Missing driven south center proximity limit switch. replaced
20. The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
21. The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for both center jack locations and the NE and SW end jacks.
22. Water is present in the bottom of the NE end jack motor disconnect. no water 2020
23. Missing nameplate and minor corrosion on cover and conduit fitting of the NE end jack motor disconnect.
24. Minor corrosion on conduit clamps throughout bridge.
25. Severe corrosion on underground conduit at the east shore service cabinet.
26. The southwest, northeast, and southeast span navigation lights were not operational.
27. The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02.
28. The east approach traffic signals and gong were not operational.
29. Striping on the west pedestrian gates stops before the end of the gate.
30. The barrier gates were not fully engaged in the receiver when lowered on both approaches.
31. None of the barrier gate lights were operational.
32. No lighting for maintenance is provided on the bridge.
33. Barrier gates are not interlocked with control system.
34. Centering device is not interlocked with jack control.
35. Jacks are not interlocked with span movement.

Please direct persons under your jurisdiction to make the following repairs for each deficiency listed above:

1. Remove the corrosion, coat with protective coating.
2. Remove the corrosion, coat with protective coating.
3. Replace the space heaters.
4. Replace the GFCI receptacles.
5. Replace the door gasket.
6. Remove miscellaneous items.

7. Replace wire nut splices with crimp type splices.
8. Remove the corrosion, coat with protective coating.
9. Replace the legend plate.
10. Install limit switch and wire into control system.
11. Remove the corrosion, coat with protective coating.
12. Remove the corrosion, coat with protective coating, and replace the door gasket.
13. Remove the corrosion, coat with protective coating, and repair door fasteners.
14. Remove the corrosion, coat with protective coating.
15. Remove the corrosion, coat with protective coating, and replace the door gasket.
16. Remove the corrosion, coat with protective coating, replace the door gasket, and repair the cover fasteners.
17. Replace limit switch.
18. Replace limit switch.
19. Replace limit switch.
20. Install limit switch and wire into control system.
21. Swap conductors on both ends of the load side of the disconnect switches.
22. Remove water and repair conduit system and or disconnect to prevent reoccurrence.
23. Replace nameplate, remove the corrosion, coat with protective coating.
24. Replace nameplate, remove the corrosion, coat with protective coating.
25. Replace corroded section of conduit.
26. Repair or replace span navigation lights.
27. Install traffic signals.
28. Repair the east approach traffic signals and gong.
29. Replace striping on gate arm.
30. Repair barrier gate receivers.
31. Repair barrier gate arm lights.
32. Install lighting and receptacles in maintenance and access areas.
33. Interlock barrier gates with control system.
34. Interlock centering device with jack control.
35. Interlock jack position with span movement.

TABLE OF CONTENTS
ConnDOT Bridge No. 01349

EXECUTIVE SUMMARY ii
GENERAL DESCRIPTION 1
OBSERVATIONS AND FINDINGS 3
ELECTRICAL SERVICE 3
BRIDGE CONTROLS & CONTROL PANELS 4
MOVABLE SPAN DRIVE MOTOR & BRAKE 5
LIMIT SWITCHES AND FEEDBACK DEVICES 6
JACKS 7
SPAN LOCK 8
CONDUIT, RACEWAYS, AND JUNCTION BOXES 8
NAVIGATION LIGHTS AND HORN 9
TRAFFIC SIGNALS 9
TRAFFIC GATES 9
BARRIER GATES 10
GENERAL LIGHTING AND RECEPTACLES 10
INTERLOCK TESTING 10
CONCLUSION 11
RECOMMENDATIONS 12

APPENDICES:

APPENDIX A ELECTRICAL MEASUREMENTS
APPENDIX B ELECTRICAL PHOTOGRAPHS
APPENDIX C NUMERICAL CONDITION REPORT
APPENDIX D FIELD NOTES
APPENDIX E TIME AT BRIDGE SITE

GENERAL DESCRIPTION

ConnDOT Bridge No. 01349 is carries one lane of traffic of route 136 in each direction over the Saugatuck River in Westport, Connecticut. The overall length of the bridge is 287 feet consisting of two fixed spans and a swing span measuring 141 feet. The bridge is oriented in a west to east direction. There is no operator's house at the bridge; instead, the bridge is controlled from the cabinets located the along the sidewalk on the north side of the bridge at the center of the movable span. The bridge opens approximately 90 degrees to allow passage of marine traffic in the one navigable channel located to the east of the center pier.

The electrical systems consists of a 208/120 volt, three phase, 60 Hz service on the east shore for the main span and east barrier gate lights, a 240/120 volt single phase, 60Hz service on the east shore for the east traffic signal and east fender navigation lights, one 3 HP span drive motor with motor brake, limit switches, center and end jacks, fender and span navigation lighting, traffic signal and gong on the east approach, wiring, conduit, cables and raceways, disconnect switches, and control cabinets located along the sidewalk at the center of the movable span. The control cabinets contain the operator station, relay control system, circuit breakers, and motor starters for the end wedges and span drive motor.

There are no traffic gates present at the bridge. There are barrier gates on both approaches that are manually operated. The barrier gate position is not interlocked with the operation of the bridge. A center pin is equipped with a limit switch that is interlocked with the controls for the movement of the span.

Modjeski and Masters performed a static field inspection of the electrical systems on the Westport Bridge over the Saugatuck River (ConnDOT Bridge No. 01349) in Westport, Connecticut from October 16, 2018 through October 17, 2018. The electrical field inspector was Mr. J.E. Gerhart, P.E. A follow up operational electrical inspection was performed on November 5, 2018 by Ms. N.K. Bhinge, P.E. and K.M. Gable. The inspection was conducted as part of ConnDOT's biennial inspection program. The scope of the assignment consisted of visual inspection and quantitative measurements. This included functional operation of the bridge electrical systems, insulation resistance measurements, and current measurements with sufficient depth to highlight problem areas that could affect the continued safe and reliable operation of the bridge.

The following codes and standards were considered for this inspection and report:

American Association of State Highway and Transportation Officials (AASHTO)
NFPA 70, National Electric Code (NEC)
NFPA 101, Life Safety Code (LSC)
National Electrical Manufacturers Association (NEMA)
Manual on Uniform Traffic Control Devices (MUTCD)

Code of Federal Regulation, Title 33 (CFR)
American Railway Engineering and Maintenance-of-Way Association (AREMA)

This report provides visual inspection findings, testing findings, evaluation, conclusions, and recommendations. Appendices are provided for photographs, field notes, and the Numerical Condition Inspection Report.

This report is written from the perspective of the dates of the inspection described herein; the use of present tense in no way implies that the descriptions presented are accurate as of any subsequent date. There is no warranty that all defects were discovered during the inspection or that defects will not later appear.

OBSERVATIONS AND FINDINGS

ELECTRICAL SERVICE

The bridge has two electrical services, one on each shore.

The west shore electrical service is 208/120 VAC, 3-phase, 60 HZ, 4-wire, supplied by three pole mounted transformers located on the west side of Riverside Ave. The service point is located in a weatherproof freestanding cabinet on top of a concrete pad. The service supplies power to the main span via an aerial cable, and the west approach barrier gate lights. Control logic for the west approach traffic signal, that has been removed, remain in the service cabinet.

There is a second service located in the same general area as the west shore bridge service that supplies power to the holiday lights on the bridge and the trees along the north side of the west approach. This service does not interface with the bridge and is excluded from this inspection.

The east shore electrical service is 240/120 VAC, single phase, 60 HZ, 3-wire, supplied from a pole mounted transformer on the NW corner of the Bridge St (Route 136) and Imperial Ave intersection. The service point is located in a weatherproof freestanding cabinet on top of a concrete pad. The service supplies power to the east fender navigation lights, east approach traffic signal and barrier gate lights. Control logic for the east approach traffic signal and cabinet containing the signal preemption controls for the Westport fire department are also located within the cabinet.

Voltage measurements were made of each phase to phase and phase to ground of both services. Measurements were made with the bridge open to vehicular traffic with the control and drive systems off. The measurements are within utility allowable tolerances for the services provided.

244.9 122.3 122.3

Utility Service	Nominal Voltage (Volts)	Phase A to B / Phase A to Gnd. (Volts)	Phase B to C / Phase B to Gnd. (Volts)	Phase C to A / Phase C to Gnd. (Volts)
East	120/240	245.9 / 122.9	NA / 122.7	NA / NA
West	208/120	208.5 / 121.7	209.2 / 121.3	211 / 121.3

Table E1: Utility Voltage Measurements

208.4/120.8 208.1/120.2 208.9/120.0

Deficiencies regarding the utility service were recorded as follows:

same ✓ • There is minor corrosion on the east meter cabinet (see Photograph E1) (as noted in previous inspection reports) and also on the west meter cabinet (see Photograph E2).

same ✓ • There is minor corrosion on the interior terminals and conduits in the east (see Photographs E3 & E4) and west (see Photograph E5) service cabinets (as noted in previous inspection reports).

east same

- The electric space heaters in the east (see Photograph E3) and west (see Photograph E5) service cabinets are not functioning (as noted in previous inspection reports).
- The GFCI test and reset buttons are not functioning in the east (see Photograph E4) and west (see Photograph E5) service cabinets.
- The west service cabinet door gasket is damaged (see Photograph E6) (as noted in previous inspection reports).

BRIDGE CONTROLS & CONTROL PANELS

The bridge control relays, motor starters, circuit breakers, and control panel are housed in three cabinets along the sidewalk at the center of the movable span.

The left cabinet contains circuit breakers and motor starters for the southeast end jack and the south, and north center jacks. Wiring within the cabinet is in a neat and workmanlike fashion.

Heater works

- minor corrosion & dirt on terminals & components (various)

The center cabinet contains an interior control panel consisting of selector switches for jack group control, center jack control, and end jack control; key switches for center jack bypass, end jack bypass, screw jack bypass, and span motor brake auto/manual; pushbuttons for open span, close span, horns and stop; and indicators for the status of the bridge systems. Located behind the interior control panel are circuit breakers, fuses, control relays, and the soft starter for the main span motor. Wiring within the cabinet is in a neat and workmanlike fashion.

- the center jack control switch is damaged and ~~in~~ not usable (pieces fell out of cabinet when cabinet was opened)

The right cabinet contains circuit breakers and motor starters for the northwest, southwest, and northeast end jacks. Wiring within the cabinet is in a neat and workmanlike fashion.

Deficiencies regarding the bridge controls and control panels were recorded as follows:

- same There are miscellaneous items stored in the bottom of the left cabinet (see Photograph E7) and the center cabinet (see Photograph E8) (as noted in previous inspection reports).
- same There are splices made with wire nuts in violation of AASHTO Article 8.9.2 within the left cabinet (see Photograph E7) and on the backside of the interior panel in the center cabinet (see Photograph E9) (as noted in previous inspection reports).
- The bottom of the center cabinet ~~has moderate~~ is corrosion ded (see Photograph E8) (as noted in previous inspection reports). ↳ more than moderate
- same The southwest end jack legend plate is missing (see Photograph E10).

- The seated/open white indicator light is on a all of the time when seated, during operation, and when fully open.

- The screw jack retracted light does not come on when all jacks are retracted

- The bypass end jacks and bypass center jacks must be switched on to operate.

MOVABLE SPAN DRIVE MOTOR & BRAKE

One span drive motor is responsible for the span movement. The motor is provided with an integral motor brake. The primary shaft of the motor is connected to a gearbox which has an auxiliary shaft for manual operation. The secondary shaft of the motor is connected to a rotary cam limit switch for span position.

A limit switch is installed on the brake to prevent operation of the main motor when the brake is manually released.

The span motor is provided with a 120V 50 watt heater and the brake has a 120V 25 watt heater.

The disconnect for the span motor also disconnects the power to the brake. A separate disconnect is provided for the motor heaters and brake limit switch.

Nameplate data for the main motor & brake was recorded as follows:

Main Motor		Brake	
Manufacturer:	Reuland	**Manufacturer:**	Stearns
Serial No.:	13-1103A-1	**Serial No.:**	41041M001
Horsepower:	3 HP	**Model No.:**	108704200324B
Phase:	3	**Torque:**	35 lb-ft
Frequency:	60 Hz	**Frequency:**	60
Voltage:	208 V	**Voltage:**	200
Full Load Amps:	12.4 A	**Inrush Amps:**	10.3
Speed:	900 RPM	**Holding Amps:**	0.7
Frame:	215	**Mounting:**	Horiz/V.Below
Encl:	TENV		

Phase 'B' motor currents were measured while the span was moving. The main motor currents were measured from the load side of the reversing starter. The current readings show that the motors are operating within the nameplate ratings. See Appendix A for graphs showing main motor currents.

During closing, the span stops at near closed, and then the operator jogs the motor until the fully closed position is reached by pressing the 'jog' pushbutton. This jogging is indicated on the graph in Appendix A and is above motor nameplate current due to the inrush of repeated starts and stops of the motor in a short period of time.

The insulation resistance level of phase B of the span drive motor was measured with respect to ground. These readings were taken from the load side of the motor disconnect switch. The insulation resistance values are acceptable. The differences in values between last inspection and this inspection are due the limits of the meter used

during the previous inspection and to weather conditions the day of the testing. The readings were taken after 60 seconds with the meter voltage set at 500V. See Table E1 for tabulated data regarding insulation resistances.

Motor	Previous Inspection February 3, 2017	Current Inspection December 12, 2017
	Motor Phase to Ground	Motor Phase B to Ground
Span Drive Motor	>550 MΩ	4.70 GΩ

Table E1: Main Drive Motor Insulation Resistance Measurements

Deficiencies regarding the main motors were recorded as follows:

- The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked (as noted in previous inspection reports).

LIMIT SWITCHES AND FEEDBACK DEVICES

Limit switches are provided for different electrical components for sending feedback signals to the bridge control system. Rotary cam limit switches are provided for span movement at the main motor and the end and center jacks. Lever arm limit switches are provided for the barrier gates lowered position, centering device installed, and fully open position. Proximity limit switches are provided for the raised and lowered position of the end and center jacks.

Deficiencies regarding the limit switches were recorded as follows:

R • Minor corrosion on the span rotary cam limit switch (see Photograph E11) (as noted in previous inspection reports).

R • Moderate corrosion (as noted in previous inspection reports) and a damaged gasket on the SW jack rotary cam limit switch (see Photograph E12).

R • Moderate corrosion and the cover could not be opened on the NW jack rotary cam limit switch (see Photograph E13) (as noted in previous inspection reports).

R • Moderate corrosion on the SE (see Photograph E14) and NE (see Photograph E15) jack rotary cam limit switch (as noted in previous inspection reports).

R • Moderate corrosion (as noted in previous inspection reports) and a damaged gasket on the north center jack rotary cam limit switch (see Photograph E16).

R • Moderate corrosion (as noted in previous inspection reports), damaged gasket, and the bottom cover bolt is damaged on the south center jack rotary cam limit switch (see Photograph E17).

R = Repaired

- The west barrier gate arm lever arm limit switch can seize in the actuated position and there is minor corrosion on the conduit fitting (see Photograph E18).
- The east barrier gate is permanently seized in the actuated position (see Photograph E19) (as noted in previous inspection reports).
- Missing driven south center proximity limit switch (see Photograph E20).

JACKS -NE Jack rotary cam has no gasket along top side of door

The swing span is equipped with four end jacks, one at each corner, and two center jacks. The motors are provided with integral motor brakes. The primary shaft of the motor is connected to a gearbox which has an auxiliary shaft for manual operation. The secondary shaft of the motor is not in use.

The motors are provided with a 120V 50 watt heater and the brake has a 120V 25 watt heater.

The disconnect for the jack motor disconnects power to the motor and brake and has an auxiliary contact that disconnects power to the heaters.

Nameplate data for the end wedge motors was recorded as follows:

Main Motor		Brake	
Manufacturer:	Reuland	**Manufacturer:**	Stearns
Horsepower:	3.3 HP	**Model No.:**	108701200111B
Phase:	3	**Torque:**	10 lb-ft
Frequency:	60 Hz	**Frequency:**	60
Voltage:	208 V	**Voltage:**	200
Full Load Amps:	10.6 A	**Inrush Amps:**	4.3
Speed:	1800 RPM	**Holding Amps:**	0.3
Frame:	184	**Mounting:**	Horiz/V.Below
Encl:	TENV		

Phase 'B' jack motor currents were measured while the jacks were being retracted and driven. The jack motor currents were measured from the load side of the overload in the jack starter cabinet. The current readings show jack motors are operating below their respective nameplate ratings. See Appendix A for graphs regarding jack motor currents.

The insulation resistance level of phase B of each jack drive motor was measured with respect to ground. These readings were taken from the load side of the local motor disconnect. The recorded insulation resistance values are acceptable. The readings were taken after 60 seconds with the meter voltage set at 500V. See Table E3 for tabulated data regarding insulation resistances.

Motor	Previous Inspection February 3, 2017	Current Inspection October 16, 2017
	Motor Phase to Ground	Motor Phase B to Ground
SW End Jack Motor	>550 MΩ	>10 GΩ
NW End Jack Motor	>550 MΩ	>10 GΩ
SE End Jack Motor	>550 MΩ	>10 GΩ
NE End Jack Motor	>550 MΩ	852 MΩ
North Center Jack Motor	>550 MΩ	>10 GΩ
South Center Jack Motor	>550 MΩ	>10 GΩ

Table E3: End Wedge Motor Insulation Resistance Measurements

Deficiencies regarding the end wedge motors were recorded as follows:

- The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked (as noted in previous inspection reports).
- The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for both center jack locations and the NE and SW end jacks (see Photographs E21-24) (as noted in previous inspection reports).
- Water is present in the bottom of the NE end jack motor disconnect (see Photograph E25).
- Missing nameplate and minor corrosion on cover and conduit fitting of the NE end jack motor disconnect (see Photograph E26).

SPAN LOCK

A manual span locking pin is provided at the center of the west end of the span.

No deficiencies regarding span lock were recorded.

CONDUIT, RACEWAYS, AND JUNCTION BOXES

The conduits throughout the bridge structure is primarily PVC coated Rigid Galvanized Steel and wiring is stranded copper. The condition of the conduits and wiring ranges from adequate to good.

Deficiencies regarding conduit, raceways, and junction boxes were recorded as follows:

- Minor corrosion on conduit clamps throughout bridge (see Photograph E27) (as noted in previous inspection reports). Same

- minor wear on flexible conduit near air horn / aerial connection

- Severe corrosion on underground conduit at the east shore service cabinet (see Photograph E28) (as noted in previous inspection reports).

NAVIGATION LIGHTS AND HORN

ON IN AM WHEN LIGHT CHECK PHOTO CONTROL?

3 navigation lights are installed on the east fender and controlled by a photo control at the base of the east barrier gate. The center pier fender system has a navigation light at each end and one on at the center of the east channel. The center fender navigation lights are always on.

The span is equipped with 3 alternating green and red navigation lights – two on the south ends of the span and one on the north east end under the sidewalk.

The navigation horn is mounted on the center north truss above the control cabinets.

Functional

Deficiencies regarding navigation lights and horn were recorded as follows:

NF ON IF REEFY WHEN SPAN CLOSED NF

- The southwest, northeast, and southeast span navigation lights were not operational. A SMS work item was created for this deficiency at the time of the inspection.

TRAFFIC SIGNALS

Only the east approach has traffic signals and they are manually activated by a switch on the traffic signal pole. The west approach traffic signals have been removed. Normal operating procedure is to have traffic stopped by local police on both approaches for all bridge operations.

Deficiencies regarding traffic signals were recorded as follows:

- The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02. Same
- The east approach traffic signals and gong were not operational. Same

TRAFFIC GATES

No traffic gates are installed on either approach. Manual pedestrian gates are provided close to the receiver end of the barrier gates to block the sidewalk on the north side of the bridge.

Deficiencies regarding the traffic gates were recorded as follows:

- Striping on the west pedestrian gates stops before the end of the gate (see Photograph E29).

BARRIER GATES

Manually operated (no motor) barrier gates are installed at both approaches. The barrier gates have three warning lights each. During the operational testing, none of the barrier gate lights were functional.

Deficiencies regarding the traffic gates were recorded as follows:

- The barrier gates were not fully engaged in the receiver when lowered on both approaches (see Photograph E30) (as noted in previous inspection reports). Still true Corrected on east
- None of the barrier gate lights were operational. Same

GENERAL LIGHTING AND RECEPTACLES

No maintenance lighting or receptacles are provided on the bridge.

Deficiencies regarding general lighting and receptacles were recorded as follows:

- No lighting or receptacles for maintenance are provided on the bridge (as noted in previous inspection reports). Same

INTERLOCK TESTING

Interlock testing was performed to determine whether all AASHTO required safety interlocks are incorporated into the bridge control system.

There is no connection between approaches and control on the movable span resulting in the barrier gates not interlocked with the movement of the span. No test were needed to confirm no interlock.

The following interlock testing was performed:

1. With the span partially open (end clear of abutment) and the centering device vertical rod removed, attempt to drive an end jack.
   Result: FAIL – Jack was driven. Not tested due to bypass use

2. With the span partially open, centering device vertical rod removed, and one end jack fully driven, attempt to open and close the span.
   Result: FAIL – Span moved in both directions.
   Not tested due to bypass use

3. With the span partially open, all jacks retracted, and the centering device vertical rod installed, attempt to open and close the span.
   Result: PASS – Span did not move in either direction. PASS

Deficiencies regarding interlock testing were recorded as follows:

- Barrier gates are not interlocked with control system.
- Centering device is not interlocked with jack control.
- Jacks are not interlocked with span movement.

CONCLUSION

The bridge operated properly and without any incidents during the operational testing. The manual nature of the traffic control allows for safe operation even with the installed traffic control devices not operational, or not installed. The bridge is in generally good condition. Most deficiencies discovered will require a minor effort to correct and can be addressed by bridge maintenance personnel.

Modjeski and Masters coordinated with Prime and ConnDoT to organize bridge operations for Westport. Bridge operator from ConnDoT and a small maintenance crew were at the bridge site for operations. The bridge operator coordinated with police to stop traffic at both ends of the bridge. ConnDoT maintenance crew were able to provide the access required for this inspection by unlocking cabinets, gates, and platforms. They also provided all manpower and expertise necessary to operate the bridge including the manual traffic gates, the manual centering device, the screw jacks, and the main drive motor. ConnDoT bridge safety personnel was also on site to witness the bridge operation.

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E1:
East Service Meter Same
Minor corrosion



Photo No. E2:
West Service Meter Same
Minor corrosion

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

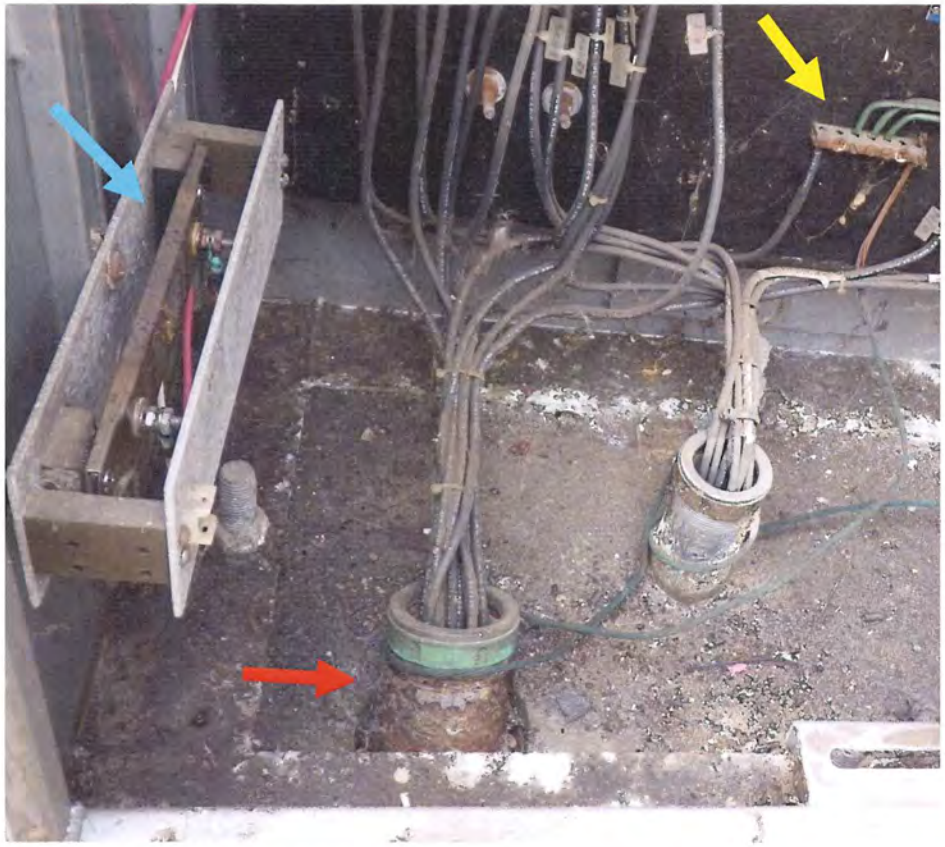


Photo No. E3:
East Service Meter Interior
Minor corrosion on conduits (red arrow) and terminals (yellow arrow) same
Nonfunctioning enclosure heater (blue arrow) same



Photo No. E4:
East Service Meter Interior
Minor corrosion on terminals (yellow arrow) same
Nonfunctioning test/reset buttons on GFCI (orange arrow) same

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

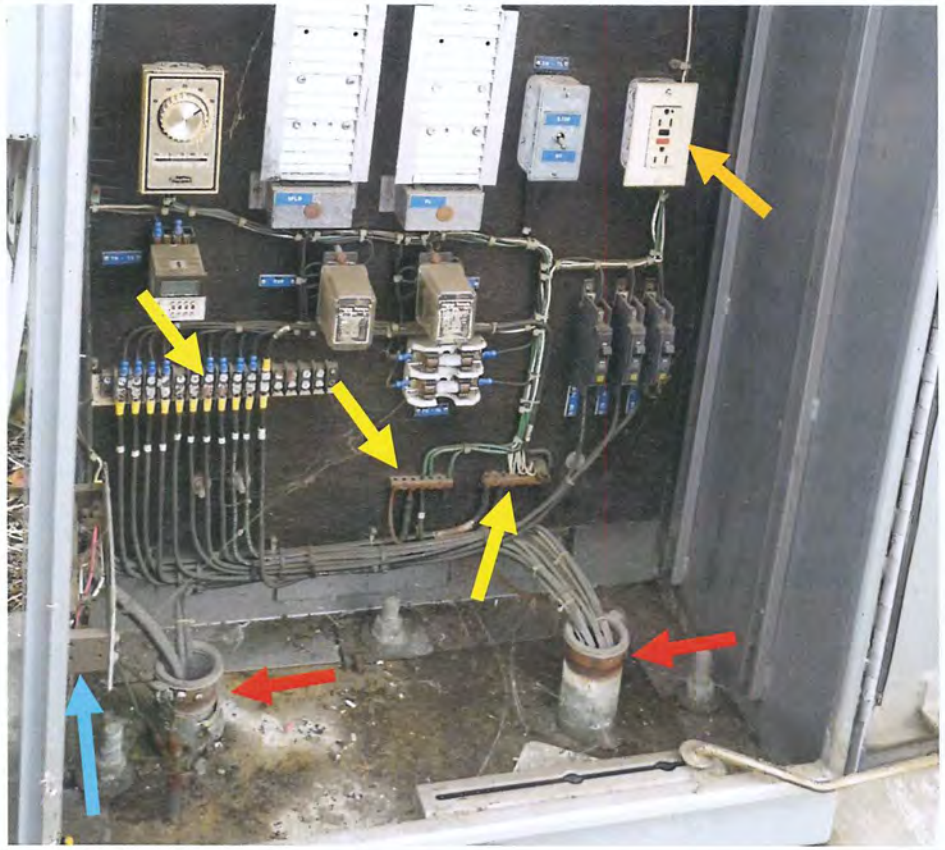


Photo No. E5:
West Service Meter Interior Same
Minor corrosion on conduits (red arrow) and terminals (yellow arrow)
Nonfunctioning enclosure heater (blue arrow)
Nonfunctioning test/reset buttons on GFCI (orange arrow)



Photo No. E6:
West Service Meter Interior Same
Damaged door gasket

275

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

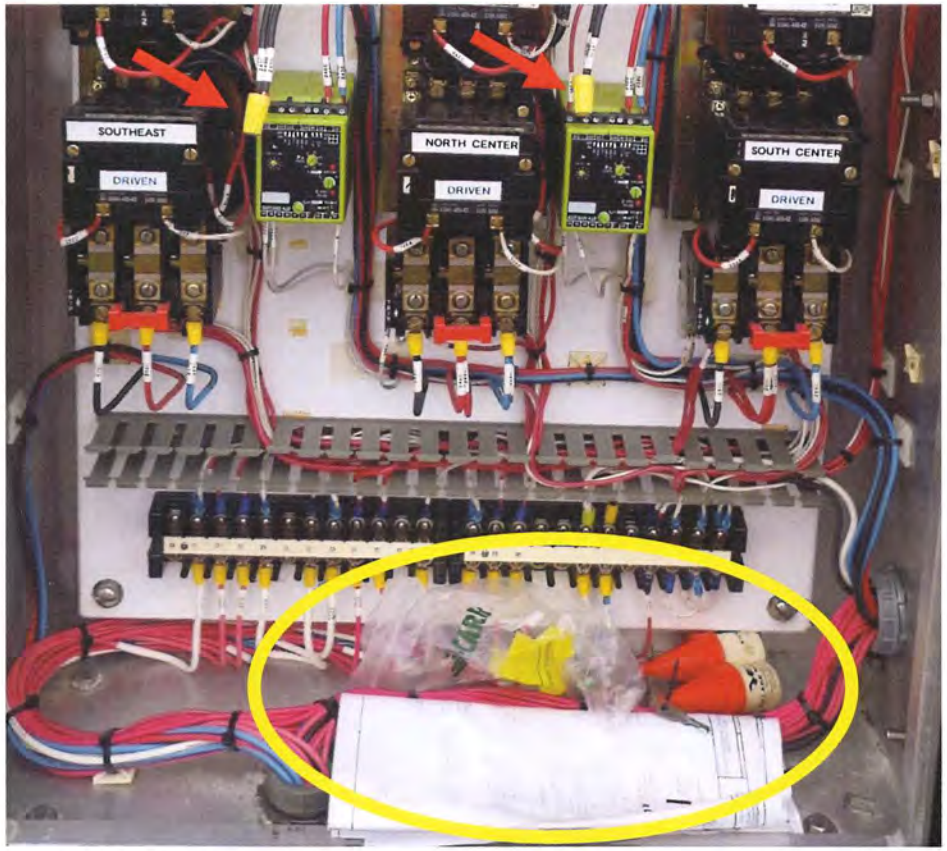


Photo No. E7:
Left Control Cabinet
Miscellaneous items stored in bottom (yellow circle) Same
Wire nut splices (red arrow) Same



Photo No. E8:
Center Control Cabinet Same
Miscellaneous items stored in bottom (yellow circle)
Moderate corrosion on the bottom of the enclosure (red arrow)

276

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

277

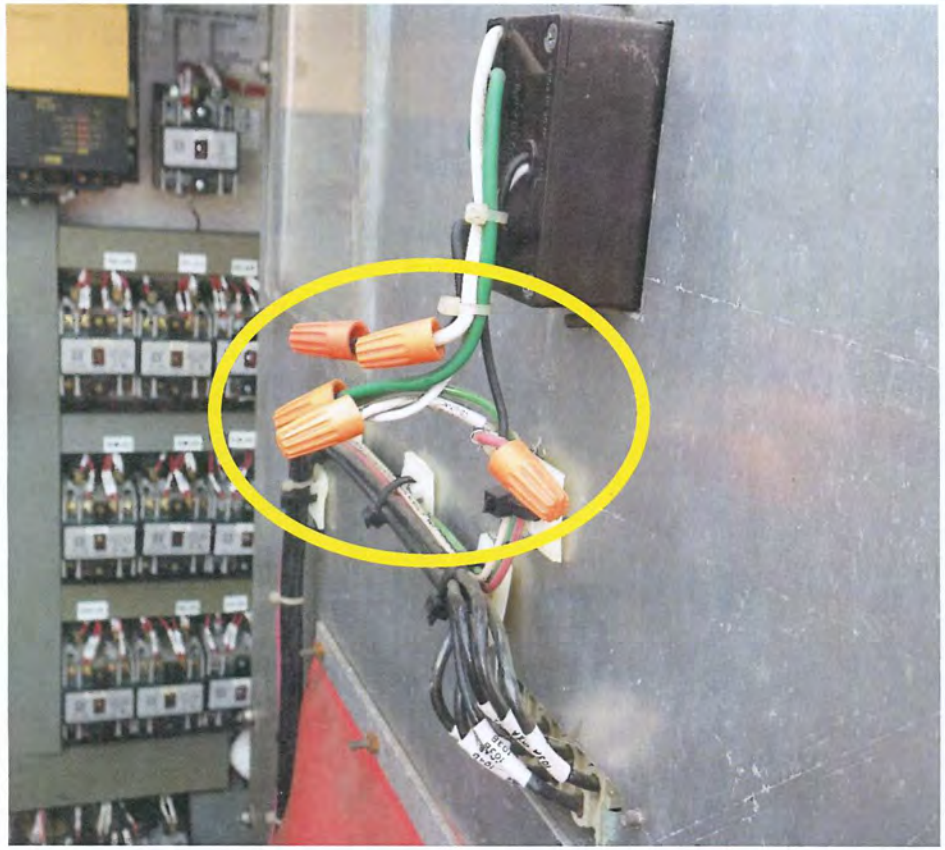


Photo No. E9:
Center Control Cabinet
Wire nut splice behind interior control panel

same



Photo No. E10:
Center Control Cabinet
Missing southwest end jack legend plate

same

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

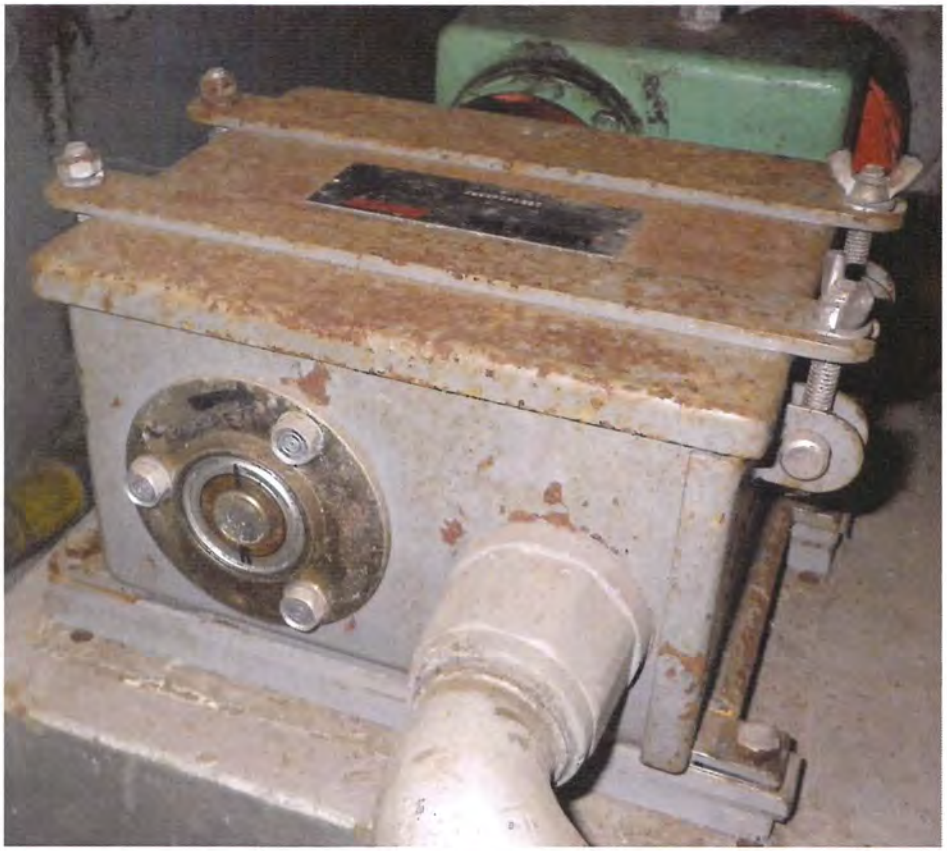


Photo No. E11:
Span Rotary Cam Limit Switch
Minor corrosion

This switch has been replaced and is in good condition



Photo No. E12:
SW Jack Rotary Cam Limit Switch
Moderate corrosion
Damaged gasket

Replaced, new and good

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

279



Photo No. E13:
NW Jack Rotary Cam Limit Switch
Moderate corrosion
Cover could not be opened due to corroded fasteners

Replaced, loose blue piece?



Photo No. E14:
SE Jack Rotary Cam Limit Switch
Moderate corrosion

Replaced, New and good

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E15:
NE Jack Rotary Cam Limit Switch
Moderate

Replaced, missing gasket along top side of door



Photo No. E16:
North Center Jack Rotary Cam Limit Switch
Moderate corrosion
Damaged gasket

Replaced, new and good

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

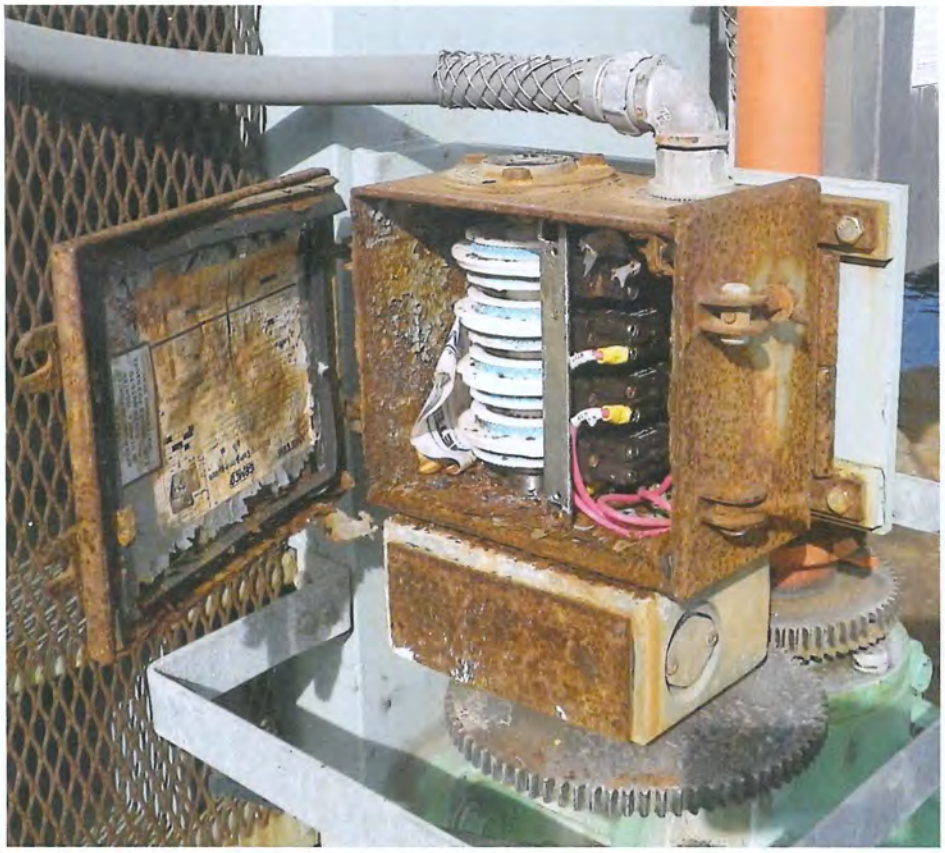


Photo No. E17:
South Center Jack Rotary Cam Limit Switch
Moderate corrosion
Damaged gasket
Damaged bottom cover bolt

Replaced, new and good



Photo No. E18:
West Barrier Gate Lever Arm Limit Switch
Seizes in the actuated position
Minor corrosion on conduit fitting

Not seized during 2020 inspection

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E19:
East Barrier Gate Lever Arm Limit Switch
Permanently seized in the actuated position same



Photo No. E20:
South Center Jack Proximity Limit Switches
Missing lowered limit switch
Replaced

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

283

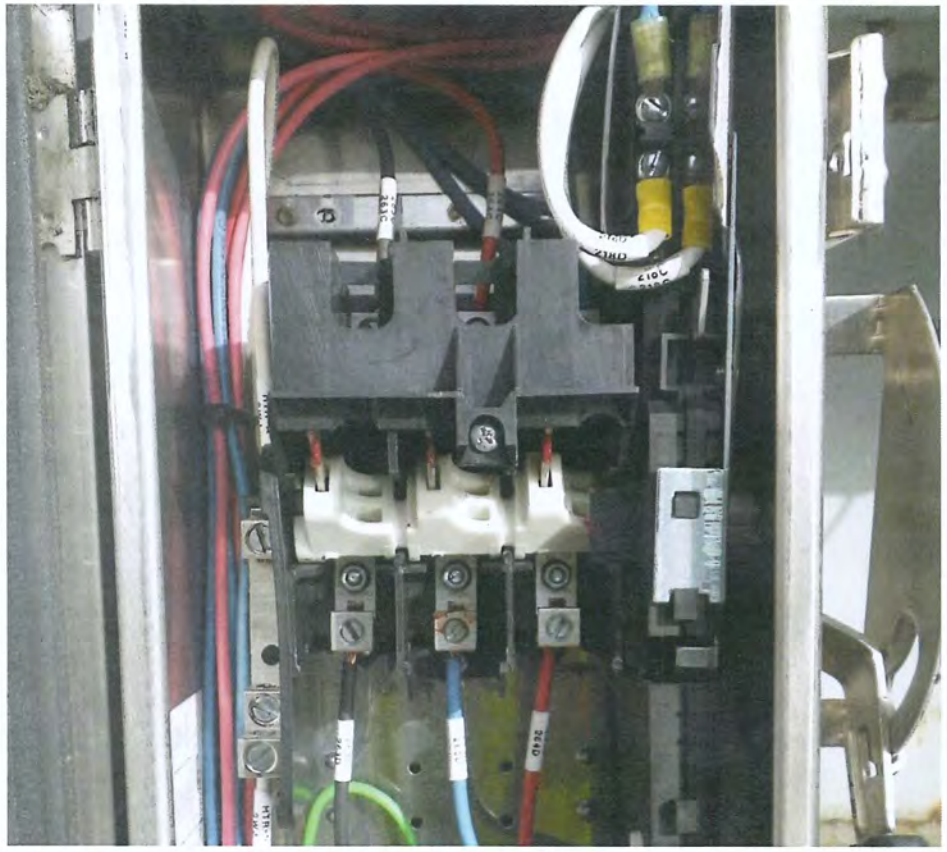


Photo No. E21:
SW End Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

Same

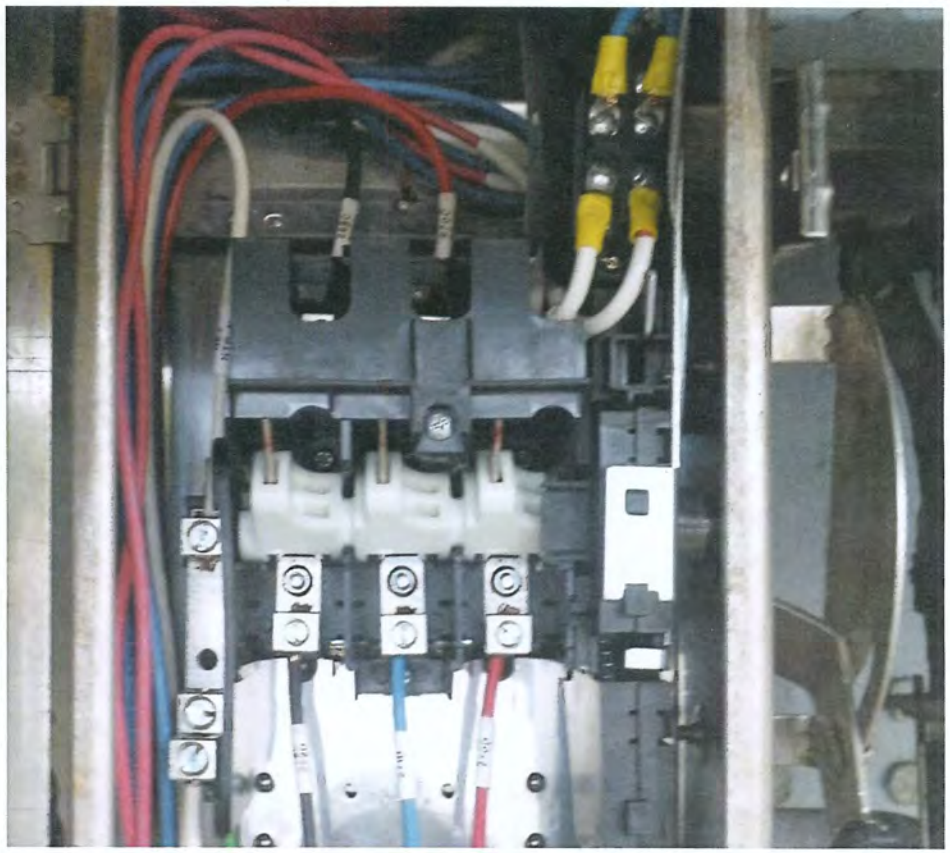


Photo No. E22:
NE End Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

Same

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

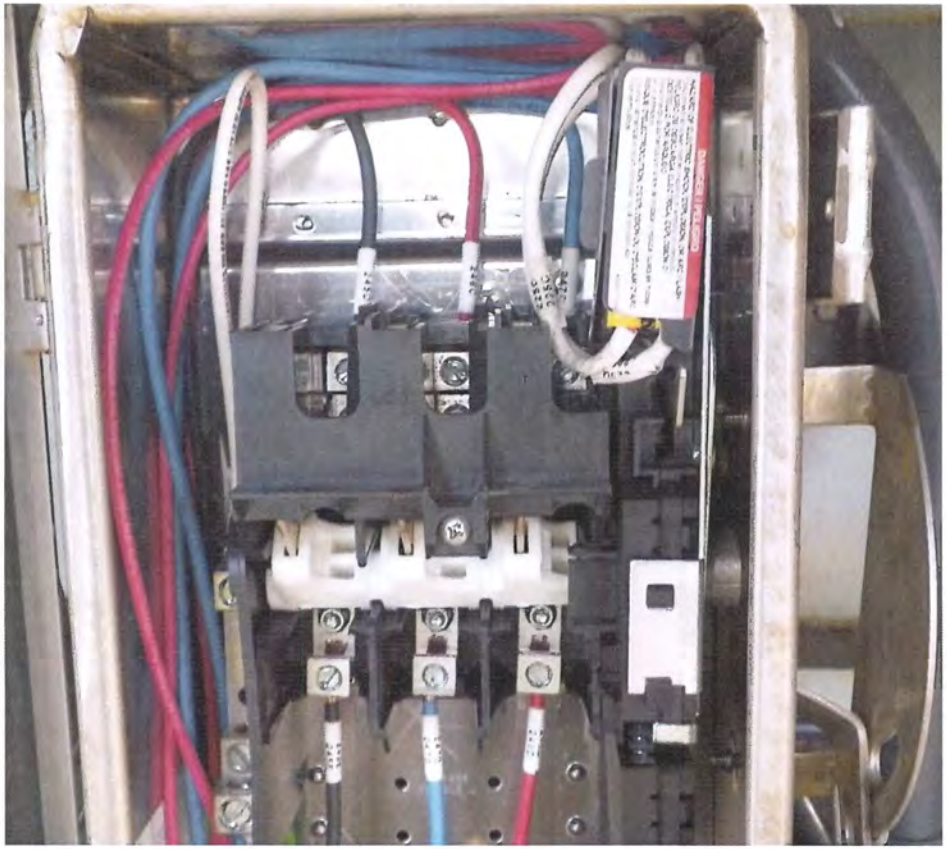


Photo No. E23:
North Center Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

same

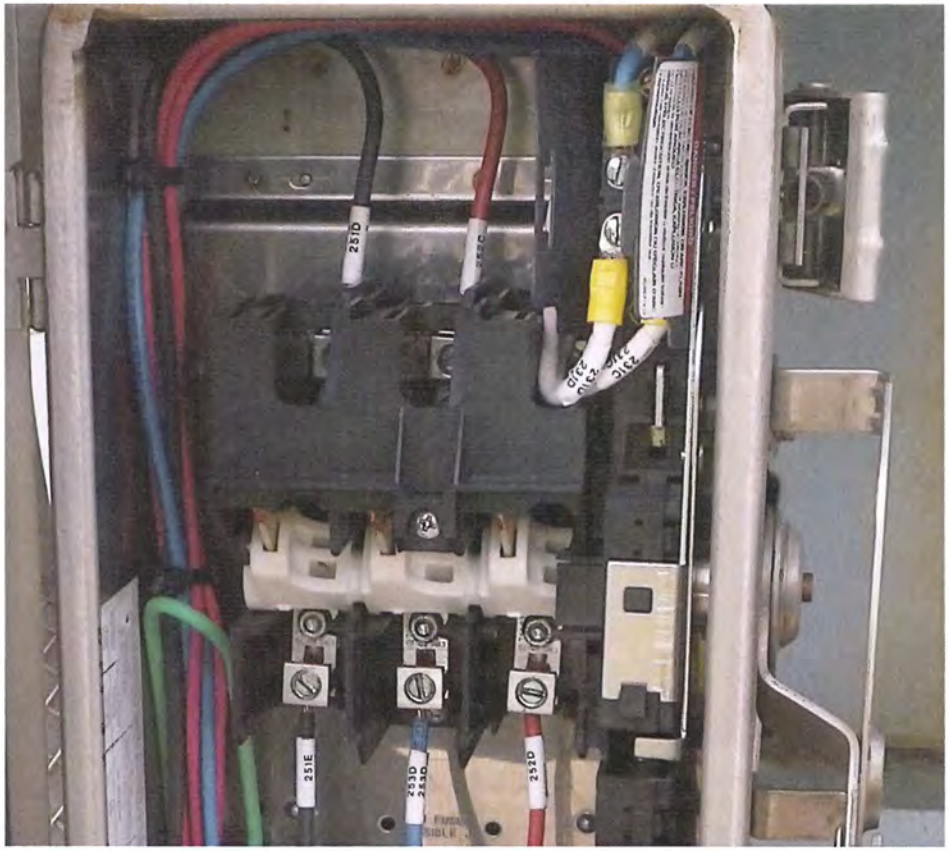


Photo No. E24:
South Center Jack Disconnect Switch
Conductor color coding on phases B & C swapped from line side to load side

True

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018

285

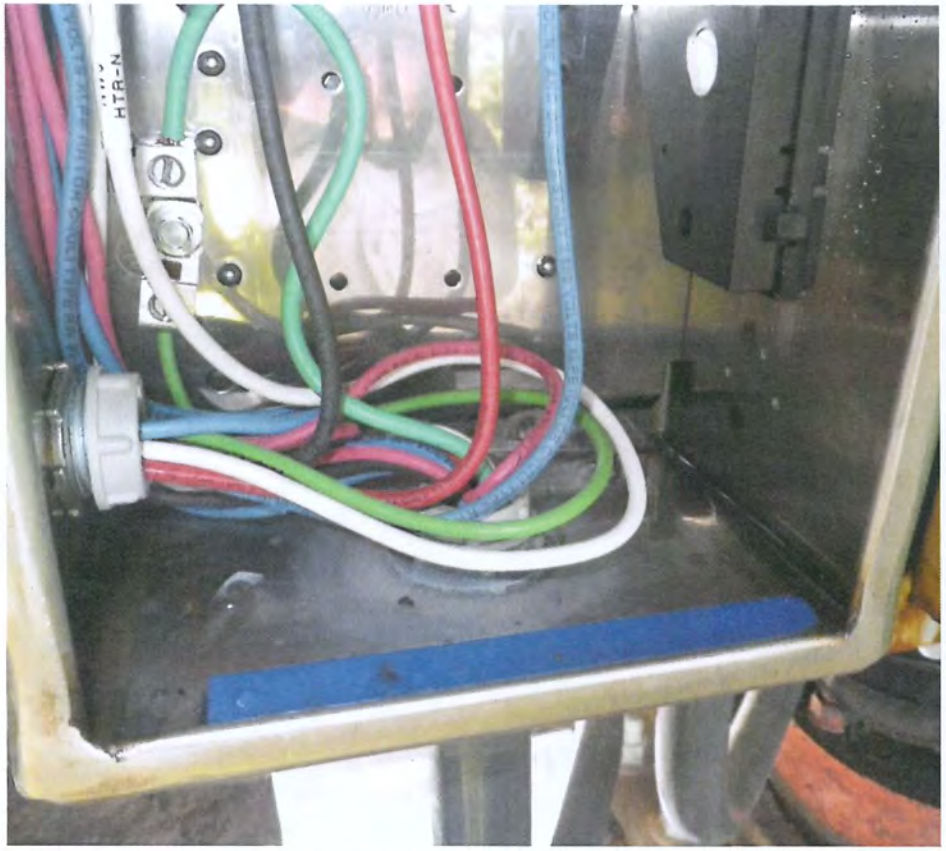


Photo No. E25:
NE End Jack Motor Disconnect
Water in the bottom of the enclosure



Photo No. E26:
SE End Jack Motor Disconnect
Missing nameplate
Minor corrosion on cover and conduit fitting

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E27:
Main Power Conduit On Span
Minor corrosion on conduit clamp (typical throughout bridge)

Same



Photo No. E28:
East Shore Service Conduit
Severe corrosion

Same

Bridge No.	01349	Inspected by:	J.E. Gerhart
Town:	Westport	Date Inspected:	October 16-17, 2018
Feature Carried:	Route 136	Inspected by:	N.K. Bhinge & K.M. Gable
Feature Crossed:	Saugatuck River	Date Inspected:	November 5, 2018



Photo No. E29:
West Pedestrian Gate
Striping stops before end of gate

same



Photo No. E30:
East Barrier Gate
Gate not fully engaged in receiver

corrected

Bridge Operation 1

Meter 2	NW Jack	Motor 6	No good
Meter 3	SW Jack	Motor 6	
Meter 4	NE Jack	Motor 6	
Meter 1	Main Motor	Motor 6	

Operation 2

Meter 2	NW Jack	Motor 7	No good
Meter 1	Main Motor	Motor 7	
Meter 3	SE	Motor 7	
Meter 4	North Center	Motor 7	
Meter 6	South Center	Motor 6	

Operation 3

Meter 2 NW Jack Motor 8

1 PM Megger 69° F 58% H

North Center Jack > 10 GΩ

2PM Megger 70° F 67% H

South Center Jack > 10 GΩ

3 PM Megger 72° F 61% H

SE Jack > 10 GΩ
NE Jack 9 GΩ ≃ 6 GΩ @ 30 sec

4PM Megger 72° F 62% H

SW Jack > 10 GΩ
NW Jack 2.6 GΩ First attempt jumpy, 2nd consistent

APPENDIX D: NUMERICAL CONDITION REPORT

MOVABLE SPANS

NUMERICAL CONDITION INSPECTION REPORT
ELECTRICAL COMPONENTS

BRIDGE NUMBER: 01349 INSPECTION DATES: 9/16/20

COMMON COMPONENTS		BASCULE SPANS		LIFT SPANS	
COMPONENTS TITLE	NCR*	COMPONENTS TITLE	NCR*	COMPONENTS TITLE	NCR*
WIRING AND CABLE	5	SPAN SEATED LIMIT SWITCH	N/A	FESTOONED CABLE	N/A
CONDUIT AND RACEWAY	5	SPAN LOCK MOTORS	N/A	SPAN SEATED LIMIT SWITCH	N/A
UTILITY SERVICE	7	BRAKES	N/A	SPAN LOCKS	N/A
SPAN DRIVE MOTORS	7			WEDGE MOTORS	N/A
SWITCHGEAR	6			DRIVE SYNC SYSTEM	N/A
MOTOR CONTROLS	7	**SWING SPANS**			
CONTROL DESK	4	COMPONENTS TITLE	NCR*		
PLC CONTROLS	N/A	END OF TRAVEL LIMIT SWITCH	3		
SPAN POSITION INDICATOR	N/A	CENTERING DEVICE	4		
SUBMARINE CABLE	N/A	WEDGE MOTORS	N/A		
DISCONNECT SWITCHES	7	JACK MOTORS	7		
GENERAL LIGHTING	3				
ROADWAY LIGHTING	N/A				
TRAFFIC SIGNALS	3	**MISC. COMPONENTS**			
TRAFFIC GATES	N/A	CONTROL LOGIC INTERLOCKS	3		
RESISTANCE BARRIERS	6				
NAVIGATION LIGHTS	3				
STANDBY GENERATOR	N/A				
ELECTRICAL CONDITION OVERALL		**RATING: 5**			

* NUMERICAL CONDITION RATING

9	NEW: Excellent functional Performance.	4	MARGINAL: Corrective action required within one year.
8	EXCELLENT: Performs intended function with very high degree of reliability and effectiveness.	3	POOR: Performance poor and/or unreliable: corrective actions required within six months.
7	GOOD: Performs with high degree of reliability and/or effectiveness.	2	URGENT: Movable span operation highly unreliable or dangerous and should be restricted. Corrective action required as soon as possible.
6	FAIR: performs with little reduction in reliability and/or effectiveness.	1	CRITICAL: Movable span Operation prohibited pending replacement or repair.
5	ADEQUATE: Performs with moderate reduction in reliability and/or effectiveness.	N/A	Not Applicable

APPENDIX E: CRITICAL FINDING PRIORITY MEMOS

From:	Lentz, Lee R.
To:	Kristoff, William; Jakiel, Michael; Orlowsky, Michael
Cc:	Ho, Albert; Christie, Shannon M.; Gable, Kyle M.
Subject:	PN 3786.01: Inspection of Bridge 01349 (Route 136 over the Saugatuck River in Westport, CT) - Mechanical and Electrical Priority Repair Item Notification
Date:	Wednesday, September 16, 2020 10:18:06 PM
Attachments:	image005.png image001.png image002.jpg image001.png image002.jpg image003.jpg image004.png image490370.png

---

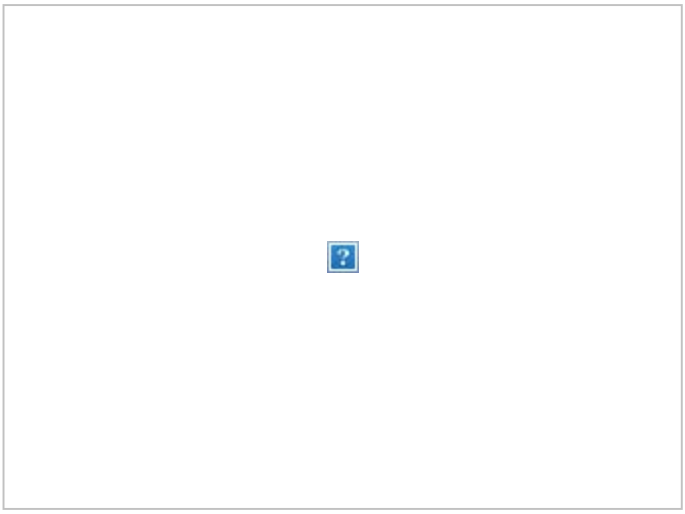
Bill,

We have a couple priority repair items to site from today's electrical and mechanical inspections:

1. When fully lowered, the east and west traffic barrier gates under engage their toe and heel end anchorages. This prevents proper engagement of the barrier energy absorption cables. CTDOT personnel on site reported that the Westport swing bridge does not open unless the roadway is shutdown by a police detail. This condition should be noted as a potential safety hazard in the event the bridge operating procedure is changed to make the traffic barrier gates the primary traffic control devices.

2. The center and end jack bypass switches were used (in ON position) to operate the bridge. This indicates that one or more jack limit switches or other related control component(s) may not be functioning properly; or the bridge interlocking may not be properly wired. CTDOT personnel on site confirmed they were aware of the bypasses being on and they provide additional personnel on site for operating the bridge in this condition. It is recommended to investigate the cause of the use of these bypasses and correct associated deficiencies as required.

   Below is a photo of the bypass switches.



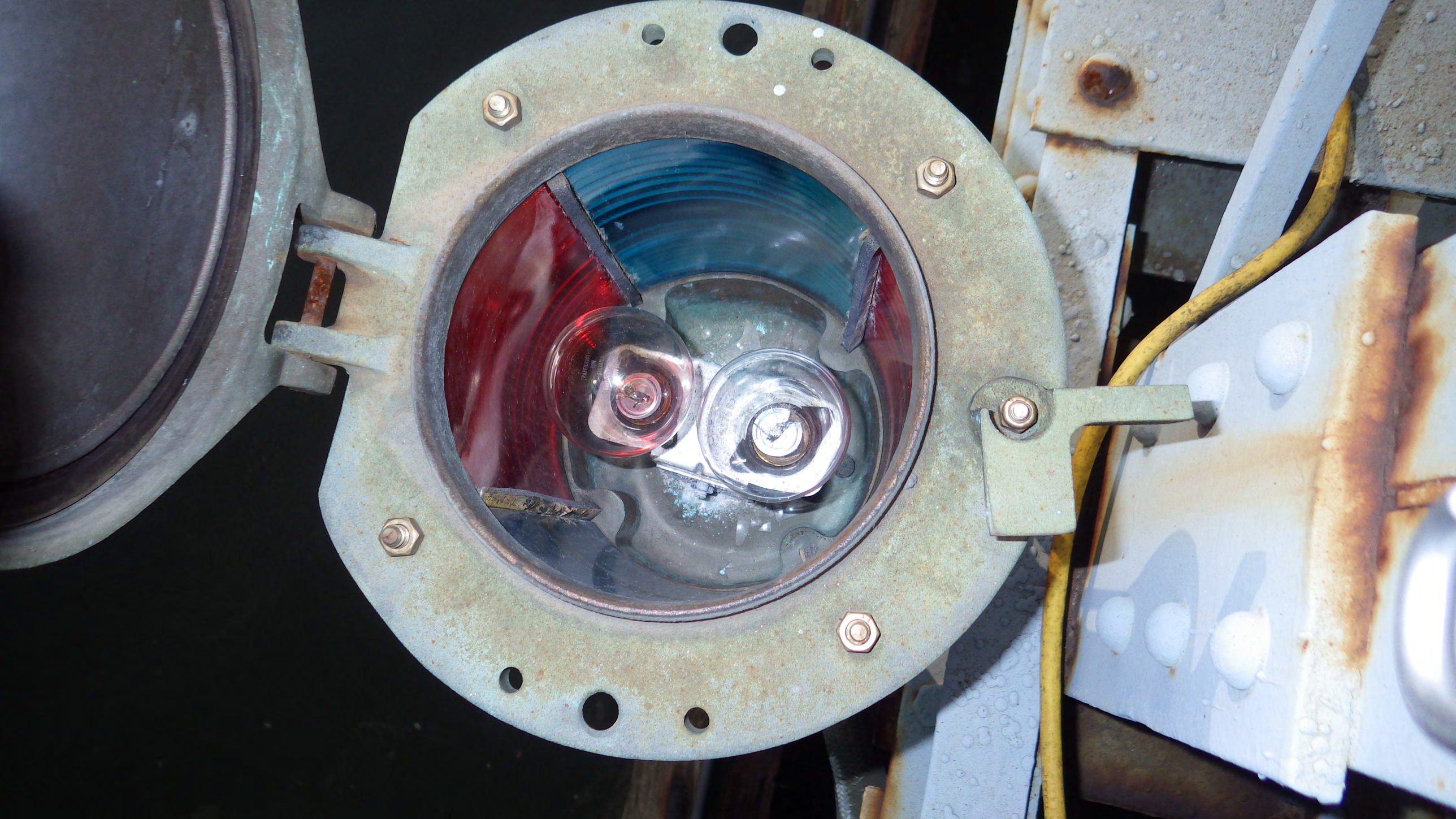
From: Lentz, Lee R
To: Kristoff, William
Cc: Gable, Kyle M; Christie, Shannon M; Orlowsky, Michael
Subject: RE: Electrical Report - navigation lights out
Date: Wednesday, October 21, 2020 7:56:51 AM
Attachments: Span_Navigation_Light_Sketch.pdf
image001.png
image002.jpg
SE_Span_Navigation_Light.JPG
SW_Span_Navigation_Light.JPG

Bill,

The SE and SW red/green span navigation lights are non-functional. Please see the attached sketch and photographs.

Thank you,
Lee


Bridge St
136
SE Span Navigation Light
Bridge St
136
SW Span Navigation Light
136





Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Maintenance Review
Assigned To: David Hiscox
Work Item ID: 01349-2020-0015
Date Issued: 10/23/2020
Priority: Routine Repair
Deficiency: Steel Corrosion
Structural Component: Superstructure
Comments: The following locations/members have areas of laminated rust with section losses up to 1/8" deep:
- Spans 1-2, girders 1 & 7 adjacent to deck drainage.
- Inside box girder at abutment 1, and exterior at south end, joint side.
- Inside pivot girder at pier 1.
- Inside box girder at pier 2.
- Transverse sidewalk support beam, top flanges adjacent to sidewalk support connections, all spans.

Date Completed:
Actual Quantity:



Span 4, 3rd sidewalk support beam: Typical laminated rust with section loss adjacent to sidewalk brackets.

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Maintenance Review
Assigned To: David Hiscox
Work Item ID: 01349-2020-0014
Date Issued: 10/23/2020
Priority: Routine Repair
Deficiency: Pigeon Waste
Structural Component: Superstructure
Comments: Box girders at abutment 1 and pier 2 and pivot girder at pier 1 have bird, wood and construction debris inside.

Date Completed:
Actual Quantity:



Span 2 box girder at pier 2, looking south: Bird debris.

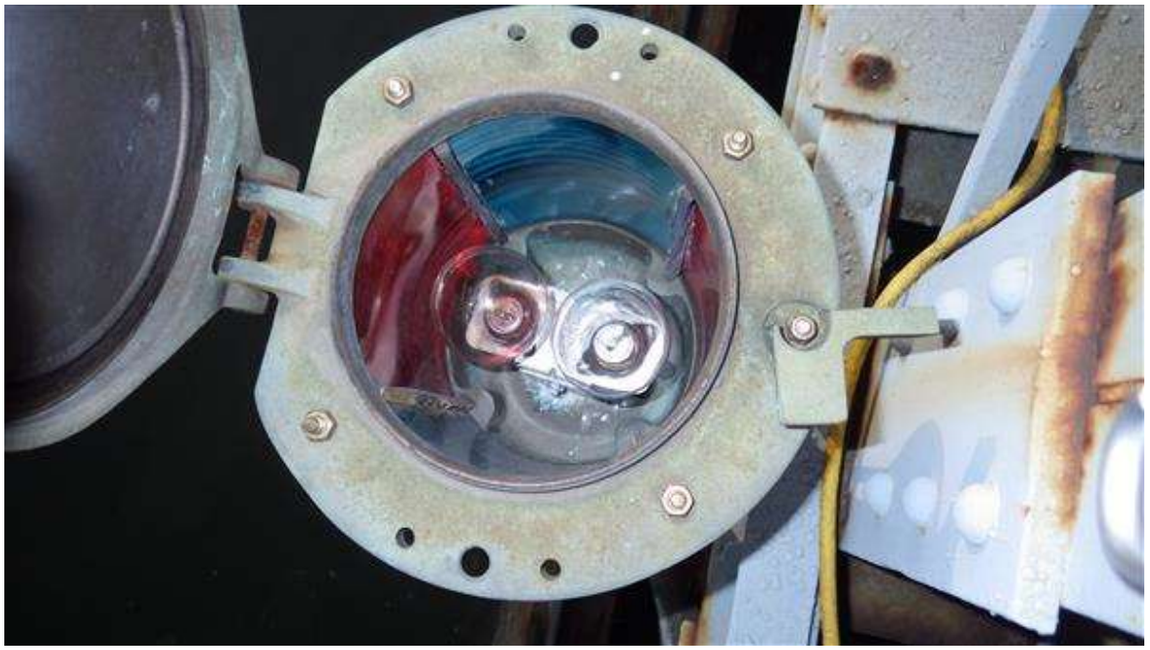
Form: Maintenance
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER

:Bridge No 01349

Town: WESTPORT
Inventory Route: Non-NHS

Status: Maintenance Review
Assigned To: David Hiscox
Work Item ID: 01349-2020-0013
Date Issued: 10/21/2020
Priority: Critical Finding B
Deficiency: Electrical
Structural Component: N/A
Comments: The southeast and southwest red/green span navigation lights are non-functional.

Date Completed:
Actual Quantity:



Southeast navigation light is non-functioning.

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Maintenance Review
Assigned To: David Hiscox
Work Item ID: 01349-2020-0012
Date Issued: 10/08/2020
Priority: Priority Repair
Deficiency: Electrical
Structural Component: N/A
Comments: The center and end jack bypass switches were used (in ON position) to operate the bridge. This indicates that one or more jack limit switches or other related control component(s) may not be functioning properly; or the bridge interlocking may not be properly wired. CTDOT personnel on site on 9/16/20 confirmed they were aware of the bypasses being on and they provide additional personnel on site for operating the bridge in this condition. It is recommended to investigate the cause of the use of these bypasses and correct associated deficiencies as required.

Date Completed:
Actual Quantity:



Bypass switches are being used to operate the bridge.

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

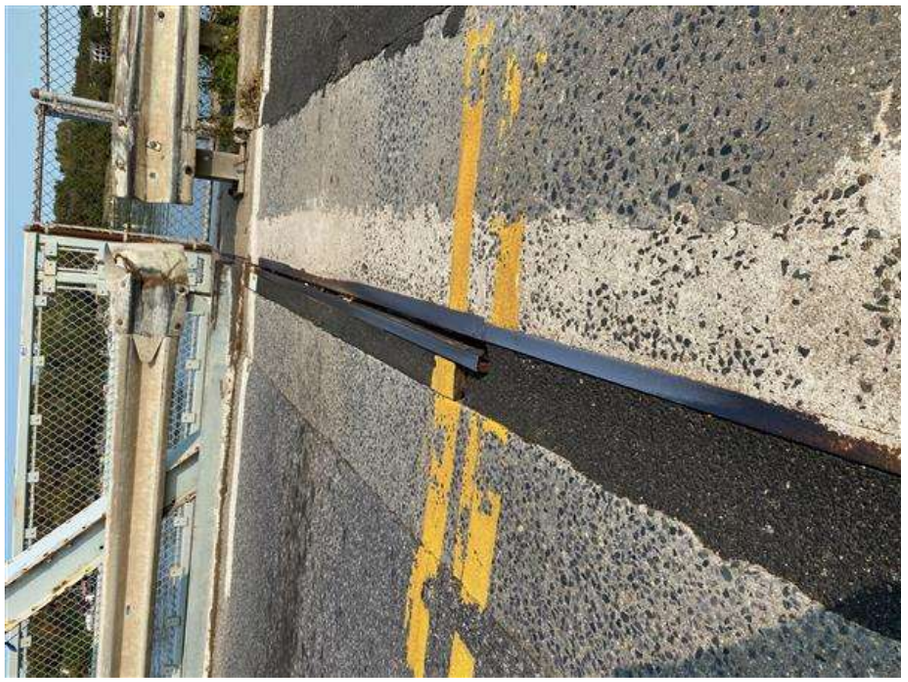
Status: Maintenance Review
Assigned To: David Hiscox
Work Item ID: 01349-2020-0011
Date Issued: 10/08/2020
Priority: Priority Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: When fully lowered, the east and west traffic barrier gates under engage their toe and heel end anchorages. This prevents proper engagement of the barrier energy absorption cables. Also, barrier gates are not interlocked with the electrical control system. CTDOT personnel on site on 9/16/20 reported that the Westport swing bridge does not open unless the roadway is shutdown by a police detail. This condition should be noted as a potential safety hazard in the event the bridge operating procedure is changed to make the traffic barrier gates the primary traffic control devices.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Bridge Maintenance Garage
Assigned To: District_3 Bridge
Work Item ID: 01349-2020-0010
Date Issued: 09/16/2020
Priority: Critical Finding B
Deficiency: Deck Joint
Structural Component: Deck
Comments: The left steel extrusion in the westbound lane at abutment 2 is loose and can be lifted up to 1” high. The extrusion easily bounces when just standing on it.

Date Completed:
Actual Quantity:



The left steel extrusion in the westbound lane at abutment 2 is loose and can be lifted up to 1” high. The extrusion easily bounces when just standing on it.

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2019-0009
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: MISCELLANEOUS:

1. Various components do not have fresh lubrication or do not show signs that plugs are being removed during lubrication.
2. Throughout the machinery system, various supports, housings, couplings, connecting bolts, and shafts exhibit minor to severe paint failure and corrosion.
3. There are oil and lubrication leaks at multiple bearing/coupling seals and reducer drains.
4. During operation, the span guard rails rub against the approach guard rails.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2019-0008
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: SPAN SUPPORT AND ALIGNMENT:

1. The balance wheel clearance with the track ranges from 0 to 0.288 inches while the design clearance was 1/16 inches. The wheels slide against the track instead of rotating.
2. The balance wheel bearing bushing clearance is well outside the range for an RC6 fit for most of the wheels.
3. There are no limit switches to disengage all screw jack motors when the screw jacks are being operated manually which creates a hazard.
4. All screw jack gear reducer desiccants are expired.
5. The oil samples taken from the south center jack reducers showed signs of water contamination.
6. The oil sample taken from the southeast end jack upper reducer showed signs of water contamination. The northwest and southeast upper end jack gear reducer dipsticks show that the oil level is low.
7. The screw jack lower reducers do not have a dipstick, sight glass, or any other means to monitor the oil level.
8. The screw jack couplings do not have lubrication fittings on them and the plugs are painted over showing no signs of recent lubrication.
9. Screw jack bearing surfaces have moderate to severe corrosion with delamination. There are small gaps under the end screw jacks with the base when fully driven. The gaps are not the entire way through the interface.
10. There appears to be a leak coming from the center pivot bearing at the northeast corner purging out over the top of the strip seal.
11. The fully closed rigid stop is deformed, most likely from hard impact with the span.
12. The centering device has moderate paint failure and corrosion.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2019-0007
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: SPAN DRIVE MACHINERY:

1. There is a gap at the split on coupling C2 (between the main motor and right angle reducer) with lube leaking out of the gap.
2. The coupling on the motor rear shaft (C3) is leaking (missing gasket) and interferes with the span control reducer during operation.
3. The right angle gear reducer drain plug is corroded and not able to be removed preventing an oil test.
4. Very heavy accumulation of dirt/debris on top of the right angle reducer, which is trapping moisture and causing corrosion.
5. The right angle gear reducer desiccant is expired.
6. The main pinion shaft is covered in excess lube coming from the pinion shaft bearing seals.
7. The lower pinion bearing has a corroded plug in the lubrication port and no lubrication fitting.
8. The open gearing teeth have little to no fresh lubrication on them and are corroded.
9. The most north section of the rack segment is filled with water.
10. It appears that the bridge comes to an uncontrolled stop after the motor deenergizes and the brake sets. The swing span oscillates by moving through the backlash on both sides of the pinion tooth.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2019-0006
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Electrical
Structural Component: N/A

Comments:
1. There is minor corrosion on the east meter cabinet and also on the west meter cabinet.
2. There is minor corrosion on the interior terminals and conduits in the east and west service cabinets.
3. The electric space heaters in the east and west service cabinets are not functioning.
4. The GFCI test and reset buttons are not functioning in the east and west service cabinets.
5. The west service cabinet door gasket is damaged.
6. There are miscellaneous items stored in the bottom of the left cabinet and the center cabinet.
7. There are splices made with wire nuts in violation of AASHTO Article 8.9.2 within the left cabinet and on the backside of the interior panel in the center cabinet.
8. The bottom of the center cabinet has moderate corrosion.
9. The southwest end jack legend plate is missing.
10. The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
11. Minor corrosion on the span rotary cam limit switch.
12. Moderate corrosion and a damaged gasket on the SW jack rotary cam limit switch.
13. Moderate corrosion and the cover could not be opened on the NW jack rotary cam limit switch.
14. Moderate corrosion on the SE jack rotary cam limit switch.
15. Moderate corrosion and a damaged gasket on the north center jack rotary cam limit switch
16. Moderate corrosion, damaged gasket, and the bottom wingnut is missing on the south center jack rotary cam limit switch.
17. The west barrier gate arm lever arm limit switch can seize in the actuated position and there is minor corrosion on the conduit fitting.
18. The east barrier gate limit switch is permanently seized in the actuated position.
19. Missing driven south center proximity limit switch.
20. The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
21. The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for both center jack locations and the NE and SW end jacks.
22. Water is present in the bottom of the NE end jack motor disconnect.
23. Missing nameplate and minor corrosion on cover and conduit fitting of the NE end jack motor disconnect.
24. Minor corrosion on conduit clamps throughout bridge.
25. Severe corrosion on underground conduit at the east shore service cabinet.
26. The southwest, northeast, and southeast span navigation lights were not operational.
27. The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02.
28. The east approach traffic signals and gong were not operational.
29. Striping on the west pedestrian gates stops before the end of the gate.
30. The barrier gates were not fully engaged in the receiver when lowered on both approaches.
31. None of the barrier gate lights were operational.
32. No lighting for maintenance is provided on the bridge.
33. Barrier gates are not interlocked with control system.
34. Centering device is not interlocked with jack control.
35. Jacks are not interlocked with span movement.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Bridge Maintenance Garage
Assigned To: District_3 Bridge
Work Item ID: 01349-2018-0005
Date Issued: 11/07/2018
Priority: Priority Repair
Deficiency: Sidewalk/ Safety Walk
Structural Component: Deck
Comments: - The northeast approach sidewalk has settled up to 1” adjacent to bridge sidewalk.
- There is vertical misalignment between adjacent sidewalk planks up to 1” deep at Pier 2.
Please repair the above deficiencies.

Date Completed:
Actual Quantity:



Bridge from the east approach, looking west.

Form: Maintenance
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER

:Bridge No 01349

Town: WESTPORT
Inventory Route: Non-NHS

Status:	Bridge Maintenance Garage	Assigned To:	District_3 Bridge	Work Item ID:	01349-2018-0003
Date Issued:	11/06/2018	Priority:	Routine Repair		

Deficiency: Sidewalk/ Safety Walk
Structural Component:
Comments: The safety walk along the west side of Pier 2 has a missing plank

Date Completed: Actual Quantity:



Span 2 at Pier 2, missing plank at fender system at northwest end.

Inspection Type: Fracture Critical and Routine and Underwater

BRIDGE NO. 01349

83500 - WESTPORT

ROUTE 136

over

SAUGATUCK RIVER

Fracture Critical and Routine and
Underwater Inspection

9/15/2022

Inspected by: A. DiCesare

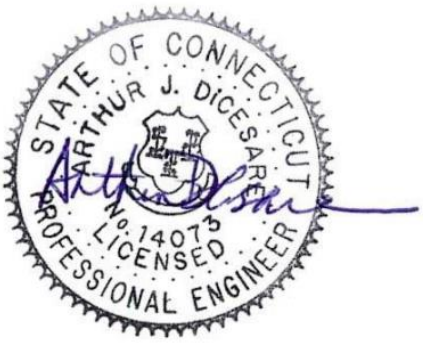


TABLE OF CONTENTS

Section	Page Number
Report Title Page	1
Location Map	2
In-Depth Components	3
Structure Inventory and Appraisal (BRI-19)	4
Inspection Data (BRI-18)	9
National Bridge Elements	19
Underwater Inspection (BRI-59)	21
Underwater Inspection (BRI-58)	22
Fracture Critical Data (BRI-12)	26
Sketches	29
Underwater Sketches	57
Pictures	68
Highway Bridge Work Items	124
Mechanical Inspection Report 2022	140
Electrical Inspection Report 2022	215

Bridge No. 01349, Route 136 over Saugatuck River, Westport

Inspected By: A.DiCesare Associates Date: 09/15/2022



Professional Certification: I hereby certify that this report, including all of its contents, has been approved by me, and that I am a duly licensed professional engineer under the laws of the State of Connecticut.

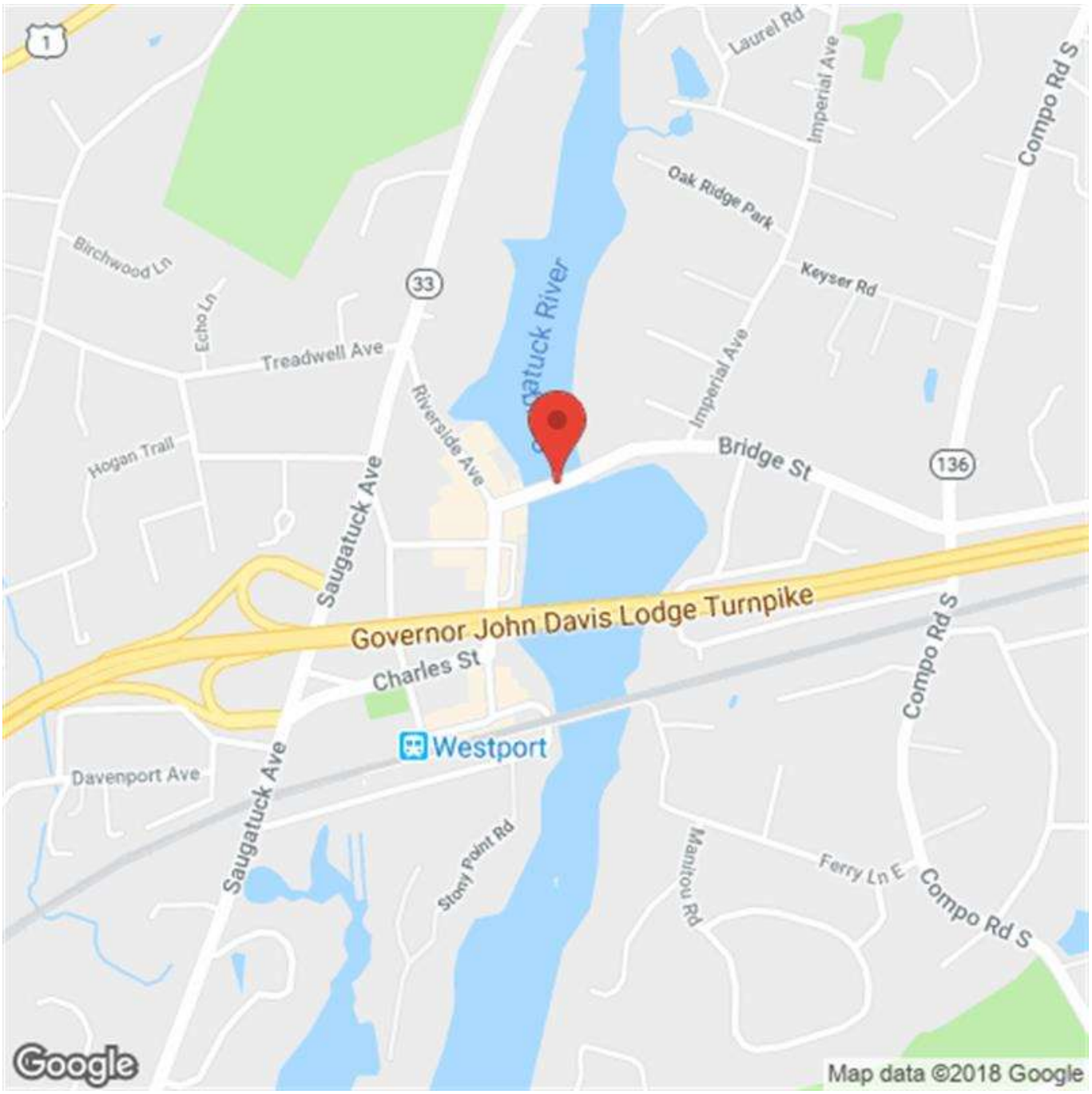
Signature:

License No.: 14073 Date: 11/07/2022

Form: Location
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



Location Map # 1

Bridge No. 01349
Route 136 over Saugatuck River
Westport, CT

In-Depth Components

Bridge: 01349

Town: 83500 - WESTPORT

Carried: ROUTE 136

Crossed: SAUGATUCK RIVER

In-Depth - 1

Component:	Steel Multi-Girders
Comments:	Hands-on inspection of open holes in longitudinal girder webs in spans 1-2. Note: All other fatigue category E & intersecting welds are between fracture critical box/pivot girders and longitudinal girders. Thus, should be inspected every inspection.
Access Requirements:	Raft and scaffolding. In-Depth completed this inspection.

Last Inspected: 09/15/2022 Frequency: 120 Inspection Due Date: 09/15/2032

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

STRUCTURE INVENTORY & APPRAISAL

INSPECTION

Structurally Deficient: Y
Functionally Obsolete: N
Sufficiency Rating: 4.0
(90) Inspection Date: 09/15/2022
(91) Frequency: 24
Indepth Insp: No
Proposed next Indepth Year:
Deck Survey Date: 1/1/1900
Class: 03
Access: 40 - Boat or raft (other than inflatable boats issued to inspection teams)
Flagman: 0

	Frequency	Date	Type
Fracture	24	09/15/2022	J Steel Pier Caps, welded box or plate girders
Underwater	24	09/15/2022	B Underwater Only
Special			

IDENTIFICATION

Bridge Name: WILLIAM F. CRIBARI MEMORIAL BRIDGE
Town Code - Name: 83500 - WESTPORT
(5) Inventory Route
(A) Record Type: 1: Route carried "on" the structure
(B) Signing Prefix: 3 - STATE HIGHWAY
(C) Level of Service: 1 - MAINLINE
(D) Route Number.: 00136
(E) Dir Suffix: 0 - NOT APPLICABLE
(6A) Featured Intersected: SAUGATUCK RIVER
(6B) Critical Facility Indicator:
(7) Facility Carried: ROUTE 136
(9) Location: BETWEEN I-95 EXIT 17 & 18
(11) Mile Post: 8.65 Miles
(16) Latitude: 41 Deg. 7 Min. 21.94 Sec.
(17) Longitude: -73 Deg. 22 Min. 8.77 Sec.
(98) Border Bridge
(A) State Code: (B) Percent Responsibility: %
(C) Border Town Name:
(99) Border Bridge Structure No.:

STRUCTURE TYPE & MATERIALS

(43) Structure Type, Main
A) Material: 4 - Steel continuous
B) Design Type: 17 - Movable - Swing
(44) Structure Type, Approach
A) Material: 4 - Steel continuous
B) Design Type: 02 - Stringer/Multi-beam or Girder
(45) Number of Spans, Main Unit: 002
(46) Number of Approach Spans: 0002
(107) Deck Structure Type: 5 - Steel Plate (inclues orthotropic)
(108) Wearing Surface/Protection Systems
A) Type of Wearing Surface: 6 - Bituminous
B) Type of Membrane: 1 - Built-up
C) Type of Deck Protection: 0 - None
Substructure
A) Material: 1 - STONE
B) Design Type: 1 - FULL HEIGHT STEM
Paint
Type:
Year:
Comment:

GEOMETRIC DATA

(48) Length of Maximum Span: 70 ft.
(49) Structure Length: 287 ft.
(50) Curb or Sidewalk Widths
A) Left: 3 ft. 8 in. B) Right: 0 ft. 0 in.
(51) Bridge Roadway Width Curb to Curb: 19 ft. 6 in.
(52) Deck Width, Out to Out: 20 ft. 0 in.
(32) Approach Roadway Width: 21 ft.

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

(33) Bridge Median: 0 - No median

Deck Area: 7653 sq. ft.

(34) Skew Angle: 00 deg.

(35) Structure Flared: 0 - No flare

(10) Inv. Rte. Min. Vert. Clearance: 13 ft. 10 in.

(47) Inv. Rte. Total Horiz. Clr.: 19 ft. 6 in.

Log Inv. Rte. Total Horiz. Clr.: 19 ft. 6 in.

RLog Inv. Rte. Total Horiz. Clr.: 0 ft. 0 in.

(53) Min. Vert. Clearance Over Bridge: 12 ft. 10 in.

(54) Log-Min. Vert. Underclearance: N ref. 0 ft. 0 in.

(55) Min. Lat Underclearance on Right: N ref. 0 ft. 0 in.

(56) Min. Lat Underclearance on Left: 0 ft. 0 in.

AGE AND SERVICE

Year Built: 1870

(106) Year Reconstructed: 1993

(42) Type of Service

A) On: 1 - Highway

B) Under: 5 - Waterway

(28) Number of Lanes

A) On: 02 B) Under: 00

(29) Average Daily Traffic: 14500

Is Above Half ADT?: No

(109) Precent Truck: 5 %

(30) Years of ADT: 2017

(19) Bypass, Detour Length: 1 Miles

CONDITION

(58) Deck: 5

(59) Superstructure: 5

(60) Substructure: 4

(61) Channel & Channel Protections: 5

(62) Culverts: N

(36) Traffic Safety Features

A) Bridge Railings: 0

B) Transitions: 0

C) Approach Guardrail: 0

D) Approach Guardrail Ends: 0

APPRAISALS

(67) Structural Evaluation: 2

(68) Deck Geometry: 2

(69) Underclearances, Vert. & Horiz.: N

(71) Waterway Adequacy: 8

(72) Approach Roadway Alignment: 6

(113) Scour Critical: 8

COMMENTS

Item 27 = 1870 (Do Not Change): Oldest Swing Span in United States.

ADT obtained from CTDOT AADT and Hourly Volume Map

WATERWAY

Drainage Basin Waterway: 7200 - Saugatuck River

(38) Navigation Control: 1 - Navigation control on waterway (bridge permit required)

(39) Navigation Vertical Clearance: 7 ft.

(40) Navigation Horiz. Clr.: 50 ft.

(111) Pier/Abutment Navigation: 2 - In place and functioning

(116) Vert-Lift Brg Nav Min: ft. In.

CLASSIFICATION

(112) NBIS Bridge Length: Yes

(104) Highway System: 0 - Structure/Route is NOT on NHS

(26) Functional Class: 16 - Urban - Minor Arterial

(100) Defense Highway: 0 - Not a STRAHNET route

(101) Parallel Structure: N - No parallel structure

(102) Direction of Traffic: 2 - 2-way traffic

Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

(103) Temporary Structure	
(110) Designated National Network	0 - Inventory route not on network
(20) Toll	3 - On Free Road
(21) Maintain	01 - State Highway Agency
(22) Owner	01 - State Highway Agency
Report Class	S - STATE
(37) Historical Significance	1 - On National Register

POSTED SIGNS

Other Posted Sign 1	8 - Other warning signs
Other Posted Sign 2	

	Actual	Recomended	
Posted Load Single Unit Truck			tons
Posted Load Semi-Trailer Truck			tons
Posted Load 4 Axle Truck			tons
Posted Load 3S2 Truck			tons
All Vehicles	20	20	tons

Posted Vert. Clearance on Bridge	12	ft. 7	in.
Posted Vert. Underclearance		ft.	in.
Posted Speed Limit on Bridge	25	m.p.h.	

OTHER FEATURES

Fence Required	No
Fence Present	Yes
Fence Type	2 - Chain Link
Fence Height	4.3
Fence Material	2 - Steel
Fence Top Type	1 - Vertical
Barrel Ladders	No
Stand Pipes	No
Catwalks	No

PROPOSED IMPROVEMENTS

(75A) Type of Work Proposed	31 - Replacement - Load/Geometry
(75B) Work Done By	1 - Work to be done by contract
(76) Length of Structure Improvement	ft.
(94) Bridge Improvement Cost	$
(95) Roadway Improvement Cost	$
(96) Total Project Cost	$ 40000
(97) Year of Improvement Estimate	2016
(114) Future ADT	21546
(115) Year of Future ADT	2037
DOT Bridge Program List No	28
Project No	0158-0214
Advertised Date	11/27/2024

LOAD RATING & POSTING

(31) Design Load	5 - HS 20
(63) Operating Rating Type	8 - Load and Resistance Factor (LRFR) rating reported by rating factor (RF) method using HL93 loading
(64) Operating Rating	0.40
(65) Inventory Rating Type	8 - Load and Resistance Factor (LRFR) rating reported by rating factor (RF) method using HL93 loading
(66) Inventory Rating	0.31
Evaluation Code	F - Load & Resistance Factor Rating
Year of Evaluation	2017
(70) Bridge Posting	0 - More than 39.9% below legal loads
(41) Structure Status	P - Posted for Load

Moveable Inspection System	No
Haunches Present over Roadway	NO
Utilities	U | Unknown Duct

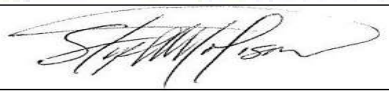
Form: BRI-19, Rev. 2/15
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

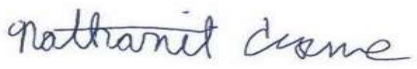
:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

INSPECTOR'S SIGNATURES:

1)  Date: 10/26/2022

2)  Date: 10/27/2022

3)  Date: 10/27/2022

4)  Date: 10/27/2022

P.E. SIGNATURE:  Date: 10/27/2022

P.E. # 14073

Reviewed By:  Date: 01/03/2023

FIELD INSPECTION REPORT

Location:	BETWEEN I-95 EXIT 17 & 18	Year Built:	1870	Snooper Required:	☐
Main Material:	4 - Steel continuous	Year Rebuilt	1993	Snooper Used:	☐
Main Design:	17 - Movable - Swing				

Inspectors:

Lead Inspector:	Kurt Gabrielson
Inspector:	Task:
Area,13	BSE - Inspector
Crane,Nathaniel	BSE - Inspector Rail - Inspector
DiCesare,Matthew	BSE - Inspector Rail - Inspector
Gabrielson,Kurt	BSE - Inspector Rail - Inspector
Molison,Steve	BSE - Inspector Rail - Inspector

Visits:

Visit Date:	Temp:	Start Time:	End Time:
09/15/2022	71	08:00 AM	02:00 PM
10/03/2022	50	08:00 AM	02:30 PM
10/07/2022	75	07:00 AM	01:00 PM

58. DECK:

Overall Rating: 5

Rating

Overlay:	5	- Heaving/wheel line rutting up to 2" high/deep. - Random longitudinal and transverse linear cracks up to 1/4" wide. - Raveling along curbs up to 6" wide x 1/2" deep. - Pothole adjacent to the south curb in span 1, 2' long x 16" wide x up to 1-1/2" deep. CTDOT was notified of this condition via email on 11/29. - Raveling adjacent to span 2, pier 2 steel joint plate full length x 3" wide x up to 1" deep. - Three scrapes up to 1' long x 2" wide x 1" deep in span 3. - Three cracks up to 3' long x 1/4" wide in span 4. See 'Top of Deck' field sheets and photos 8, 12 & 17-18.
Deck - Str. Condition:	5	Welded steel plate deck in spans 1 & 2 (swing spans) that functions as a top flange for girders: - See "Girders" item below. Exodermic deck in spans 3 & 4 (fixed spans): - Random light rust. - Deck overhangs have random laminated rust with perforations up to 2' x 1' around weeps/scuppers (photo 11). See 'Underside and Framing General Notes' and 'Underside and Framing' field sheets and photos 9-10.
Curbs:	6	Steel channel curbs: - Moderate rust and isolated laminated rust with up to 1/8" deep section loss. - Minor scrapes. - East end of north curb is a 6" high blunt/sharp edge that is bent back 1" from impact. - Average curb reveal is 7" at both sides. - Northeast approach curb is missing for 2' long with an exposed rebar. See 'Top of Deck' field sheets and photos 12 & 17-19.
Median:	N	
Sidewalks:	5	Timber plank sidewalk at north side of bridge:

		- Random planks are misaligned and bent up at the ends up to 1/2" high. - Minor checks and wear. - The previous two disconnected/loose planks at the northwest approach have been repaired. Timber sidewalk stringers & transverse steel support members: - Extra timber stringer between stringers 1 & 2 over abutment 1, pier 1 and pier 2. - Checks up to 1/4" wide along the bottom. - Random connection bolts or nuts are backed off, loose and/or missing (photo 15). - Connection brackets have laminated rust and up to paper thin remaining and up to 1.5" diameter perforations. - This condition is typically along the bottom 4" of brackets. - Support beam top flanges have up to full width x 2" long x 1/8" deep section loss adjacent to brackets. - Support beams in swing spans have flame cut flanges at random locations. Concrete approach sidewalk at northwest: - Isolated 4' long x 3/8" wide transverse crack. See 'Top of Deck', 'Underside and Framing General Notes' and 'Underside and Framing' field sheets and photos 13-16.
Parapet:	N	
Railing:	6	Metal W-beam rails: - Isolated post base plates with heavy laminated rust. - Random light to moderate impact damage. - Span 1, south railing at abutment 1 has a post bent east +/-1' and heavy collision damage. - Span 2, north railing has a 3' long x 2" high tear (photo 12). - Northeast corner with heavy impact damage with isolated tears up to 3" x 1". - +/-1' gap between bridge and approach rail at northeast due to missing approach end treatment. - 20' of guide rail attached directly to truss members above north rail to protect electrical box at pier 1. Sidewalk railing with chain link fence: - See "Fence" item below. See 'Top of Deck' field sheets and photos 8, 12 & 17-19.
Paint:	7	- Less than 10% of painted surfaces deteriorated. - See "Fence" item below.
Fence:	8	4'-3" high chain link fence & rail along north sidewalk: - No significant deficiencies See 'Top of Deck' field sheets and photos 12-13.
Drains:	6	Scuppers: - Grates are up to 66% clogged; all down pipes are clear. - Grates have settled up to 2" deep relative to the overlay. - Span 4, north center grate concrete apron has an 18" long x 6" wide x 1" deep spall. PVC weeps: - No significant deficiencies. See 'Top of Deck' field sheets and photos 11 & 17.
Lighting Standard:	N	

Overall Utility Condition Rating	6 - Fair

Utility Type/Size

U | Unknown Duct	- Several utility conduits attached to underside of superstructure with no

		notable deficiencies. - In span 1 at the north sidewalk, there is one missing utility cover & one cover with no bolts (can be lifted by hand). See 'Top of Deck' field sheet and photo 13.
Construction Joints:	N	
Expansion Joint:	7	Steel-armored open joints at abutment 1 and pier 2: - Random nicks and gouges in steel armor. Strip seal joint at abutment 2: - No significant deficiencies See 'Top of Deck' field sheets and photos 18-20.

Haunches Present over travelway? NO

APPROACH CONDITION:

Overall Rating: 6

Rating

Approach Slab:	N	- None per plans.
Relief Joints:	N	
Approach Guide Rail:	5	Metal beam railings: - Minor scrapes and dents. - Northwest approach metal beam rail near west traffic gate is missing an end treatment. - Northeast approach metal beam rail adjacent to bridge is missing an end treatment. - Boxing glove ends at west approaches have heavy impact damages. See 'Top of Deck' field sheets and photos 4-7 & 19-21.
Approach Pavement:	7	- East approach adjacent to concrete header with up to 1" deep settlement (smooth transition). - West approach exhibits (3) cracks up to full width x 1/4" wide See 'Top of Deck' field sheets and photos 4-5.
Approach Embankment:	8	

Trafic Safety Features

Bridge Railings:	0	Do not meet standards for Non-NHS bridges.
Transitions:	0	Do not meet current standards (steel block-outs and not continuous).
Approach Guardrails:	0	Do not meet current standards (steel block-outs).
Approach Guardrail Ends:	0	Do not meet current standards (blunt ends at the west approach).

59. SUPERSTRUCTURE:

Trusses are ornamental and do not carry live load, only self-weight.

Overall Rating: 5

Rating

Bearing Devices:	6	Elastomeric bearings under trusses and girders in spans 3 and 4: - Pads in neutral position and have slight tilts up to 1/4" at 75°F. - Sole plates are typically bowed/dished up to 1/2" (appears as-built). - Plates typically have light to moderate rust, but up to laminated rust at abutment 2 bearings. - Truss 1 bearing on box girder at abutment 1 has a 4" x 6" x 1/4" gap under pad (covered by debris) (photo 25). - Truss 2 bearing on box girder at abutment 1 has a backed off anchor bolt nut.

		Original truss bearings: - Up to laminated rust on plates and components. - Up to 25% section loss to rivet heads at pier 1 bearings. - Bearings at pier 2 have up to 100% section loss at 3 of 4 spacers at anchor bolts (photo 26). - Bearings at pier 2 have up to 50% section loss on anchor and/or drop bolt nuts. - Bearings at pier 2 also have anchor bolt nuts backed off up to 1". - Truss 1 bearing at abutment 2 has 100% section loss on spacers. - Up to heavy debris on bearings at abutment 2. Swing span screw jack bearings at abutment 1 and piers 1 and 2: - See 2022 Mechanical inspection report. See 'Underside and Framing General Notes' and 'Underside and Framing' field sheets and photos 22-27.
Stringers:	N	
Girders:	6	Plate girders: - Random peeling paint and up to laminated rust with negligible section loss, typically near weeps. - Top and bottom of webs adjacent to weeps with up to 1' long x 4" high x 1/8" deep section loss (photo 29). - Span 2, girder 7 bottom flange near mid-span has minor scrapes with light rust. - Span 1, girders 2-5 near abutment 1 are bowed +/- 1/8" over full height at welded splice (no change). Spans 1-2 girders with a common top plate (flange), continuous across all girders & across pier 1: - Random peeling paint. - Isolated 4" wide x 1/16" deep section loss along span 1, girder 7 top flange at abutment 1. - See "Rivets & Bolts" and "Welds-Cracks" items below. See 'Underside and Framing General Notes' and 'Underside and Framing' field sheets and photos 9-10, 23-24 & 28-30.
Floor Beams:	5	Fracture critical end floorbeams (box girders) at abutment 1 and pier 2: - Exterior has up to laminated rust with negligible loss on bottom flanges and bottom 2" high of webs. - Interior has random moderate to heavy rust at lower portions of box girders. - 10" diameter holes cut in both end diaphragms of girders, allowing pigeon access. - Construction debris and heavy accumulation of pigeon debris up to 3" high inside girders (pier 2). Fracture critical box girder at pier 1 (pivot girder for swing span): - Exterior has isolated light to moderate rust. - Interior has up to laminated rust along bottom flange, bottom 6" of stiffeners and webs. - Isolated 1/16" deep section losses. - See "Welds-Cracks" item below. See 'Underside and Framing General Notes' and 'Underside and Framing' field sheets and photos 31-33 & 57-58.
Trusses - General:	2	Trusses were retained during the 1993 rehabilitation for ornamental purposes only and carry no live load, only their self-weight. Therefore, trusses are no longer considered fracture critical. Built-up truss members: General: - Up to 3/8" pack rust between plates. - Random severed, disconnected, cut-out and/or bent lattice bars (mostly above roadway level). - Batten plates and lattice bars with random laminated rust and up to 3/16" deep section loss. - Batten plates and lattice bars also have random rusted through holes.

		Bottom chords in spans 1-2: - Random laminated rust. - Bottom plates have losses, up to knife edge remaining & perforations up to 19" x 9" (truss 2, L5-L6). - Bottom chord webs adjacent to bottom plate losses have up to 6" high x 1/8" deep losses. Top chords: - Span 4, truss 2, U8-U9, south edge of top plate has a 9" long horizontal split with 3/16" pack rust (photo 37). Verticals & diagonals: - Several members with bent, dented, torn and cracked areas, typically along roadway level (photo 60). - Several members have bolted plates covering/protecting these areas. - Members are bent up to 1" over 2' and tears are up to 2" long. Eyebars & pins: - Up to 1/2" pack rust between adjacent eyebar heads and/or plates. - Up to 1/2" gap between pin nuts and eyebar heads and/or truss web plates. - Eyebar heads have random laminated rust with up to 1/4" deep section loss. - Span 1, truss 1, diagonal L3-U2 eyebar heads at L3 have losses up to 50%; mostly painted. - Span 2, truss 2 at U7-L8 connection to L7-U8 is loose and bars have as little as 5/8" remaining. - Bottom chord eyebars are bowed up to 1". - Vertical and diagonal eyebars bent/bowed up to 4". - Several eyebars are loose (can be moved by hand). - Spans 1-2, U4-U6 members at both trusses are bent/bowed vertically & laterally up to 10". - Span 3, truss 2, L4-U5, south bar is broken at the bottom, near L4. See "Rivets & Bolts" and "Welds-Cracks" items below. See 'Truss General Notes' and 'Truss' field sheets and photos 2-5, 10 & 34-48.
Trusses - Portals:	5	Strut with sway bracing: - Most members with angle legs dented up to 2" (typically 1/2") due to vehicle impacts. - Isolated angles are bent west, up to 2". - Isolated 1/4" pack rust between portal brace connection plate to top chord in span 3, truss 1. - Span 1, U3 strut has two cracks in the west angle, up to 6" long. See 'Truss General Notes' and 'Truss' field sheets and photos 4-5 & 48-51.
Trusses - Bracing:	4	Top chord lateral bracing: - Four top chord lateral bracing members have been removed in spans 1 & 2. - Random rods are slightly bent. - Span 1, panel 1, rod is sagged +/-3.5". - Span 2, truss 1 U8 to truss 2 U9 member has up to 50% section loss for 4" long and a 1" long crack around the circumference. Bottom chord lateral bracing: - Moderate rust on rods in span 4. - Random cables and rods are loose and sagging up to 2". - Span 3, L3 brace near truss 2 has a half circumference x 1/16" wide crack; no change. See 'Truss General Notes' and 'Truss' field sheets and photos 48 & 52-56.
Paint:	5	- Less than 25% of painted surfaces are rusting. See above items "Girders", "Floor Beams", "Trusses - General" "Trusses - Portals", and "Trusses - Bracing".
Rust:	5	- Based on the condition of "Girders" & "Floor Beams", items above.
Machinery Movable Span:	5	- Rating based on the attached 2022 Mechanical/Electrical inspection reports.
Rivets & Bolts:	6	- Random rivets replaced with bolts at truss members.

		- Random mis-drilled holes. - Random rivet heads and/or bolts/nuts with up to 90% section loss; typically at bottom chord losses. - Span 1 at 2nd intermediate diaphragm, near girder 7, there is a missing bolt nut at truss retrofit. - Span 2 has two missing bolts at the deck plate near pier 1 between girders 4 & 5. - Span 1, truss 1, U4-L5 near bottom is missing three bolts. - Random connection bolts at the intersection of truss diagonals are bent and/or loose. - Marine signs attached to trusses are missing random connection bolts, but are secure. See 'Underside and Framing General Notes', 'Underside and Framing', 'Truss General Notes' and 'Truss' field sheets and photos 26-28, 35 & 37-38.
Welds - Cracks:	2	Field welded connections listed below are typically uneven, poor quality and not ground smooth: - Spans 1-2, longitudinal welded splice at top flange deck plate between girder 4-5. - Top flange deck plate, transverse splices at abutment 1, both sides of pier 1 & west side of pier 2. - Vertical splices at both ends of spans 1-2 and near pier 3 in span 3 have web cope holes. - Vertical welds at girder web connections to box girders in spans 1-2 have backer bars in-place. - Transverse welds at girder flange to box girder web connections have backer bars in-place. - Interior of pivot girder at south end has two tack welds at the top flange up to 3" long. - Span 4, truss 2, members L6-U7, L7-U8 & L8-U9 have an extra I-beam/plates welded to eyebars. Intersecting welds at the following locations (equivalent to Fatigue Category E): - Girder to pivot girder welded connections. - Previous intersecting welds at transverse beam connections for truss supports to fascia girders not found. Built-up truss member cracks (non-structural) due to impact damage (just above roadway level): - Several vertical & diagonal members have cracks & tears up to 21" long. - Several members have bolted plates covering/protecting these areas. - There are a total of twelve (12) members with cracks/tears without bolted plates. - Isolated cracks have stop holes drilled. Other built-up truss member cracks: - Span 1, truss 1, L0-U1 near U1: 3.5" long crack with stop holes at south channel. - Span 1, truss 1, L7-U7 near U7: 1.5" long crack at east angle (repair plate at north side) (photo 63). - Span 3, truss 2, L3-U3 at L3: 1" long crack at bottom of north vertical channel (photo 65). - Span 4, truss 1, L6-U6 near U6: 12" long crack in web of south channel, north face (photo 64). - Span 4, truss 1, L7-U7 near U7: 12" long crack with stop holes in web of south channel. - Random lattice bars with cracks, typically at tips to rivet head. Eyebar head cracks along forge lines: - Span 2, truss 1, L7-U8 at U8, previous north bar: 2" long previous crack at south face was found to be a crack in the paint. - Span 2, truss 2, U8-L9 at L9, north bar: +/-1" long crack at south face (photo 66). - Span 3, truss 1, L4-U5 at L4, south bar: 1-5/8" long crack at north face. - Span 3, truss 2, L4-U5 at L4, north bar: 15/16" long crack at south face. - Span 3, truss 2, L4-U5 at L4, south bar: 1-1/16" long crack at north face (this bar is broken). - Span 3, truss 2, U4-L5 at L5, north bar: 2-1/4" long crack at south face (photo 68). - Span 3, truss 2, U4-L5 at L5, south bar: 1" long crack at north face. - Span 3, truss 2, L4-U5 at U5, south bar: 1-1/8" long crack at north face. - Spans 3-4, truss 1, U4-L5 & L5-U6 at L5: (4) cracks up to 2-1/16" long (photo 67). - Span 4, truss 1, U5-L6 at L6, north bar: 1-7/8" long crack at south face. - Span 4, truss 1, U5-L6 at L6, south bar: 1" long previous crack at north face was found to be a crack in the paint. - Span 4, truss 1, L5-U6 at U6, south bar: 1-7/8" long crack at north face. - Span 4, truss 2, U5-L6 at L6, north bar: 1-1/4" long crack at south face. - Span 4, truss 2, U5-L6 at L6, south bar: 3/4" long crack at south face. See 'Underside and Framing General Notes', 'Underside and Framing', 'Truss General Notes' and 'Truss'

		field sheets and photos 57-68.
Timber Decay:	N	
Concrete Cracking:	N	
Collision Damage:	2	- See above items "Girders", "Floor Beams", "Trusses - General" "Trusses - Portals", and "Trusses - Bracing".
Member Alignment:	2	- See above items "Girders", "Floor Beams", "Trusses - General" "Trusses - Portals", and "Trusses - Bracing".
Deflection Under Load:	N	(N) Normal; (E) Excessive.
Vibration Under Load:	N	(N) Normal; (E) Excessive.
Stand Pipes:	N	
Catwalks:	N	
Movable Inspection System:	N	
Barrel Ladders:	N	

Are Barrel Ladders OSHA Compliant? NA

60. SUBSTRUCTURE:

Overall Rating: 4

	Rating	
Abutments - Stem:	5	Stone masonry abutment stems: - 50% +/- mortar pointing missing above waterline. - Up to 90% deteriorated / missing mortar with penetrations up to 4' deep between stones (mostly near water line). - Up to 90% of grout-repair / epoxy coating has failed in the tidal zone. - 10" long crack through a stone near the swing machinery pedestal. - Abutment 1 Right (south) end has a broken stone 1.4' long x 10" high with 6" penetration. - Abutment 1 6th stone course from the top steps out 5" along the full length of the abutment. - Abutment 1 has voids up to 1' diameter due to missing mortar and chinking stones Reinforced concrete bridge seats: - Random horizontal, vertical and map hairline cracks with random efflorescence. Reinforced concrete pedestals: - Random vertical and map hairline cracks with random efflorescence. - Abutment 1, truss 1 pedestal has an 8" x 6" x 1.5" deep spall. - Abutment 2, girder 4 pedestal has a 4" diameter x 1/2" deep spall. - Also, see BRI-58. See 'Abutment' field sheets and photos 69-70.
Abutments - Backwall:	7	- Random vertical and map hairline cracks with isolated efflorescence. - Abutment 1 has an isolated 8" x 3" x 3" deep void. See 'Abutment' field sheets and photos 69-70.
Abutments - Footings:	N	- Not visible.
Abutments - Settlement:	8	- No evidence of settlement observed at the time of inspection. - Also, see BRI-58.
Abutments - Wingwalls:	5	Stone masonry return/retaining walls: - Up to 90% deteriorated / missing mortar with penetrations up to 4' between stones. - Abutment 1 north return wall 11' from the corner has a void 1.3' long x 2' high x 3' deep at the retaining wall interface

		- Up to 50% missing mortar and deteriorated patches at random locations. - Voids between stones up to 3' deep (mostly near water line). - North face of abutment 1/wingwall 1A has a 5' diameter x 2.5' deep area of missing/fallen stones as well as cracks up to 1/8" wide in stones at this location. - Also, see BRI-58. See photos 71-72.
Piers/Bents - Caps:	5	Reinforced concrete pier caps at piers 2 and 3: - Random vertical, diagonal and map hairline cracks with random efflorescence and isolated rust. - North & south faces of pier 3 between truss & girders have spalls up to 18" long x 1' high x 2" deep. Steel cap beam at pier 2: - Underwater at time of inspection; see BRI-58. Transverse steel carrier beams at pier 2: - Underwater at time of inspection; see BRI-58. See 'Pier' field sheets and photos 73-76.
Piers/Bents - Pile Bent:	4	Concrete encased H-piles with fiberglass jackets at piers 2 and 3: - Underwater at time of inspection; see BRI-58. - Tops of encasements have extensive spalling with exposed rebar and steel H-piles. - H-pile flanges exposed up to 2.5' high x full width with up to 1/16" deep loss. Steel diagonal and horizontal cross bracing members between pier 2 piles: - Underwater at time of inspection; see BRI-58. - Bracing members have extensive rusted out and/or missing sections. The bracing only are considered a condition rating of 2 (critical condition) however these are considered secondary members and does not control the overall rating. See 'Pier' field sheets and photos 89-95. Based on the section loss initiated on the piles and the poor condition of the pile encasements no longer providing adequate protection, condition rating is coded as '4'.
Piers/Bents - Columns:	5	Pier 1 steel jacket at column/pier wall: - Heavy laminated rust up to full perimeter x 3' high with perforations up to 1' diameter. - Also, see BRI-58 for deficiencies in exposed concrete. Top of concrete column/pier wall: - Random linear and map hairline cracks. - Spalls up to 10" x 3" x 1/2" deep. - 1/2" pack rust between steel jacket and concrete at top north corner. See 'Pier' field sheets, the BRI-58 and photos 85-88.
Piers/Bents - Footings:	4	- Stone masonry footing on timber cribbing at pier 2. - Footing exposed up to full length x full height. - Footing undermined at two corners up to 5' long x 1' high x 2' deep. -- Pier 2 on piles, extent of stone masonry footing undermining does not control overall rating. - See BRI-58.
Piers/Bents - Settlement:	7	- None noted. - Also, see BRI-58.
Erosion - Scour:	5	- See BRI-58.
Concrete Crack - Spall:	4	- See above items. - Rating based on extensive spalling of concrete encasements at pier 2.

		--protective encasement, does not control overall rating. - Also, see BRI-58.
Steel Corrosion:	2	- See BRI-58. - Rating based on extensive section loss at pier 1 steel jacket and pier 2 bracing members. - Protective and secondary members, does not control overall rating.
Paint:	N	
Timber Decay:	N	
Collision Damage:	8	
Debris:	6	- Up to 6" high debris on abutment 1 seat. - Up to moderate debris on pier 2 cap. See field sheets and photos 25 & 73.

61. CHANNEL AND CHANNEL PROTECTION:

All ratings based on attached Underwater Inspection Report; see BRI-58. Overall Rating: 5

	Rating	
Channel - Scour:	5	- See BRI-58.
Embankment - Erosion:	6	- See BRI-58.
Debris:	7	- See BRI-58.
Vegetation:	8	- See BRI-58.
Channel Change:	7	- See BRI-58.
Fender - System:	5	- See BRI-58.
Spur Dikes and Jetties:	N	
Rip Rap:	7	- See BRI-58.

62. CULVERTS AND RETAINING WALLS:

Overall Rating: N

	Rating	
Barrel:	N	
Concrete:	N	
Steel:	N	
Timber:	N	
Headwall:	N	
Cutoff Wall:	N	
Debris:	N	
Retaining Wall System:	N	
Footing:	N	

LOAD POSTING:

	Rating	
Single Unit (Tons):		
Semi Trailer (Tons):		
4 Axle (Tons):		
3S2 (Tons):		
All Vechicles:	20	
Advanced Warning:	All Approaches	- Postings at northwest (Riverside Ave SB), southwest (Riverside Ave NB) and east

		approaches (three signs at intersection between Bridge St, Green Farms Road and Compo Road South).
Warning At Bridge:	All Approaches	- At west approach, +/- 100' from bridge. See photo 78. - At east approach, +/- 550' from bridge. See photo 77.
Legibility:	Adequate	
Visibility:	Adequate	

VERTICAL CLEARANCE POSTING

Min. Vert Under Clearance:	12	Ft	10	In	- See clearance diagram. - The minimum vertical clearance was modified by S. Keedy to be the vertical dimension taken vertically at the face of the MBR to the bottom of the electrical supply bracket.
Posted Clearance Under Bridge:		Ft		In	
Posted Clearance On Bridge:	12	Ft	7	In	- Advance vertical clearance is posted as 12'-7" at both approaches. See photos 77-78.

Advanced Warning:	Some Approaches	Only at east approach, before Imperial Avenue.
Warning At Bridge:	All Approaches	See photos 77-78.
Legibility:	Adequate	
Visibility:	Adequate	- The previous sign at the east approach partially blocked by vegetation has been repaired since the previous inspection. See photos 77-78.

NOTES / COMMENTS:

Character of Traffic: - Heavy / Mixed traffic.

Additional Notes:

- Bridge ID is in good condition.
- Bridge is logged from west to east with girder 1 and truss 1 at the north fascia which is consistent with the previous inspection reports and bridge plans.
- However, log direction is inconsistent with Route 136 log direction per CTDOT Highway Log; log direction left unchanged per BS&E.
- Bridge inspected with a 40' lift, raft and scaffolding, vendor and local police provided bridge closure with detour.
- Per Westport police, traffic was detoured at Riverside Avenue at west approach, and at Imperial Avenue at east approach.
- End box girders at abutment 1, pier 2 and the pivot girder at pier 1 are considered to be confined spaces; an air meter was used during inspection and the air quality was found to be acceptable and no ventilation was required.

Additional Comments:

- There is one In-Depth tracking component associated with this bridge. In depth inspection performed this inspection.
- There are (8) eight existing and pending work items associated with this bridge and Work item IDs 01349-2018-0003 and 01349-2018-0005 have been completed and can be removed.

National Bridge Elements
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

	Environment	Total Quantity	Units	Condition State 1	Condition State 2	Condition State 3	Condition State 4
30 - Steel Deck Corrugated/Orthotropic/Etc.	Mod.	2840	sq. ft.	2690	50	50	50
1000 - Corrosion		150		0	50	50	50
510 - Wearing Surfaces		2808	sq. ft.	2239	280	289	0
3230 - Effectiveness (Wearing Surface)		569		0	280	289	0
60 - Other Deck	Mod.	2860	sq. ft.	2860	0	0	0
510 - Wearing Surfaces		2790	sq. ft.	2190	300	300	0
3210 - Delamination/Spall/Patched Area/Pothole (Wearing Surfaces)		23		0	20	3	0
3230 - Effectiveness (Wearing Surface)		577		0	280	297	0
107 - Steel Open Girder/Beam	Mod.	1559	ft.	1461	68	30	0
1000 - Corrosion		90		0	60	30	0
1900 - Distortion		3		0	3	0	0
7000 - Damage		5		0	5	0	0
515 - Steel Protective Coating		17100	sq. ft.	15400	0	0	1700
3440 - Effectiveness (Steel Protective Coatings)		1700		0	0	0	1700
111 - Timber Open Girder/Beam	Mod.	574	ft.	469	103	2	0
1020 - Connection		5		0	3	2	0
1170 - Split/Delamination (Timber)		100		0	100	0	0
120 - Steel Truss	Mod.	574	ft.	344	70	60	100
1000 - Corrosion		90		0	30	30	30
1010 - Cracking		10		0	0	0	10
1020 - Connection		40		0	40	0	0
1900 - Distortion		60		0	0	0	60
7000 - Damage		30		0	0	30	0
515 - Steel Protective Coating		7825	sq. ft.	7433	0	0	392
3440 - Effectiveness (Steel Protective Coatings)		392		0	0	0	392
152 - Steel Floor Beam	Mod.	70	ft.	0	56	14	0
1000 - Corrosion		70		0	56	14	0
515 - Steel Protective Coating		1440	sq. ft.	1180	0	0	260
3440 - Effectiveness (Steel Protective Coatings)		260		0	0	0	260
161 - Steel Pin and Pin & Hanger Assembly or both	Mod.	88	each	65	23	0	0
1000 - Corrosion		8		0	8	0	0
1020 - Connection		15		0	15	0	0
515 - Steel Protective Coating		88	sq. ft.	80	0	0	8
3440 - Effectiveness (Steel Protective Coatings)		8		0	0	0	8
210 - Reinforced Concrete Pier Wall	Mod.	26	ft.	0	0	26	0
1080 - Delamination/Spall/Patched Area		20		0	0	20	0
1190 - Abrasion/Wear (PSC/RC)		6		0	0	6	0
213 - Masonry Pier Wall	Mod.	26	ft.	0	0	26	0
1610 - Mortar Breakdown (Masonry)		15		0	0	15	0

1620 - Split/Spall (Masonry)		3		0	0	3	0
6000 - Scour		8		0	0	8	0
217 - Masonry Abutment	Mod.	52	ft.	0	5	47	0
1610 - Mortar Breakdown (Masonry)		51		0	5	46	0
1620 - Split/Spall (Masonry)		1		0	0	1	0
220 - Reinforced Concrete Pile Cap/Footing	Mod.	26	ft.	0	16	10	0
1080 - Delamination/Spall/Patched Area		2		0	0	2	0
1120 - Efflorescence/Rust Staining		4		0	2	2	0
1130 - Cracking (RC and Other)		14		0	14	0	0
6000 - Scour		6		0	0	6	0
225 - Steel Pile	Mod.	14	each	11	0	3	0
1000 - Corrosion		3		0	0	3	0
300 - Strip Seal Expansion Joint	Mod.	20	ft.	0	0	0	20
2350 - Debris Impaction		20		0	0	0	20
304 - Open Expansion Joint	Mod.	39	ft.	37	2	0	0
7000 - Damage		2		0	2	0	0
310 - Elastomeric Bearing	Mod.	16	each	15	1	0	0
2230 - Bulging, Splitting, or Tearing		1		0	1	0	0
316 - Other Bearing	Mod.	7	each	3	4	0	0
1020 - Connection		4		0	4	0	0
330 - Metal Bridge Railing	Mod.	574	ft.	239	270	60	5
1000 - Corrosion		30		0	20	10	0
7000 - Damage		305		0	250	50	5
515 - Steel Protective Coating		100	sq. ft.	70	0	0	30
3440 - Effectiveness (Steel Protective Coatings)		30		0	0	0	30

UNDERWATER INSPECTION (BRI-59)

Bridge: 01349 Town: 83500 - WESTPORT Carried: ROUTE 136 Crossed: SAUGATUCK RIVER

Total Number of Piers:	3
Piers in the Water:	3
Boat Used?	Yes
Boat Size:	14'
Dive Station Used?	Yes
Access to Bridge:	Boat
Access/ Equipment Comments U/W:	Tethered scuba.
Type of water:	Brackish
Marine Growth:	Barnacles and oysters up to 1" thick
Max Water Depth:	10.4'
Max Water Depth at Pier Or Abutment:	9.6'
Current Strength:	1 fps
U/W Visibility:	1'
Bottom Composition:	Rip rap up to 3' diameter, sand, silt and natural debris with up to 3.0' penetrations into the channel bottom.

UNDERWATER INSPECTION

ITEM	*RATING*	*REMARKS*
60. SUBSTRUCTURE	4	
ABUTMENT 1:	6	Stone masonry stem with reinforced concrete cap.
STEM	6	The stone masonry stem has the following deficiencies: • 80% deteriorated / missing mortar with penetrations up to 3.5' between stones. • Up to 90% of grout-repair / epoxy coating has failed in the tidal zone. • Right (south) end has a broken stone 1.4' long x 10" high with 6" penetration. • 6th stone course from the top steps out 5" along the full length of the abutment. Due to the 80% deteriorated/missing mortar with penetrations up to 4 feet deep this could be rated a '5', however above that mark it is approximately only 50% so due to the extensive 80% missing mortar primarily being at the water line and below we justify keeping it a '6'. (See UW Drawing C and Photos 69, 80-81)
FOOTING	N	Not exposed.
EROSION	6	Minor deterioration and voiding in north return wall and channel walls. Refer to 61. 'Embankment - Erosion' item below.
SETTLEMENT	7	No evidence of settlement observed at the time of inspection.
SCOUR	7	Channel bottom elevations along the abutment have no significant changes (less than 0.8' variations) since the 2020 Underwater Inspection. (See UW Drawings A & C)
WINGWALLS	5	The stone masonry return walls have the following deficiencies: • 80% deteriorated / missing mortar with penetrations up to 2.5' between stones. • Voids up to 1' diameter due to missing mortar and chinking stones. • North return wall 11' from the corner has a void 1.3' long x 2' high x 3' deep at the retaining wall interface. (See UW Drawing C and Photos 82-83)
General Remarks:		
ABUTMENT 2:	6	Stone masonry stem with reinforced concrete cap.
STEM	6	The stone masonry stem has the following deficiencies: • 90% deteriorated / missing mortar with penetrations up to 4' between stones. • Up to 90% of grout-repair / epoxy coating has failed in the tidal zone. Due to the 90% deteriorated/missing mortar with penetrations up to 4 feet deep this could be rated a '5', however above that mark it is approximately only 50% so due to the extensive 90% missing mortar primarily being at the water line and below we justify keeping it a '6'. (See UW Drawing K and Photos 70 & 84)
FOOTING	N	Not exposed.
EROSION	6	Rating lowered from '8' to '6' due to deterioration and voiding in retaining walls. Refer to 61. 'Embankment - Erosion' item below.
SETTLEMENT	8	No evidence of settlement observed at the time of inspection.

SCOUR	7	Channel bottom elevations along the abutment have no significant changes (less than 0.9' variations) since the 2020 Underwater Inspection. (See UW Drawings A & K)
WINGWALLS	5	The stone masonry return walls have the following deficiency: • 90% deteriorated / missing mortar with penetrations up to 4' between stones. (See UW Drawing K)

General Remarks:

PIER NO. 1	5	Reinforced concrete pier with a steel protective jacket.
PILES	N	
STEM	5	The reinforced concrete stem with a steel jacket has the following deficiencies: • The steel jacket has moderate to severe corrosion with intermittent areas of section loss up to 100% throughout and a band of missing steel 4' high within the tidal zone. • Areas of exposed concrete have abrasion up to 3" deep with exposed and loose aggregate. • Extending from the west face to the east face around the upstream (north) face there is a spall 27' long x 1.8' high x 1.8' deep near the channel bottom. • East face has a spall 8' long x 1.5' high x 0.9' deep above channel bottom right (south) of the centerline. • East face has a void 5' long x 0.5' high x up to 2.3' deep below rubble fill along the channel bottom. (See UW Drawings D & E and Photos 85-88)
FOOTING	N	Not exposed.
SCOUR	7	Channel bottom elevations around the pier have no significant changes (less than 0.9' variations) since the 2020 Underwater Inspection with the following exception: • East side of the pier has an area of degradation 1.8' deep. (See UW Drawings A, D & E)
SETTLEMENT	8	No apparent settlement noted.

General Remarks:

PIER NO. 2	4	Original stone masonry pier stem on a stone masonry footing has a retrofitted concrete cap encasing steel beams on a steel framing plan. Framing plan is supported by (6) reinforced concrete encased steel H-piles (HP12x74) with fiberglass wraps and steel channel bracing.
PILES	4	The retrofitted piles are labelled left (north) to right (south) on the west and east face and have the following deficiencies: • The steel beams bearing on the piles have moderate corrosion with up to 1/8" section loss on the bottom flanges and areas of laminated rust up to 1/4" thick on the top flanges. • Fiberglass wraps on the piles are loose / missing throughout. • The exposed reinforced concrete encasement has abrasion up to 2.5" deep with exposed aggregate. • The diagonal steel channel cross-bracing has severe corrosion with areas of 100% section loss up to 5' long and random perforations. • The lower steel cross-braces on the west, south and east faces are missing with the lower brace on the north face missing the bottom flange and part of the web. • Pile 1W has a full perimeter spall 4.0' high x up to 6" deep with (4) exposed rebar with section loss up to 100% at the top of the encasement. • Pile 1W, spall has exposed (2) flanges up to 1.5' high and have minor corrosion with 1/16" deep pitting. • Pile 1W has a void 7" diameter x 1" deep on the east face near the channel bottom. • Pile 2W has a full perimeter spall 5.0' high x 8" deep with (5) exposed rebar with up to 30% section loss (steel H-pile not exposed) at the top of the encasement.

		• Pile 3W has a full perimeter spall 5.5' high x up to 7" deep with (6) exposed rebar with up to 30% section loss at the top of the encasement. • Piles 2E and 3E have elastomeric wraps up to 2.5' high at the top filled with grout. • Pile 1E elastomeric wrap is missing. • Pile 1E has a full perimeter spall 5.5' high x up to 15" deep with (7) exposed rebar that has up to 20% section loss at the top of the encasement. • Pile 1E spall has exposed (3) flanges up to 2.5' high around 80% of perimeter with moderate corrosion with up to 1/16" section loss. • Pile 3E has a full perimeter spall 2.5' high x up to 6" deep with (5) exposed rebar with up to 100% section loss at the top of the encasement. • Pile 3E spall has exposed (2) flanges 1.2' high with minor corrosion and up to 1/16" section loss. Based on the section loss initiated on the piles and the poor condition of the pile encasements no longer providing adequate protection, condition rating is coded as '4'. (See UW Drawing F,G & H and Photos 73-74 and 89-96)
STEM	5	The stone masonry stem has the follow deficiencies: • 80% deteriorated / missing mortar with penetrations up to 2.5' between stones. • Missing chinking stones. • Random stones have hairline cracks. • East face has a broken stone / void 3' long x 2' high x 10" deep between Piles 1E and 2E. (See UW Drawings F,G & H and Photos 73, 74 & 96)
FOOTING	4	The stone masonry footing on timber cribbing has the following deficiencies: • The footing is exposed full length by up to full height (1.5') around the perimeter, no change from the previous 2020 Underwater Inspection. • Northwest corner of the footing is undermined 5' long x up to 1' high x up to 2' penetration, previously undermined 5' long x 1' high x up to 2' penetration in 2020. • Southwest corner of the footing is undermined 3' long x up to 1' high x up to 2' penetration, previously undermined 3' long x up to 1' high x up to 2' penetration in 2020. (See UW Drawings F, G & H)
SCOUR	5	Channel bottom elevations around the pier have no significant changes (less than 0.9' variations) since the 2020 Underwater Inspection with the following exception: • Area of aggradation up to 1.9' high on the west face. Refer to 'Footing' item above for more details. (See UW Drawings A, F, G & H)
SETTLEMENT	8	No apparent settlement noted.
General Remarks:		

PIER NO. 3	7	Reinforced concrete cap supported by (8) reinforced concrete encased steel H-piles with fiberglass wraps.
PILES	7	The steel H-piles are encased in reinforced concrete and covered by fiberglass wraps. The reinforced concrete and fiberglass wraps have marine growth up to 1" thick and no significant deficiencies. (See UW Drawings I & J and Photos 75 & 97)
STEM	N	
FOOTING	N	
SCOUR	7	Channel bottom elevations around the pier have no significant changes (less than 0.8' variations) since the 2020 Underwater Inspection. (See UW Drawings A, I & J)
SETTLEMENT	8	No apparent settlement noted.

General Remarks:

61. CHANNEL & CHANNEL PROTECTION:

	5	The Saugatuck River is a tidal saltwater body that flows beneath the structure.
CHANNEL SCOUR	5	Channel bottom elevations along the fascias have the following variations greater than 0.9' since the 2020 Underwater Inspection: • Isolated area of degradation 1.0' deep north of Pier 1. (See UW Drawing A and Photos 98-99)
EMBANKMENT EROSION	6	Southwest and northwest embankments consist of dry-laid stone channel walls, the southeast and northeast embankments consist of dry-laid stone retaining walls with the following deficiencies: • Northwest channel wall has a void 3' long x 2' high x 3' deep adjacent to a discharge pipe. • Southeast and northeast retaining walls have penetrations up to 3' between stones. • Southeast retaining wall has (2) voids up to 3' high x 4' wide x up to 4' deep. (See UW Drawings C & K and Photos 100 - 105)
DEBRIS	7	• There is a concrete overpour and construction debris around Pier 1. • The remnants of an old pier in span 3 do not impede the navigable channel. (See UW Drawings A, D & E)
VEGETATION	8	
CHANNEL CHANGE	7	No apparent change in the channel orientation. (See UW Drawing A and Photos 98-99)
FENDER SYSTEM	5	The timber fender system around Pier 1 and on the west side of Pier 2 have the following deficiencies: • Piles and wales have splits / checks up to 3/4" wide. • The ends of wales have deterioration / rot up to 2' long x full height x up to 2" deep. • The hardware of wales 4, 5 and 6 from the top have heavy to severe corrosion within the tidal zone. • Pier 1 fender system, steel brackets at the upstream and downstream noses have moderate to heavy corrosion with areas of 100% section loss up to 8" long x up to 7" high. • Pier 1 fender system has a 5' long area of impact damage on the 6th wale from the top at the northwest corner. (See UW Drawing A and Photos 106-111)
SPUR DIKES & JETTIES	N	
RIP RAP	7	Rip rap up to 3' diameter along Abutment 2 and large rocks / rip rap at the northeast corner of Pier 3. (See UW Drawings A, J & K)

General Remarks:

FRACTURE CRITICAL MEMBERS / FRACTURE PRONE DETAILS

Inspectors:

Lead Inspector:	Kurt Gabrielson
Inspector:	Task:
Area,13	BSE - Inspector
Crane,Nathaniel	BSE - Inspector Rail - Inspector
DiCesare,Matthew	BSE - Inspector Rail - Inspector
Gabrielson,Kurt	BSE - Inspector Rail - Inspector
Molison,Steve	BSE - Inspector Rail - Inspector

Visits:

Visit Date:	Temp:	Start Time:	End Time:
09/15/2022	71	08:00 AM	02:00 PM
10/03/2022	50	08:00 AM	02:30 PM
10/07/2022	75	07:00 AM	01:00 PM

Fracture Critical Inspection Frequency: 24 Months

Fracture Critical Type Code: J Steel Pier Caps, welded box or plate girders

Structure Type: Highway Bridges Year Built: 1870 ADT: 14500 Year of ADT: 2017 % Truck: 5

Access Equipment Needed: Raft and scaffolding.

Traffic Control Required: None.

Reference to Plans: Project #158-150 (1989)

MEMBER/DETAIL TYPE # 1

Member/Details Type: C Steel bent caps sustaining tensile stresses Fracture Critical: Yes

Fatigue Category: C Steel Type: A-588 Fatigue Prone: Yes

Description: Transverse box girders at Abutment 1, Pier 1 (pivot girder) and Pier 2.

Inspection Procedure: 100% hands-on.

Condition Comments: Fracture critical end floorbeams (box girders) at abutment 1 and pier 2:
- Exterior has up to laminated rust with negligible loss on bottom flanges and bottom 2" high of webs.
- Interior has random moderate to heavy rust at lower portions of box girders.
- 10" diameter holes cut in both end diaphragms of girders, allowing pigeon access.
- Construction debris and heavy accumulation of pigeon debris up to 3" high inside girders (pier 2).

Fracture critical box girder at pier 1 (pivot girder for swing span):
- Exterior has isolated light to moderate rust.
- Interior has up to laminated rust along bottom flange, bottom 6" of stiffeners and webs.
- Isolated 1/16" deep section losses.

Procedure Followed This Inspection? Yes If No please explain:

MEMBER/DETAIL TYPE # 2

Member/Details Type: H Highly fatique prone details in tension areas Fracture Critical: No

Fatigue Category: E' Steel Type: A-588 Fatigue Prone: Yes

Description: Girders 1-7 bottom flange welded attachment to the bottom flange/web of box girders at Abutment 1, Pier 1 and Pier 2.

Inspection Procedure: 100% hands-on.

Condition Comments: No significant deficiencies noted.

Procedure Followed This Inspection? Yes If No please explain:

MEMBER/DETAIL TYPE # 3

Member/Details Type: H Highly fatique prone details in tension areas Fracture Critical: No

Fatigue Category: D Steel Type: A-588 Fatigue Prone: Yes

Description: Open holes in longitudinal girder webs in tension areas.

Inspection Procedure: 100% hands-on.

Condition Comments: No significant deficiencies noted.

Procedure Followed This Inspection? Yes If No please explain:

MEMBER/DETAIL TYPE # 4

Member/Details Type: H Highly fatique prone details in tension areas Fracture Critical: No

Fatigue Category: E Steel Type: A-588 Fatigue Prone: Yes

Description: Intersecting/nearly intersecting welds at longitudinal girder to pivot girder welded connections. Although not assigned a fatigue category by AASHTO, these are problematic details that were

treated as fatigue category "E"

Inspection Procedure: 100% hands-on.

Condition Comments: No significant deficiencies noted.

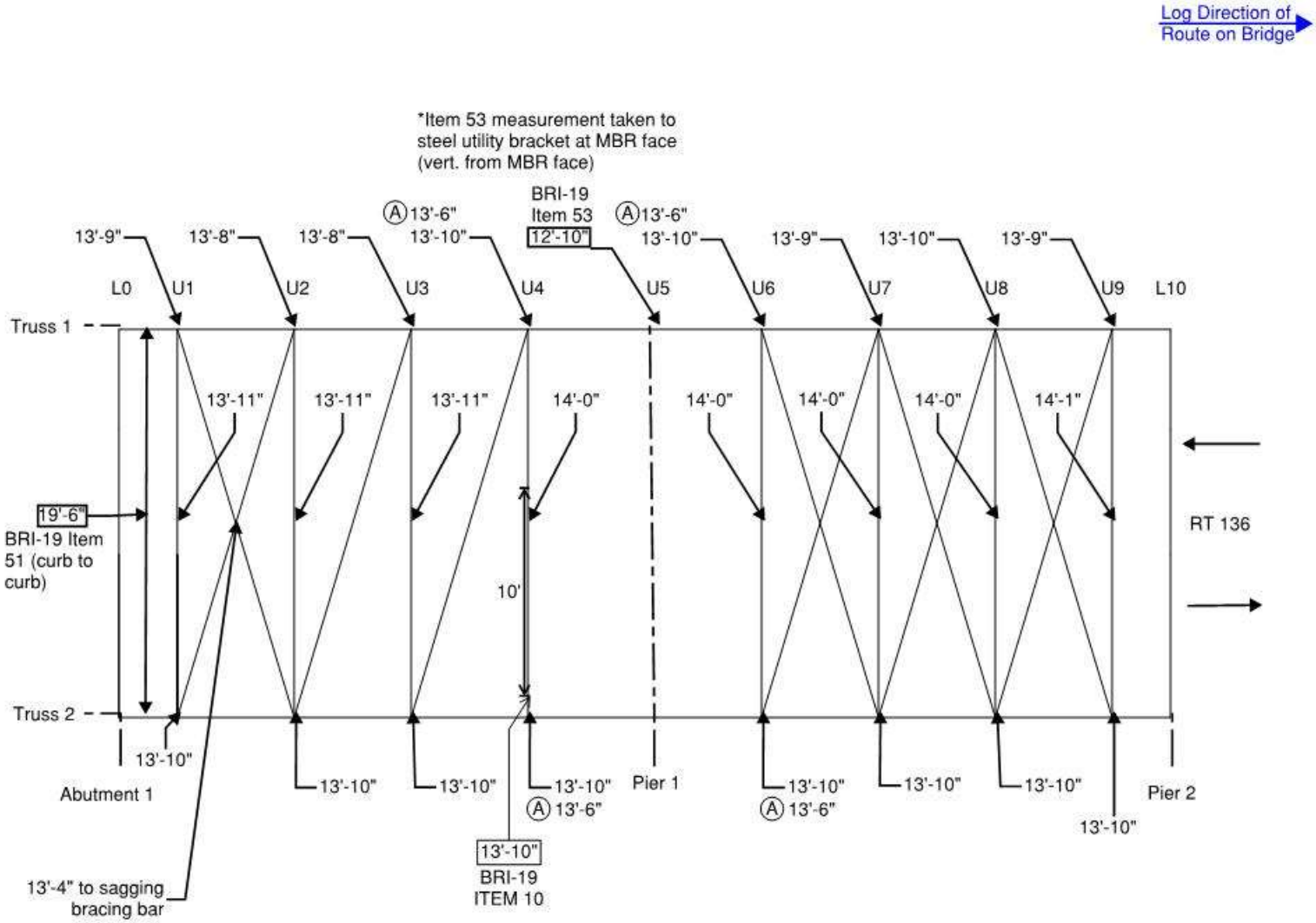
Procedure Followed This Inspection? Yes If No please explain:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:
-All truss measurements are from pavement to bolt at the top chord web
-Vertical clearance posted 12'-7" at both ends (150'± from bridge)
-Past changes to clearances appear due to pavement heaving/rutting and impact damage on several truss members (continue to monitor)

Ⓐ MEASURED AT TOP PIN CONNECTION; behind MBR

CLEARANCE DIAGRAM SPANS 1-2

N.T.S.

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

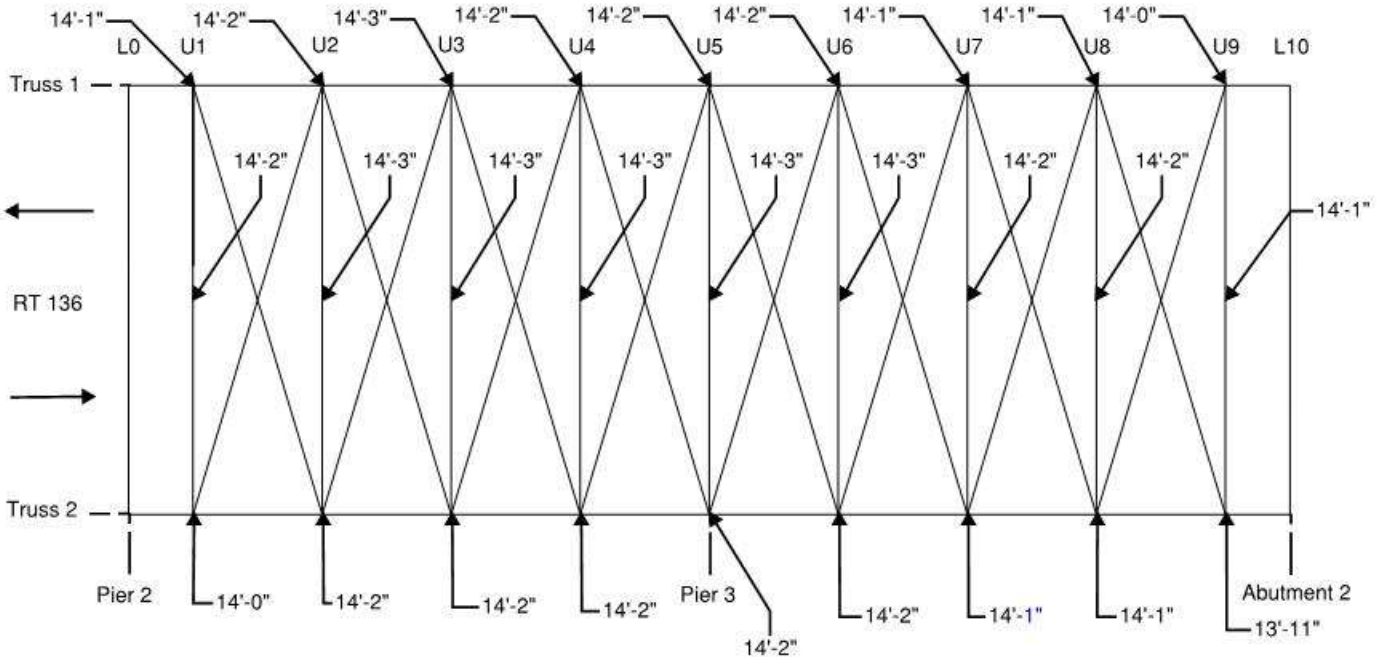
Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349

Log Direction of Route on Bridge



General Notes:
See clearance diagram for spans 1-2 for general notes

CLEARANCE DIAGRAM SPANS 3-4

N.T.S.

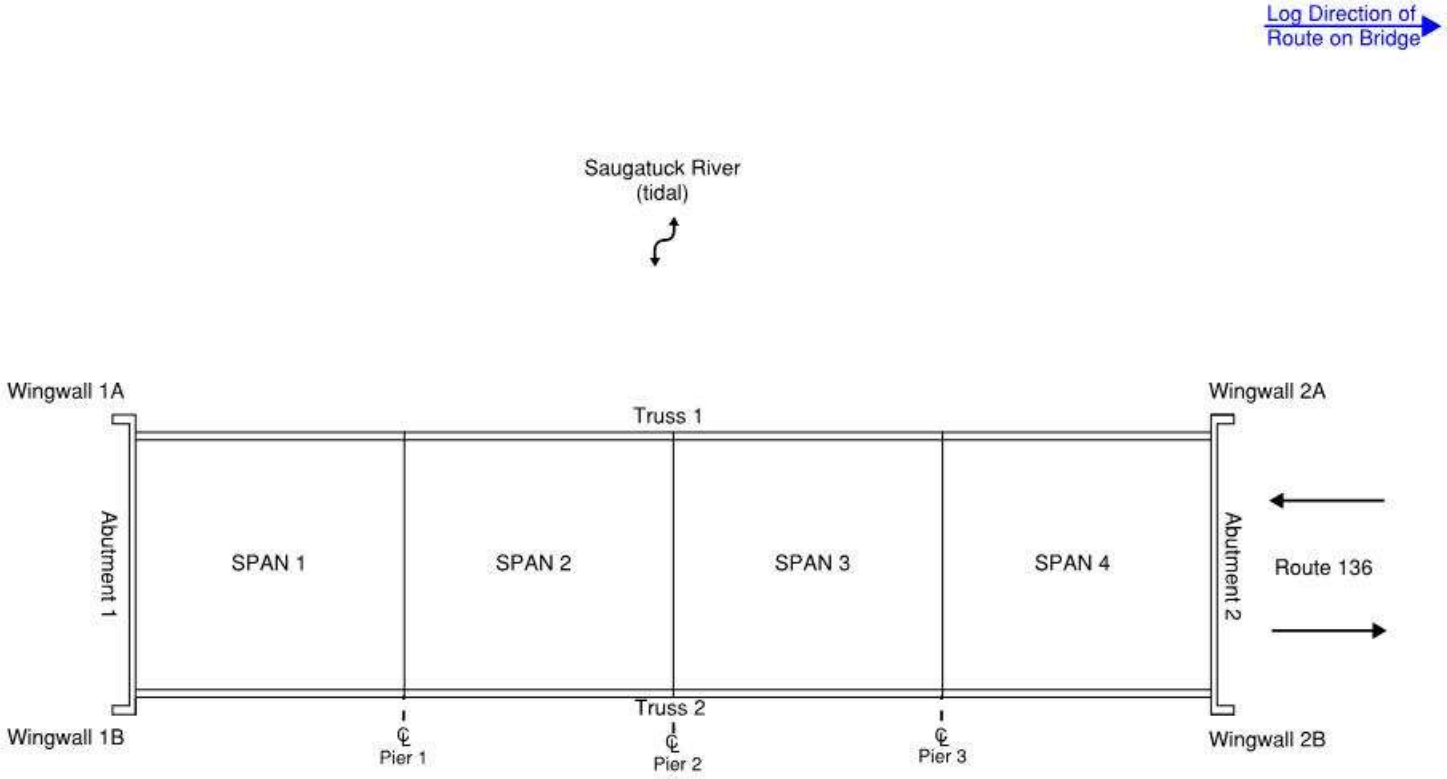
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: KHI, MMB (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



KEY PLAN
N.T.S.

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349

Top of Deck General Notes

Overlay:
- Heaving/wheel line rutting up to 2"H/D
- Random transverse and longitudinal linear cracks up to 1/4"W
- Areas of raveling along curbs up to 6"W x 1/2"D

Curbs:
- Vertical deck plates and curb channels with moderate rust and isolated laminated rust with up to 1/8"D SL
- Random minor scrapes
- Average curb reveals at north & south = 7"

Timber sidewalk at north:
- Random planks misaligned and bent up at the ends up to 1/2"H
- Minor checks and wear

Railing:
- Isolated bridge guide rail post base plates with heavy laminated rust
- Metal bridge railing across bridge has random light to moderate impact damage
- 20' of guide rail attached directly to truss members above north rail to protect electrical box at pier 1.

Drains:
- Most scuppers 66% clogged; all down pipes are clear
- Some grates settled up to 1"D relative to the overlay

Expansion Joint:
- Steel headers with random nicks & gouges
- Strip seal joint at abut 2 with loose steel extrusion at bridge side; extrusion and seal previously removed at TOI by DOT Maintenance and area filled with bituminous

Approach railing:
- Metal beam railings are not continuous onto bridge & have minor scrapes & dents
- Boxing glove ends at NW & SW with heavy impact damage

Approach pavement:
- Pavement at both approaches with no significant deficiencies; Unless otherwise noted

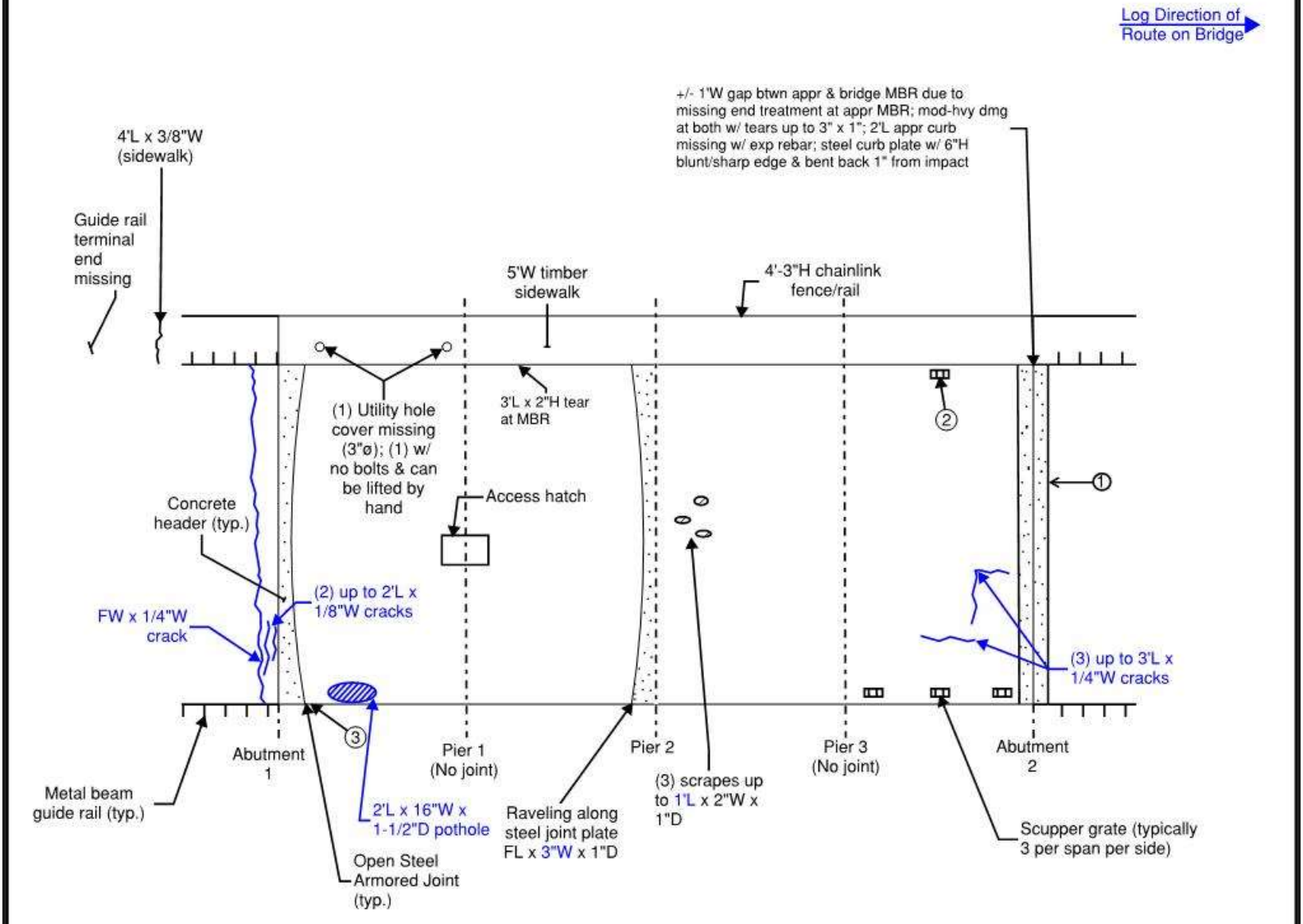
REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



- See Top of Deck General Notes sheet

Deterioration Legend:

① - Approach pavement w/ settlement up to 1"D, but w/ smooth transition
② - Scupper grate concrete header w/ 18"L x 6"W x 1"D spall; bit +/-2" higher than bot of spall
③ - MBR post bent east +/- 1' w/ hvy impact damage at MBR end

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

TOP OF DECK
N.T.S.

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: KHI, MMB (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349

Underside and Framing General Notes

Deck items:

- Spans 1 and 2 have a welded steel deck with areas of peeling paint (<15%) and isolated light rust.
- Spans 3 and 4 have an exodermic deck with random light rust.

Bearings:

- Sole plates are bowed/dished at random locations up to 1/2" (appears as-built).
- Bearing plates with light to moderate rust.
- Elastomeric bearings in neutral position with slight tilts (up to 1/4") at 75°F.

Girders:

- Girders with areas of peeling paint (<15%) with light to heavy rust and laminated rust.
- Top and bottom of girder webs at random weep locations with heavy laminated rust up to 1'L x 4"H and negligible section loss.
- Fascia girder connections to drains/weeps/trusses with moderate to heavy laminated rust and the nuts have up to 25% section loss.
- Girder bottom flanges with light pigeon debris and minor impact scrapes in span 2.
- Girder to pivot girder connections with intersecting welds.
- Random intersecting welds also between mechanical components & pivot girder
- Transverse beam connection at fascia girders for trusses with poor quality welds, intersecting welds not found
- Field welded splices not ground smooth.
- Transverse truss support beam connection at fascia girders with moderate to heavy laminated rust at truss connections with up to 3/16"D section loss on top flange connection plate (worst at spans 1 & 2).
- Transverse support beams at truss bottom chords with flame cut flanges at random locations.
- Box girder interior with 10" Ø flame cut hole in end plate/diaphragm (allows pigeon access) at each end of Abutment 1 box girder.

Timber Sidewalk Stringers:

- Connection angles and channels with random areas of moderate to heavy rust and laminated rust with negligible section loss, U.O.N.
- Stringers 1 and 2 are timber stringers with checks up to 1/4"W along the bottom.

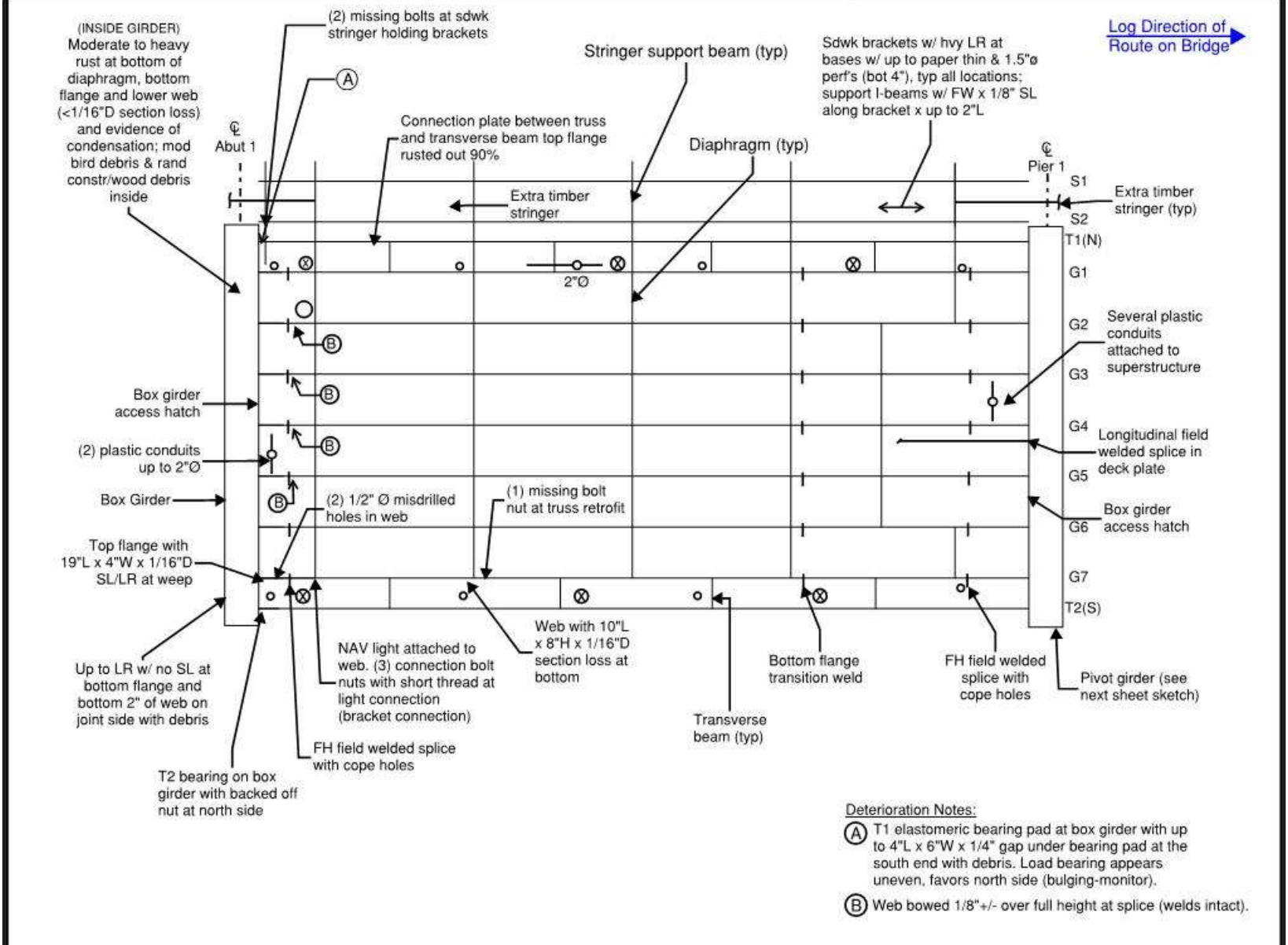
REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: KHI, MMB (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



Deterioration Notes:

(A) T1 elastomeric bearing pad at box girder with up to 4"L x 6"W x 1/4" gap under bearing pad at the south end with debris. Load bearing appears uneven, favors north side (bulging-monitor).

(B) Web bowed 1/8"+/- over full height at splice (welds intact).

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- PVC Weep
- Scupper Downspout
- Conduit

General Notes:

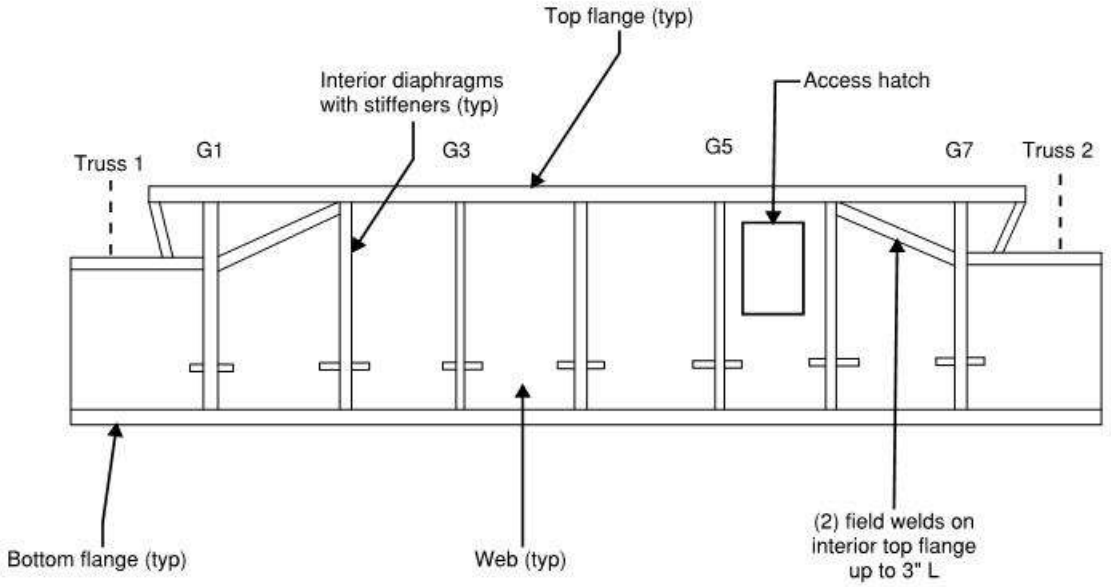
- See Underside and Framing General notes sheet
- Backer bars between girder & box girder connections in place at each girder location at abutment 1 (previous specific call-outs removed)

UNDERSIDE OF DECK & FRAMING PLAN - SPAN 1

N.T.S.

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:
- Interior bottom flange with evidence of moisture throughout
- Heavy laminated rust on interior bottom flange FL x FW and at base of stiffeners and web with 6" H laminated rust (isolated section loss up to 1/16" D)
- Only one opening, no drains/ventilation inside
- Welds not ground smooth/uneven, backer bars remain in place with heavy laminated rust at bottom flange to web welds
- Swing machinery not shown for clarity
- Exterior with isolated light to moderate rust
- Poor quality welds at interior stiffeners with undercutting up to 1/16" D
- Debris accumulation under trusses

PIVOT GIRDER AT PIER 1 - WEST ELEVATION

N.T.S.

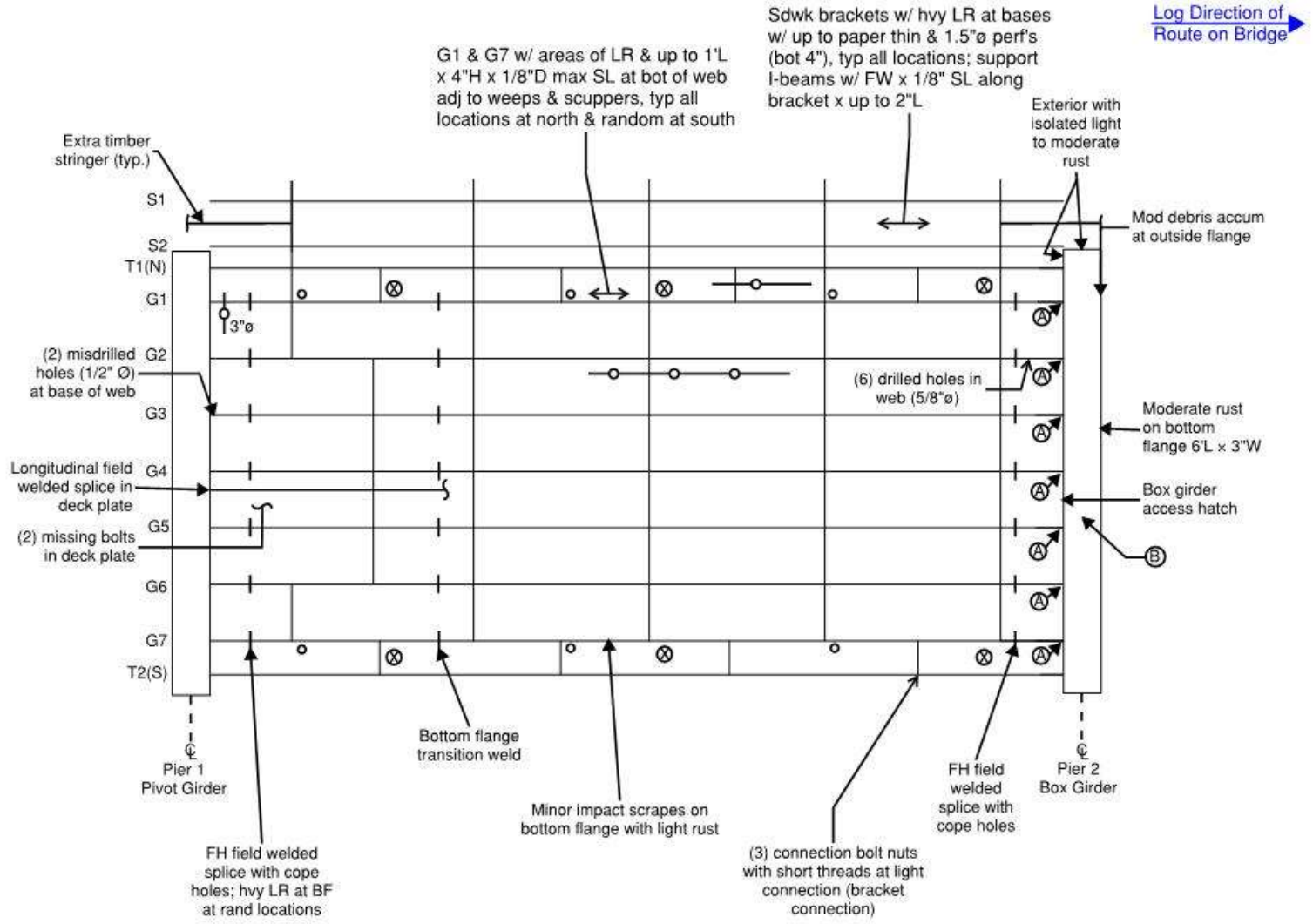
REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: KHI, MMB (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



Deterioration Notes:

(A) Backer bars in place on web with sloppy welds.

(B) Heavy pigeon debris up to 3"D inside box girder. Bottom flange, web plates and stiffeners at both ends with moderate rust up to full width; random construction debris/wood boards inside

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- PVC Weep
- Scupper Downspout
- Conduit

General Notes:
- See Underside and Framing General notes sheet
- Box girder interior with 10" Ø flame cut hole in end plate/diaphragm (allows pigeon access) at each end of Pier 2 box girder.

UNDERSIDE OF DECK & FRAMING PLAN - SPAN 2

N.T.S.

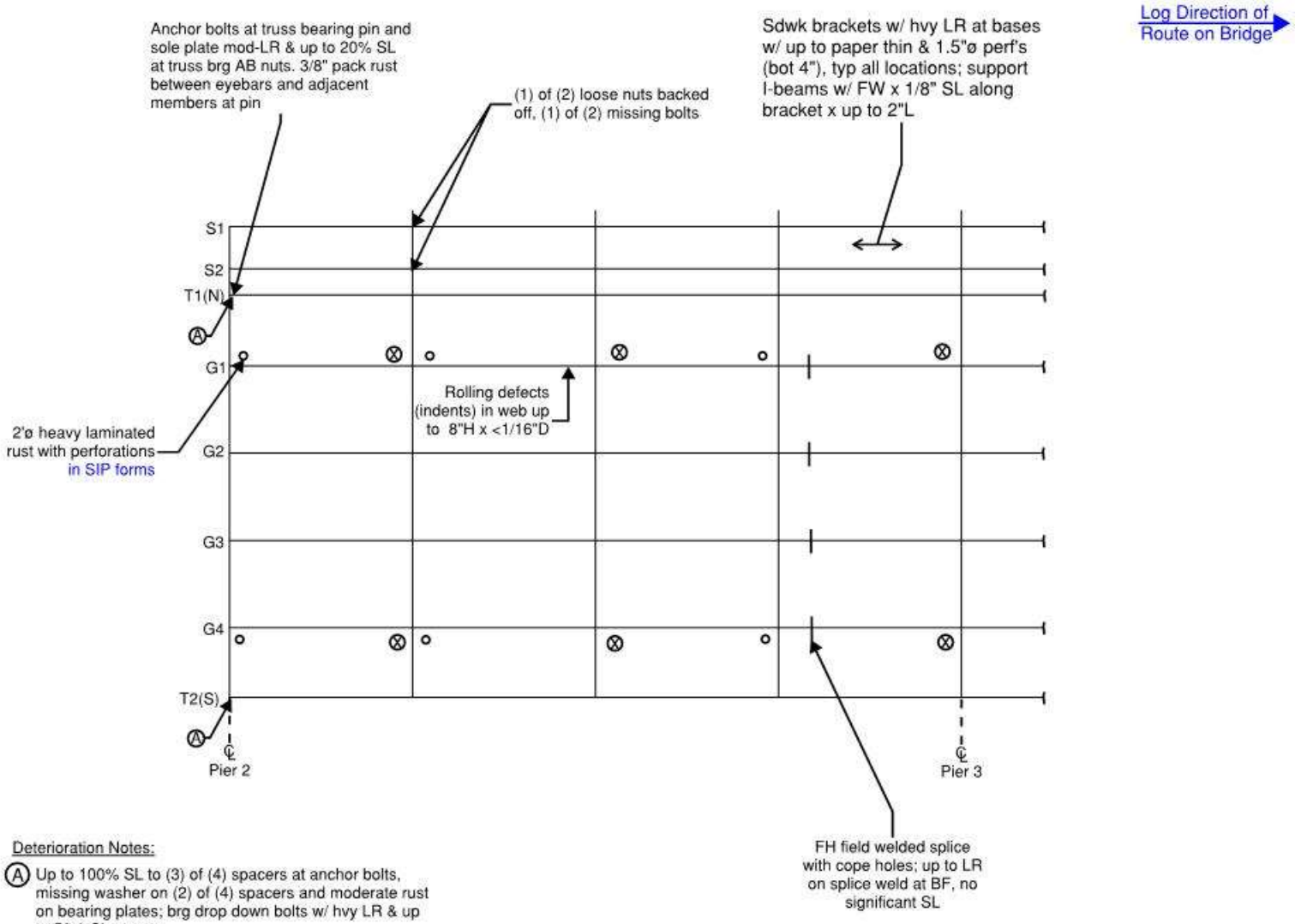
REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: KHI, WEA (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



Deterioration Notes:

(A) Up to 100% SL to (3) of (4) spacers at anchor bolts, missing washer on (2) of (4) spacers and moderate rust on bearing plates; brg drop down bolts w/ hvy LR & up to 50% SL at nuts

General Notes:

- See Underside and Framing General notes sheet
- Underside of deck has LR w/ perforations up to 2' x 1', typically adj to scuppers and weeps (bay btwn G4 & T2; specific call-outs removed from framing)
- Truss bearings at pier 2 have double anchor bolt nuts (single nut at north) and are backed off up to 1"

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- PVC Weep
- Scupper Downspout

UNDERSIDE OF DECK & FRAMING PLAN - SPAN 3

N.T.S.

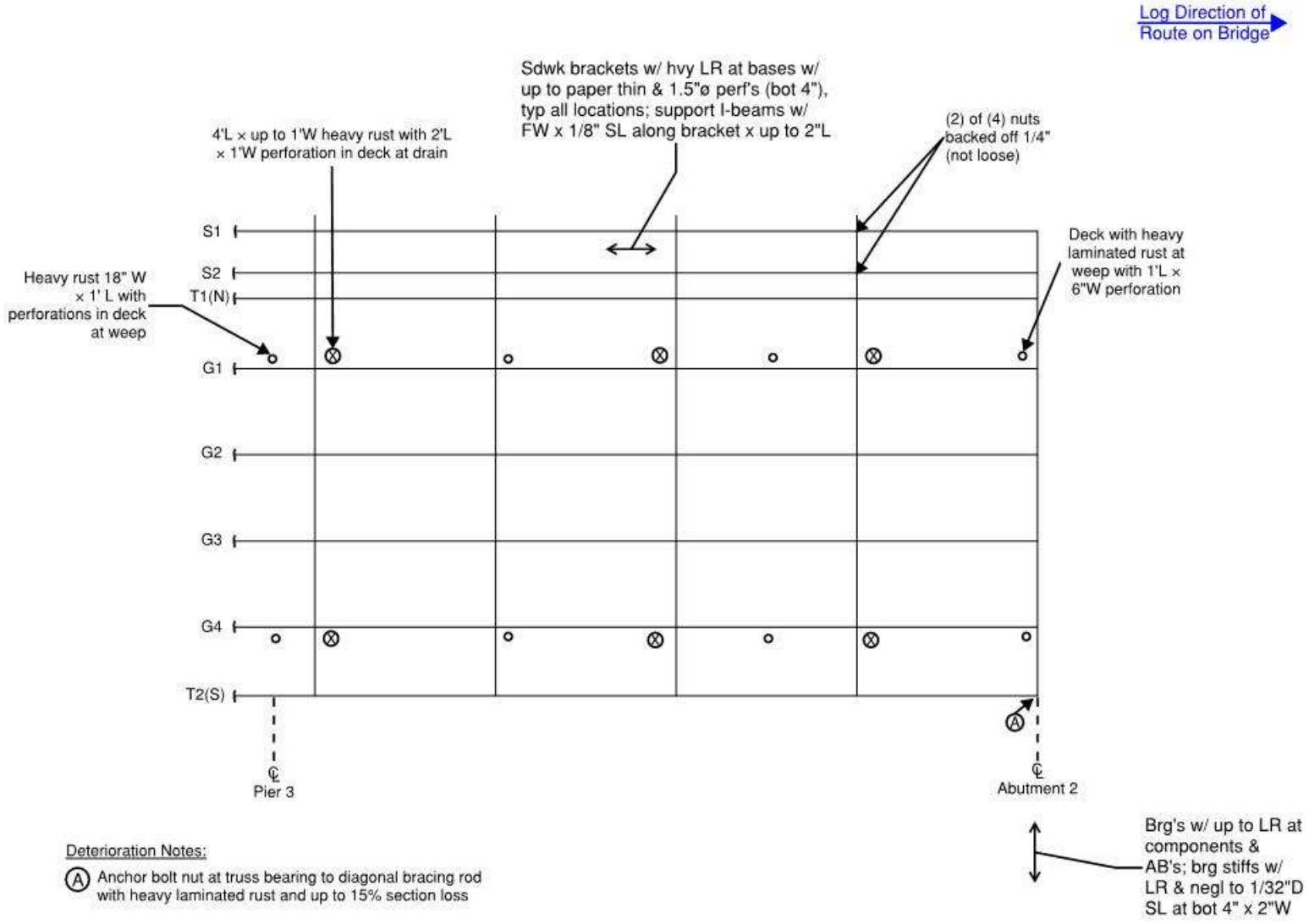
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: KHI, WEA (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



Deterioration Notes:

Ⓐ Anchor bolt nut at truss bearing to diagonal bracing rod with heavy laminated rust and up to 15% section loss

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- PVC Weep
- Scupper Downspout

General Notes:

- See Underside and Framing General notes sheet
- Outside face of deck cover angle w/ heavy rust/LR
- Underside of deck has LR w/ perforations up to 2' x 1', typically adj to scuppers and weeps (bay btwn G4 & T2; specific call-outs removed)

UNDERSIDE OF DECK & FRAMING PLAN - SPAN 4

N.T.S.

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349

Truss General Notes

Bearings:

- Abutment 1 bearings with light rust.
- Pier 1 bearing plates with heavy laminated rust and rivet heads with up to 25% SL.

Trusses:

- Trusses are ornamental and support no live loads, only self weight.
- Rust on ±5% of surface of truss.
- Bottom chord with localized moderate to heavy rust with laminated rust up to 1' Ø.
- Bottom chord batten plates and lattice bars with random heavy laminated rust with full width x up to 3/16"D section loss and up to 1/4" thick pack rust between lattice bars and bottom chord channel horizontal legs.
- Bottom chord top lattice bars cut out at MBR locations.
- Eyebar heads with light to moderate rust and random areas of pitting up to 1/8"D; mostly painted over.
- Bottom chord eyebars with pack rust up to 3/8" thick between adjacent eyebar heads and between eyebar heads and adjacent members.
- Bottom chord eyebars are bowed up to 1".
- Vertical plates at base of vertical members with full height poor quality welds with porosity and undercutting up to 1/16" deep.
- Light debris along bottom chord.
- Most truss verticals with minor bends and shifts due to impact damage.
- Areas with impact damage on trusses have bent angle legs up to 1" over 2'L with tears along the edges up to 1"L.
- Isolated 1/2" Ø misdrilled holes in bottom chord channel horizontal legs.
- Transverse portal braces at truss ends have bent flanges and angle legs.
- Typical up to 1/2" gap between pin cap and upper chord web at random locations.
- Top chord plates with up to 1/4" pack rust at edges in spans 3-4
- Random lattice bars with cracks at tips to rivet head
- Random rivets previously replaced with bolts
- Top chord with gaps up to 3/8" between nuts and web plate
- Random post vertical angles with 1-1/2" diameter drill holes

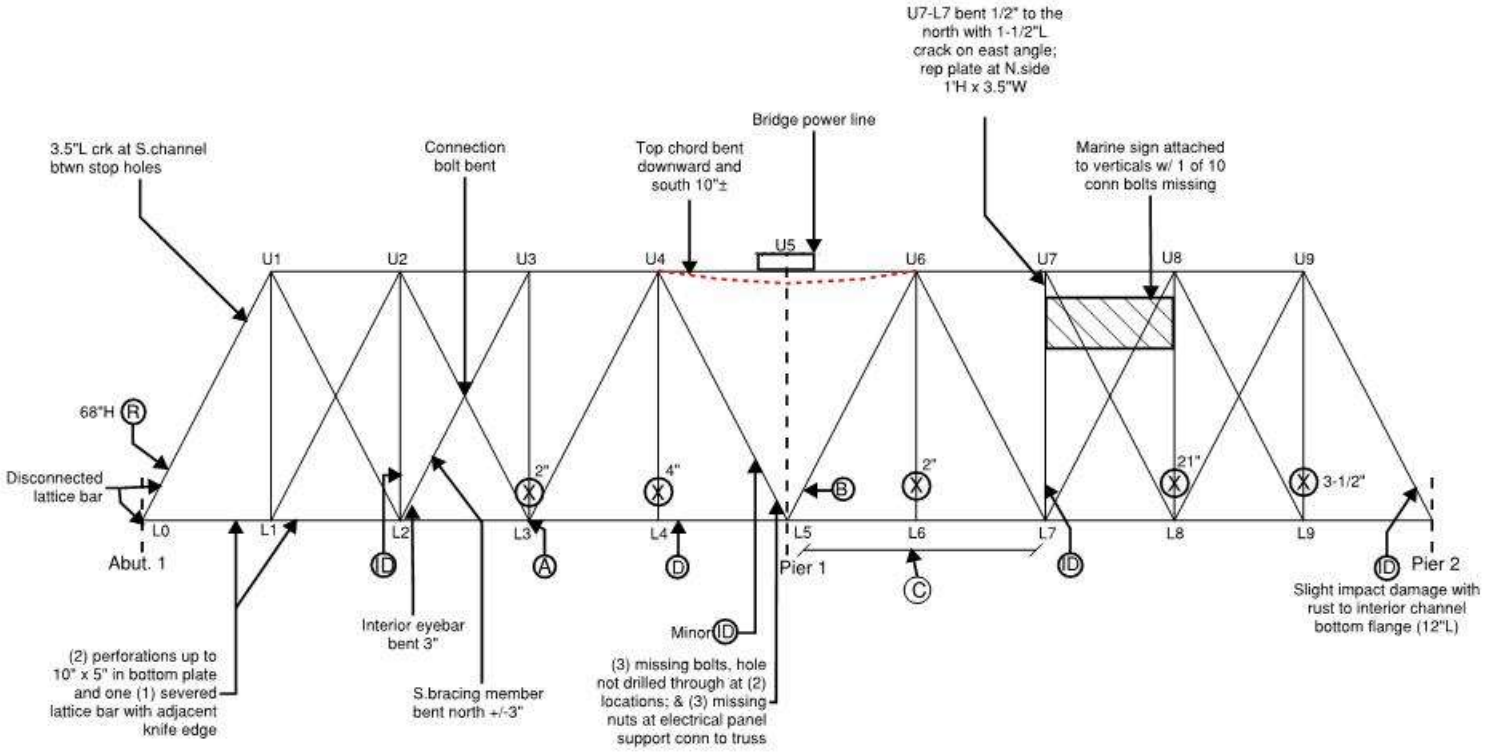
REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

(A) 8"L x 3"W perforation in bottom plate of bottom chord, up to 1/2" thick pack rust between eyebars (mostly painted at eyebars) and vertical members, 50% section loss in (1) of (4) diagonal eyebar heads, 30% section loss in another and remaining (2) with random pitting up to 3/16"D (worst at L3U2 diagonals bars)

(B) Heavy impact damage to interior channel with (2) cracks on the web - top crack (8") and bottom crack (20")

(C) Bottom flange plate with FL x FW x as little as 3/16" thick minimum remaining and up to 1/2"W knife edge around hole (4" ø); bolt nuts with up to 75% section loss, 1/8"± pack rust between bottom flange plates and entire section with heavy laminated rust at web channels (interior side) with up to 6"H x 1/8"D section loss (tight access to verify web loss)

(D) Bottom flange plate with laminated rust and 8"Ø perforation with adjacent areas of knife edge

(X) Impact damage with cracks in steel member (total length of cracks)

(ID) Impact damage with bent angle legs up to 1" over 2'L and no cracks

(R) Bolted plates up to 12-1/2"W x 1/2"Th at the noted locations

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

General Notes:
- See Truss general notes sheet

TRUSS 1 SOUTH ELEVATION - SPANS 1 & 2

N.T.S.

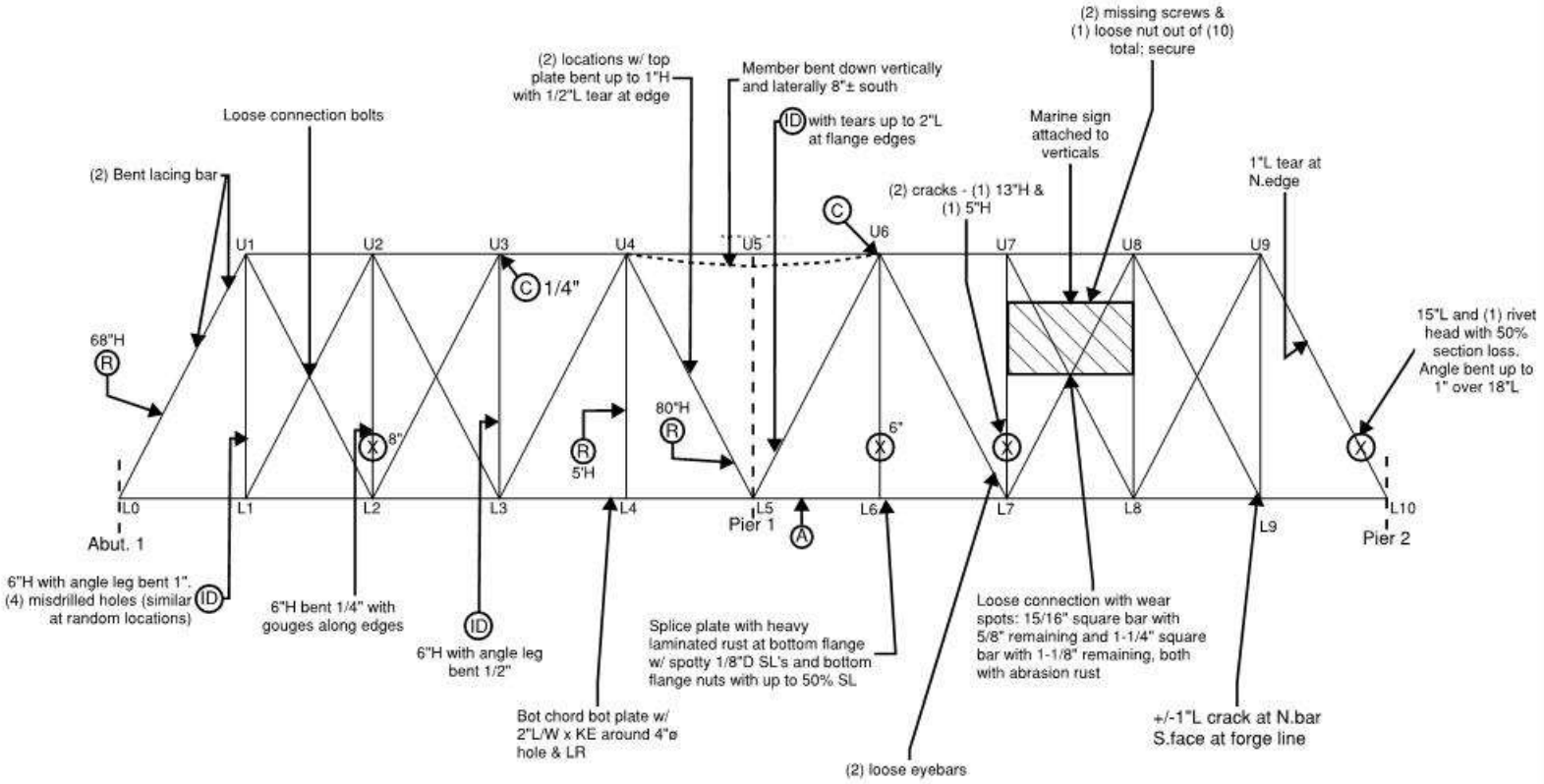
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

(A) Bottom chord flange plate with heavy laminated rust and 1/16"-1/8" avg REM x +/-12'L x FW & (2) perfs up to 19"L x 9"W, and bolt nuts with up to 90% SL and web channels (interior side) with up to 3"H x 1/8"D section loss

(X) Impact damage with cracks in steel member (total length of cracks)

(ID) Impact damage with bent angle legs up to 1" over 2'L and no cracks

(C) 1/2" gap between pin connection

(R) Bolted plates up to 12-1/2"W x 1/2"Th at the noted locations

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

General Notes:

- See Truss general notes sheet

TRUSS 2 SOUTH ELEVATION - SPANS 1 & 2

N.T.S.

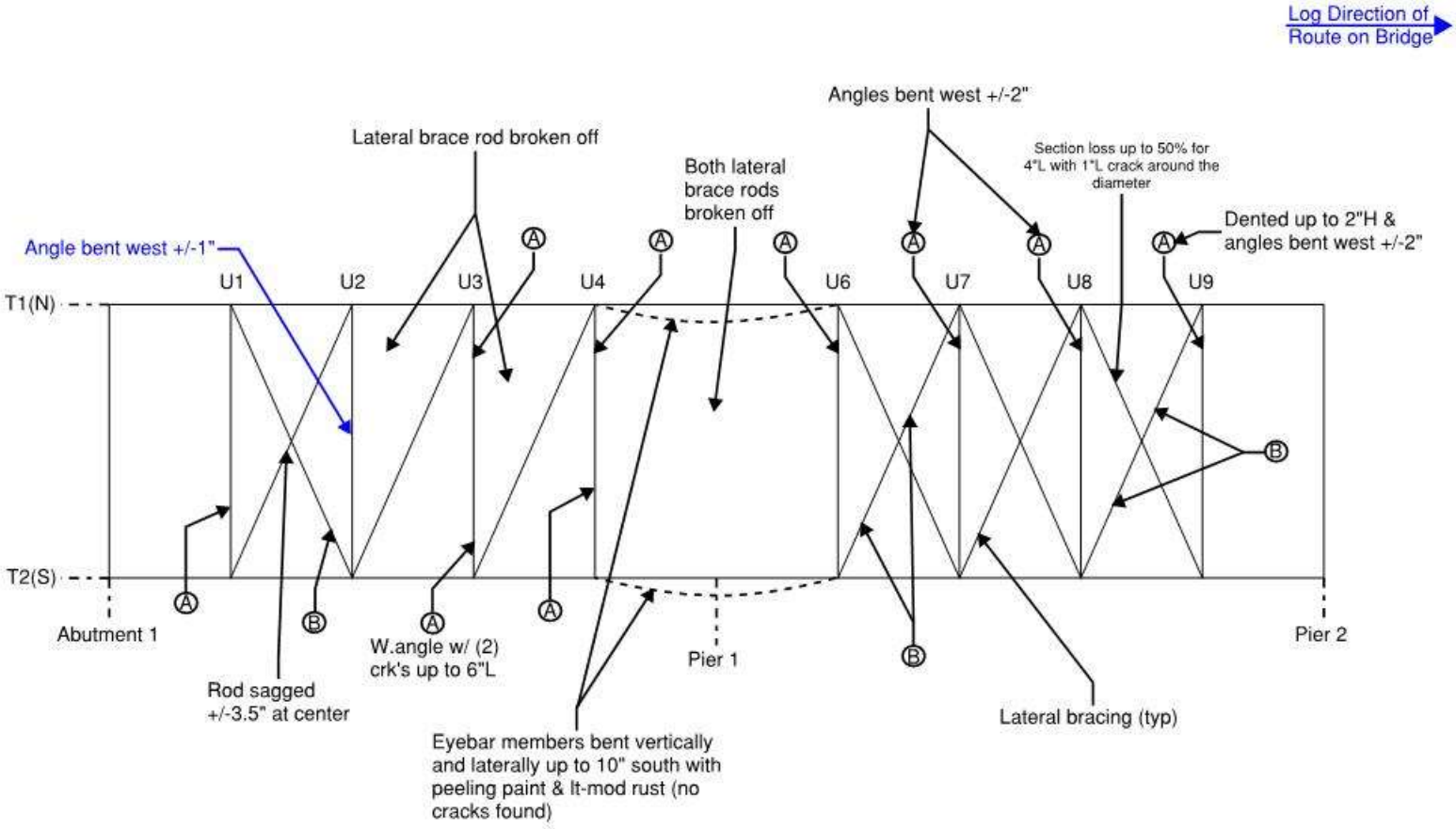
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes
Ⓐ- Impact damage to horizontal members (angle legs dented up to 1/2"
Ⓑ- Lateral bracing rod slightly bent

General Notes:
- See Truss general notes sheet

TOP CHORD LATERAL BRACING - SPANS 1 & 2

N.T.S.

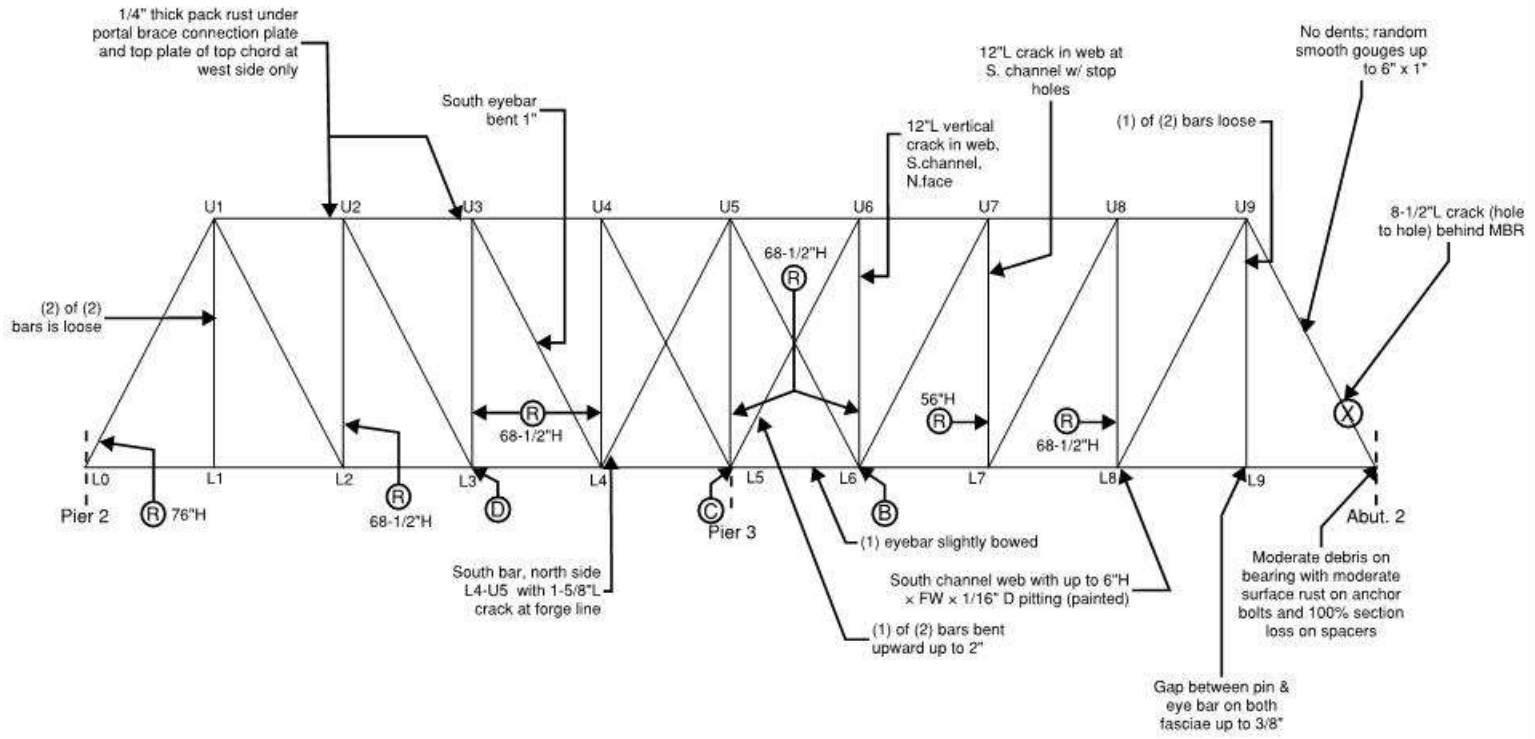
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

Ⓑ North U5-L6 with 1-7/8"L crack at forge line (south face), south U5-L6 (north face) with 1"L crack; bars with 2"W x 1"L/H x 3/16"D section loss/LR along shank

Ⓒ U4-L5 and L5-U6, north and south eyebars with cracks up to 2-1/16"L along forge line (4 cracks total)

Ⓓ 1/16" gap at bottom chord truss pin (south side) between nut and eyebar (nuts tight)

Ⓧ Vertical cracks to interior members of verticals from impact damage (typically members are bent up to 1" over 2'L) and cracks at lacing bar ends.

Ⓡ Bolted plates up to 12-1/2"W x 1/2"Th at the noted locations (damage at original truss sections difficult to see due to bolted plates)

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

General Notes:

- See Truss general notes sheet

TRUSS 1 SOUTH ELEVATION - SPANS 3 & 4

N.T.S.

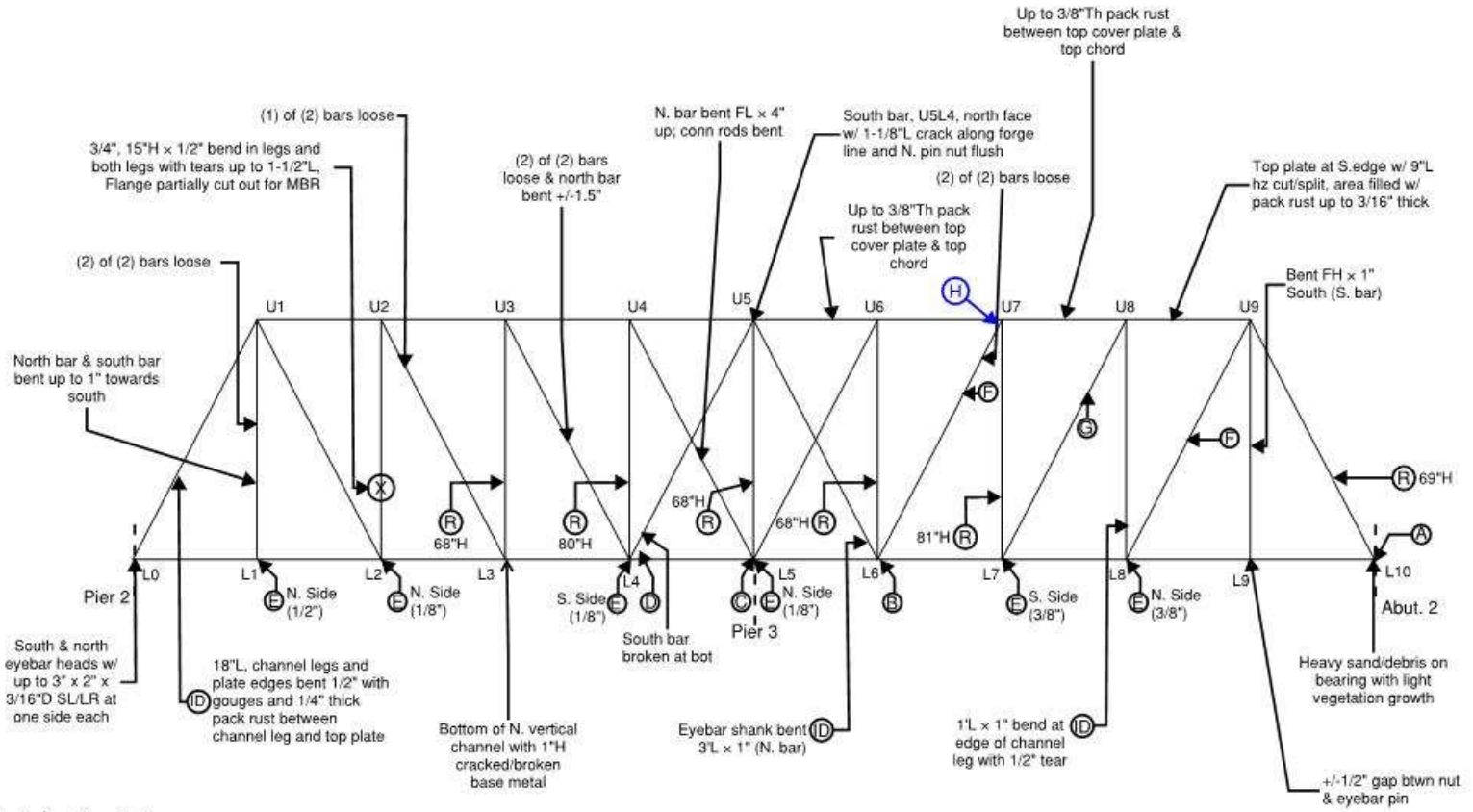
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

(A) Anchor bolt with laminated rust (northwest)

(B) North bar, south face of U5-L6 with 1-1/4"L crack. South bar, south face of U5-L6 with 3/4"L crack along forge line and up to 1/2" x 1/2" x1/4"D SL/LR on eyebar heads at forge

(C) North bar, south face of U4-L5 with 2-1/4"L crack at forge line and up to 1/8"D pitting on eyebar heads. South bar, north face of U4-L5 with 1"L crack at forge line

(D) South bar, north face of L4-U5 with 1-1/16"L crack at forge line (Bar Sheared). North bar, south face of L4-U5 with 15/16"L crack at eyebar head forge

(E) Gap between pin nut and eyebar head (nuts typically not loose)

(F) I-Beam section welded (longitudinal and transverse) to eyebars

(G) (2) plates welded to eyebars (longitudinal)

(H) 1/2" gap between pin nut and web plate

(X) Impact damage with cracks (total length of cracks)

(ID) Impact damage with bent angle legs up to 1" over 2'L and no cracks

(R) Bolted plates up to 12-1/2"W x 1/2"Th at the noted locations

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

General Notes:

- See Truss general notes sheet

TRUSS 2 SOUTH ELEVATION - SPANS 3 & 4

N.T.S.

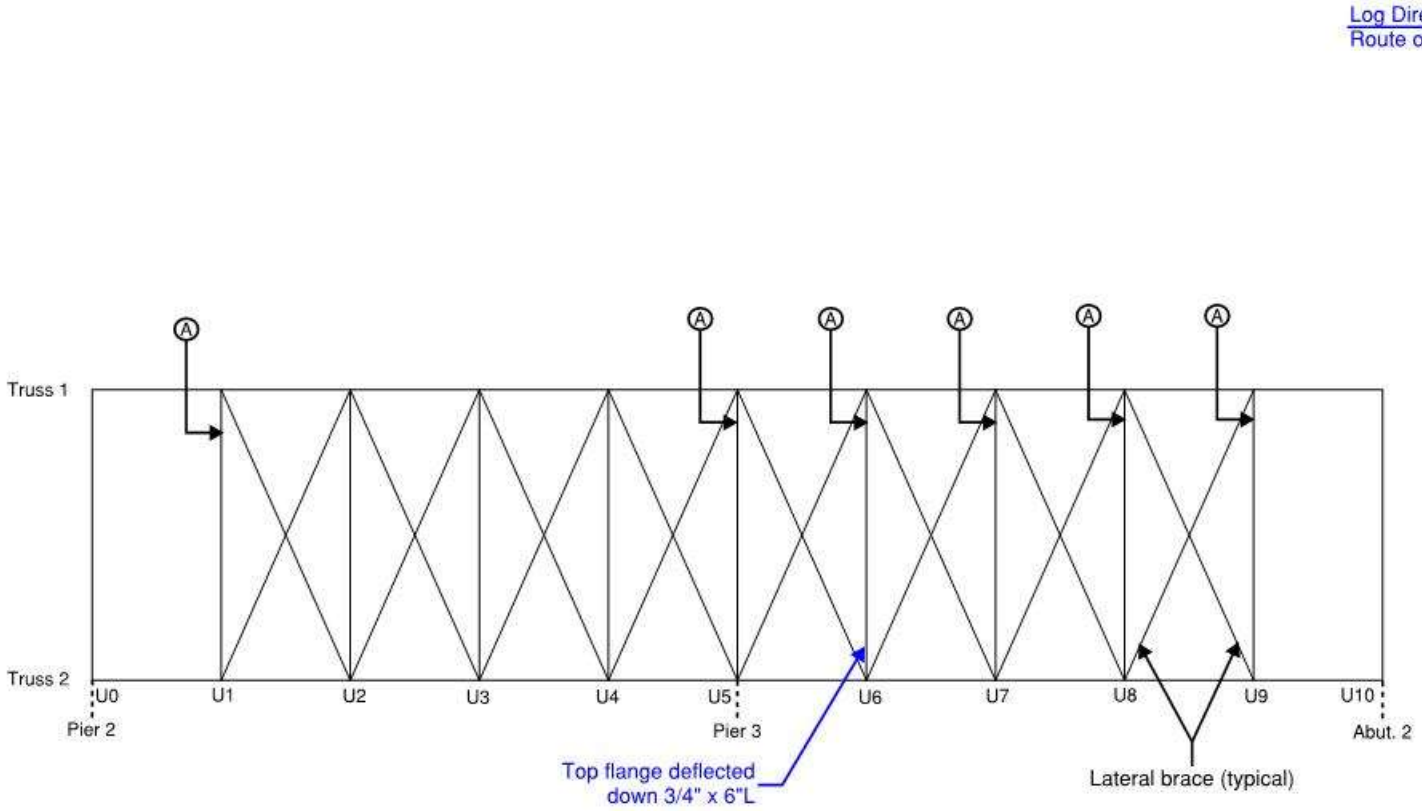
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:

Ⓐ Impact damage to horizontal members (angle legs dented up to 1"); typ two spots each call-out

General Notes:

- See Truss general notes sheet
- Rods at center (point of contact) with up to 3/8" deep dents/wear

TOP CHORD LATERAL BRACING - SPANS 3 & 4

N.T.S.

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

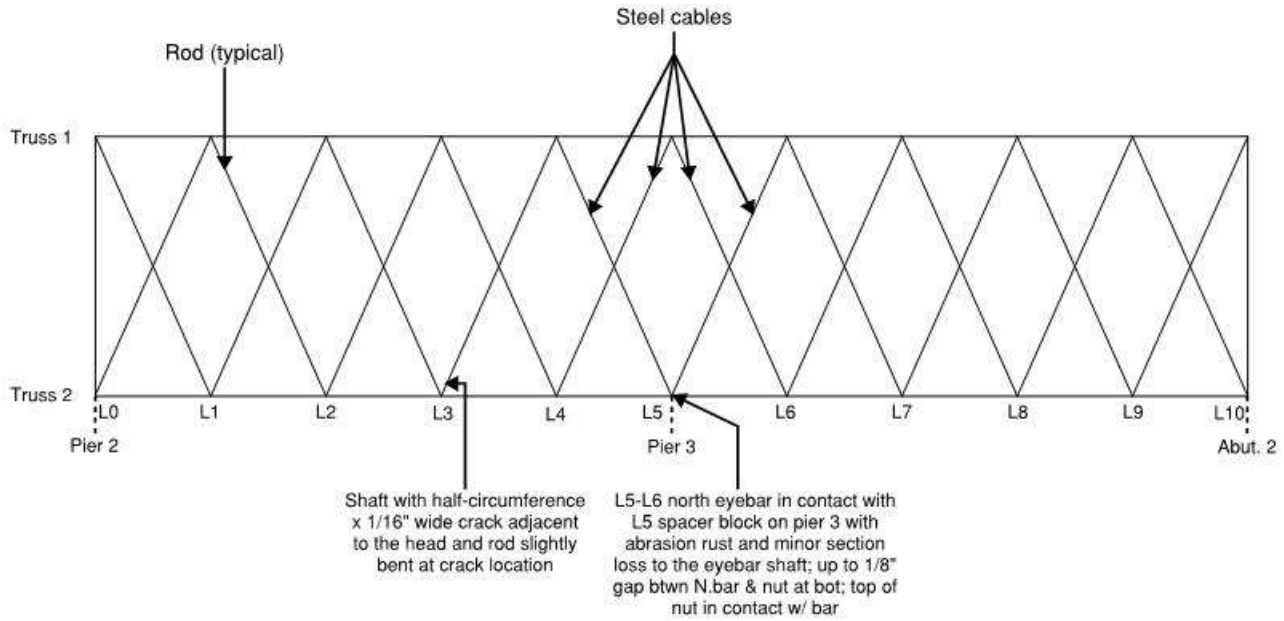
Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: KHI, WEA (TSC)	DATE: 11/17/16	BRIDGE NO.: 01349

Log Direction of Route on Bridge



General Notes:

- See Truss general notes sheet
- Several diagonal cables and rods loose and sagging up to 2".
- Light rust on cables and rods.
- Moderate rust on rods in span 4.

BOTTOM CHORD LATERAL BRACING - SPANS 3 & 4

N.T.S.

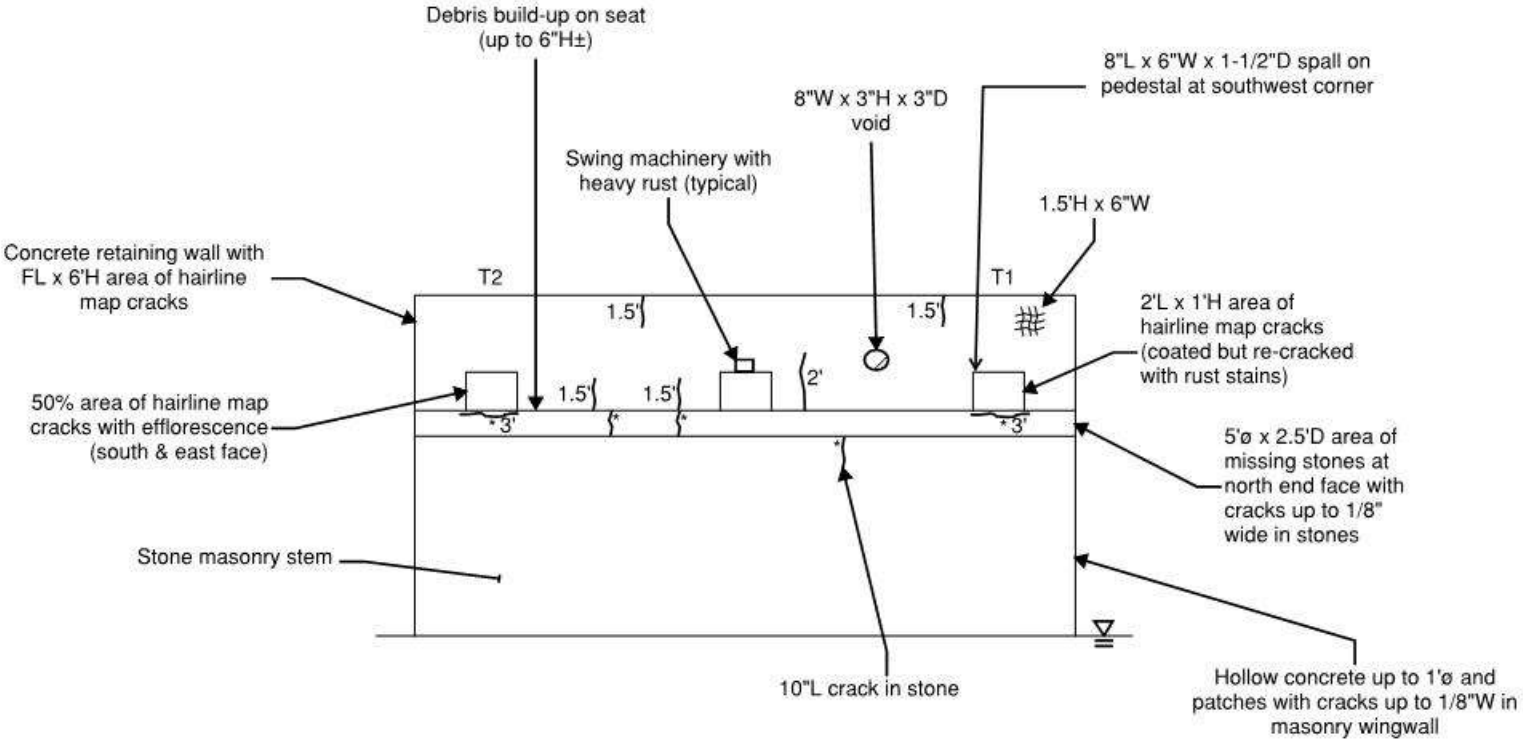
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:

-Mortar joints with patch material separated from stone at random locations
-50%± of mortar pointing missing above waterline and up to 80% missing below
-Voids between stones up to 4'D (mostly near water line)
-Timber platform attached to front face of stone masonry stem (not shown for clarity)
-Skim coat on backwall and pedestals beginning to peel
-Minor accumulation of debris on abutment seat and pedestals (unless otherwise noted)
-Efflorescence staining along construction joint between pedestal and seat
- Up to moderate scale on top of pedestals

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

ABUTMENT 1
N.T.S.

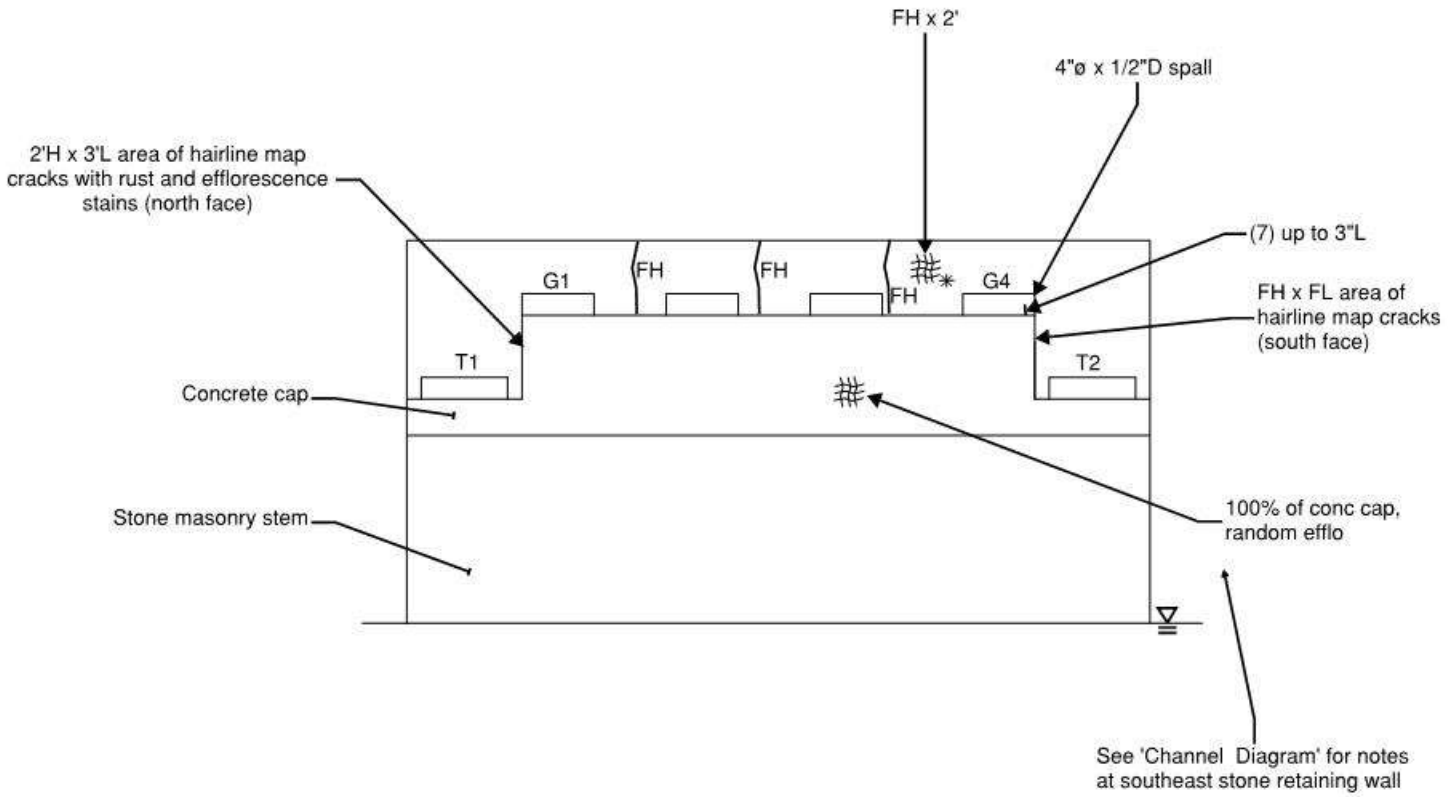
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:

-Mortar joints with patch material separated from stone at random locations

-50%± of mortar pointing missing above waterline and up to 80% missing below

-Evidence of leakage on backwall and concrete cap

- +/-50% map crack at top of cap w/ isolated efflorescence

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- FH Full Height

ABUTMENT 2
N.T.S.

REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: KHI, MMB (TSC)	DATE: 11/16/2016	BRIDGE NO.: 01349



General Notes:

- Swing machinery and cap girder on top
- Fender system not shown for clarity (see channel sketch)
- Steel encasement of concrete pier is severely corroded below high water line (heavy laminated rust up to 3'H × full perimeter) and areas of 100% section loss with spalled concrete
- Top of concrete pier with isolated hairline cracks up to 3'L and widespread map cracks up to 3'W × 1'L
- Timber work platforms at north and south ends on top of fender
- Steel grate walkway at west end attached at top

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 1 - WEST ELEVATION
N.T.S.

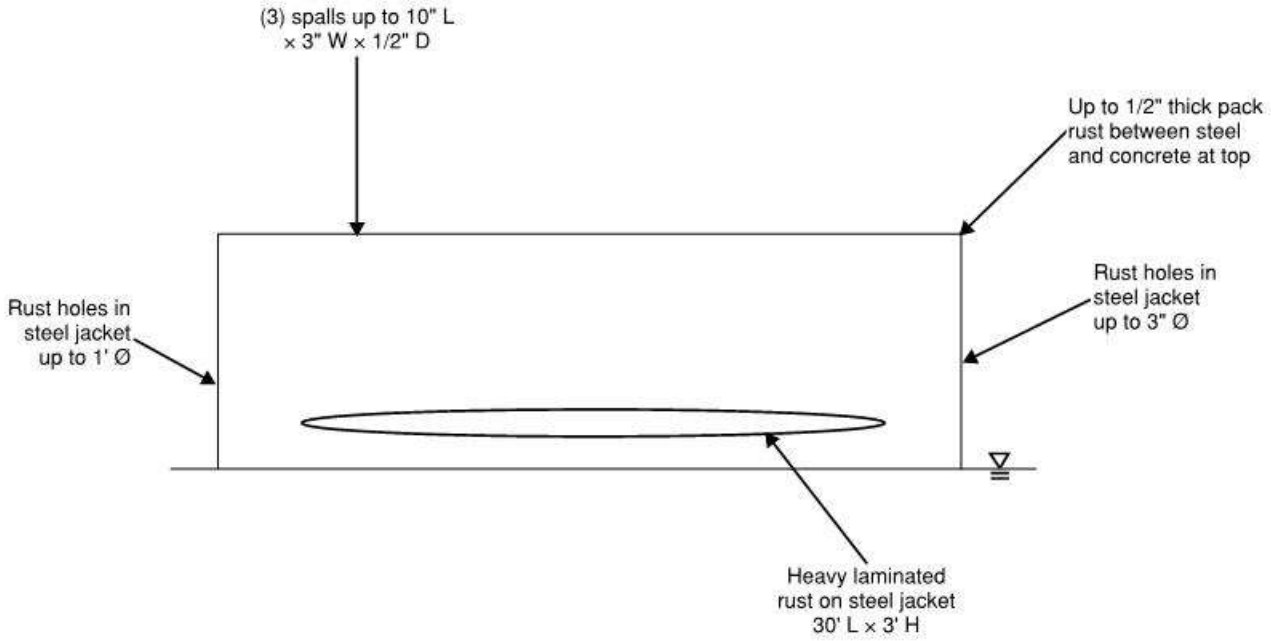
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:
- See Pier 1, West Elevation

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 1 - EAST ELEVATION
N.T.S.

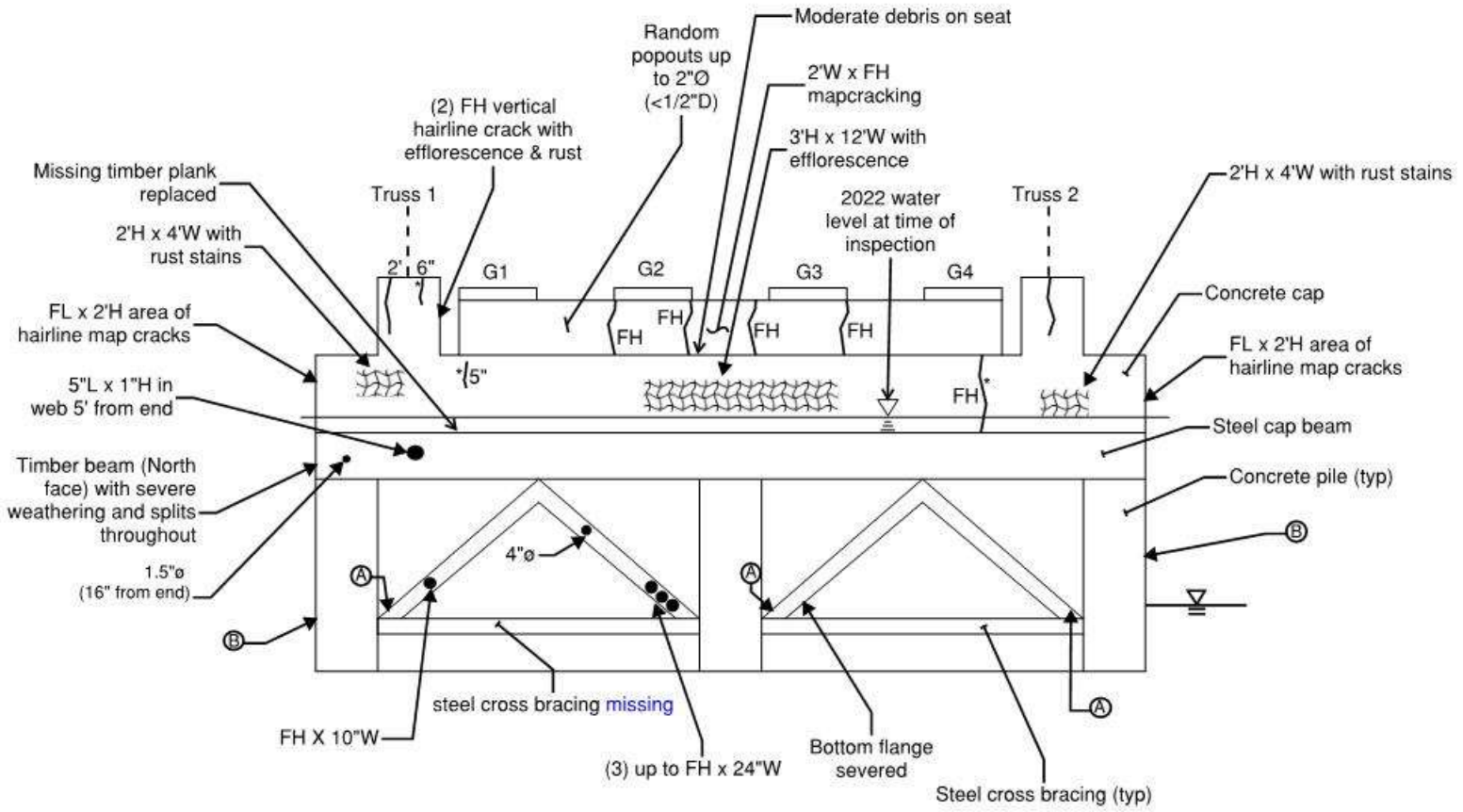
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:
Ⓐ- Steel cross bracing has several locations of 100% section loss x up to 4.5'W at the ends (disconnected from piles at these locations)
Ⓑ- Fiberglass shell missing, exposed concrete pile with heavy scale up to full perimeter x 3'H x up to 4"D with exposed rebar

General Notes:
-Moderate sand accumulation on pier cap
-Concrete skimcoat peeling at random locations
-Moderate-Heavy rust on cap beam
- Only concrete portion of pier visible during 2022 inspection (high tide)
- See Underwater sketches for more detailed/updated notes at/below waterline

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- Holes in web

PIER 2 - WEST ELEVATION
N.T.S.

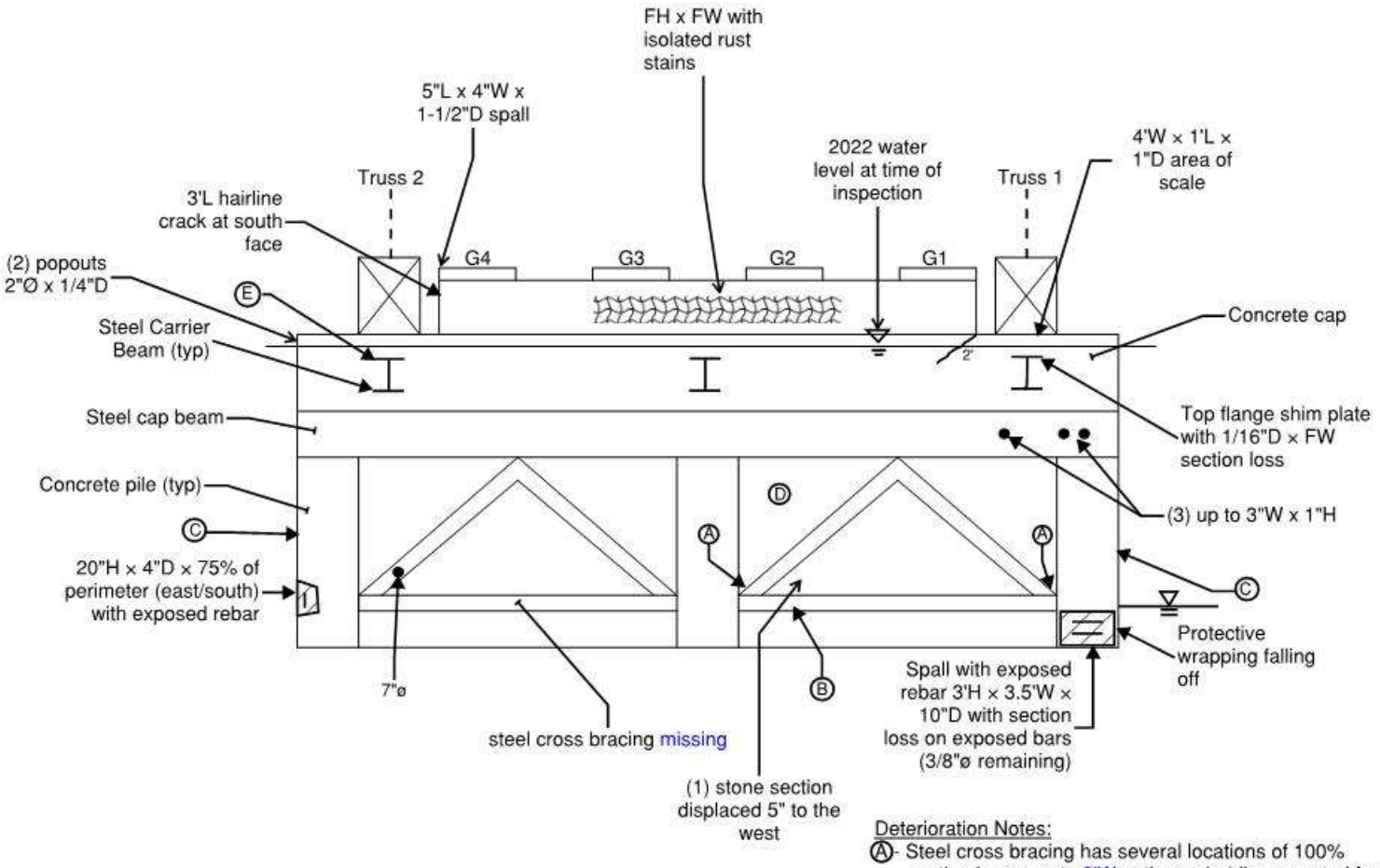
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Deterioration Notes:
- (A) Steel cross bracing has several locations of 100% section loss x up to 3'W at the ends (disconnected from piles at these locations)
- (B) 100% bottom flange loss x 2'L
- (C) Fiberglass shell missing, exposed concrete pile with heavy scale up to full perimeter x 3'H x up to 4"D
- (D) 3'L x 1.5'W x 5"D chipped stone and 15"D mortar void in stone masonry pier wall behind steel cross bracing
- (E) Shim plate with 11"L x FW x 1/8" thick remaining with knife edge up to FW x 5"L at east end

General Notes:
- Concrete skimcoat peeling at random locations
- Moderate sand accumulation on pier cap
- Moderate to heavy rust throughout steel cap beam and cross bracing
- Shim plates on top flanges of steel carrier beams with areas of laminated rust
- Only concrete portion of pier visible during 2022 inspection (high tide)
- See Underwater sketches for more detailed/updated notes at /below waterline

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT
- Holes in web

PIER 2 - EAST ELEVATION
N.T.S.

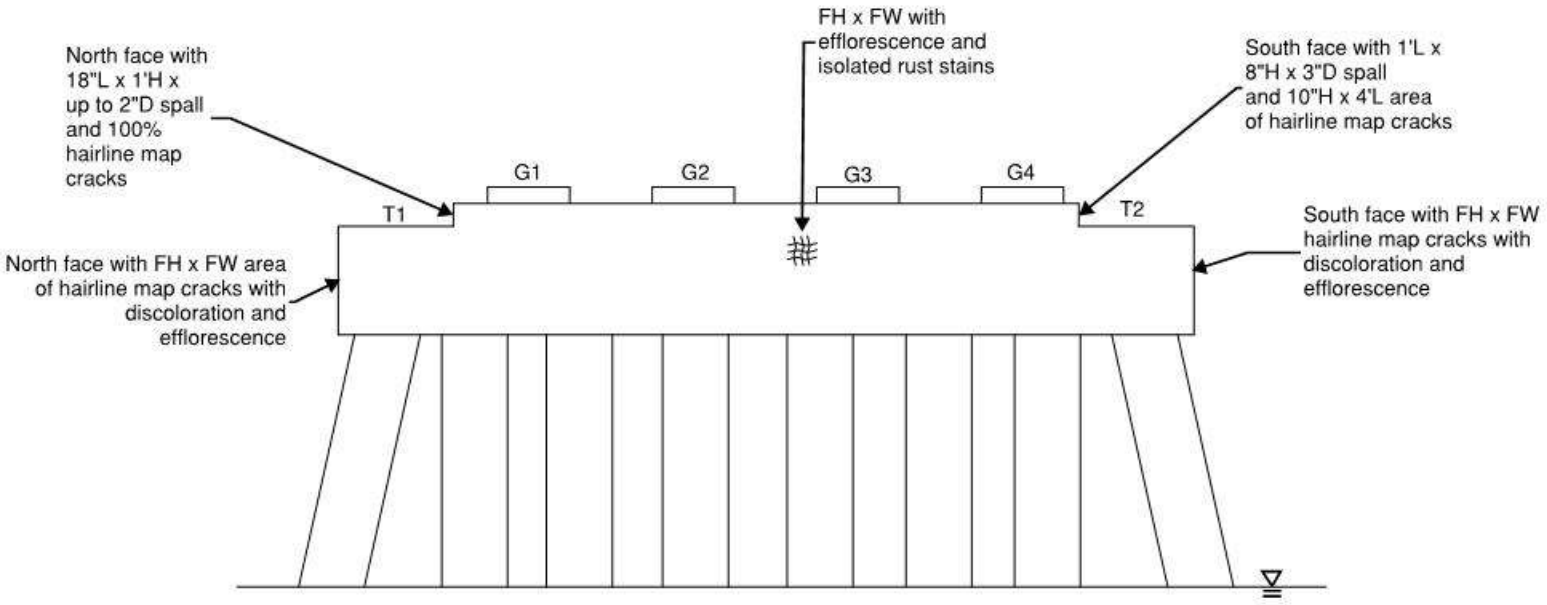
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE:11/16/16	BRIDGE NO.: 01349



General Notes:
-Moderate silt and algae staining on concrete cap, full height under trusses and FW x 6"H along the bottom.
-Piles wrapped in fiberglass jacket.

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 3 - WEST ELEVATION
N.T.S.

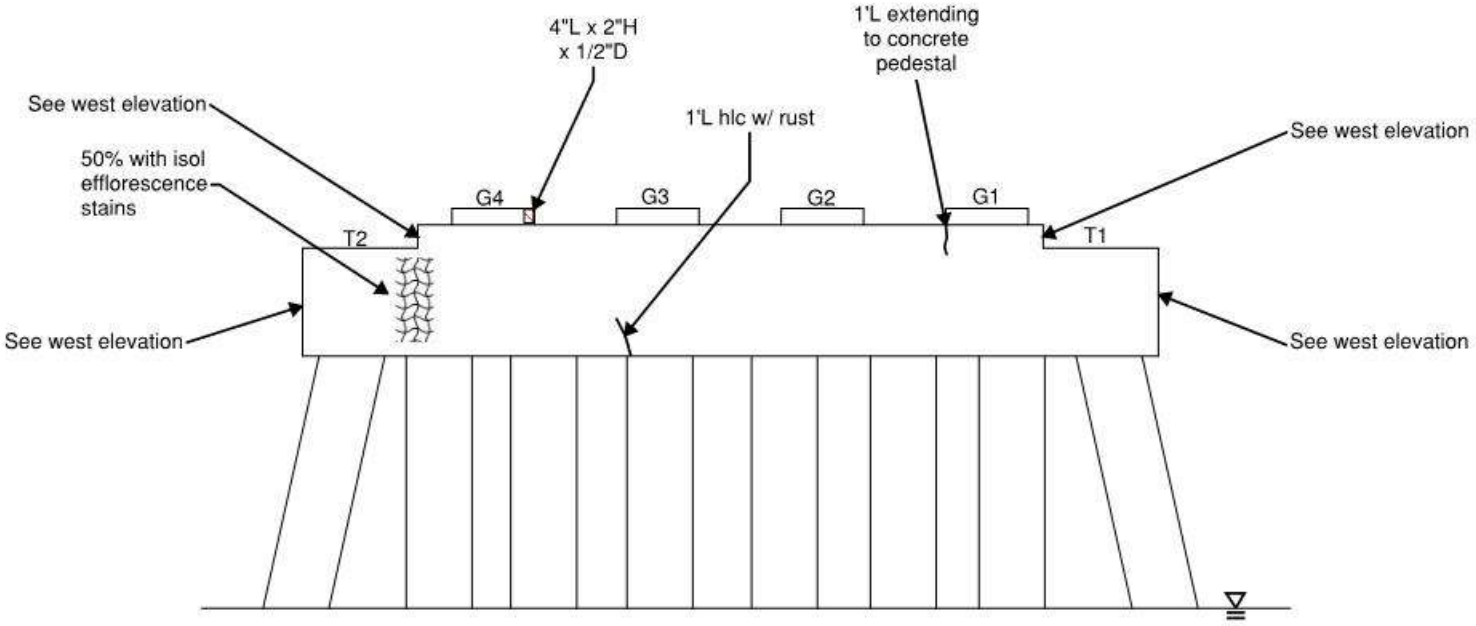
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: MMB, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



General Notes:
-See Pier 3, West Elevation sheet

LEGEND:
- HOLLOW AREA
- SHALLOW REBAR
- SPALL AREA
- SPALL AREA WITH EXPOSED REBAR
- MAPCRACKS
- HAIRLINE CRACKS
- HONEYCOMB AREA
- SCALE AREA
- EFFLORESCENCE PRESENT

PIER 3 - EAST ELEVATION
N.T.S.

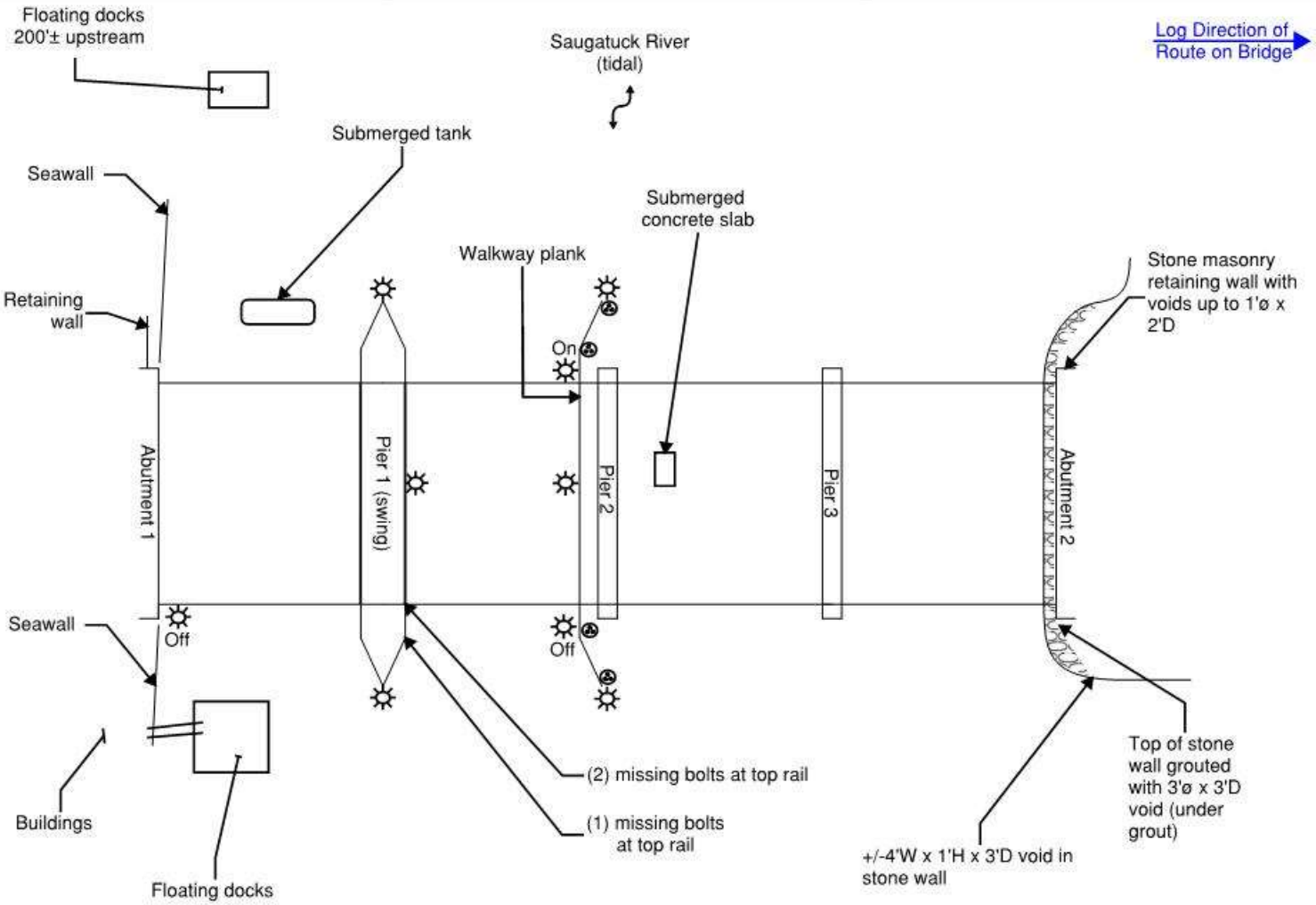
REVISION 1	DATE:09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:

Sketches
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

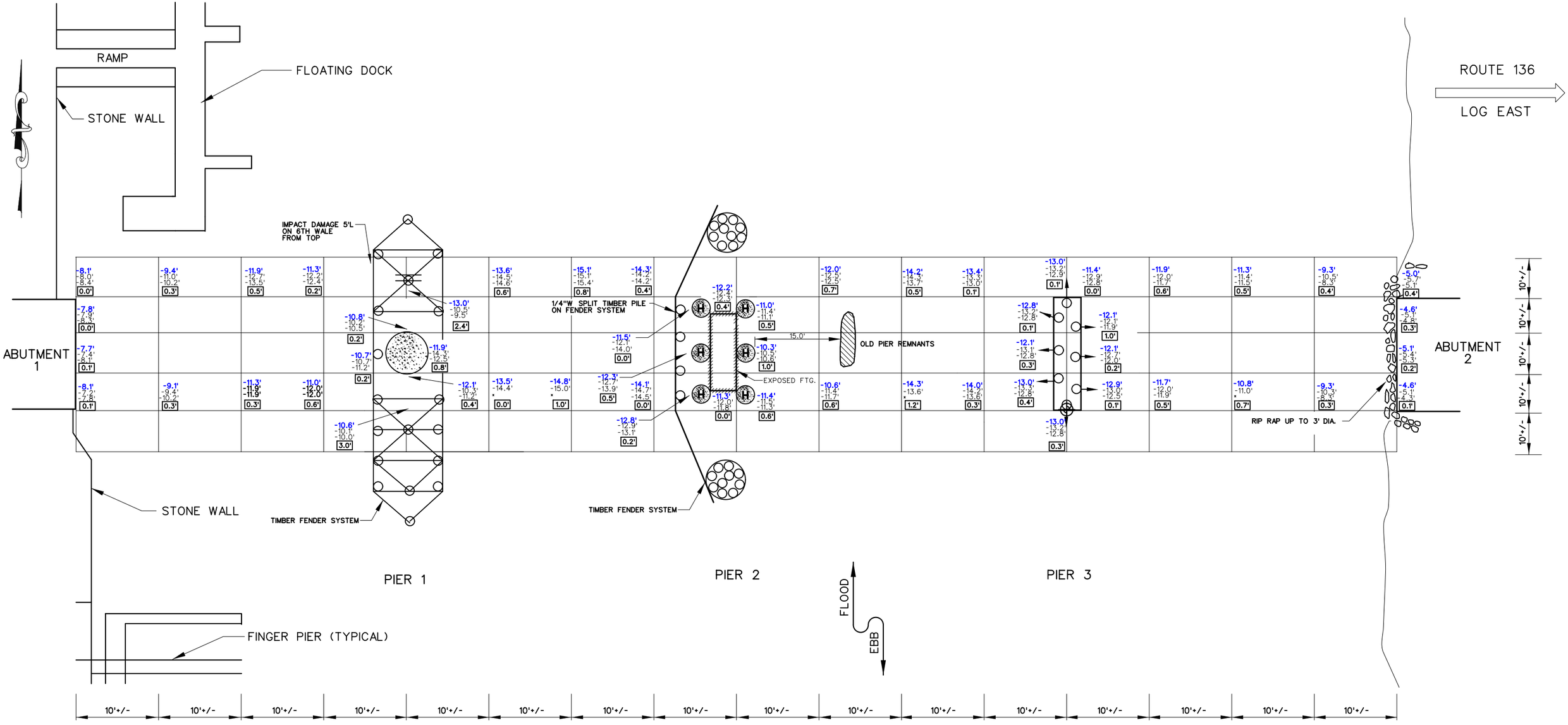
Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

CREW: WEA, KHI (TSC)	DATE: 11/16/16	BRIDGE NO.: 01349



Channel Diagram
N.T.S.

REVISION 1	DATE: 09/27/2018	CREW: PRIME: NB, BM, EA, EB, IS	REVISION 3	DATE: 09/15/22	CREW: KG, NC, SM, MD (ADA)
REVISION 2	DATE: 9/16/20	CREW: JG, AH, TK, BF (Baker)	REVISION 4	DATE:	CREW:



NOTES:

1. THERE ARE DRY-LAID STONE CHANNEL WALLS ALONG WEST SIDE OF CHANNEL AND DRY-LAID STONE RETAINING WALLS AT ENDS OF ABUTMENT 2.
2. TIMBER FENDER SYSTEM HAS PILES AND WALES WITH SPLITS AND CHECKS UP TO 3/4"W WIDE. ENDS OF WALES HAVE DETERIORATION/ROT UP TO 2'L x FH x UP TO 2"D. THE HARDWARE HAS HEAVY TO SEVERE CORROSION AT WALES 4, 5 & 6 WITHIN TIDAL ZONE.
3. PROBING WITH UP TO 3.0' PENETRATION INTO CHANNEL BOTTOM.
4. PIER 1 STEEL BRACKETS ON TIMBER FENDER SYSTEM HAVE MODERATE TO HEAVY CORROSION WITH AREAS OF 100% SECTION LOSS UP TO 8"L x UP TO 7"H.

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

SOUNDING PLAN

N.T.S.

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -3.3'
-4.7'
-6.5'

0.0' DEPTH OF PENETRATION

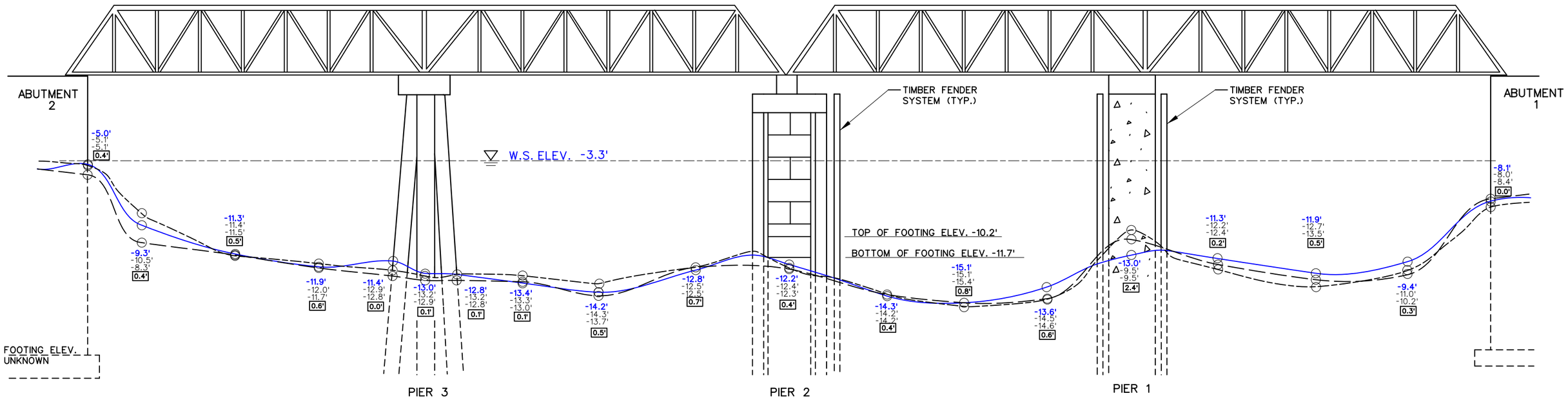
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

SOUNDING PLAN

INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 01349A

UW DRAWING 1



UPSTREAM (NORTH) ELEVATION

N.T.S.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -3.3' / -6.5' / -8.0'
- 0.0' DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

LEGEND FOR MUDLINE CONTOURS

- OCT. 2022
- SEPT. 2020
- OCT. 2018

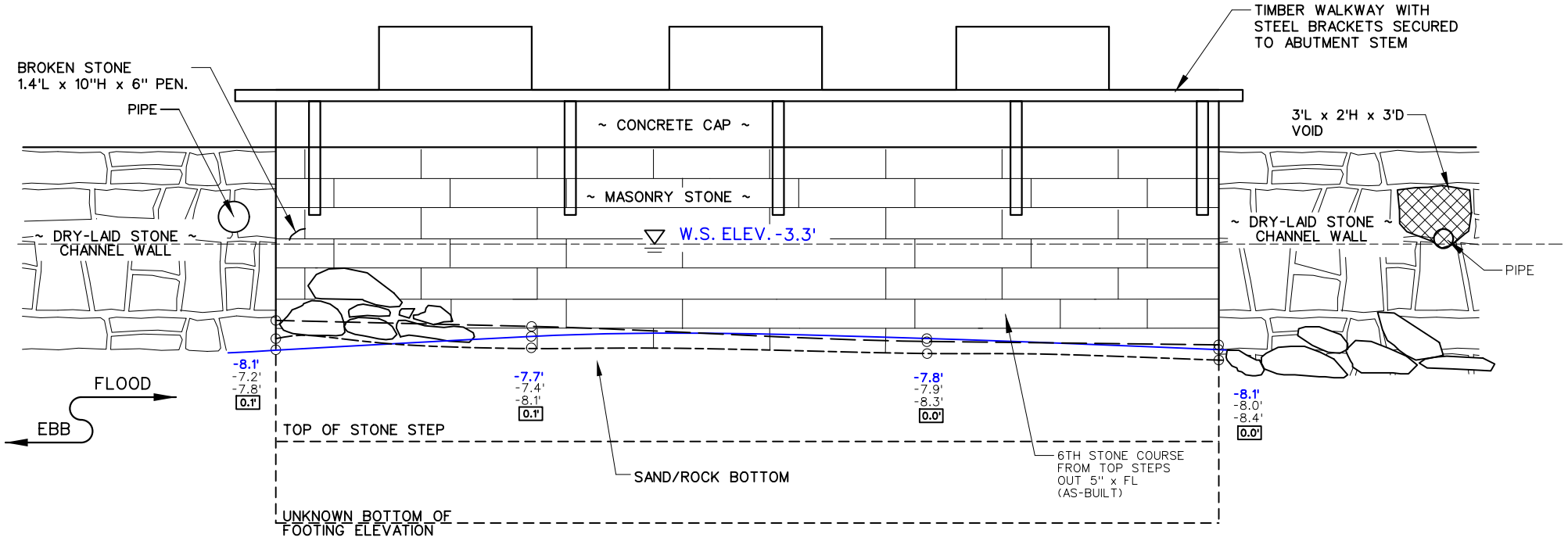
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

UPSTREAM (NORTH) ELEVATION

INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 01349B

UW DRAWING 2



NOTES:

1. GROUT-REPAIR / EPOXY COATING ON STONE MASONRY STEM HAS FAILED UP TO 90% IN TIDAL ZONE.
2. STONE MASONRY STEM HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 3.5' BETWEEN STONES.
3. STONE MASONRY RETURN WALL HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES WITH VOIDS UP TO 1' DIA. DUE TO MISSING MORTAR AND CHINK STONES.
4. DRY-LAID STONE CHANNEL WALLS HAVE PENETRATIONS UP TO 2.5' BETWEEN STONES.
5. NORTH RETURN WALL, 11' FROM CORNER AT RETAINING WALL INTERFACE HAS A 1.3'L x 2'H x 3'D VOID AT EL. -3.0'.

ABUTMENT 1

N.T.S.

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -3.3'
-6.5'
-8.0'

0.0' DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

LEGEND FOR MUDLINE CONTOURS

OCT. 2022
SEPT. 2020
OCT. 2018

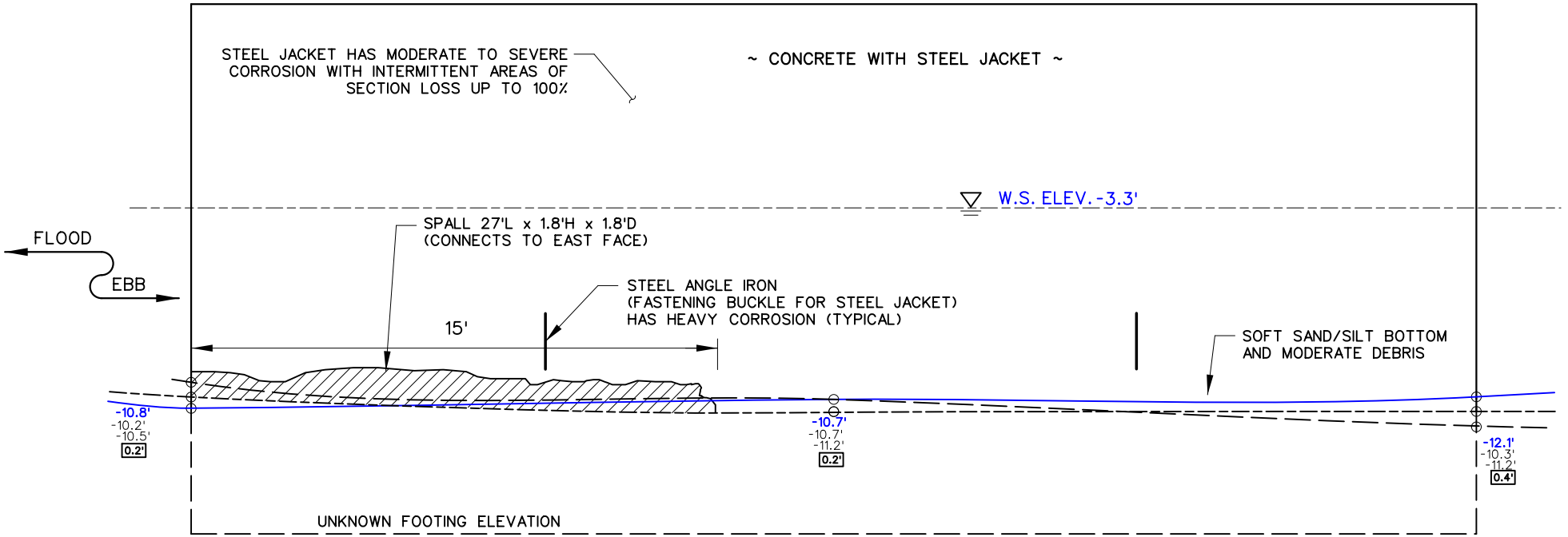
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

ABUTMENT 1

INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 01349C

UW DRAWING 3



PIER 1 (WEST ELEVATION)

N.T.S.

NOTES:

1. THERE IS A 4' HIGH BAND OF MISSING STEEL JACKET FROM 0.5' ABOVE WATER SURFACE TO 3.5' BELOW WATER SURFACE. AREAS OF EXPOSED CONCRETE HAVE MODERATE TO SEVERE ABRASION UP TO 3"D WITH EXPOSED / LOOSE AGGREGATE.
2. CONCRETE OVERPOUR AND CONSTRUCTION DEBRIS ALONG CHANNEL BOTTOM.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -3.3'
  -6.5'
  -8.0'
- 0.0' DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

LEGEND FOR MUDLINE CONTOURS

- OCT. 2022
- SEPT. 2020
- OCT. 2018

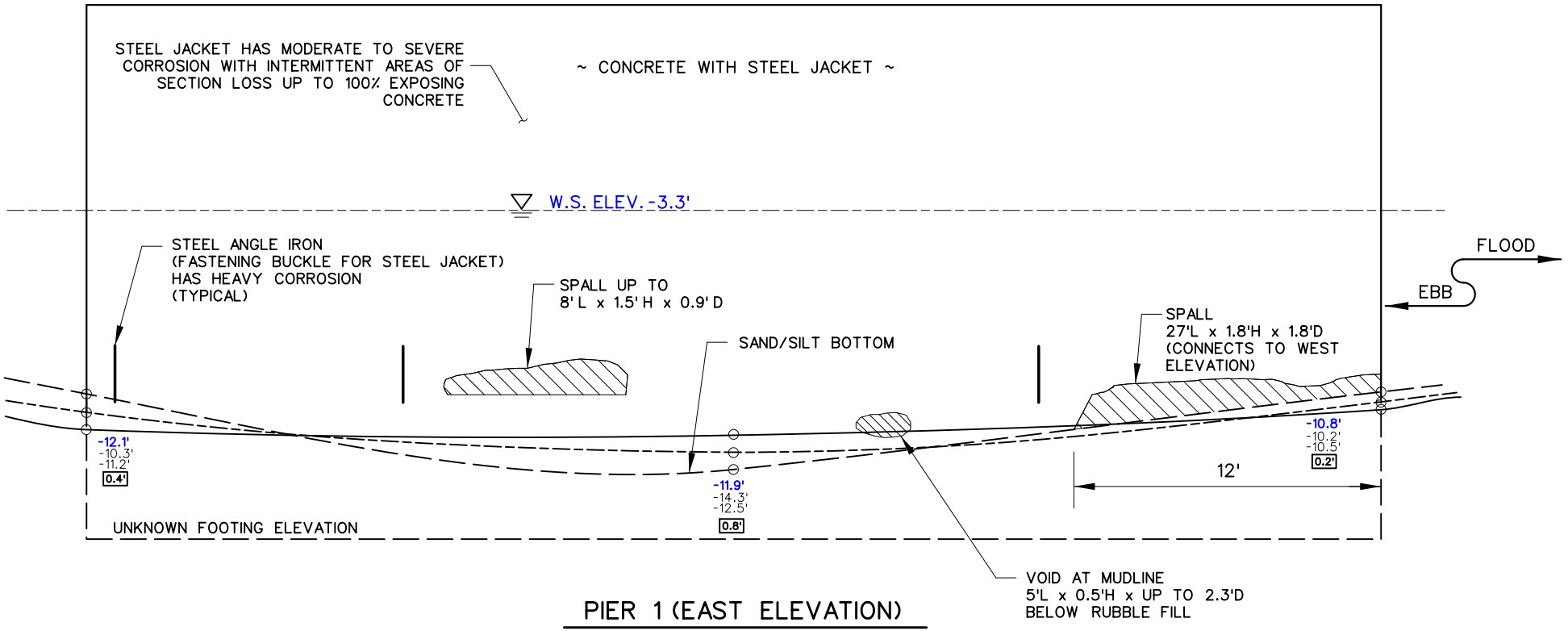
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

PIER 1 (WEST ELEVATION)

INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 01349D

UW DRAWING 4



PIER 1 (EAST ELEVATION)

N.T.S.

NOTES:

1. THERE IS A 4' HIGH BAND OF MISSING STEEL JACKET FROM 0.5' ABOVE WATER SURFACE TO 3.5' BELOW WATER SURFACE. AREAS OF EXPOSED CONCRETE HAVE MODERATE TO SEVERE ABRASION UP TO 3"D WITH EXPOSED / LOOSE AGGREGATE.
2. CONCRETE OVERPOUR AND CONSTRUCTION DEBRIS ALONG CHANNEL BOTTOM.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -3.3'
  -6.5'
  -8.0'
- 0.0' DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

LEGEND FOR MUDLINE CONTOURS

- OCT. 2022
- SEPT. 2020
- OCT. 2018

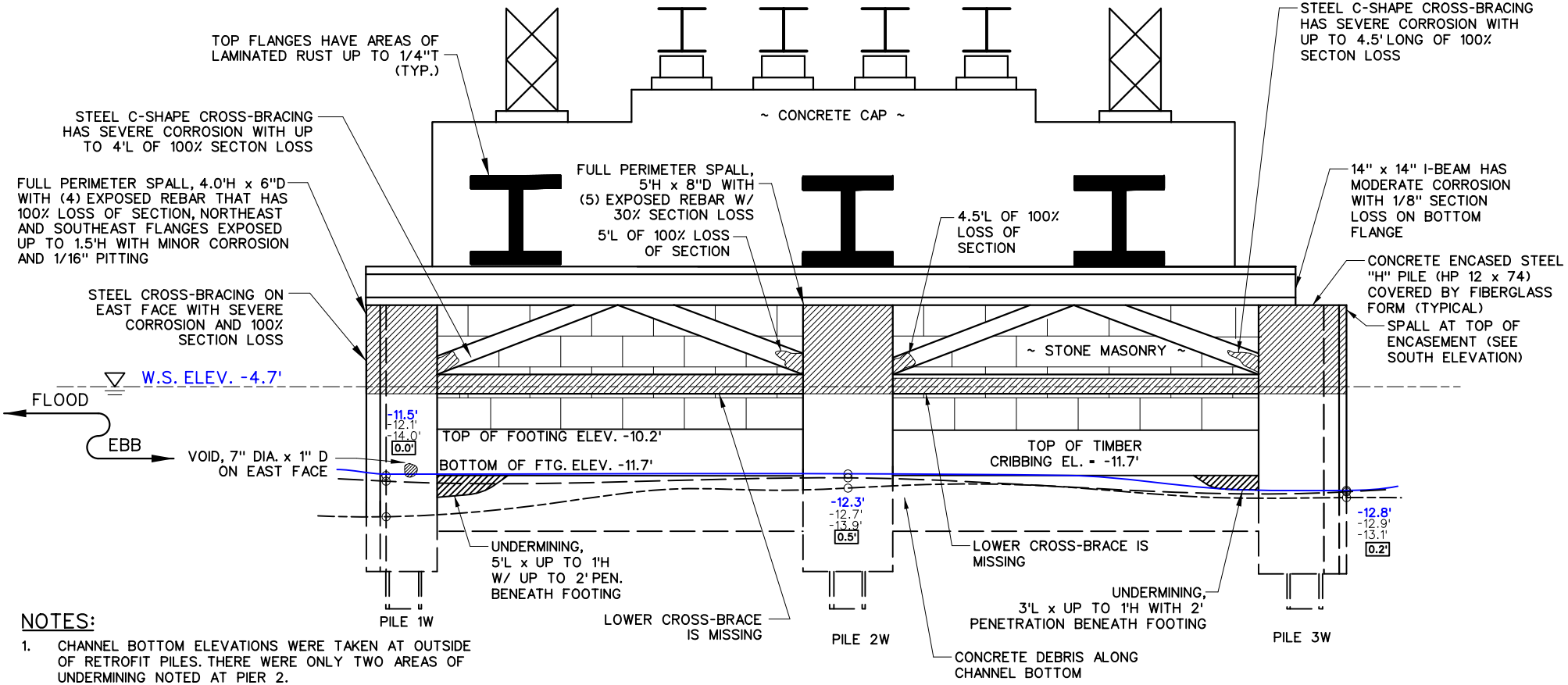
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

PIER 1 (EAST ELEVATION)

INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 01349E

UW DRAWING 5



PIER 2 (WEST ELEVATION)

N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. TIMBER CRIBBING WAS EXPOSED AT AREAS OF UNDERMINING AND HAS EVIDENCE OF MARINE BORER ACTIVITY WITH UP TO 20% LOSS OF SECTION.
3. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS ABRASION UP TO 2.5" DEEP WITH EXPOSED AGGREGATE.
4. STONE MASONRY PIER FACE HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES, MISSING CHINKING STONES, AND RANDOM STONES HAVE HAIRLINE CRACKS.
5. ALL JACKETS ON PILES EXTEND TO MUDLINE.
6. STEEL CAP BEAMS HAS MODERATE CORROSION WITH UP TO 1/8" SECTION LOSS ON THE BOTTOM FLANGE.

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

LEGEND FOR MUDLINE CONTOURS

OCT. 2022
SEPT. 2020
OCT. 2018

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -3.3'
-6.5'
-8.0'

0.0' DEPTH OF PENETRATION

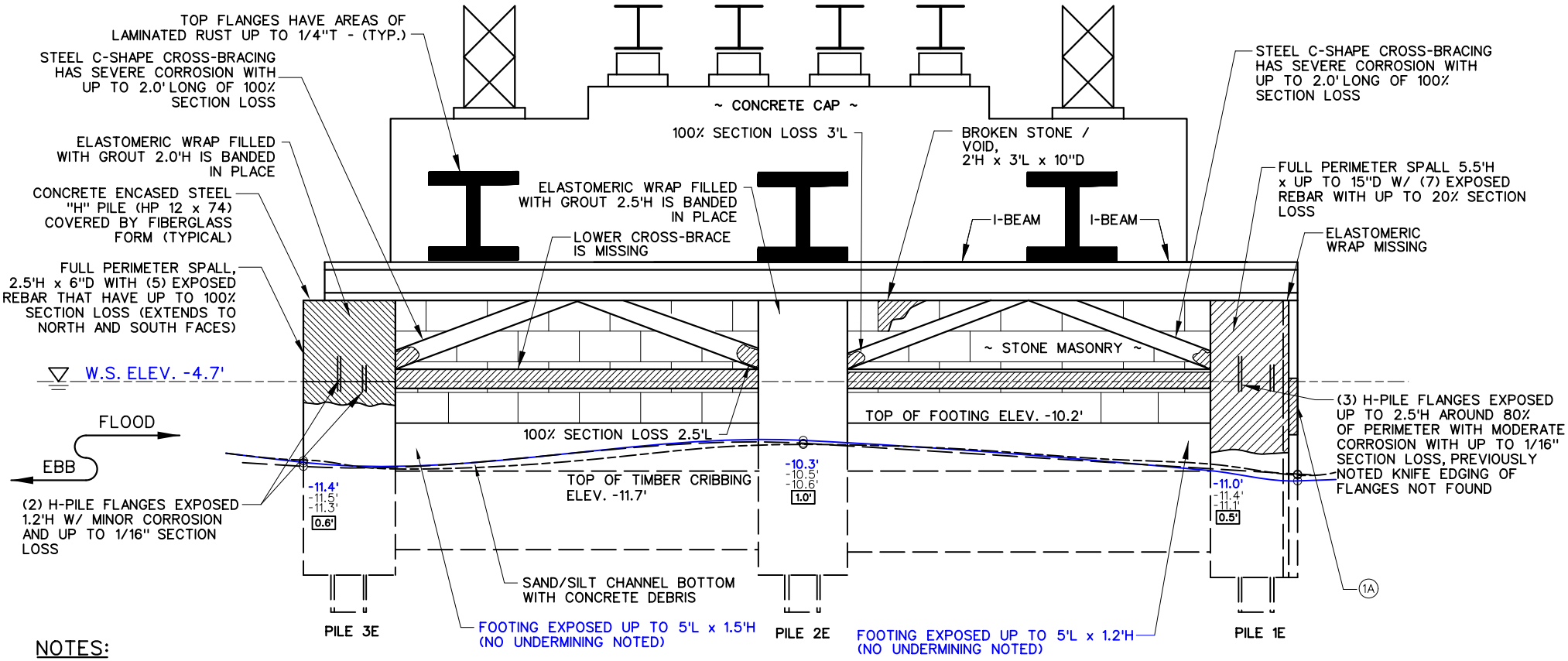
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 2 (WEST ELEVATION)

INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 01349F

UW DRAWING 6



PIER 2 (EAST ELEVATION)

N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS ABRASION UP TO 2.5" DEEP WITH EXPOSED AGGREGATE.
3. STONE MASONRY PIER FACE HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES AND RANDOM STONES HAVE HAIRLINE CRACKS.
4. ALL JACKETS ON PILES GO TO MUDLINE.
5. STEEL CAP BEAMS HAS MODERATE CORROSION WITH UP TO 1/8" SECTION LOSS ON THE BOTTOM FLANGE.

(1A) — STEEL BEAM WELDED TO STEEL "H" PILE HAS SEVERE CORROSION WITH UP TO 100% SECTION LOSS 2.5'H AT BOTTOM OF PLATE IN TIDAL ZONE

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -3.3' / -6.5' / -8.0'
- [0.0'] DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

LEGEND FOR MUDLINE CONTOURS

- OCT. 2022
- SEPT. 2020
- OCT. 2018

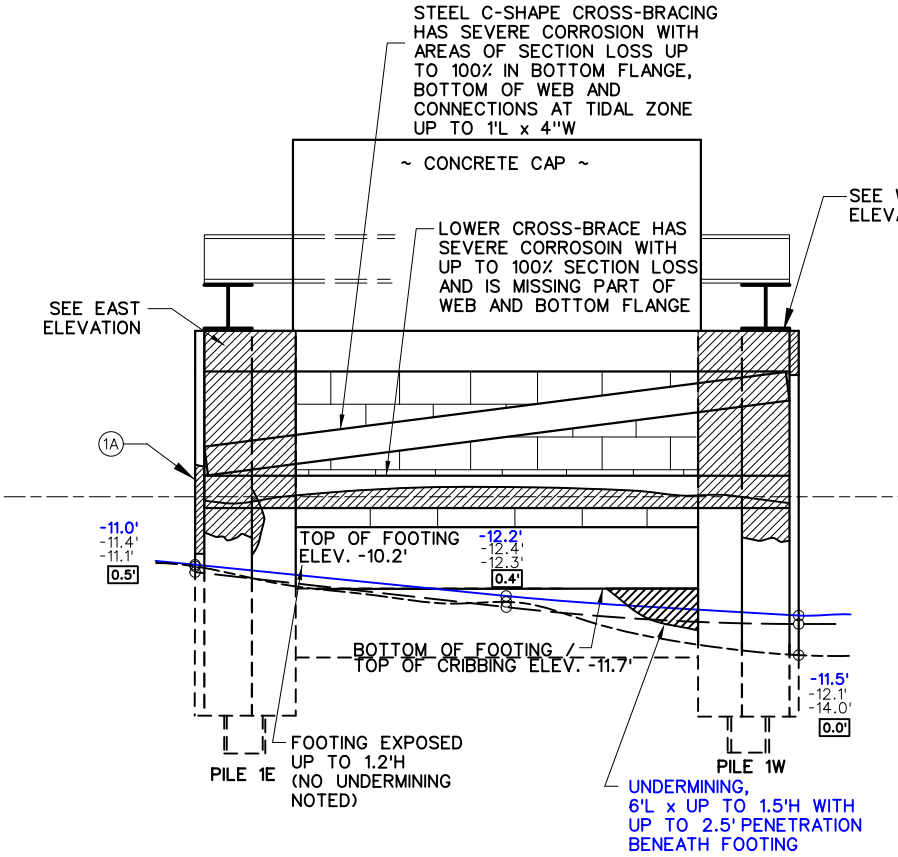
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

PIER 2 (EAST ELEVATION)

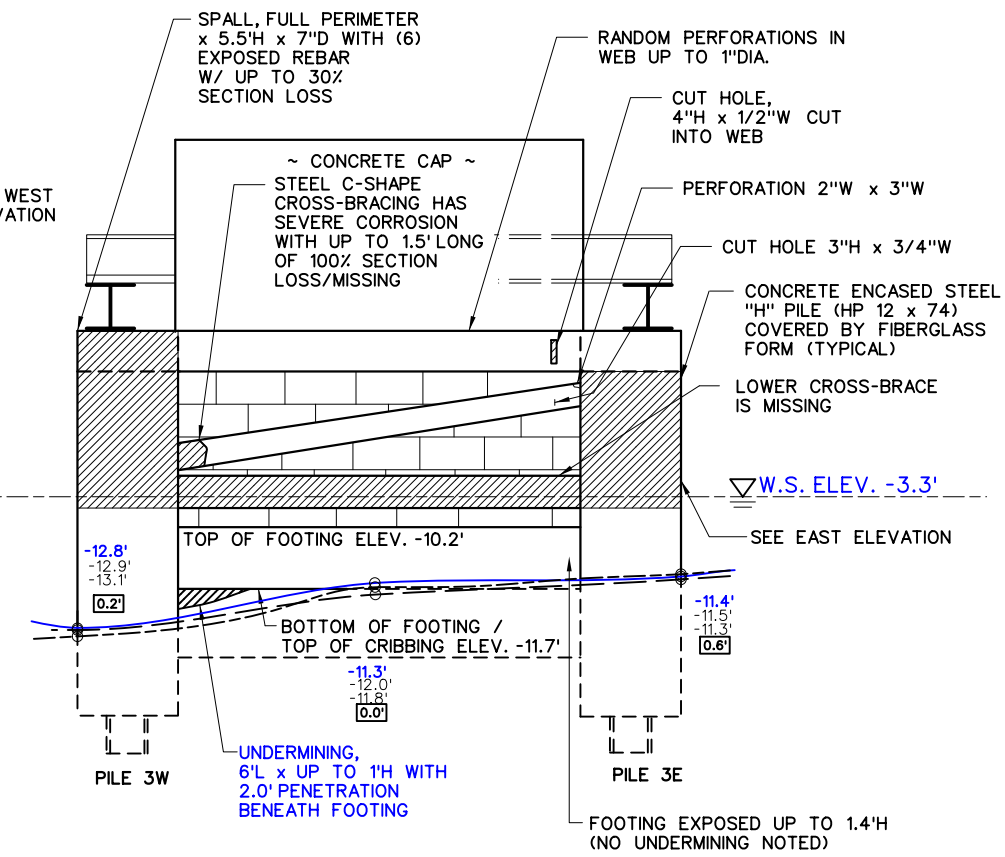
INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 01349G

UW DRAWING 7



PIER 2 (NORTH ELEVATION)

N.T.S.



PIER 2 (SOUTH ELEVATION)

N.T.S.

NOTES:

1. CHANNEL BOTTOM ELEVATIONS WERE TAKEN AT OUTSIDE OF RETROFIT PILES. THERE WERE ONLY TWO AREAS OF UNDERMINING NOTED AT PIER 2.
2. TIMBER CRIBBING WAS EXPOSED AT AREAS OF UNDERMINING AND HAS EVIDENCE OF MARINE BORER ACTIVITY.
3. FIBERGLASS FORMS ON PILES ARE LOOSE / MISSING THROUGHOUT. EXPOSED CONCRETE ENCASEMENT HAS ABRASION UP TO 2.5" DEEP WITH EXPOSED AGGREGATE.
4. STONE MASONRY PIER FACE HAS 80% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 2.5' BETWEEN STONES, MISSING CHINKING STONES, AND RANDOM STONES HAVE HAIRLINE CRACKS.

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

LEGEND FOR MUDLINE CONTOURS

OCT. 2022
SEPT. 2020
OCT. 2018

(1A) – STEEL BEAM WELDED TO STEEL "H" PILE HAS SEVERE CORROSION WITH UP TO 100% SECTION LOSS 2.5'H AT BOTTOM OF PLATE IN TIDAL ZONE

LEGEND FOR SYMBOLS

DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

W.S. ELEV. -3.3'
-6.5'
-8.0'

0.0' DEPTH OF PENETRATION

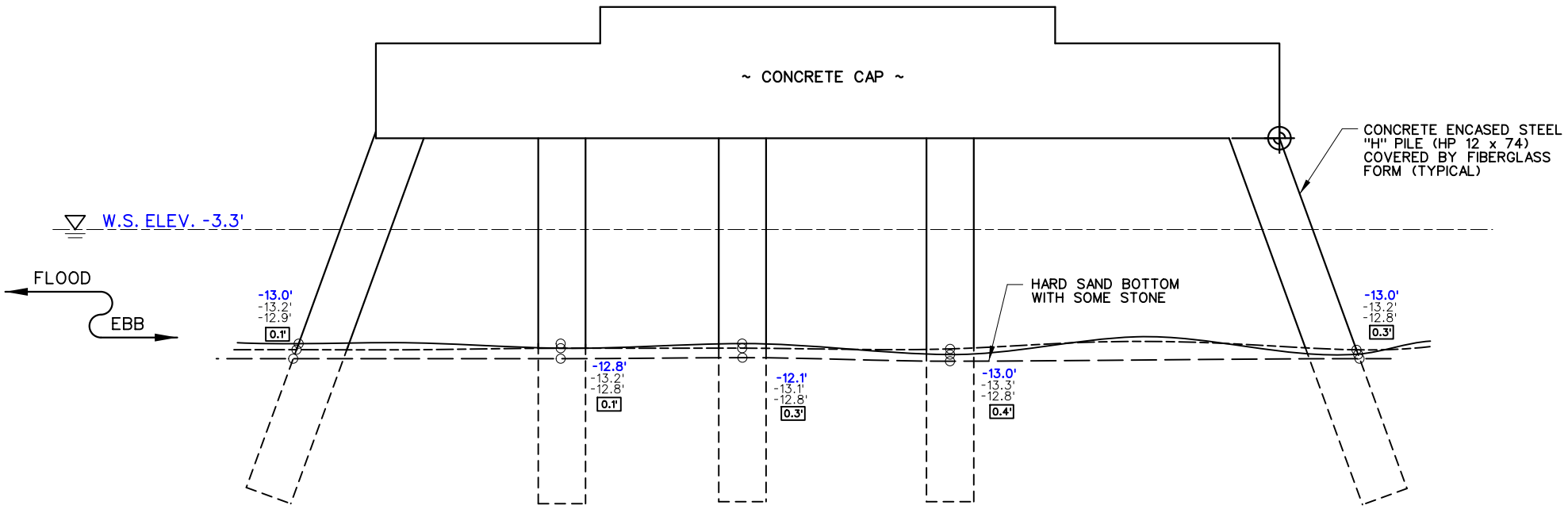
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

PIER 2 NORTH AND SOUTH ELEVATIONS

INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 01349H

UW DRAWING 8



PIER 3 (WEST ELEVATION)

N.T.S.

NOTES:

1. FIBERGLASS FORMS HAVE MARINE GROWTH (BARNACLES AND OYSTERS) UP TO 1" THICK.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -3.3'
  -6.5'
  -8.0'
- 0.0' DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

LEGEND FOR MUDLINE CONTOURS

- OCT. 2022
- SEPT. 2020
- OCT. 2018

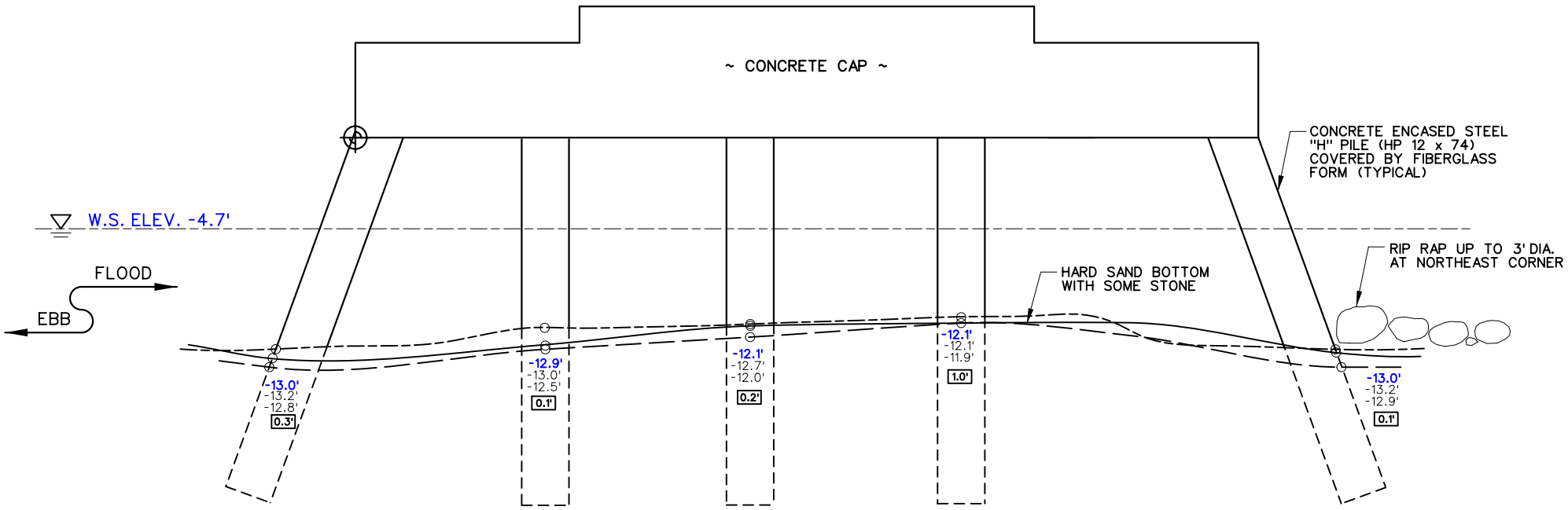
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

PIER 3 (WEST ELEVATION)

INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 013491

UW DRAWING 9



PIER 3 (EAST ELEVATION)

N.T.S.

NOTES:

1. FIBERGLASS FORMS HAVE MARINE GROWTH (BARNACLES AND OYSTERS) UP TO 1" THICK.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -3.3' / -6.5' / -8.0'
- [0.0'] DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

LEGEND FOR MUDLINE CONTOURS

- OCT. 2022
- SEPT. 2020
- OCT. 2018

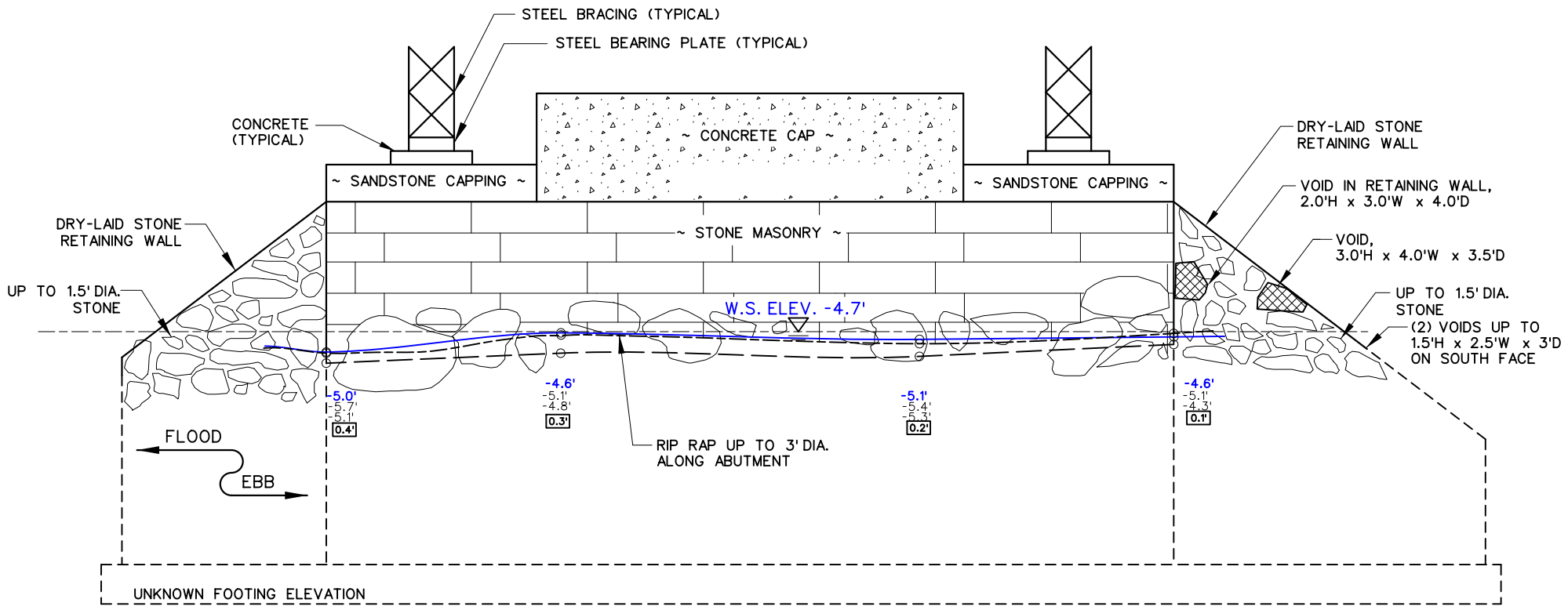
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

PIER 3 (EAST ELEVATION)

INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 01349J

UW DRAWING 10



ABUTMENT 2

N.T.S.

NOTES:

1. GROUT-REPAIR / EPOXY COATING ON STONE MASONRY HAS FAILED UP TO 90% IN TIDAL ZONE.
2. STONE MASONRY STEM AND RETURN WALLS HAVE 90% DETERIORATED / MISSING MORTAR WITH PENETRATIONS UP TO 4' BETWEEN STONES.
3. DRY-LAID STONE RETAINING WALLS HAVE PENETRATIONS UP TO 3' BETWEEN STONES.

LEGEND FOR SYMBOLS

- DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.
- W.S. ELEV. -3.3' / -6.5' / -8.0'
- 0.0' DEPTH OF PENETRATION

LEGEND FOR BOTTOM ELEVATIONS

OCT. 2022: -0.0'
SEPT. 2020: -0.0'
OCT. 2018: -0.0'

LEGEND FOR MUDLINE CONTOURS

- OCT. 2022
- SEPT. 2020
- OCT. 2018

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT — CONNECTICUT

ABUTMENT 2

INSPECTED BY: KG, SM, MD REVISED BY: NC	SCALE: AS SHOWN	DATE OF INSPECTION 10 / 03 / 22	DRAWING NO. 01349K

UW DRAWING 11



Photo Number: 1 Photo Taken: 09/15/2022

Bridge identification number.



Photo Number: 2 Photo Taken: 10/07/2022

North elevation.



Photo Number: 3 Photo Taken: 10/07/2022

South elevation.



Photo Number: 4 Photo Taken: 09/15/2022

Bridge from west approach.



Photo Number: 5 Photo Taken: 09/15/2022

Bridge from east approach.



Photo Number: 6 Photo Taken: 09/15/2022

West approach from bridge.



Photo Number: 7 Photo Taken: 09/15/2022

East approach from bridge.



Photo Number: 8 Photo Taken: 09/15/2022

Typical top of deck, looking west, span 4 shown.



Photo Number: 9 Photo Taken: 10/07/2022

Typical underside (span 1 shown), looking west.



Photo Number: 10 Photo Taken: 10/07/2022

Typical underside (span 4 shown), looking east.



Photo Number: 11 Photo Taken: 10/07/2022

Span 4, south overhang. Note typical laminated rust with perforations near deck weeps.



Photo Number: 12 Photo Taken: 09/15/2022

Span 2, north curb and metal beam railing: Tear in the metal beam railing.



Photo Number: 13 Photo Taken: 09/15/2022

North timber sidewalk in span 1: Missing utility cover.



Photo Number: 14 Photo Taken: 09/15/2022

Northwest approach sidewalk: First two planks adjacent to bridge sidewalk previously loose/disconnected have been repaired.



Photo Number: 15 Photo Taken: 10/07/2022

Span 3, sidewalk bracket 2. Note typical laminated rust on brackets and missing connection bolts.



Photo Number: 16 Photo Taken: 10/07/2022

Span 4, 3rd sidewalk support beam. Note typical laminated rust with section loss adjacent to sidewalk brackets.

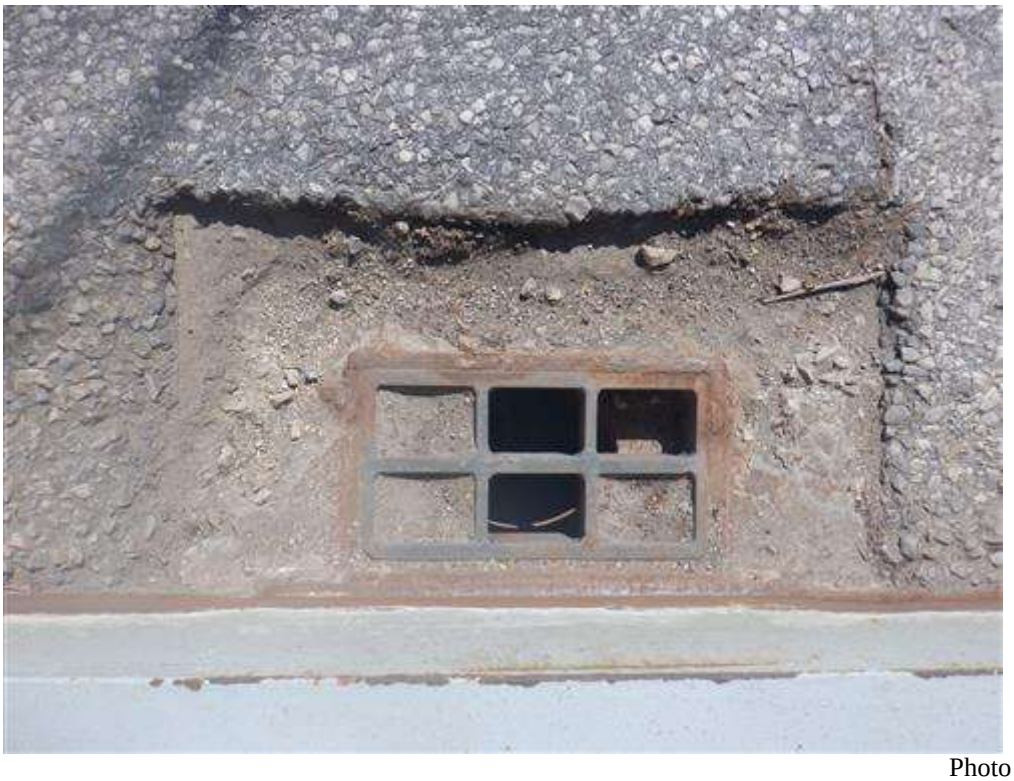


Photo Number: 17 Photo Taken: 09/15/2022

Span 4, north scupper grate: Concrete apron spall and typical partially clogged grate.



Photo Number: 18 Photo Taken: 09/15/2022

Pier 2 steel-armored open deck joint, looking south. Note the raveled overlay along the steel plate.



Photo Number: 19 Photo Taken: 09/15/2022

Abutment 2 strip seal joint, looking north. Note the missing section of approach curb with exposed rebar. Also, note the missing end treatment at the approach railing



Photo Number: 20 Photo Taken: 09/15/2022

Abutment 2 joint, looking south.



Photo Number: 21 Photo Taken: 09/15/2022

Northwest approach transition: Missing section connecting to concrete block and missing end treatment.



Photo Number: 22 Photo Taken: 10/07/2022

Typical bearings at pier 2 (span 3 shown).



Photo Number: 23 Photo Taken: 10/07/2022

Typical elastomeric bearing at pier 3 (girder 3 shown).



Photo Number: 24 Photo Taken: 10/07/2022

Span 4, girder 1 elastomeric bearing at abutment 2: Dishing and laminated rust on sole plate.



Photo Number: 25 Photo Taken: 10/07/2022

Span 1, truss 1 bearing at abutment 1: Previously noted gap difficult to see due to debris.



Photo Number: 26 Photo Taken: 10/07/2022

Span 3, truss 1 bearing at pier 2. Note backed off anchor bolt nuts and section loss in the spacers and nuts.



Photo Number: 27 Photo Taken: 10/07/2022

Span 4, truss 2 bearing at abutment 2.



Photo Number: 28 Photo Taken: 10/07/2022

Span 1, girder 7 at abutment 1. Note laminated rust with section loss along top flange adjacent to weep.



Photo Number: 29 Photo Taken: 10/07/2022

Typical laminated rust with section loss along girder web bases near drains (span 2, girder 1, shown).



Photo Number: 30 Photo Taken: 10/07/2022

Span 2, girder 7 at west splice. Note laminated rust with negligible section loss. Also, note weld is not ground smooth.



Photo Number: 31 Photo Taken: 10/07/2022

Span 1 box girder at abutment 1, looking south note debris inside.



Photo Number: 32 Photo Taken: 10/07/2022

Span 2 box girder at pier 2, looking south, note bird debris.



Photo Number: 33 Photo Taken: 10/07/2022

Inside pivot girder at pier 1. Note typical laminated rust inside on the bottom flange.



Photo Number: 34 Photo Taken: 10/07/2022

Span 1, truss 1, L0-L1 at L1, looking east. Note rusted out batten plate and lattice bar.



Photo Number: 35 Photo Taken: 10/07/2022

Span 2, truss 2, L5-L6. Note heavy laminated rust with section losses and perforations along the bottom chord bottom plate.



Photo Number: 36 Photo Taken: 10/07/2022

Span 2, truss 1, L5-L6, looking east: Interior of bottom chord with debris and laminated rust with section losses along webs.



Photo Number: 37 Photo Taken: 09/15/2022

Typical pack rust between top chord plates (span 3, truss 1, U3-U4 shown).



Photo Number: 38 Photo Taken: 09/15/2022

Typical bolted plates along verticals (span 4, truss 1 U5 and U6 shown, looking northwest).



Photo Number: 39 Photo Taken: 09/15/2022

Span 3, truss 2, L4-U4: Damaged member with bolted plates.



Photo Number: 40 Photo Taken: 09/15/2022

Span 2, truss 2, U9-L10: Impact damage.



Photo Number: 41 Photo Taken: 10/07/2022

Span 4, truss 1 at L7. Note typical pack rust between eyebars and vertical plates.



Photo Number: 42 Photo Taken: 10/07/2022

Span 4, truss 2 at L9. Note typical gap between pin nut and eyebar.



Photo Number: 43 Photo Taken: 09/15/2022

Span 4, truss 2 south elevation at U7: Typical gap between pin nut and top chord plate.



Photo Number: 44 Photo Taken: 10/07/2022

Span 1, truss 1 at L3. Note eyebar heads with section losses and rusting.



Photo Number: 45 Photo Taken: 09/15/2022

Spans 1-2, truss 1, U4-U6, looking west: Eyebars bent/bowed laterally.



Photo Number: 46 Photo Taken: 09/15/2022

Spans 1-2, truss 2, U4-U6, looking east: Eyebars bent/bowed laterally.



Photo Number: 47 Photo Taken: 10/07/2022

Span 3, truss 2, L4-U5 at L4. Note the south bar is broken.



Photo Number: 48 Photo Taken: 09/15/2022

Spans 1-2 top chord lateral bracing, looking west.



Photo Number: 49 Photo Taken: 09/15/2022

Span 3, top strut at U1: Typical dents due to impact damage.



Photo Number: 50 Photo Taken: 09/15/2022

Span 2, U8 strut, looking north: Strut bent west.



Photo Number: 51 Photo Taken: 09/15/2022

Span 1, top strut at U3 near truss 2, looking north: West angle has cracks along the bottom.



Photo Number: 52 Photo Taken: 09/15/2022

Span 1, times 1, top lateral bracing rod at U2 is broken.

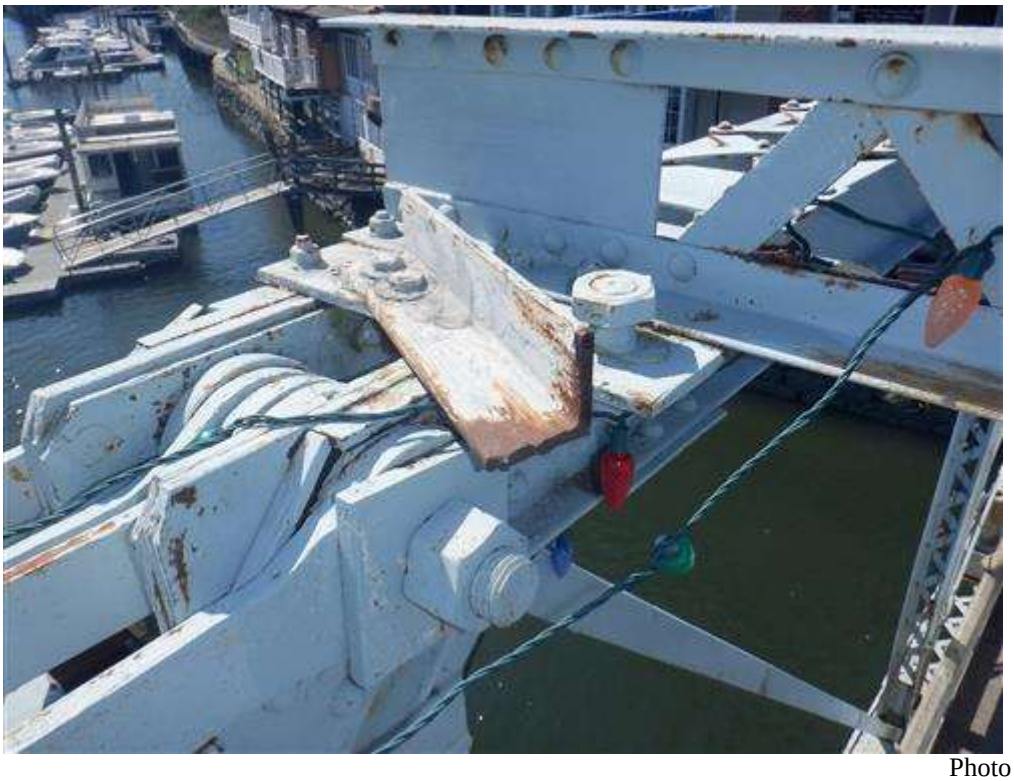


Photo Number: 53 Photo Taken: 09/15/2022

Span 1, truss 2, top lateral bracing at U4 is broken.



Photo Number: 54 Photo Taken: 09/15/2022

Typical wear/dents at top lateral bracing rods (spans 3 & 4 between U4-U5 shown).



Photo Number: 55 Photo Taken: 09/15/2022

Span 1, panel 1, top lateral bracing rods are sagged.



Photo Number: 56 Photo Taken: 10/07/2022

Span 3, truss 2 at L3. Note the bottom lateral bracing rod is partially cracked.



Photo Number: 57 Photo Taken: 10/07/2022

Typical intersecting welds between pivot girder (box girder) and girder 1 (plate girder).



Photo Number: 58 Photo Taken: 10/07/2022

Span 2, girder 2 connection to box girder at pier 2: Typical backer bar left-in-place.



Photo Number: 59 Photo Taken: 09/15/2022

Span 4, truss 2, L7-U8: Additional welded plate between eyebars.



Photo Number: 60 Photo Taken: 09/15/2022

Span 3, truss 2, L2-U2: Impact damage with gouges/tears at edges.



Photo Number: 61 Photo Taken: 09/15/2022

Span 2, truss 1, L5-U6: Impact damage with cracks along interior of south channel.

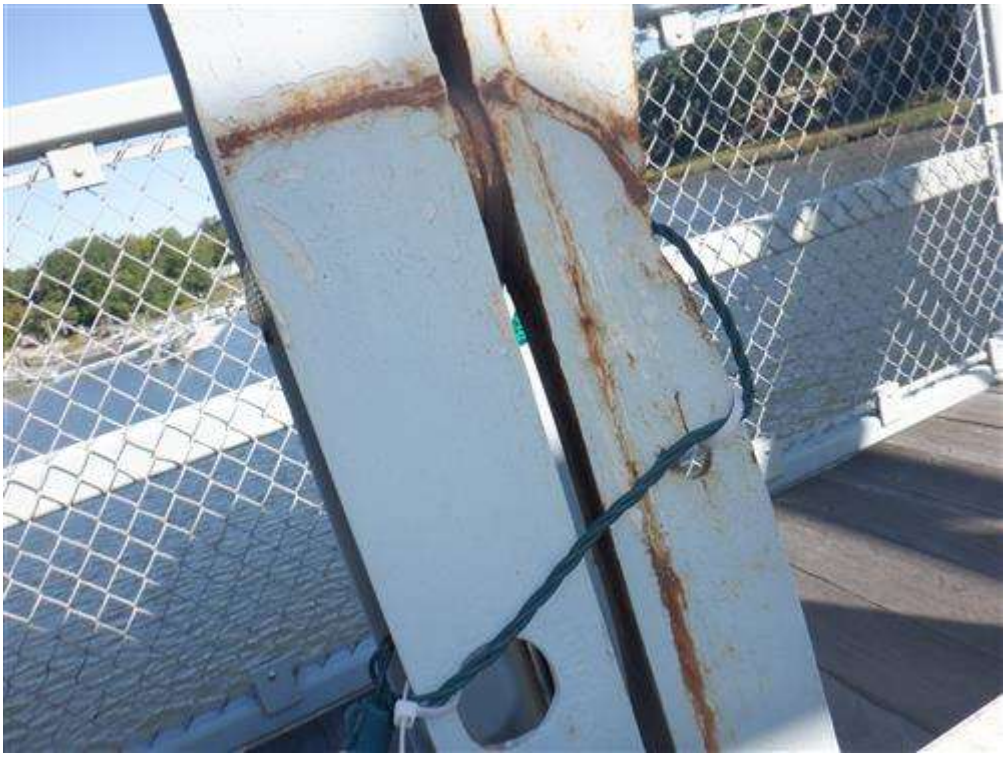


Photo Number: 62 Photo Taken: 09/15/2022

Span 2, truss 1, L8-U8: Crack at southeast angle.



Photo Number: 63 Photo Taken: 09/15/2022

Span 4, truss 1, L7-U7: Crack with stop holes.



Photo Number: 64 Photo Taken: 09/15/2022

Span 4, truss 1, L6-U6: Crack at the south channel, north face.

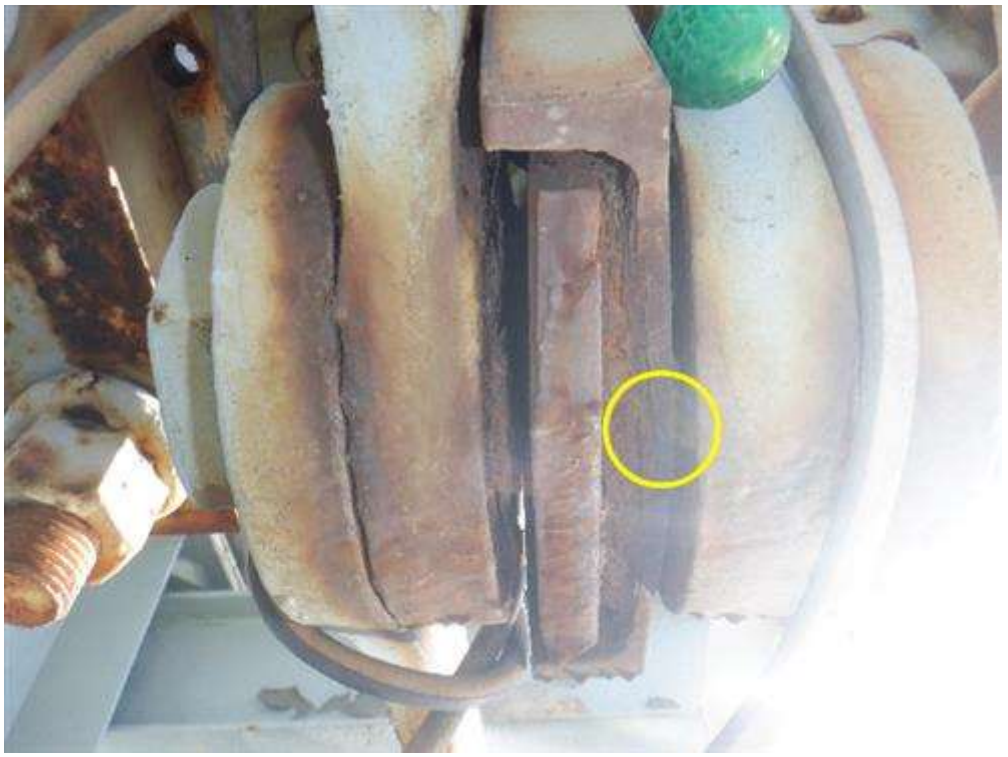


Photo Number: 65 Photo Taken: 10/07/2022

Span 3, truss 2 at L3. Note crack at bottom of vertical channel.



Photo Number: 66 Photo Taken: 10/07/2022

Span 2, truss 2, U8-L9 at L9. Note north bar, south face with crack along forge line.



Photo Number: 67 Photo Taken: 10/07/2022

Span 4, truss 1, L5-U6 at L5. Note south bar, north face with crack along forge line.



Photo Number: 68 Photo Taken: 10/07/2022

Span 3, truss 2, U4-L5 at L5. Note north bar, south face with crack along forge line.



Photo Number: 69 Photo Taken: 10/03/2022

Abutment 1.



Photo Number: 70 Photo Taken: 10/03/2022

Abutment 2.



Photo Number: 71 Photo Taken: 10/03/2022

Northwest retaining wall/seawall.



Photo Number: 72 Photo Taken: 10/03/2022

Southeast wall. Note voids in rocks/stones.



Photo Number: 73 Photo Taken: 10/07/2022

West elevation of pier 2.



Photo Number: 74 Photo Taken: 10/03/2022

East elevation of pier 2.



Photo Number: 75 Photo Taken: 10/03/2022

West elevation of pier 3.



Photo Number: 76 Photo Taken: 10/07/2022

Pier 3, north face of cap adjacent to girders: Large spall.



Photo Number: 77 Photo Taken: 09/15/2022

Load posting at east approach, +/- 1/2 mile from bridge.



Photo Number: 78 Photo Taken: 09/15/2022

Load and vertical clearance posting at west approach.



Photo Number: 79 Photo Taken: 09/15/2022

East approach vertical clearance posting.



Photo Number: 80 Photo Taken: 10/03/2022

Abutment 1 near right (south) end. Note the broken stone.



Photo Number: 81 Photo Taken: 10/03/2022

Abutment 1. Note mortar loss with penetration.



Photo Number: 82 Photo Taken: 10/03/2022

Northwest return wall and dry-laid retaining wall.



Photo Number: 83 Photo Taken: 10/03/2022

Northwest return wall / dry-laid retaining wall interface. Note the void.



Photo Number: 84 Photo Taken: 10/03/2022

Abutment 2. Note mortar loss with penetration.



Photo Number: 85 Photo Taken: 10/03/2022

West elevation of pier 1.



Photo Number: 86 Photo Taken: 10/03/2022

East elevation of pier 1.



Photo Number: 87 Photo Taken: 10/03/2022

Pier 1 at north end. Note spall along channel bottom.



Photo Number: 88 Photo Taken: 10/03/2022

Pier 1 east face. Note areas of heavy corrosion on steel jacket (typical).



Photo Number: 89 Photo Taken: 10/03/2022

West elevation of pier 2.



Photo Number: 90 Photo Taken: 10/03/2022

Pier 2, Pile 1W. Note the spall in concrete encasement with exposed H-pile flange.



Photo Number: 91 Photo Taken: 10/03/2022

Pier 2, Pile 1E. Note the spall with exposed rebar with section loss and H-pile flanges exposed.



Photo Number: 92 Photo Taken: 10/03/2022

Pier 2, Pile 1E. Note the spall with exposed rebar with section loss and H-pile flanges exposed.



Photo Number: 93 Photo Taken: 10/07/2022

Pier 2, Pile 1E, vertical bracing member. Note 100% section loss.



Photo Number: 94 Photo Taken: 10/03/2022

Pier 2, Pile 3E. Note the spall in concrete encasement with exposed H-pile flange.



Photo Number: 95 Photo Taken: 10/03/2022

Pier 2, east face. Note the cross bracing with 100% section loss.



Photo Number: 96 Photo Taken: 10/03/2022

Pier 2, east face between Piles 1E and 2E. Note the broken stone / void in stone masonry.



Photo Number: 97 Photo Taken: 10/03/2022

East elevation of pier 3.



Photo Number: 98 Photo Taken: 10/03/2022

Channel looking upstream (north) from the bridge.



Photo Number: 99 Photo Taken: 10/03/2022

Channel looking downstream (south) From the bridge.



Photo Number: 100 Photo Taken: 10/03/2022

Southwest dry-laid retaining wall.



Photo Number: 101 Photo Taken: 10/03/2022

Northwest dry-laid retaining wall. Note the void adjacent to discharge pipe.



Photo Number: 102 Photo Taken: 10/03/2022

Southeast dry-laid retaining wall.



Photo Number: 103 Photo Taken: 10/03/2022

Southeast dry-laid retaining wall.. Note the void.



Photo Number: 104 Photo Taken: 10/03/2022

Northeast dry-laid retaining wall.



Photo Number: 105 Photo Taken: 10/03/2022

Northeast dry-laid retaining wall. Note penetrations between stones.



Photo Number: 106 Photo Taken: 10/03/2022

Pier 1 fender system, west face.



Photo Number: 107 Photo Taken: 10/03/2022

Pier 1 fender system, east face.



Photo Number: 108 Photo Taken: 10/03/2022

Pier 1, west fender system. Note steel brackets with moderate to heavy corrosion and areas of 100% section loss.



Photo Number: 109 Photo Taken: 10/03/2022

Pier 2, west timber fender system. Note split/ check.



Photo Number: 110 Photo Taken: 10/03/2022

Pier 2 Fender system west face.

Form: Asset Photos
Inspection type: Fracture
Inspection Date: 9/15/2022
Inspected by: A. DiCesare Associates

:Bridge No 01349

Town: WESTPORT
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS



Photo Number: 111 Photo Taken: 10/03/2022

Pier 2, navigation light. Note light "On" at the time of inspection.

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Bridge Maintenance Garage
Assigned To: District_3 Bridge
Work Item ID: 01349-2023-0022
Date Issued: 01/13/2023
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: 4 of 8 balance wheels could not be rotated by hand (wheels 2 through 4 and wheel 7). Wheel 8 was hard to rotate by hand. Free balance wheels that don't rotate.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2023-0021
Date Issued: 01/13/2023
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: The lower bearing lubrication port contains a corroded plug and does not appear to be used. The upper bearing exhibits significant corrosion at the support interface. Both bearings have a layer of grease on them with minor corrosion and paint failure. Seals exhibit grease purge or leakage. Replace pinion shaft bearing seals that are causing leaks.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2023-0020
Date Issued: 01/13/2023
Priority: Routine Repair
Deficiency: Electrical
Structural Component: N/A
Comments: The west barrier gate lights were not operational. Replace the west barrier gate limit switch.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2023-0019
Date Issued: 01/13/2023
Priority: Routine Repair
Deficiency: Electrical
Structural Component: N/A
Comments: Both lights at the southeast swing span were lit, indicating a faulty transfer relay. Repair or replace the Southeast swing span navigation light transfer relay.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2023-0018
Date Issued: 01/13/2023
Priority: Routine Repair
Deficiency: Electrical
Structural Component: N/A
Comments: The screw jack retracted light does not come on when all jacks are retracted. Replace the screw jack retracted indicator light.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2023-0017
Date Issued: 01/13/2023
Priority: Routine Repair
Deficiency: Electrical
Structural Component: N/A
Comments: The seated/open white indicator light is always ON when the bridge is seated, during operation, and when the bridge is fully open. Replace the fully open/seated limit switch and/or rewire the indicator light.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2022-0016
Date Issued: 11/22/2022
Priority: Priority Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: See the attached 2022 Mechanical and Electrical Inspection repair recommendations PDFs.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2020-0015
Date Issued: 10/23/2020
Priority: Routine Repair
Deficiency: Steel Corrosion
Structural Component: Superstructure
Comments: The following locations/members have areas of laminated rust with section losses up to 1/8" deep:
- Spans 1-2, girders 1 & 7 adjacent to deck drainage.
- Inside box girder at abutment 1, and exterior at south end, joint side.
- Inside pivot girder at pier 1.
- Inside box girder at pier 2.
- Transverse sidewalk support beam, top flanges adjacent to sidewalk support connections, all spans.

Date Completed:
Actual Quantity:



Span 4, 3rd sidewalk support beam: Typical laminated rust with section loss adjacent to sidewalk brackets.

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2020-0012
Date Issued: 10/08/2020
Priority: Priority Repair
Deficiency: Electrical
Structural Component: N/A
Comments: The center and end jack bypass switches were used (in ON position) to operate the bridge. This indicates that one or more jack limit switches or other related control component(s) may not be functioning properly; or the bridge interlocking may not be properly wired. CTDOT personnel on site on 9/16/20 confirmed they were aware of the bypasses being on and they provide additional personnel on site for operating the bridge in this condition. It is recommended to investigate the cause of the use of these bypasses and correct associated deficiencies as required.

Date Completed:
Actual Quantity:



Bypass switches are being used to operate the bridge.

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2020-0011
Date Issued: 10/08/2020
Priority: Priority Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: When fully lowered, the east and west traffic barrier gates under engage their toe and heel end anchorages. This prevents proper engagement of the barrier energy absorption cables. Also, barrier gates are not interlocked with the electrical control system. CTDOT personnel on site on 9/16/20 reported that the Westport swing bridge does not open unless the roadway is shutdown by a police detail. This condition should be noted as a potential safety hazard in the event the bridge operating procedure is changed to make the traffic barrier gates the primary traffic control devices.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2019-0009
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: MISCELLANEOUS:

1. Various components do not have fresh lubrication or do not show signs that plugs are being removed during lubrication.
2. Throughout the machinery system, various supports, housings, couplings, connecting bolts, and shafts exhibit minor to severe paint failure and corrosion.
3. There are oil and lubrication leaks at multiple bearing/coupling seals and reducer drains.
4. During operation, the span guard rails rub against the approach guard rails.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2019-0008
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: SPAN SUPPORT AND ALIGNMENT:

1. The balance wheel clearance with the track ranges from 0 to 0.288 inches while the design clearance was 1/16 inches. The wheels slide against the track instead of rotating.
2. The balance wheel bearing bushing clearance is well outside the range for an RC6 fit for most of the wheels.
3. There are no limit switches to disengage all screw jack motors when the screw jacks are being operated manually which creates a hazard.
4. All screw jack gear reducer desiccants are expired.
5. The oil samples taken from the south center jack reducers showed signs of water contamination.
6. The oil sample taken from the southeast end jack upper reducer showed signs of water contamination. The northwest and southeast upper end jack gear reducer dipsticks show that the oil level is low.
7. The screw jack lower reducers do not have a dipstick, sight glass, or any other means to monitor the oil level.
8. The screw jack couplings do not have lubrication fittings on them and the plugs are painted over showing no signs of recent lubrication.
9. Screw jack bearing surfaces have moderate to severe corrosion with delamination. There are small gaps under the end screw jacks with the base when fully driven. The gaps are not the entire way through the interface.
10. There appears to be a leak coming from the center pivot bearing at the northeast corner purging out over the top of the strip seal.
11. The fully closed rigid stop is deformed, most likely from hard impact with the span.
12. The centering device has moderate paint failure and corrosion.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2019-0007
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Mechanical
Structural Component: N/A
Comments: SPAN DRIVE MACHINERY:

1. There is a gap at the split on coupling C2 (between the main motor and right angle reducer) with lube leaking out of the gap.
2. The coupling on the motor rear shaft (C3) is leaking (missing gasket) and interferes with the span control reducer during operation.
3. The right angle gear reducer drain plug is corroded and not able to be removed preventing an oil test.
4. Very heavy accumulation of dirt/debris on top of the right angle reducer, which is trapping moisture and causing corrosion.
5. The right angle gear reducer desiccant is expired.
6. The main pinion shaft is covered in excess lube coming from the pinion shaft bearing seals.
7. The lower pinion bearing has a corroded plug in the lubrication port and no lubrication fitting.
8. The open gearing teeth have little to no fresh lubrication on them and are corroded.
9. The most north section of the rack segment is filled with water.
10. It appears that the bridge comes to an uncontrolled stop after the motor deenergizes and the brake sets. The swing span oscillates by moving through the backlash on both sides of the pinion tooth.

Date Completed:
Actual Quantity:

Form: Maintenance
Town: WESTPORT
Carried: ROUTE 136
:Bridge No 01349
Crossed: SAUGATUCK RIVER
Inventory Route: Non-NHS

Status: Open
Assigned To: ATB ATB
Work Item ID: 01349-2019-0006
Date Issued: 02/18/2019
Priority: Routine Repair
Deficiency: Electrical
Structural Component: N/A
Comments:
1. There is minor corrosion on the east meter cabinet and also on the west meter cabinet.
2. There is minor corrosion on the interior terminals and conduits in the east and west service cabinets.
3. The electric space heaters in the east and west service cabinets are not functioning.
4. The GFCI test and reset buttons are not functioning in the east and west service cabinets.
5. The west service cabinet door gasket is damaged.
6. There are miscellaneous items stored in the bottom of the left cabinet and the center cabinet.
7. There are splices made with wire nuts in violation of AASHTO Article 8.9.2 within the left cabinet and on the backside of the interior panel in the center cabinet.
8. The bottom of the center cabinet has moderate corrosion.
9. The southwest end jack legend plate is missing.
10. The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
11. Minor corrosion on the span rotary cam limit switch.
12. Moderate corrosion and a damaged gasket on the SW jack rotary cam limit switch.
13. Moderate corrosion and the cover could not be opened on the NW jack rotary cam limit switch.
14. Moderate corrosion on the SE jack rotary cam limit switch.
15. Moderate corrosion and a damaged gasket on the north center jack rotary cam limit switch
16. Moderate corrosion, damaged gasket, and the bottom wingnut is missing on the south center jack rotary cam limit switch.
17. The west barrier gate arm lever arm limit switch can seize in the actuated position and there is minor corrosion on the conduit fitting.
18. The east barrier gate limit switch is permanently seized in the actuated position.
19. Missing driven south center proximity limit switch.
20. The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
21. The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for both center jack locations and the NE and SW end jacks.
22. Water is present in the bottom of the NE end jack motor disconnect.
23. Missing nameplate and minor corrosion on cover and conduit fitting of the NE end jack motor disconnect.
24. Minor corrosion on conduit clamps throughout bridge.
25. Severe corrosion on underground conduit at the east shore service cabinet.
26. The southwest, northeast, and southeast span navigation lights were not operational.
27. The west approach traffic signals have been removed which is a violation of MUTCD section 4J.02.
28. The east approach traffic signals and gong were not operational.
29. Striping on the west pedestrian gates stops before the end of the gate.
30. The barrier gates were not fully engaged in the receiver when lowered on both approaches.
31. None of the barrier gate lights were operational.
32. No lighting for maintenance is provided on the bridge.
33. Barrier gates are not interlocked with control system.
34. Centering device is not interlocked with jack control.
35. Jacks are not interlocked with span movement.

Date Completed:
Actual Quantity:

Form: Maintenance
Carried: ROUTE 136
Crossed: SAUGATUCK RIVER

:Bridge No 01349

Town: WESTPORT
Inventory Route: Non-NHS



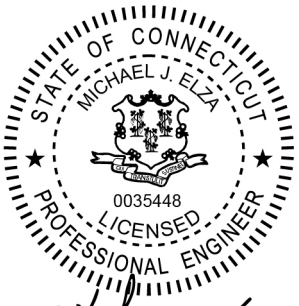
BRIDGE SAFETY INSPECTION

BRIDGE NO. 01349
ROUTINE MECHANICAL INSPECTION

US ROUTE 136
OVER SAUGATUCK RIVER
WESTPORT, CONNECTICUT



INSPECTED
August 31, 2022



November 22, 2022

Prepared By:

TranSystems

Table of Contents

Page No.

Executive Summary 3

Introduction 4

General Description 5

Observations and Findings 7

Span Drive Machinery 7

A) Motors 7
B) Motor Brakes 7
C) Span Control 7
D) Couplings 7
E) Pinion Shaft 8
F) Pinion Shaft Bearing 8
G) Enclosed Gear Reducer 8
H) Open Gearing 8

Span Support and Alignment Machinery 9

A) Balance Wheels and Track 9
B) Center Pivot Bearing 9
C) Rigid Stops 9
D) Center Screw Jacks 10
E) End Screw Jacks 11
F) Centering Device 12

Traffic Warning Gates and Resistance Barrier Gates 12

MISCELLANEOUS 12

SPAN OPERATION 12

Recommendations 13

Appendices:

Appendix I – Mechanical Photos

Appendix II – Mechanical Schematics and Field Notes

Appendix III – Mechanical Oil Analysis Reports

Appendix IV – Mechanical Numerical Condition Inspection Report

Executive Summary

Transystems personnel were on site August 31ST, 2022 to perform a routine mechanical inspection of the mechanical systems and components of the US Route 136 Swing Bridge over the Saugatuck River in Westport, Connecticut. The mechanical field inspectors were Michael J. Elza, P.E and Nitesh Yadav, CBI.

The inspection was conducted in accordance with the inspection procedures recommended for routine inspection stated in the Movable Bridge Inspection, Evaluation, and Maintenance Manual, 2017 edition, of the American Association of State Highway and Transportation Officials (AASHTO). During the course of this inspection, the existing mechanical systems and equipment were visually inspected, evaluated and measurements were taken and recorded. The mechanical systems and equipment were also evaluated against their conditions recorded at the time of the previous inspection, performed in September 2020.

For the purposes of this report the bridge is considered to be oriented east to west.

This report is written from the perspective of the dates of the inspection described herein; the use of present tense herein in no way implies that the descriptions presented are accurate as of any subsequent date.

The bridge mechanical systems are overall in fair condition. When the following priority repair items have been addressed and assuming proper maintenance is provided, long term reliable operation is anticipated:

- All reducers of the movable span are lubricated via an oil bath. Oil samples were taken at the upper and lower reducers at the south center, southeast, and southwest screw jacks. The analysis reports show that there is a high concentration of water present in the reducers. The oil should be drained, flushed, and refilled with fresh oil to preserve the life of these reducers. In addition, the reducers should be protected from water intrusion.

Introduction

ConnDOT Bridge No. 01349 carries U.S. Route 136 over the Saugatuck River in Westport, Connecticut. The movable portion of the bridge is a center bearing swing span. The swing span is 141 feet and 2 inches long between the centers of the end jacks. The bridge opens approximately 83.5 degrees only in one direction to allow passage of marine traffic.

The bridge is oriented from east to west. The bridge operator's control console is located on the north sidewalk at roadway level above the center pier.

The ensuing sections present a brief description of the mechanical systems, observations, and findings at the time of the inspection, and recommendations for corrective action.

Color photographs were taken of observations and findings during the inspection. Color copies of the photographs with detailed captions are presented in Appendix I.

Schematic of the machinery and field notes are presented in Appendix II.

Reports documenting the results of the oil analysis are presented in Appendix III.

A Numerical Condition Inspection Rating Report is presented in Appendix IV.

General Description

ConnDOT Bridge No. 01349 is a center bearing swing span which carries one lane, in each direction, of Route 136 vehicular traffic and one pedestrian sidewalk on the north side over the Saugatuck River in Westport, Connecticut. The swing span is 141 feet and 2 inches long between the centers of the end jacks. The swing span is 21 feet and 3 inches wide between truss centers and is oriented generally east to west. The operator control console is located on the north sidewalk at roadway level above the center pier. Machinery in this report is identified by compass direction and are referenced to the center pivot bearing. The bridge opens approximately 83.5 degrees only in one direction to allow passage of marine traffic.

The machinery was rehabilitated in 2013 but is otherwise original and dates back to 1989. The machinery for this bridge consists of components assembled into two major functional subsystems:

a) Span drive, which includes:
    i. Main motor
    ii. Motor brake
    iii. Span control
    iv. Couplings
    v. Enclosed gear reducer
    vi. Pinion shaft
    vii. Bearings
    viii. Drive pinion and rack
b) Span support and alignment, which includes:
    i. Balance wheels and track
    ii. Center jacks
    iii. End jacks
    iv. Center pivot bearing
    v. Rigid stops
    vi. Centering device

The movable span is rotated by one span drive. The drive consists of a 3 hp, 900 rpm electric motor with an integral disc brake, coupled to a right-angle enclosed gear reducer and then to a rack-engaging pinion via a vertically mounted pinion shaft. The rear motor shaft is coupled to span control equipment which consists of a gear reducer and rotary cam limit switch. Bridge rotation is realized when motor rotation and torque is transferred through the right-angle reducer and pinion. The pinion torque reacting on the rack (with integral track), which is fixed to the pivot pier (pier 1), causes the span to rotate about the center bearing which is mounted to the pivot pier. Figures 1, 2 and 3 of Appendix I present the machinery layout and screw jack machinery. As shown in Appendix I, the major span drive elements highlighted above are connected and supported by appropriate couplings and bearings.

The span drive machinery is located below the roadway level and is accessible from the center pier. The space available for the machinery is limited, resulting in difficult access for both maintenance and inspection. Components on the output shaft side of the right-angle reducers are more readily accessible than those on the respective input side.

During rotation, the entire weight of the bridge is supported by the center pivot bearing, which is comprised of a base casting, spherical roller thrust bearing, top casting, and dust cover. The base casting is secured to the center pier and the top casting to the span. The sliding surfaces are lubricated through lubrication ports and the dust cover surrounds the upper portion of the assembly.

Eight balance wheels are distributed radially about the center bearing to provide stability for imbalance and external loads such as wind and ice. The balance wheels are not intended to support either dead or live loads in the bridge closed position. The track for the balance wheels is integral with the rack gear.

For stability under live loads, in the closed position, there are two center screw jack and four end screw jack assemblies. The center jack assemblies are located on the center pier at the north and south pivot girders. The end jack assemblies are located at each corner of the movable span. The end jacks also support the dead load of the swing span along with the center pivot bearing. Each screw jack assembly consists of a base, which is anchored to the pier, and an independent operating machinery system, which is secured to the movable structure. The screw jack operating machinery consists of a 3.3 hp, 1800 rpm electrical motor with and integral disc brake, two right angle gear reducers, couplings, a floating shaft (only for the center jacks), an actuator, protective boot, and limit switches.

In the engaged position, the screw jacks are driven in contact with the bases to level the road surfaces of the swing span with the road surfaces of the approaches and transfer the live loads to the piers. The center jacks allow for 3” travel while the end jacks allow for 5” travel to accommodate deflection. When withdrawn, the screw jacks retract from their bases on the rest piers so that the span can rotate. Each screw jack is located directly beneath the lower chord of the movable span truss. Figure 3 of Appendix I presents a schematic diagram of the screw jack machinery.

To prevent overtravel in both directions, the bridge has a fully open and a fully closed rigid stop. The fully open rigid stop is located on the center pier and consists of a strike plate mounted to the span and a spring bumper mounted to the pier. The fully closed rigid stop is located on the west pier at the center of the span. The fully closed rigid stop consists of a strike plate mounted to the span and a bumper block mounted to the pier. A manual centering device is also located at the center of the west pier. A vertical rod is accessed from the roadway level and is lowered by hand to engage a receiver mounted to the west pier.

Observations and Findings

During the course of the inspection, all machinery components were visually inspected statically and during operation. Various measurements were taken to monitor wear compared to previous inspections. Couplings and bearings were visually inspected but not opened for an internal inspection. Enclosed gear reducer inspection covers were not removed due to lack of access; however, representative oil samples were taken, and oil levels were checked where possible.

SPAN DRIVE COMPONENTS

Motor

The main drive motor is generally in fair condition. It is a Reuland 3 hp, 900 rpm electric motor with a 215 TENV frame. The mounting bolts do not have double nuts, but the fasteners are not corroded. There are no signs of fresh lubrication. See the Electrical Inspection report for additional details.

Motor Brake

The main Stearns disc brake is integral with the main span drive motor. Brake covers were not removed during the inspection. The manual release operates smoothly.

Span Control

Located behind the main motor, the span instrumentation components consist of a gear reducer and rotary cam limit switch. The gear reducer is generally in fair condition. The gear reducer has single nuts on the mounting bolts with some corrosion on the fasteners and a minor leak from the shaft seals. There is a light coating of debris and lubrication under the reducer. The limit switch has been replaced recently.

Couplings

There are four span drive couplings. C1 is a Falk double engagement gear type coupling connecting the right-angle reducer and pinion shaft. It has a seal leak on the channel side causing a light to moderate coating of grease on the lower half of the coupling. C1 also has moderate paint failure and significant corrosion on the top half of the coupling (see Photograph M01). Lubrication is leaking through the lower hub to shaft interface and keyway.

C2 is a Falk grid coupling connecting the main motor and right-angle reducer. There is a gap at the split of this coupling with lubrication leaking from the split (see Photograph M02). It is possible that an after-market gasket is currently in place. The lubrication ports are painted over with no signs of lubrication. Only lubrication port plugs are provided and no fittings. Moderate paint failure is exhibited on the housing.

Couplings C3 and C4 are the span instrumentation couplings. These couplings are in good condition. Coupling C3 is noisy during operation and has wear marks showing signs that it is scraping against the span control reducer (see Photograph M03).

Pinion Shaft

The pinion shaft is generally in good condition. It is painted and has not developed corrosion due to grease leaking past seals of the adjacent pinion bearing. The leaking seals should be replaced, and the shaft should be cleaned.

Pinion Shaft Bearings

The pinion shaft Torrington spherical roller bearings are generally in good condition. The mounting bolts have single nuts, and the heads of the bolts are unpainted. It appears that the purge plugs on the top of the bearings are not being used. The lower bearing lubrication port contains a corroded plug and does not appear to be used (see Photograph M04). The upper bearing exhibits significant corrosion at the support interface. Both bearings have a layer of grease on them with minor corrosion and paint failure. Seals exhibit grease purge or leakage.

Enclosed Gear Reducer

The main drive reducer is generally in fair condition. There is no overhead access for an oil sample. The oil level is halfway up the portal style site glass with no level nameplate. There is corrosion and debris buildup on top of the reducer and on the mounting surface (see Photograph M05). All bolts have heavy corrosion. The manual input shafts have minor widespread corrosion and chipped paint. The desiccant breather has expired.

Open Gearing

The pinion and rack are in fair condition. The pinion teeth have minor pitting from corrosion. The gear teeth have smooth surfaces and the rack opening face has a slight pitch line depression. Operation is generally smooth.

Chordal tooth thickness measurements for both the pinion and the rack were taken at the top and bottom of the tooth face. The single tooth caliper has an addendum stop setting in order to get the thickness of the tooth at the pitch line. The addendums and original tooth thicknesses were calculated from the information on the original machinery drawings. The results of the gear tooth measurements are included in Appendix ll.

Minimal wear has occurred according to the measurements taken. Cleaning and relubrication of rack and pinion teeth should be a part of the regular maintenance procedures.

The bolts in this region exhibit significant corrosion. Minor to moderate corrosion is occurring on isolated areas along the inside face of the rack. One split bolt is severely corroded with minor section loss (see Photograph M06). The rack bolts are generally in good condition. The

northern most section of the segment for rack bolts exhibits clogged drain holes (see Photograph M07).

SPAN SUPPORT AND ALIGNMENT

Balance Wheels and Track

The track is generally in good condition with no sign of recent lubrication on the rolling surfaces. There is minor debris buildup and minor corrosion near the anchor bolts. Several isolated areas of grout have begun to break away at the pier interface (see Photograph M08).

The eight balance wheels are in fair condition. Some of the balance wheel contacting surfaces exhibit minor surface corrosion. 4 of 8 balance wheels could not be rotated by hand (wheels 2 through 4 and wheel 7). Wheel 8 was hard to rotate by hand. All wheel bearing lubrication fittings show signs of fresh lubrication. Wheels 5 and 6 have slight lubrication buildup at the shaft and journal interface.

The balance wheel clearance with the track when the jacks are engaged ranges from 0.020 to 0.217 inches. A table of these values can be seen on page 12 of the Field Notes in Appendix II. Most of the balance wheels do not contact the track during operation. When they do contact the track, they often slide against it instead of rotating.

The original balance wheel bearing clearance was designed to be an RC6 fit. Except for the bushings for wheels 4 and wheel 6 inboard, and wheel 6 outboard bushing, the clearance measurements show that all other bushings are outside of the 0.003 inch to 0.009 inch range for an RC6 fit (see Photograph M09). Measurements can be seen on page 14 of the Field Notes in Appendix II. The Wheel 7 outboard bushing is dry.

Center Pivot Bearing

The center bearing assembly is in fair condition. There is minor isolated corrosion at the base. There is minor to moderate corrosion on the upper casting and the upper casting bolts. One cover bolt is missing (see Photograph M10).

Rigid Stops

The center pier fully open rigid stop is in good condition with some minor corrosion at the base plate (see Photograph M11).

The end pier fully closed rigid stop is in fair condition with minor to heavy corrosion with section loss on the strike plate, base, and mounting bolts (see Photograph M12). The rigid stop is deformed likely from impact with the span in the past.

Center Screw Jacks

The two center screw jack assemblies overall are in fair condition and operate smoothly. The motor is a Reuland 3.3 hp, 1800 rpm, 184 TENV frame electric motor with a Stearns integral disc brake. The main motor is connected to the upper right-angle reducer with a Falk grid 1020T10D coupling. The upper right-angle reducer is a Falk 1020 FC83 with a ratio of 7.669:1. The upper reducer is coupled to a floating shaft and then the lower reducer with Falk single engagement couplings. The lower reducer is a Foote-Jones Maxi-Power reducer, model 7SBV, with a ratio of 4.125:1. The lower reducer is coupled to a Duff-Norton machine screw actuator rated at 50 tons with 3 inches of travel.

There is no limit switch to disable the motors during manual operation which presents a hazard. The north motor and south motor has fresh lubrication at fittings.

The north upper reducer shows signs of delamination localized at the housing split and the south upper and lower reducers do not show signs of recent lubrication at the fittings. Except north lower reducer desiccant is nearly saturated (see Photographs M13), all other reducer desiccants were in good condition and were replaced since the last inspection. The lower reducers appear to have recent bearing fitting lubrication.

Couplings do not appear to have been lubricated recently as they do not have any fittings and the plugs are painted over. The south upper floating shaft coupling has a small leak at the flex hub.

Open gears for the rotary cam limit switch show no signs of recent lubrication, exhibit minor surface corrosion, and make a minor amount of noise during operation. The gears and keys appear to be tight on their shafts.

The screw jack actuators do not appear to have been lubricated recently. The protective boots on the jacks are typically in good condition with minor debris and grease buildup. Bearing surfaces for the screw jacks are generally dry with moderate to severe corrosion and delamination (see Photographs M14 and M15).

Overall, the assemblies have varying degrees of surface corrosion ranging from minor to severe with some areas of section loss. The couplings and floating shafts show minor to severe paint failure as well (see Photograph M16).

Representative oil samples were taken from the south upper and lower reducers. The results can be found in Appendix III. Both reducers are contaminated with water. All reducers should be checked for a source of water entry to prevent further contamination.

End Screw Jacks

The four end screw jack assemblies overall are in fair condition and operate smoothly. The motor is a Reuland 3.3 hp, 1800 rpm, 184 TENV frame electric motor with a Stearns integral disc brake. The main motor is connected to the upper right-angle reducer with a Falk grid 1020T10D coupling. The upper right-angle reducer is a Falk 1020 FC83 with a ratio of 7.669:1. The upper reducer is coupled to the lower reducer with a Falk double engagement coupling. The lower reducer is a Foote-Jones Maxi- Power reducer, model 7SBV, with a ratio of 4.125:1. The lower reducer is coupling connected to a Duff-Norton machine screw actuator rated at 150 tons with 5 inches of travel.

There is no limit switch to disable the motors during manual operation which presents a hazard. The southwest motor shows no signs of recent lubrication.

The northeast and southeast end motors mounting feet fillet welds have 1/16 inch and 3-inch-long cracks (see Photograph M17).

Almost all upper and lower reducers have no signs of fresh lubrication on all fittings and the southeast upper reducer oil levels are low on the dipsticks. The northeast upper and lower reducers have very minor oil leaks at the drains. The southeast upper reducer has a minor leak at the input shaft and the manual shaft is corroded. The southwest upper reducer has excess lubrication leaking from the bearing seal region. The desiccant style breathers were in good condition.

Couplings do not appear to have been lubricated recently as they do not have any fittings and the plugs are painted over. The northeast motor coupling has a leak at the split and the northwest motor coupling gasket is starting to work itself out.

Open gears for the rotary cam limit switch show no signs of recent lubrication, exhibit minor surface corrosion, and make a minor amount of noise during operation (see Photograph M18). The gears and keys appear to be tight on their shafts.

The northwest and southwest jacks have a buildup of excess grease. The protective boots on the jacks are typically in good condition with minor debris and grease buildup. The northwest and southeast jacks have slight gaps when fully driven (see Photograph M19). This gap is not present around the entire jack. The bearing surfaces are corroded but have fresh lube on them.

Overall, the assemblies have varying degrees of surface corrosion ranging from minor to severe with some section loss. The couplings show minor to severe paint failure as well.

Representative oil samples were taken from the southwest and southeast end jack lower and upper reducers. The results can be found in Appendix III. The upper and lower reducers for the southeast and southwest end jacks exhibit water contamination . Southeast and southwest upper and lower reducers should be drained, flushed, and filled with new oil. Also, check for a source of water entry to prevent further contamination.

Centering Device

The centering device rod, limit switch mount, and guides have moderate to heavy paint failure, corrosion, and debris buildup (see Photographs M20 and M21). The pier mounted receiver has minor corrosion and heavy debris buildup. This system is completely manual, and the maintenance personnel had some minor issues with positioning the rod and making consistent limit switch trip points.

TRAFFIC BARRIER GATES

Both traffic barrier gates are operated manually. However, police block vehicles at both ends of the bridge during operations. No issues were noted. .

MISCELLANEOUS

It should be noted that the space available for the main drive machinery is limited, resulting in difficult access for both maintenance and inspection. The gear reducer drain plug is difficult to open to collect oil samples (see Photograph M22).

SPAN OPERATION

Transystems's coordinated with CTDOT directly to organize bridge operations for Westport. A district maintenance crew of 2 personnel were at the bridge site for operations. A police officer and patrol car stopped traffic at both ends of the bridge. The operation included manual traffic gates, the manual centering device, and electric operation of the screw jacks and the main drive motor.

Operation of the bridge is generally smooth. Coupling C3 rubs against the span control reducer during operation. The rotary cam limit switch open gears at the screw jacks are not lubricated and make noise during operation.

Recommendations

PRIORITY KEY

A. Critical Finding – IMMEDIATE response by Maintenance forces.
B. Critical Finding – Response within 1 WEEK.
C. Priority Repair – Safety concerns.
D. Routine Repair.

SPAN DRIVE MACHINERY

1.	Replace gear reducer drain plug with ¼-turn ball valve to allow for easy removal. Use the drain to collect an oil sample for testing.	D
2.	Replace pinion shaft bearing seals that are causing leaks and clean the pinion shaft.	D
3.	Remove the corroded plug on the lower pinion bearing lubrication port and install a fitting.	D
4.	Replace desiccant breather at the north center lower reducer.	D
5.	Spot clean and paint span drive machinery.	D

SPAN SUPPORT AND ALIGHMENT MACHINERY

6.	Reduce the balance wheel bearing bushing clearance by removing liner shims to achieve an RC6 fit as designed.	D
7.	Free balance wheels that don't rotate.	D
8.	Install limit switches at all screw jacks (center and end) to disable the motors when they are being manually operated.	D
9.	Drain, flush, and refill both reducers on the south center screw jack.	D
10.	Drain, flush, and refill the southeast and southwest end screw jack upper and lower reducers with new oil. Check for source of water entry and repair.	D
11.	Lubricate all end screw jack reducer fittings.	D
12.	Add oil to the southeast end screw jack upper reducer.	D
13.	Lubricate all open gears for rotary cam limit switch.	D
14.	Install lubrication fittings at all screw jack couplings.	D
15.	Replace the centering device limit switch mount and guides.	D
16.	Spot clean and paint span support and alignment machinery.	D

GENERAL

17.	Clean all oil/seal leaks and repair the source of the leak. Monitor these areas for future leaks.	D

APPENDIX I
MECHANICAL PHOTOS

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M01: **Coupling C1 with lubricant leakage, moderate paint failure and corrosion.**



Photo M02: **Coupling C2 with a gap at the split and lubrication leak (arrow).**

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M03: **Coupling C3 with wear marks from scraping reducer (white arrow).**



Photo M04: **Lower pinion bearing with corroded plug-in lubrication port (circle).**

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M05: **The top of the main right angle gear reducer with typical heavy dirt/debris accumulation causing corrosion.**



Photo M06: **Rack split bolt with moderate to significant corrosion.**

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M7: **North rack bolt pocket dry at the time of inspection but drains in this area appear to be clogged.**



Photo M08: **Grout pad failure at inboard face of track connection to pivot pier.**

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M09: **6 of 8 balance wheel bearings have excessive clearance, adjust balance wheel bearing liner shims as necessity.**



Photo M10: **Center pivot bearing upper cover missing one bolt. (See oval)**

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M11: **Fully open rigid stop with minor to moderate corrosion at the mounting base. (See oval)**



Photo M12: **Fully closed rigid stop with heavy corrosion with section loss and deformation from impact.**

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M13: **The north lower reducer desiccant breather is nearly saturated and is at the end of its service.**



Photo M14: **North Center screw jack bearing surfaces with typical corrosion and delamination.**

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M15: **Center screw jack bearing surface with typical corrosion and delamination.**



Photo M16: **Center screw jack typical coupling and floating shaft condition with paint failure and severe corrosion.**

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M17: **The northeast and southeast end motor mounting at 90 degrees filled weld has 1/16 and 3inch long cracked (southeast shown).**



Photo M18: **Open gears for the rotary cam limit switch show no signs of recent lubrication, exhibit minor surface corrosion, and make a minor amount of noise during operation (southeast shown). Typical**

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M19: **Southeast end screw jack gap on east and west sides with 0.010” feeler.**



Photo M20: **Manual centering device rod and guides with moderate to heavy corrosion, paint failure, and debris buildup.**

Bridge No.	01349	**Inspected by 1:**	Michael J. Elza, P.E.
Town:	Westport, Connecticut	**Inspected by 2:**	Nitesh Yadav, CBI
Feature Carried:	US Route 136	**Date Inspected:**	08/31/2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo M21: **Manual centering device receiver with minor to moderate corrosion and debris buildup. The centering device rod contacts the receiver on the south side.**

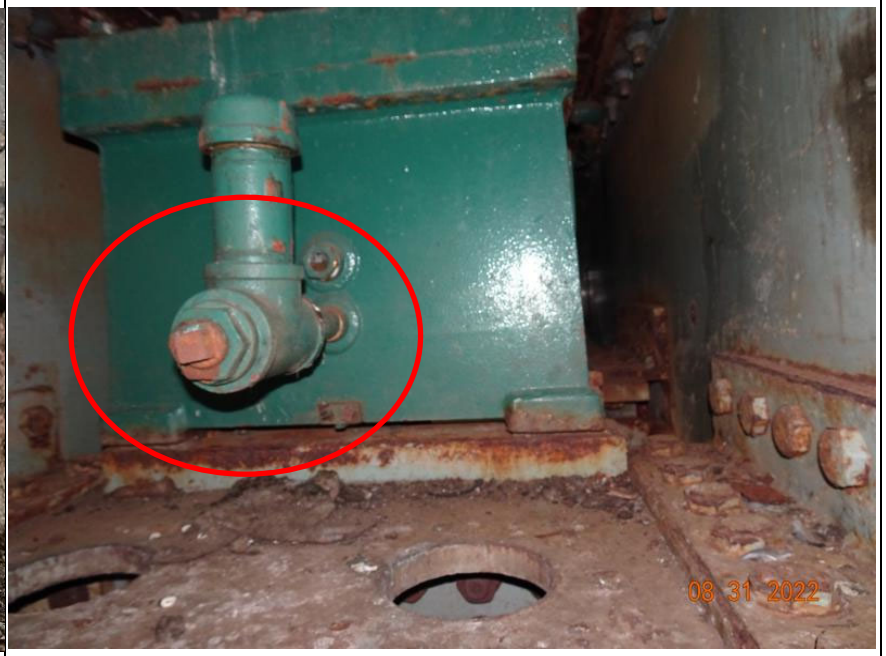


Photo M22: **The gear reducer drain plug is difficult to open to collect oil samples.**

APPENDIX II

MECHANICAL SCHEMATIC AND FIELD NOTES

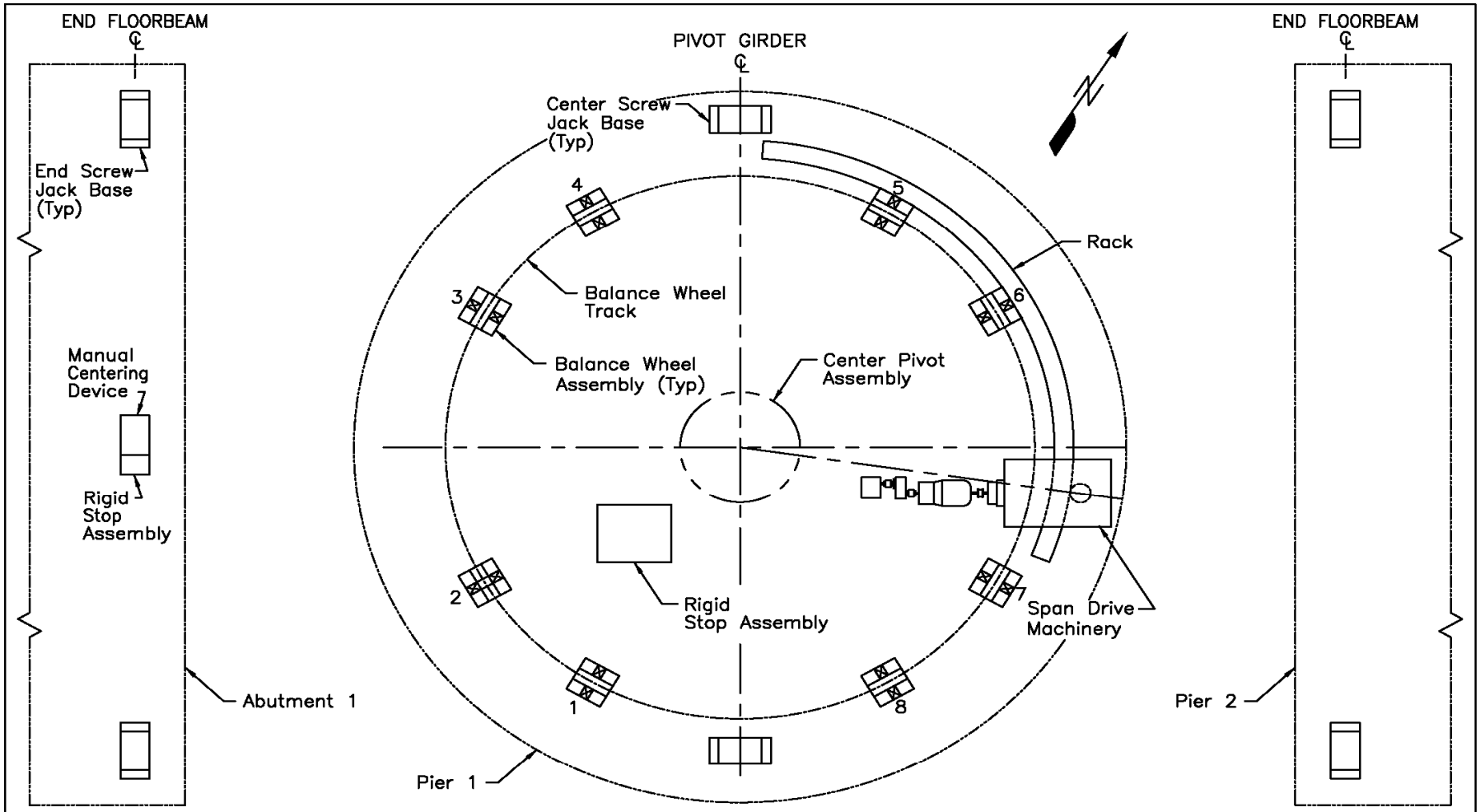


Figure 1. Plan View of Span Drive Machinery and Span Support Machinery

Project:
Saugatuck Swing Bridge (01349)
Westport, Connecticut

Prepared by: TranSystems

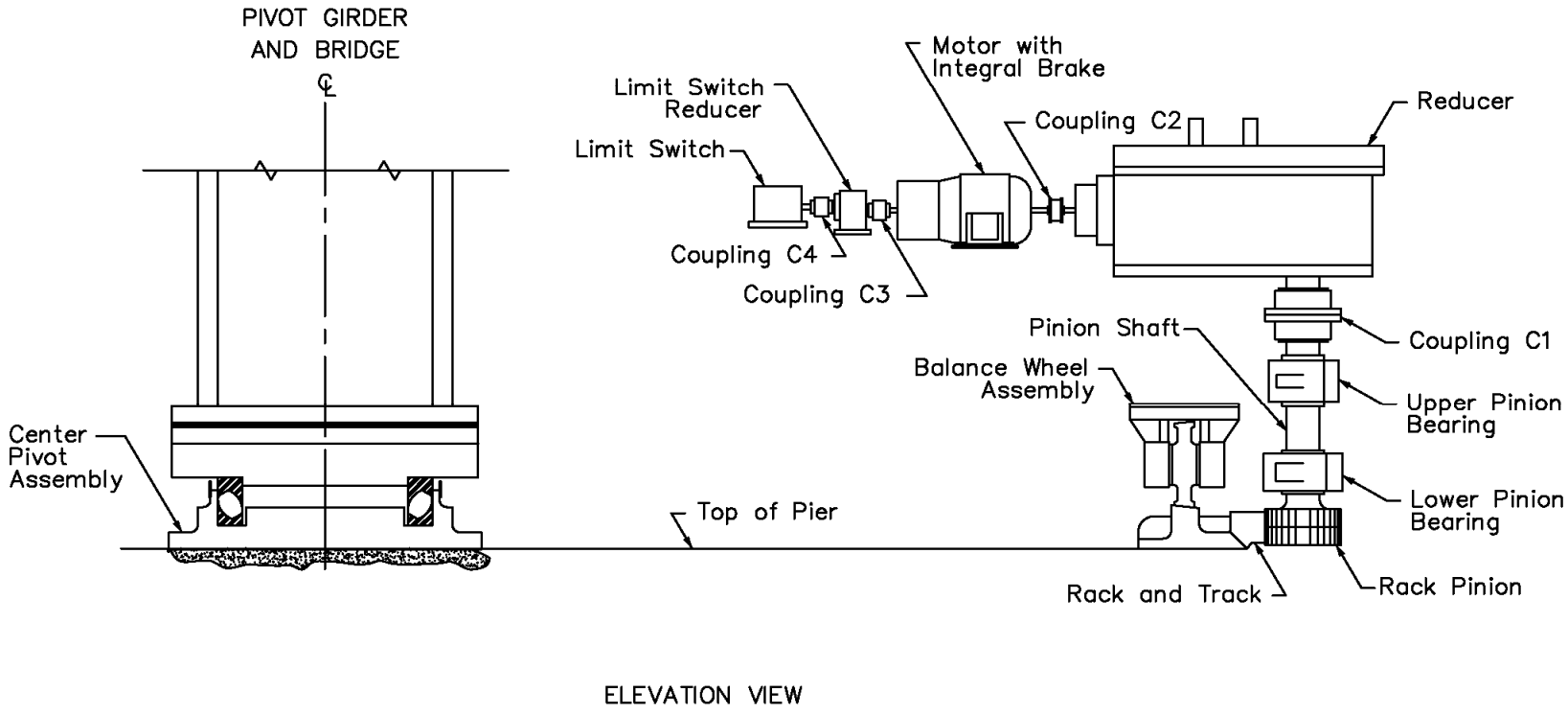


Figure 2. Span Drive Machinery

Project:
Saugatuck Swing Bridge (01349)
Westport, Connecticut

Prepared by: TranSystems

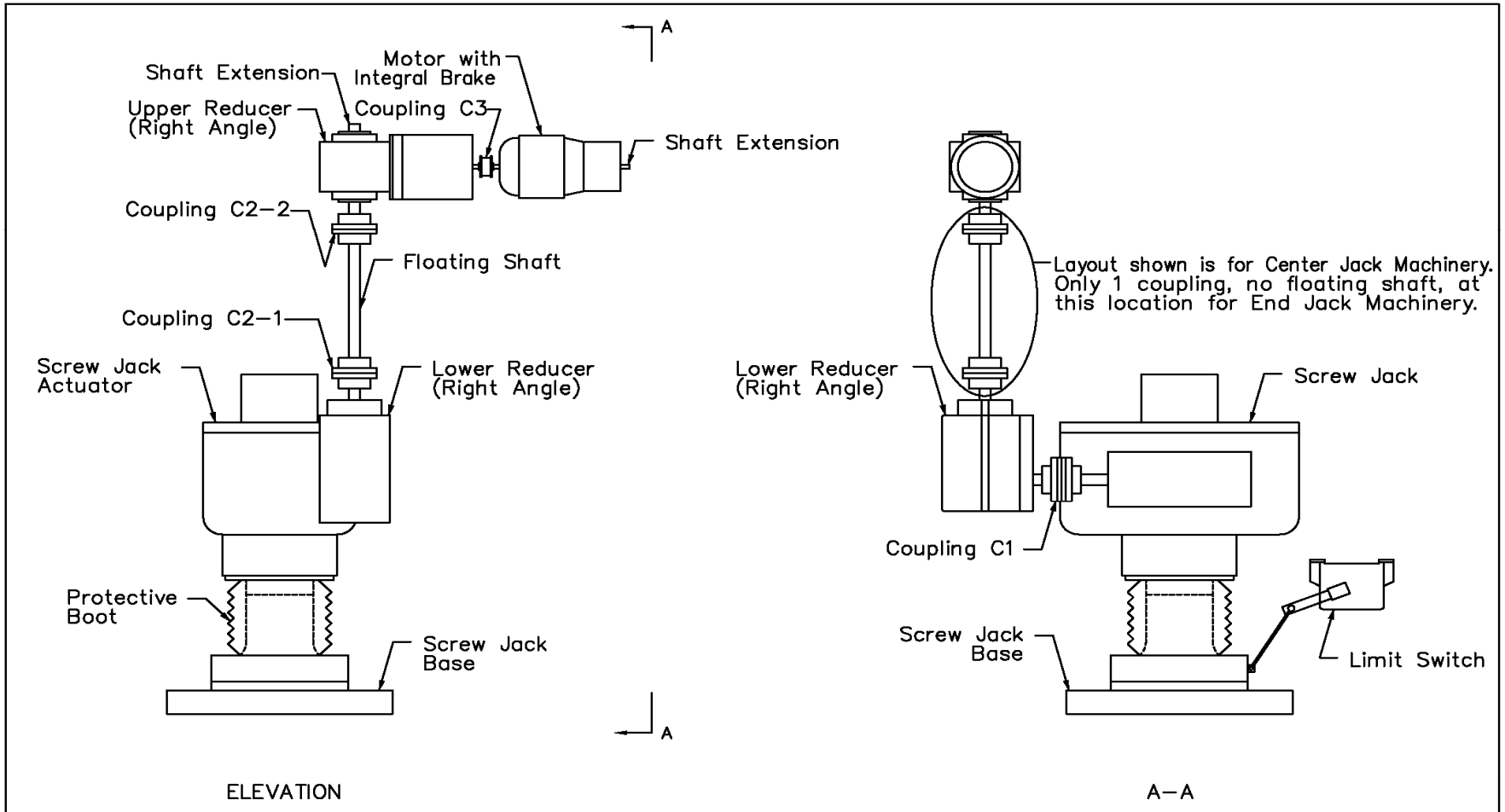


Figure 3. Screw Jack Machinery Typical Arrangement

Project:
Saugatuck Swing Bridge (01349)
Westport. Connecticut

Prepared by: TranSystems

SPAN DRIVE MOTOR:

Motor Identification per Schematic:	**Span Drive Motor**	
Name Plate Info.:	Manufacturer: Reuland	Type: A000
	Serial No: 13-1103A-1	Code: M
	Prod. No: 0030F-1AAB-0020	Style: ABR
	Horsepower: 3HP	Encl.: TENV
	SF: 1.15	RPM: 900 RPM
	Amps: 12.4	HZ: 60
	Volts: 208	Frame: 215
	Phase: 3	Time Rating: 30
Brake:	Integral disc brake with manual release; Manual release operates smoothly.	
Shafts:	Coated in grease, minor corrosion and no paint.	
Lubrication:	No recent lube on lube port.	
Bolts:	Do not have double nuts (would typically recommend double); Not corroded (maybe stainless steel). Tight.	
Supports:	Small amount of debris.	
General Comments:	Paint is in good condition.	

SPAN INSTRUMENTATION:

Worm Gear Reducer:	Parallel offset reducer; Light coating of debris; Paint in good condition; Single nuts on bolts with some corrosion on fasteners; Grease leak from bearing.
Span Position Limit Switch:	Good
General:	Light debris.

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C1**
Nameplate Data:	NA
Coupling Type:	Falk Flex-Flex Gear.
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Lower hub seal leak on channel side.
Cap & Housing Bolts:	No paint, moderate corrosion, tight.
Cover Condition:	Moderate corrosion and paint failure.
Hubs and Keys:	Grease seeping through lower keyway and hub to shaft interface.
Alignment:	Good
Lubrication:	Light to moderate coating of grease on lower half of coupling; Grease leaking out of seal on lower half on channel side. Plugs present and no fittings.
Comments:	Moderate paint failure and corrosion.

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C2**
Nameplate Data:	NA
Coupling Type:	Falk Grid 1030T10D
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Torn and possibly missing, may even be liquid aftermarket gasket
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good, set screw found over keyway on reducer half
Alignment:	Gap in the split most likely from not being tightened completely
Lubrication:	Lube coming out of gap in split; No fresh lubrication found, no fittings, just plugs
Comments:	Light coating of grease; Moderate paint failure but no corrosion.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C3**
Nameplate Data:	NA
Coupling Type:	Martin 50
Grid/Gear Condition:	IA
Seal/Gasket Condition:	
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Key and keyway are in good condition
Alignment:	Good
Lubrication:	Good
Comments:	Overall good condition; Light coating of debris; ~1/32” away from the reducer; Scraping against limit switch reducer as it rotates causing it to wear in that location and make noise during operation

SPAN DRIVE COUPLING:

Coupling Identification per Schematic:	**C4**
Nameplate Data:	NA
Coupling Type:	Martin 40 (similar to coupling C3)
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Gasket is in good condition
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	Good
Comments:	Overall good condition; Small amount of grease buildup

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SPAN DRIVE PINION SHAFT

Shaft Identification per Schematic:	Pinion Shaft
Surface Condition:	Paint is in good condition – excess lubrication on surface is preventing it from corroding.
Hubs and Keys:	Pinion is integral with shaft.
Alignment:	Good
General:	Covered in grease.

PINION SHAFT BEARING - UPPER:

Bearing Identification per Schematic:	SPAN DRIVE – UPPER BEARING
Bearing Type:	Spherical Roller Bearing (smaller size than lower bearing).
Journal Diameter:	NM
Clearance:	NM
Lubrication:	Appear to be only using purge on bottom and not the top; The fitting on the cap has fresh lube.
Bolts:	Single mounting nuts (should be double)
Support:	Significant corrosion at bearing and support interface with beginning of delamination in isolated areas.
Comments:	Minor paint failure and minor corrosion; Layer of grease and debris.

PINION SHAFT BEARING - LOWER:

Bearing Identification per Schematic:	SPAN DRIVE – LOWER BEARING
Bearing Type:	Torrington SAFS 528; Spherical Roller Bearing
Journal Diameter:	NM
Clearance:	NM
Lubrication:	Appear to be only using purge on bottom and not the top; Not using the lower lube port (there is a corroded plug in there).
Bolts:	Heads of bolts are unpainted and exhibit moderate corrosion; Single mounting nuts.
Support:	Good
Comments:	Silicone sealant around the base; Shaft is in good condition; A lot of grease buildup between lower bearing and pinion.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SPAN DRIVE ENCLOSED GEARING:

Item:	Span Drive Primary Reducer		
	Manufacturer: Horsburgh and Scott	Ser. No.: 1000Bv	
	Size/Type: Spiral Bevel	HP: 3.7	Ratio: 363:1
Nameplate:	Repair Order No.: NA	Input RPM: 900	
		Service Factor: NM	
Lubrication:	No overhead access – cannot get oil sample; Oil level is halfway on site glass.		
Seals:	Good		
Housing:	Paint is in good condition (looks more recent than other components); Corrosion and debris buildup on top of reducer and mounting surface.		
Shafts:	Chipped paint and minor widespread corrosion on manual input shafts.		
Bearings:	Good		
Bolts:	Heavy corrosion.		
General:	Desiccant is expired.		

IA – Inaccessible

NA – Not Applicable

NM – Not Measured

RACK AND PINION:

			Chordal Tooth Thickness Measurements (all dimensions in inches)			
		Addendum	Original	2020	2022	Tooth Measured
Pinion	Top	0.660	0.999	0.956	0.951	5 from most engaged tooth (toward opening direction)
	Bottom			0.955	0.961	
Rack	Top	0.638	1.000	0.931	0.925	8 from most engaged tooth (toward opening direction)
	Bottom			0.942	0.948	

Observations: Pinion

Opening Face	Minor pitting from corrosion, full face contact.
Closing Face	Minor pitting from corrosion, full face contact.

Observations: Rack

Opening Face	Slight pitch line depression, full face contact.
Closing Face	Full face contact heavier at top 2/3rds.

Observations During Operation:	Smooth operation. Minor to moderate corrosion observed on the inside faces of the rack assembly. Grout is failed in several areas. One split bolt exhibited severe corrosion and minor section loss.

Bolts:	North End Rack Bolts -> Last cut out for bolts on rack segment is dry but the drains appear to be clogged; The bolts in this section exhibit significant corrosion. Rack Bolts -> Most of them are studs but some are bolts; All bolts painted with light debris. A small amount of mounting bolts exhibited minor paint failure. Track Bolts -> Good condition; Debris buildup especially near the rack segments; Significant corrosion on the North most bolt washer.
General Notes:	2 long segments with rack teeth, 7 short segments Track -> Minor debris buildup; No significant defects; Minor corrosion on inside where the segment mounts to concrete; No sign of hard metal contact after cleaning hardened lubrication, minor pitting from corrosion, original machined reference arcs appear to be visible

Wheel Number	Lubrication:	Bolts:	Free Movement? Yes/No	General:	Clearance with Jacks Engaged (design clearance 0.063”):	Clearance with Jacks Retracted:
1	Good, fresh grease	Good paint, Mounting bolt heads corroded, old lube and debris	Yes	Wheel tread good	0.040"	Not Measured
2	Good, fresh grease	Paint in good condition	No	Wheel tread good	0.020”	Not Measured
3	Good, fresh grease	Good	No	Wheel tread good	0.111”	Not Measured
4	Good, fresh grease	Minor surface corrosion, Upper have moderate corrosion	No	Wheel tread good	0.175”	Not Measured
5	Good, fresh grease, Slight buildup	Good	Yes	Wheel tread good	0.217”	Not Measured
6	Good, fresh grease, Slight buildup	Good	Yes	Wheel tread good	0.200”	Not Measured
7	Marginal	Upper minor to moderate paint failure and corrosion	No	Wheel tread good	0.130”	Not Measured
8	Good, fresh grease	Upper bolts minor/moderate paint failure, Lower bolt heads minor paint failure/corrosion, debris buildup	Yes (harder to rotate than others)	Wheel tread good	0.078”	Not Measured

(All balance wheel bearing bolts have single nuts)

Observations During Operation:	Balance wheel 1 and 2 roll during a majority of the opening direction. In the closing direction balance wheel 1 is clear and 2 has intermittent contact that appears to be light. Balance wheels 3 and 5 rotated during operation in the NW quadrant of the track. This area also exhibited debris buildup on the track) Balance wheels 4 and 6 were clear of the track for the entire operation. Balance wheel 7 was clear of the track a majority of the operation but when it came in contact it slid instead of rolled. Balance wheel 8 slid from near closed to closed position. Balance wheel 8 rolled from near open to fully open.

BALANCE WHEEL BEARING CLEARANCE:

Wheel Number	Inboard (in):	Location:	Outboard (in):	Location:
1	0.014	Top	0.014	Top
2	0.031	Bottom	0.025	Top
3	0.037	Bottom	0.014	Bottom
4	<0.003	NA	0.007	Bottom
5	0.035	Top	0.011	Top
6	0.008	4:00	0.004	Top
7	0.014	Bottom	0.035	Top
8	0.034	Bottom	0.029	Bottom

Shaft Dia~3 ½”

Design clearance RC6= 0.003” to 0.009”.

IA – Inaccessible

NA – Not Applicable

NM – Not Measured

CENTER PIVOT BEARING:

General Notes:	Good condition, one bolt missing on the cover, two drain ports in the base, one fill on east side. Minor isolated corrosion at base. Minor corrosion at upper mounting surface.

RIGID STOP (fully open):

Center rigid stop

General Notes:	Good condition Some minor to moderate corrosion at base plate to pier interface.

End rigid stop

General Notes:	Fair condition Minor to heavy corrosion with section loss on the strike plate, base and mounting bolts. Rigid stop deformed.

NORTH CENTER JACK MACHINERY: **MOTOR**

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Stearns, Hand release functional, 10 ft-lb.	
Housing:	Minor isolated corrosion, Minor corrosion mounting surface.	
Bearings:	Some grease present.	
Fasteners:	Minor corrosion.	
Lubrication:	Fresh lube at fittings.	
Comments:	Heater is functioning.	

NORTH CENTER JACK MACHINERY: **MOTOR COUPLING**

Identification per Figures:	**C3**
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Minor to Moderate corrosion.
Cover Condition:	Minor to moderate isolated paint failure.
Hubs and Keys:	Not visible
Alignment:	Good
Lubrication:	No signs of fresh lubrication.
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTH CENTER JACK MACHINERY: **UPPER REDUCER**

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Isolated minor corrosion, delamination.		
Bearings:	Fresh lube		
Fasteners:	Minor corrosion		
Lubrication:	Oil level low according to dip-stick, Oil fill/level plug has severe corrosion.		
Operation:	Smooth		
Comments:	Minor/moderate corrosion on mounting surface.		

NORTH CENTER JACK MACHINERY: **UPPER REDUCER COUPLING**

Identification per Figures:	**C2-2**
Nameplate Data:	NA
Coupling Type:	Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks
Cap & Housing Bolts:	Minor/moderate corrosion
Cover Condition:	Significant/severe corrosion with section loss.
Hubs and Keys:	Paint failure
Alignment:	Good
Lubrication:	No sign of lubrication.
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTH CENTER JACK MACHINERY: **FLOATING SHAFT**

Identification per Schematic:	
Surface Condition:	Minor surface corrosion and paint failure with isolated significant corrosion with section loss up to 5% at the bottom 6in. areas.
Hubs and Keys:	NA
Alignment:	Good
General:	NA

NORTH CENTER JACK MACHINERY: **LOWER REDUCER COUPLING**

Identification per Figures:	**C2-1**
Nameplate Data:	NA
Coupling Type:	Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cap & Housing Bolts:	Severe corrosion with section loss.
Cover Condition:	Severe corrosion with section loss.
Hubs and Keys:	Severe corrosion with section loss.
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

NORTH CENTER JACK MACHINERY: **COUPLING C1**

Identification per Figures:	**C1**
Nameplate Data:	Martin 50
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTH CENTER JACK MACHINERY: **LOWER REDUCER**

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output RPM: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Minor surface corrosion.		
Bearings:	Good		
Fasteners:	Mounting: Moderate corrosion; Split: Minor corrosion.		
Lubrication:	Good		
Operation:	Smooth		
Comments:	Desiccant is nearly saturated.		

NORTH CENTER JACK MACHINERY: **SCREW JACK**

Identification per Figures:	**C2-2**
Actuator:	Duff Norton 8k-1850-1x
Protective Boot:	Good; grease and debris buildup
Base:	Moderate corrosion and paint failure; Bolts in good condition
Limit Switches:	Proximity switches good; Gears for RCLS are dry and minor noise during operation from backlash but tight on respective shafts.
Operation:	Smooth
Comments:	Good lube; Upper bolts have minor to moderate corrosion. Bearing surfaces are dry and have moderate to severe corrosion with delamination. When driven contact appears tight with no gaps.

IA – Inaccessible

NA – Not Applicable

NM – Not Measured

SOUTH CENTER JACK MACHINERY: **MOTOR**

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Manual release appears to function.	
Housing:	Very minor isolated corrosion and corrosion at manual operating shaft.	
Bearings:	Good	
Fasteners:	Very minor isolated corrosion and single nuts used.	
Lubrication:	Fresh lube at fittings.	
Comments:	Heater appears to be functioning.	

SOUTH CENTER JACK MACHINERY: **MOTOR COUPLING**

Identification per Figures:	**C3**
Nameplate Data:	Falk
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Grease purge at reducer side.
Cap & Housing Bolts:	Minor paint failure and corrosion.
Cover Condition:	Moderate paint failure all around.
Hubs and Keys:	Good, debris buildup, some old minor grease purge.
Alignment:	Good
Lubrication:	No sign of fresh lube with ports painted over.
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTH CENTER JACK MACHINERY: **UPPER REDUCER**

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Very minor corrosion at split, paint is good with minor isolated corrosion		
Bearings:	Fresh lube on all fittings, 4 fittings, no plugs, purge at seal		
Fasteners:	Mounting bolts have minor corrosion with single nuts, one bolt head that was visible had moderate corrosion		
Lubrication:	Level looks full. Oil sample taken - Water under drain pulg, KFH20 is critical, excessive water indicated.		
Operation:	Smooth		
Comments:	Drain has buildup from past leak. Silicone seal at base. Hand crank shaft exhibits corrosion.		

SOUTH CENTER JACK MACHINERY: **UPPER REDUCER COUPLING**

Identification per Figures:	**C2-2**
Nameplate Data:	NA
Coupling Type:	Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Small leak at flex hub, grease from the reducer reaching the top of the coupling
Cap & Housing Bolts:	Minor grease and debris buildup
Cover Condition:	Moderate corrosion, Lube buildup, moderate to significant paint failure
Hubs and Keys:	Good, key; paint failure.
Alignment:	Good
Lubrication:	No sign of lubrication at port, excess lube from reducer reaching this coupling
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTH CENTER JACK MACHINERY: **FLOATING SHAFT**

Identification per Schematic:	
Surface Condition:	Good; Minor corrosion at bottom
Hubs and Keys:	Good
Alignment:	Good
General:	NA

SOUTH CENTER JACK MACHINERY: **LOWER REDUCER COUPLING**

Identification per Figures:	**C2-1**
Nameplate Data:	NA
Coupling Type:	Gear
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Minor to moderate corrosion with pain failure.
Cover Condition:	Moderate to significant corrosion and severe paint failure.
Hubs and Keys:	Good, keys not visible.
Alignment:	Good
Lubrication:	No sign of lube at port.
Comments:	NA

SOUTH CENTER JACK MACHINERY: **LOWER REDUCER**

Identification per Figures:			
	Manufacturer: Foote-Jones Maxi-power		
Type / ID Plate Data	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Service Factor: 1.17	Output Torque: NM	
Housing:	Good; Minor corrosion at bottom, silicone seal at the base		
Bearings:	Fresh lube on fitting		
Fasteners:	Mounting: 1 with minor corrosion, paint failure, both upper bolts not fully engaged with nut, minor paint failure and corrosion at the bolt heads		
Lubrication:	Level looks full. Oil sample taken - Water under drain pulg, KFH20 is critical, excessive water indicated. See FDRL Level in oil sample report.		
Operation:	Smooth		
Comments:	Desiccant is good, corrosion at the oil drain/level check plug.		

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTH CENTER JACK MACHINERY: **COUPLING C1**

Identification per Figures:	**C1**
Nameplate Data:	Martin 50
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

SOUTH CENTER JACK MACHINERY: **SCREW JACK**

Identification per Figures:	
Actuator:	Duff Norton 8k-1850-1x
Protective Boot:	Good; Slight grease buildup
Base:	Minor to moderate corrosion, single nuts on mounting bolts, minor isolated paint failure
Limit Switches:	Proximity switches good; Gears for RCLS are dry and minor noise during operation from backlash but tight on respective shafts.
Operation:	Smooth
Comments:	Upper bolts: Moderate corrosion, moderate corrosion on upper mounting surface Bearing surfaces are dry and have moderate to severe corrosion with delamination The actuator lubrication fitting is dry

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHEAST END JACK MACHINERY: **MOTOR**

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland Motor with Stearns Brake	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800 rpm
Brake:	Good, manual release good.	
Housing:	Minor isolated corrosion; Minor paint failure on mounting feet.	
Bearings:	Good	
Fasteners:	Minor corrosion.	
Lubrication:	Fresh grease on fittings.	
Comments:	Mounting feet; at 90 degrees filled weld has 1/16 and 3inch long cracked.	

NORTHEAST END JACK MACHINERY: **MOTOR COUPLING**

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Leak at split.
Cap & Housing Bolts:	Minor/moderate corrosion.
Cover Condition:	Minor isolated corrosion; Minor paint failure.
Hubs and Keys:	Not visible.
Alignment:	Good
Lubrication:	No signs of fresh lubrication.
Comments:	

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHEAST END JACK MACHINERY: **UPPER REDUCER**

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Minor to moderate isolated corrosion; Moderate at shims and at bottom, caulk has been added in this area.		
Bearings:	Some recent lube on both bearings.		
Fasteners:	Minor/moderate corrosion.		
Lubrication:	Very minor leak at drain, access cover mounted to sidewalk with square socket head fastener, not removed.		
Operation:	Smooth		
Comments:	The dip-stick cap exhibited severe corrosion and section loss.		

NORTHEAST END JACK MACHINERY: **REDUCER COUPLING**

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement.
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Minor paint failure and corrosion.
Cover Condition:	Moderate to heavy paint failure and corrosion.
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of lube.
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHEAST END JACK MACHINERY: **LOWER REDUCER**

Identification per Figures:			
Type / ID Plate Data (not found this inspection cycle)	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Moderate to heavy isolated corrosion.		
Bearings:	Not fresh lubrication.		
Fasteners:	Minor corrosion on East bolts, Moderate corrosion on West bolts.		
Lubrication:	Minor to moderate oil leak at bottom (drain or split).		
Operation:	Smooth		
Comments:	Desiccant is good; Moderate isolated corrosion on parts and fasteners.		

NORTHEAST END JACK MACHINERY: **SCREW JACK**

Identification per Figures:	
Actuator:	Grease dripping from shaft (remote lube); Minor isolated corrosion.
Protective Boot:	Grease and dirt buildup; Good condition.
Base:	Grease buildup; Good condition; Minor corrosion.
Limit Switches:	Open gears dry and minor surface corrosion.
Operation:	Smooth
Comments:	Upper bolts: Minor to moderate corrosion. Shims: Moderate corrosion. LL shoes exhibit minor corrosion and no fresh lube. No gap when driven. ¾" of droop at screw jack when all ends retracted. No handrail at end of lower maintenance walkway.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHEAST END JACK MACHINERY: **COUPLING C1**

Identification per Figures:	**C1**
Nameplate Data:	NM
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHEAST END JACK MACHINERY: **MOTOR**

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland Motor with Stearns Brake	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Good, manual release functions.	
Housing:	Paint in good condition, minor corrosion on isolated areas.	
Bearings:	Good	
Fasteners:	Good; Very minor corrosion, all have single nuts with lock washers on some.	
Lubrication:	Appears recent with some isolated areas of dry buildup even at the fittings.	
Comments:	Minor corrosion at foot and foot at 90 degrees filled weld has 1/16 and 3inch long cracked. Heater appears to be working.	

SOUTHEAST END JACK MACHINERY: **MOTOR COUPLING**

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good, chipped paint and isolated corrosion.
Cover Condition:	Good
Hubs and Keys:	Good, keys not visible
Alignment:	Good
Lubrication:	Grease/debris from reducer input shaft bearing No sign of recent lube, grease ports painted over
Comments:	Isolated minor paint failure

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHEAST END JACK MACHINERY: **UPPER REDUCER**

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Good paint, isolated areas of minor paint failure and corrosion especially at the mounting feet.		
Bearings:	Good		
Fasteners:	Minor corrosion.		
Lubrication:	Leak at output shaft, minor leak at input shaft; Oil Barely at dipstick; lower fittings in use top fittings dry. Oil sample taken - Water under drain pulg, KFH20 is critical, excessive water indicated. See FDRL and potassium level in oil sample report.		
Operation:	Smooth		
Comments:	Corrosion at upper mounting shim.		

SOUTHEAST END JACK MACHINERY: **REDUCER COUPLING**

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement.
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good; lube at top coming from reducer.
Cap & Housing Bolts:	Good
Cover Condition:	Minor to moderate paint failure.
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	Buildup on top half.
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHEAST END JACK MACHINERY: **LOWER REDUCER**

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Good paint, very minor corrosion.		
Bearings:	Some grease (dry), fitting is dry		
Fasteners:	1 unpainted		
Lubrication:	Minor buildup of oil, water and debris at the drain. Level looks full. Oil sample taken - Water under drain pulg, KFH20 is critical, excessive water indicated.		
Operation:	Smooth		
Comments:	Desiccant is good		

SOUTHEAST END JACK MACHINERY: **SCREW JACK**

Identification per Figures:	
Actuator:	Lube leak (remote fittings); Heavy corrosion at upper mounting shims and botls, washers heavy laminar corrosion.
Protective Boot:	Good
Base:	Bolts in good condition; Minor corrosion on plate; Grease/debris
Limit Switches:	Corrosion
Operation:	Smooth
Comments:	0.010” feeler fits under on East/West sides. LL shoes are corroded and have some fresh lube. 1 1/4” droop observed at this location when all jacks are retracted.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOTHEAST END JACK MACHINERY: **COUPLING C1**

Identification per Figures:	**C1**
Nameplate Data:	NM
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHWEST END JACK MACHINERY: **MOTOR**

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland Motor with Stearns Brake	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Manual release functional.	
Housing:	Minor corrosion on rear manual shaft. Hand cranks stored at maintenance garage.	
Bearings:	OK	
Fasteners:	Minor to moderate corrosion at upper 2 bolts.	
Lubrication:	Adequate	
Comments:	Manual shaft key taped in place.	

NORTHWEST END JACK MACHINERY: **MOTOR COUPLING**

Identification per Figures:	
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Gasket starting to come out, no leaks observed.
Cap & Housing Bolts:	Minor corrosion.
Cover Condition:	Good, Isolated areas paint failure and minor corrosion.
Hubs and Keys:	Good; Isolated areas with no paint and minor corrosion, Keys IA.
Alignment:	NM
Lubrication:	No sign of recent lubrication (since painting) 2 plugs present with no lubrication fittings.
Comments:	

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHWEST END JACK MACHINERY: **UPPER REDUCER**

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Minor to moderate corrosion.		
Bearings:	Adequate lube at grease fitting.		
Fasteners:	Moderate to significant corrosion of fasteners.		
Lubrication:	Oil level good on dipstick.		
Operation:	Smooth		
Comments:	Slight oil leak at output shaft.		

NORTHWEST END JACK MACHINERY: **REDUCER COUPLING**

Identification per Figures:	
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Minor leak.
Cap & Housing Bolts:	Significant to severe corrosion with section loss up to 5%.
Cover Condition:	Severe corrosion with section loss up to 10%.
Hubs and Keys:	Moderate corrosion.
Alignment:	Good
Lubrication:	No sign of recent lubrication, pulled 1 of 4 plugs and looks full.
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHWEST END JACK MACHINERY: **LOWER REDUCER**

Identification per Figures:			
Type / ID Plate Data (not found this inspection cycle)	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: See nameplate	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Minor to moderate corrosion.		
Bearings:	Good		
Fasteners:	Minor corrosion.		
Lubrication:	Okay, Oil fill/level plug has severe corrosion.		
Operation:	Smooth		
Comments:	NA		

NORTHWEST END JACK MACHINERY: **SCREW JACK**

Identification per Figures:	
Nameplate:	Duff Norton LM-20150-41B MUBAZ4BR005ZA
Actuator:	Moderate to heavy corrosion on upper mounting bolts; Excess grease on shaft; Paint failure.
Protective Boot:	Good; Covered in grease and dirt.
Base:	Significant corrosion at mounting bolts; Grease buildup.
Limit Switches:	Good
Operation:	Smooth
Comments:	Slight gap less than 0.010” on the north half and Southwest quadrant. LL shoes are corroded and have some fresh lube. 1-1/4” droop measured when all jacks were retracted.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

NORTHWEST END JACK MACHINERY:

COUPLING C1

Identification per Figures:	**C1**
Nameplate Data:	NM
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHWEST END JACK MACHINERY: **MOTOR**

Identification per Figures:		
Type / ID Plate Data	Manufacturer: Reuland Motor with Stearns Brake	Size: 184 TENV
	HP Rating: 3.3	Input RPM: 1800
Brake:	Manual release functional	
Housing:	Minor corrosion, good paint condition	
Bearings:	Dry fittings	
Fasteners:	Good condition, single nuts with very minor paint failure	
Lubrication:	No sign of fresh lube	
Comments:	Heater appears to be working	

SOUTHWEST END JACK MACHINERY: **MOTOR COUPLING**

Identification per Figures:	C3
Nameplate Data:	Falk 1020T10D
Coupling Type:	Grid
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good
Cover Condition:	Good
Hubs and Keys:	Good hubs, keys not visible
Alignment:	Good
Lubrication:	Grease/debris from reducer input shaft bearing, no fresh lube
Comments:	Grease ports are painted over

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHWEST END JACK MACHINERY: **UPPER REDUCER**

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Falk		
	Size: 1020 FC	Ratio: 7.669:1	Serial No.:
	Lubrication: NM	Output RPM: 228	
	HP Rating: NM	Input RPM: 1750	Service Factor: 2.4
Housing:	Good; Lube leak, minor corrosion		
Bearings:	No grease on upper; moderate grease leaking from seal		
Fasteners:	Good condition; Minor corrosion		
Lubrication:	Over “full” line on dipstick, dipstick area exhibits minor corrosion, bearing lube fittings dry. Oil sample taken - Water under drain pulg, KFH20 is critical, excessive water indicated. See FDRL and iron level in oil sample report.		
Operation:	Smooth		
Comments:	NA		

SOUTHWEST END JACK MACHINERY: **REDUCER COUPLING**

Identification per Figures:	C2
Nameplate Data:	NA
Coupling Type:	Gear Double Engagement
Grid/Gear Condition:	IA
Seal/Gasket Condition:	Good
Cap & Housing Bolts:	Good, some debris buildup
Cover Condition:	Grease from reducer on top half
Hubs and Keys:	Hubs good, keys not visible
Alignment:	Good
Lubrication:	No sign of lube at ports and painted over
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHWEST END JACK MACHINERY: **LOWER REDUCER**

Identification per Figures:			
Type / ID Plate Data	Manufacturer: Foote-Jones Maxi-power		
	Size: 7SBV	Ratio: 4.125:1	Serial No.: OC62072-03
	Lubrication: NM	Output Torque: NM	
	HP Rating: NM	Input RPM: NM	Service Factor: 1.17
Housing:	Good condition with minor paint failure in lower front region.		
Bearings:	Lube fittings dry.		
Fasteners:	Good condition, minor paint failure and single nuts with some lockwashers.		
Lubrication:	Good,Oil sample taken - Water under drain pulg, KFH20 is critical, excessive water indicated.		
Operation:	Smooth		
Comments:	Desiccant is expired		

SOUTHWEST END JACK MACHINERY: **SCREW JACK**

Identification per Figures:	
Actuator:	Excessive grease buildup at upper bolts and shims and the fittings are good.
Protective Boot:	Good condition; Covered in grease and dirt.
Base:	Good condition; Covered in grease/debris; Some minor corrosion; the bolts only have single nuts and exhibit minor paint failure.
Limit Switches:	Good, minor corrosion and dry with respect to lubrication.
Operation:	Smooth
Comments:	Upper bolts: moderate to heavy corrosion. Nuts; heavy corrosion with section loss. No gap on base. LL shoes are corroded and have some fresh lube. 1” of droop measured when all jacks were retracted.

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

SOUTHWEST END JACK MACHINERY: **COUPLING C1**

Identification per Figures:	**C1**
Nameplate Data:	NM
Coupling Type:	NM
Grid/Gear Condition:	IA
Seal/Gasket Condition:	No leaks observed
Cover Condition:	Minor debris, fasteners exhibit moderate corrosion
Hubs and Keys:	Good
Alignment:	Good
Lubrication:	No sign of recent lubrication
Comments:	NA

IA – Inaccessible
NA – Not Applicable
NM – Not Measured

MANUAL CENTERING DEVICE:

Identification per Figures:	
Comments:	Isolated corrosion on base with heavy debris buildup. Rod and guides have moderate to heavy paint failure, corrosion, and debris buildup. Rod in contact with the receiver on the south side. Rod appears to be bent. Two limit switches found in this area. Maintenance personnel had minor issues with the retract and set positions being recognized by the control system. The limit switch mounting plate has moderate surface corrosion, fasteners have severe corrosion with debris buildup.

END RIGID STOP ASSEMBLY (fully closed):

Identification per Figures:	
Comments:	Minor/moderate corrosion on the strike plates, base and mounting bolts, limit switch and span mounted assembly. Does not contact when fully closed. Deformed from impact, bent plate touching the limit switch

TRAFFIC BARRIER GATES:

Comments:	Both the east and west Traffic gates are fully manual. No lights were working at the time of the inspection. The west barrier does not seat fully into the anchorage at the toe and the heel locking clasp for fully lowered cannot be engaged. Maintenance personnel reported that bridge operation is not attempted without police detail blocking the oncoming lanes. The east barrier gate limit switch is frozen in the tripped condition. The cable anchor bolts are twisted and misaligned with the receiver at the heel.

APPENDIX III

MECHANICAL OIL ANALYSIS REPORTS

SOUTHWEST SPECTRO-CHEM LABS

1009 Louisiana Ave. South Houston, Texas 77587 713/944-3694 Fax 713/944-9881

ATTENTION: NITESH YADAV
TRANSYSTEMS CORPORATION
201 E KENNEDY BLVD
SUITE 1260 TAMPA, FL 33602

234571 0001
CUSTOMER TRANSYSTEMS CORPORATION
LOCATION WESTPORT, CT
UNIT NO. CTDOT 01349
EQUIPMENT SOUTH CENTER JACK UPPER GB
SERIAL NO.
OIL

OIL USE AND DATES

LAB #	EXC	OIL HOURS	UNIT HOURS	SAMPLE DATE	RECEIVED DATE
I0363		N/A		09/08/22	09/12/22

WEAR METALS

LAB #	IRON ppm	LEAD ppm	COPPER ppm	TIN ppm	ALUMINUM ppm	CHROMIUM ppm	NICKEL ppm	SILVER ppm	TITANIUM ppm
I0363	15	0	0	0	1	0	0	0	0

CONTAMINANT METALS

LAB #	SILICON ppm	BORON ppm	SODIUM ppm	POTASIUM ppm
I0363	0	0	14	0

ADDITIVE METALS

LAB #	PHOSPHORUS ppm	ZINC ppm	CALCIUM ppm	BARIUM ppm	MAGNESIUM ppm	MOLYBDENUM ppm	ANTIMONY ppm
I0363	311	374	64	0	0	3	0

PHYSICAL PROPERTY TEST RESULTS

LAB #	WATER %	TAN mg/g	VIS40C cst	KFH2O ppm	FDRS COUNT	FDRL COUNT
I0363	15.8	0.82	219.1	2384	19.4	29.2

ANALYSIS COMMENTS

LAB #
I0363 35. Note water content; probable source: condensation, operating temps., contaminated storage(new oil) or system open to environment. Recommendation: change oil; eliminate source.
08. Note KF water is critical; excessive water indicated. This can cause tan and oxidation changes. Suggest remove h2o.

Southwest Spectro-Chem Labs and its affiliates make no warranty for proper operation of any equipment associated with this report.

SOUTHWEST SPECTRO-CHEM LABS

1009 Louisiana Ave. South Houston, Texas 77587 713/944-3694 Fax 713/944-9881

ATTENTION: NITESH YADAV
TRANSYSTEMS CORPORATION
201 E KENNEDY BLVD
SUITE 1260 TAMPA, FL 33602

234571 0002
CUSTOMER TRANSYSTEMS CORPORATION
LOCATION WESTPORT, CT
UNIT NO. CTDOT 01349
EQUIPMENT SOUTH CENTER JACK LOWER GB
SERIAL NO.
OIL

OIL USE AND DATES

LAB #	EXC	OIL HOURS	UNIT HOURS	SAMPLE DATE	RECEIVED DATE
I0364		N/A		09/08/22	09/12/22

WEAR METALS

LAB #	IRON ppm	LEAD ppm	COPPER ppm	TIN ppm	ALUMINUM ppm	CHROMIUM ppm	NICKEL ppm	SILVER ppm	TITANIUM ppm
I0364	8	0	1	0	0	0	0	0	0

CONTAMINANT METALS

LAB #	SILICON ppm	BORON ppm	SODIUM ppm	POTASIUM ppm
I0364	2	2	11	13

ADDITIVE METALS

LAB #	PHOSPHORUS ppm	ZINC ppm	CALCIUM ppm	BARIUM ppm	MAGNESIUM ppm	MOLYBDENUM ppm	ANTIMONY ppm
I0364	355	436	59	0	0	1	0

PHYSICAL PROPERTY TEST RESULTS

LAB #	TAN mg/g	VIS40C cst	KFH2O ppm	FDRS COUNT	FDRL COUNT
I0364	0.82	247.6	222	22.7	83.8

ANALYSIS COMMENTS

LAB #
I0364 08. Note KF water is critical; excessive water indicated. This can cause tan and oxidation changes. Suggest remove h2o.
61. Note FDRL level; probable source: gear teeth, bushing, bearing, shaft and/or ferrous metal contact surfaces. Recommendation: check for unusual vibration, noise, thermal and performance condition. Watch for continued FDRS increase and sudden decrease.

Southwest Spectro-Chem Labs and its affiliates make no warranty for proper operation of any equipment associated with this report.

SOUTHWEST SPECTRO-CHEM LABS

1009 Louisiana Ave. South Houston, Texas 77587 713/944-3694 Fax 713/944-9881

ATTENTION: NITESH YADAV
TRANSYSTEMS CORPORATION
201 E KENNEDY BLVD
SUITE 1260 TAMPA, FL 33602

234571 0003
CUSTOMER TRANSYSTEMS CORPORATION
LOCATION WESTPORT, CT
UNIT NO. CTDOT 01349
EQUIPMENT SOUTHEAST END JACK UPPER GB
SERIAL NO.
OIL

OIL USE AND DATES

LAB #	EXC	OIL HOURS	UNIT HOURS	SAMPLE DATE	RECEIVED DATE
I0365		N/A		09/08/22	09/12/22

WEAR METALS

LAB #	IRON ppm	LEAD ppm	COPPER ppm	TIN ppm	ALUMINUM ppm	CHROMIUM ppm	NICKEL ppm	SILVER ppm	TITANIUM ppm
I0365	4	0	1	0	0	0	0	0	0

CONTAMINANT METALS

LAB #	SILICON ppm	BORON ppm	SODIUM ppm	POTASIUM ppm
I0365	0	0	6	33

ADDITIVE METALS

LAB #	PHOSPHORUS ppm	ZINC ppm	CALCIUM ppm	BARIUM ppm	MAGNESIUM ppm	MOLYBDENUM ppm	ANTIMONY ppm
I0365	278	417	54	0	0	1	0

PHYSICAL PROPERTY TEST RESULTS

LAB #	TAN mg/g	VIS40C cst	KFH2O ppm	FDRS COUNT	FDRL COUNT
I0365	0.82	231.3	26542	30.1	42.0

ANALYSIS COMMENTS

LAB #
I0365 08. Note KF water is critical; excessive water indicated. This can cause tan and oxidation changes. Suggest remove h2o.
61. Note FDRL level; probable source: gear teeth, bushing, bearing, shaft and/or ferrous metal contact surfaces. Recommendation: check for unusual vibration, noise, thermal and performance condition. Watch for continued FDRS increase and sudden decrease.
33. Note potassium content; probable sources: coolant or additive in the oil. Recommendation: check for and eliminate source and/or new oil for additive level.

Southwest Spectro-Chem Labs and its affiliates make no warranty for proper operation of any equipment associated with this report.

SOUTHWEST SPECTRO-CHEM LABS

1009 Louisiana Ave. South Houston, Texas 77587 713/944-3694 Fax 713/944-9881

ATTENTION: NITESH YADAV
TRANSYSTEMS CORPORATION
201 E KENNEDY BLVD
SUITE 1260 TAMPA, FL 33602

234571 0004
CUSTOMER TRANSYSTEMS CORPORATION
LOCATION WESTPORT, CT
UNIT NO. CTDOT 01349
EQUIPMENT SOUTHEAST END JACK LOWER GB
SERIAL NO.
OIL

OIL USE AND DATES

LAB #	EXC	OIL HOURS	UNIT HOURS	SAMPLE DATE	RECEIVED DATE
I0366		N/A		09/08/22	09/12/22

WEAR METALS

LAB #	IRON ppm	LEAD ppm	COPPER ppm	TIN ppm	ALUMINUM ppm	CHROMIUM ppm	NICKEL ppm	SILVER ppm	TITANIUM ppm
I0366	6	0	1	0	0	0	1	0	0

CONTAMINANT METALS

LAB #	SILICON ppm	BORON ppm	SODIUM ppm	POTASIUM ppm
I0366	0	0	6	9

ADDITIVE METALS

LAB #	PHOSPHORUS ppm	ZINC ppm	CALCIUM ppm	BARIUM ppm	MAGNESIUM ppm	MOLYBDENUM ppm	ANTIMONY ppm
I0366	315	408	60	0	0	0	0

PHYSICAL PROPERTY TEST RESULTS

LAB #	TAN mg/g	VIS40C cst	KFH2O ppm	FDRS COUNT	FDRL COUNT
I0366	0.80	215.1	331	10.4	25.8

ANALYSIS COMMENTS

LAB #
I0366 08. Note KF water is critical; excessive water indicated. This can cause tan and oxidation changes. Suggest remove h2o.

Southwest Spectro-Chem Labs and its affiliates make no warranty for proper operation of any equipment associated with this report.

SOUTHWEST SPECTRO-CHEM LABS

1009 Louisiana Ave. South Houston, Texas 77587 713/944-3694 Fax 713/944-9881

ATTENTION: NITESH YADAV
TRANSYSTEMS CORPORATION
201 E KENNEDY BLVD
SUITE 1260 TAMPA, FL 33602

234571 0005
CUSTOMER TRANSYSTEMS CORPORATION
LOCATION WESTPORT, CT
UNIT NO. CTDOT 01349
EQUIPMENT SOUTHWEST END JACK UPPER GB
SERIAL NO.
OIL

OIL USE AND DATES

LAB #	EXC	OIL HOURS	UNIT HOURS	SAMPLE DATE	RECEIVED DATE
I0367		N/A		09/08/22	09/12/22

WEAR METALS

LAB #	IRON ppm	LEAD ppm	COPPER ppm	TIN ppm	ALUMINUM ppm	CHROMIUM ppm	NICKEL ppm	SILVER ppm	TITANIUM ppm
I0367	38	0	1	0	0	0	0	0	0

CONTAMINANT METALS

LAB #	SILICON ppm	BORON ppm	SODIUM ppm	POTASIUM ppm
I0367	0	0	2	3

ADDITIVE METALS

LAB #	PHOSPHORUS ppm	ZINC ppm	CALCIUM ppm	BARIUM ppm	MAGNESIUM ppm	MOLYBDENUM ppm	ANTIMONY ppm
I0367	309	389	48	0	0	0	0

PHYSICAL PROPERTY TEST RESULTS

LAB #	WATER %	TAN mg/g	VIS40C cst	KFH2O ppm	FDRS COUNT	FDRL COUNT
I0367	10.9	0.82	218.9	3705	55.6	85.3

ANALYSIS COMMENTS

LAB #
I0367 35. Note water content; probable source: condensation, operating temps., contaminated storage(new oil) or system open to environment. Recommendation: change oil; eliminate source.
08. Note KF water is critical; excessive water indicated. This can cause tan and oxidation changes. Suggest remove h2o.
61. Note FDRL level; probable source: gear teeth, bushing, bearing, shaft and/or ferrous metal contact surfaces. Recommendation: check for unusual vibration, noise, thermal and performance condition. Watch for continued FDRS increase and sudden decrease.
05. Note iron content; probable source: gear teeth, shaft, housing, oil pump and/or water. Recommendation: check for suspicious vibration, noise, thermal and performance condition.

Southwest Spectro-Chem Labs and its affiliates make no warranty for proper operation of any equipment associated with this report.

SOUTHWEST SPECTRO-CHEM LABS

1009 Louisiana Ave. South Houston, Texas 77587 713/944-3694 Fax 713/944-9881

ATTENTION: NITESH YADAV
TRANSYSTEMS CORPORATION
201 E KENNEDY BLVD
SUITE 1260 TAMPA, FL 33602

234571 0006
CUSTOMER TRANSYSTEMS CORPORATION
LOCATION WESTPORT, CT
UNIT NO. CTDOT 01349
EQUIPMENT SOUTHWEST END JACK LOWER GB
SERIAL NO.
OIL

OIL USE AND DATES

LAB #	EXC	OIL HOURS	UNIT HOURS	SAMPLE DATE	RECEIVED DATE
I0368		N/A		09/08/22	09/12/22

WEAR METALS

LAB #	IRON ppm	LEAD ppm	COPPER ppm	TIN ppm	ALUMINUM ppm	CHROMIUM ppm	NICKEL ppm	SILVER ppm	TITANIUM ppm
I0368	3	0	0	0	0	0	0	0	0

CONTAMINANT METALS

LAB #	SILICON ppm	BORON ppm	SODIUM ppm	POTASIUM ppm
I0368	0	0	6	1

ADDITIVE METALS

LAB #	PHOSPHORUS ppm	ZINC ppm	CALCIUM ppm	BARIUM ppm	MAGNESIUM ppm	MOLYBDENUM ppm	ANTIMONY ppm
I0368	275	401	63	0	0	1	0

PHYSICAL PROPERTY TEST RESULTS

LAB #	TAN mg/g	VIS40C cst	KFH2O ppm	FDRS COUNT	FDRL COUNT
I0368	0.90	216.1	248	8.9	23.1

ANALYSIS COMMENTS

LAB #
I0368 08. Note KF water is critical; excessive water indicated. This can cause tan and oxidation changes. Suggest remove h2o.

Southwest Spectro-Chem Labs and its affiliates make no warranty for proper operation of any equipment associated with this report.

APPENDIX IV

MECHANICAL NUMERICAL CONDITION INSPECTION REPORT

MOVABLE SPANS
NUMERICAL CONDITION INSPECTION REPORT
MECHANICAL COMPONENTS

BRIDGE NUMBER: 01349 **INSPECTION DATE: 08/31/22**

COMMON COMPONENTS		BASCULE SPANS		LIFT SPANS	
COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*
OPEN GEARING	6	RACK & RACK PINION	N	RING GEARS	N
REDUCERS	6	TRUNNION ASSY.	N	SHEAVES	N
SHAFTS	6	SPAN LOCKS	N	DRUMS	N
BEARINGS	7	TAIL LOCKS	N	SHEAVE TRUNION ASSY.	N
COUPLINGS	5	CURVED TREAD PLATES	N	DRUM BEARING ASSY.	N
FASTENERS	6	STRAIGHT TREAD PLATES	N	WIRE ROPES & FITTINGS	N
MACHINERY SUPPORTS	7	**SWING SPANS**		SPAN GUIDES	N
CENTERING DEVICE ASSY.	5	CENTER BEARING ASSY.	6	BALANCE CHAINS	N
BUFFER CYLINDERS	N	CIRCULAR RACK	6	**MISC. COMPONENTS**	
STRIKE PLATES	N	BALANCE WHEEL ASSY.	6	END SCREW JACKS	6
EMERGENCY DRIVES	6	CIRCULAR TRACK	6	CENTER SCREW JACKS	6
LIVE LOAD SHOES	N	RIM-BEARING ASSY.	N	FULLY OPEN RIGID STOP	6
BRAKES	3	CENTER WEDGE ASSY.	N	FULLY CLOSED RIGID STOP	6
		END WEDGE ASSY.	N		

MECHANICAL CONDITION OVERALL RATING: 6

***NCR IS AN ACRONYM FOR NUMERICAL CONDITION RATING; SEE BELOW:**

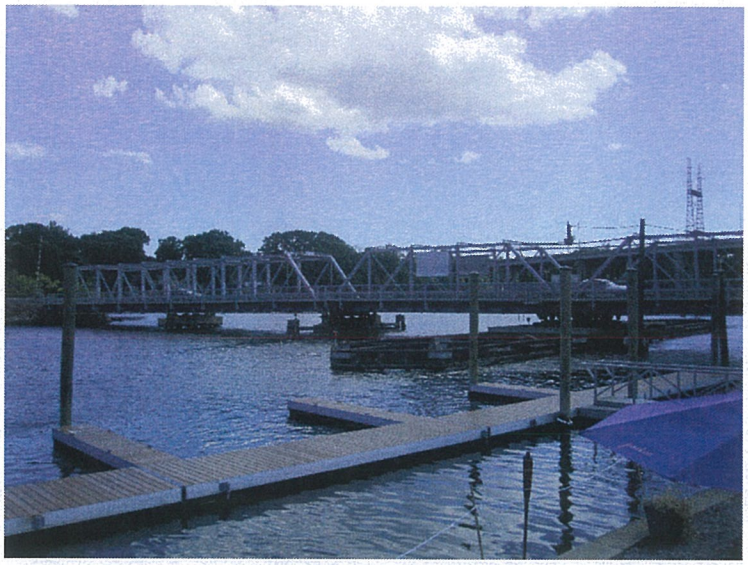
NUMERICAL CONDITION RATING INFORMATION

9	EXCELLENT: No defects noted, component appears to be in new condition and functions as designed.	5	FAIR: Moderate wear/deterioration: performs with moderate reduction in reliability and/or effectiveness.	1	"IMMINENT" FAILURE: Movable span operation prohibited pending replacement or repair
8	VERY GOOD: Displays insignificant wear and/or deterioration: performs intended function with very high degree of reliability and effectiveness.	4	POOR: Advanced wear/deterioration: performance marginal: corrective action required within one year.	0	FAILED: Movable span will not operate without replacement or repair
7	GOOD: Minor deterioration or wear noted, component appears to be functional	3	SERIOUS: Severe wear/deterioration: performance poor and/or unreliable: corrective actions required within six months.	N	Not Applicable
6	SATISFACTORY: Early measurable wear/deterioration: performs with little reduction in reliability and/or effectiveness.	2	CRITICAL: Movable span operation highly unreliable or dangerous and should be restricted: corrective action required as soon as possible.		

BRIDGE SAFETY INSPECTION

ConnDOT BRIDGE NO. 01349

Route 136 Bridge
Over
Saugatuck River
WESTPORT, CT



Electrical Inspection
Inspection Date: August 31st, 2022

Prepared By
TranSystems Corporation
530 Preston Ave
Meriden, CT 06450

STATE OF CONNECTICUT
NICHOLAS G SPRANKLE
No. 33463
LICENSED
PROFESSIONAL ENGINEER

11/22/2022

TABLE OF CONTENTS
ConnDOT Bridge No. 01349

Page

EXECUTIVE SUMMARY 2

INTRODUCTION 3

GENERAL DESCRIPTION 4

OBSERVATIONS AND FINDINGS 5

CONCLUSIONS 19

RECOMMENDATIONS 20

APPENDICES
APPENDIX I PHOTOS
APPENDIX II NUMERICAL CONDITION INSPECTION REPORT

EXECUTIVE SUMMARY - ELECTRICAL INSPECTION REPORT

ConnDOT Bridge No. 01349

Transystems performed a detailed field inspection of the electrical systems on Bridge No. 01349, which carries Route 136 over the Saugatuck River in Westport, Connecticut. This inspection work was carried out on August 31st, 2022. The inspection was conducted as part of CTDOT's biennial inspection program.

Deficiencies pointed out in the report are generally minor and primarily relate to maintenance issues.

The bridge is not equipped with traffic gates and is only provided with a resistance barrier at each approach. MUTCD 4J.01 states "movable bridge resistance gates are considered a design feature and not a traffic control device." As such, the remaining barrier gates cannot be considered an adequate replacement for the traffic gates. It should be noted, however, that the span is only operated when a full road closure is performed with police vehicles blocking the roadway.

The bridge is designed with a limited number of safety interlocks. Traffic control devices, span lock and span drive motor are not interlocked to control the sequence of operation. Although this appears to be the intent of the past rehabilitation of the bridge, this lack of safety interlocking does not meet the current AASHTO Specifications and is not considered safe for this type of structure.

The overall status of the electrical power and control installation for the subject bridge is in fair condition as defined by the Numerical Condition Inspection Report, which accompanies this report. This indicates that the electrical power and control systems perform with moderate reduction in reliability and/or effectiveness. However, the bridge control system is of an obsolete design and with difficulty finding replacement parts in the event of a component failure, which reduces the reliability of the bridge.

INTRODUCTION

On August 31st, 2022, Nicholas G. Sprankle, P.E. performed the field inspection on ConnDOT Bridge No. 01349 (Route 136 over the Saugatuck River). This included functional operation of the bridge electrical systems, insulation resistance measurements, and load current measurements with sufficient depth to highlight problem areas that could affect the continued safe and reliable operation of the bridge and to determine the status of the bridge operating system.

The following codes and standards were considered for the inspection and report:

American Association of State Highway and Transportation Officials (AASHTO)
NFPA 70, National Electric Code (NEC)
NFPA 101, Life Safety Code (LSC)
National Electrical Manufacturers Association (NEMA)
Manual on Uniform Traffic Control Devices (MUTCD)
Code of Federal Regulation, Title 33 (CFR)

The subject bridge carries vehicular and pedestrian traffic along Route 136 over the Saugatuck River in Westport, Connecticut. The bridge consists of two fixed spans and one movable swing span. The overall length of the bridge is 287 ft. The bridge, which is basically oriented west-east, carries two lanes of vehicular traffic with a sidewalk for pedestrian traffic on the north side of the vehicular roadway.

This report provides visual inspection findings, testing findings, evaluation, conclusions, and recommendations. Appendices are provided for photographs, field notes, and the Numerical Condition Inspection Report.

GENERAL DESCRIPTION

The Saugatuck Swing Span carries Route 136 (Bridge Street) and spans the Saugatuck River in Westport, Connecticut. The bridge is provided with a center lock, traffic lights, and barrier gates, which all are manually controlled and not provided with any form of electrical drive, or centralized controls. The barrier gates do not have any type of interlock with the control system of the span. The center pin is equipped with a limit switch that prevents span operation before it is manually pulled. The barrier gates are supplemented with arm lights to increase their visibility. These are manually activated and controlled via a limit switch at each gate arm receiver.

The electrical systems consist of a 208/120 volt, three phase, 60 Hz service on the east shore, a 240/120 volt single phase, 60Hz service on the west shore, one 3 HP span drive motor with integral motor brake, limit switches, center and end jacks, fender and span navigation lighting, traffic signal and gong on the east approach, wiring, conduit, cables and raceways, disconnect switches, and control cabinets located along the sidewalk at the center of the movable span. The control cabinets contain the operator station, relay control system, circuit breakers, and motor starters for the end wedges and span drive motor.

Automated controls for bridge operation (jacks and span drive) are relay logic based. The system provides no interlocking between traffic control devices and the movable span. Motor speed control is conducted with an Allen-Bradley soft start motor drive unit. This unit provides reduced motor inrush current but provides little control for centering the span.

OBSERVATIONS AND FINDINGS

This report is based on a visual routine inspection of the bridge. The following sections describe the bridge and focus on the electrical installation and electrical equipment to assure the safety and reliability of the bridge.

Bridge Electrical Service

The bridge is provided with two electric utility services. The electric utility service at the west bridge approach consists of a 208/120 VAC, 3-phase, 4-wire, solidly grounded overhead service provided by a bank of three pole mounted transformers located on the west side of Riverside Ave **(see Photo E1)**. This service terminates in a weatherproof, freestanding enclosure. The enclosure contains the electrical distribution equipment for the west bridge approach electrical service and a 3-phase, 50 Amp, 208 VAC feeder for the movable span. An electric utility meter is mounted on the side of the enclosure, which is the utility service entrance point for this service.

The electrical installation associated with the west service is operational and in satisfactory condition. The enclosure is provided with a space heater, but this device was found to be inoperable at the time of inspection. The enclosure also contains control relays and switches for the control of the west bridge approach traffic signals, however, the west traffic signals and gong, along with their pole, have been removed.

A second electrical utility meter is provided at the bridge northwest approach and is used to feed an auxiliary power panel for bridge auxiliary power, such as lighting and receptacles. All equipment for the auxiliary service appears to be in satisfactory condition.

The electric utility service at the east bridge approach consists of a 240 VAC, single phase, 3-wire service supplied from a pole mounted transformer at the northwest corner of the Bridge St (Route 136) and Imperial Ave intersection **(see Photo E2)**. This service terminates in a weatherproof, freestanding enclosure mounted on a concrete pad at the southeast corner of the bridge approach. The enclosure contains the electrical distribution equipment for the east bridge approach electrical service. An electric utility meter is mounted on the side of the enclosure, which is the utility service entrance point for this service. The electrical installation associated with the service is operational and in fair condition. The enclosure is provided with a space heater, but this device was found to be inoperable at the time of inspection. As with the west electric utility service enclosure, the east service enclosure contains the control logic for the east approach traffic signals. The operation and status of this system is identical to that at the west bridge approach. In addition to the conventional traffic signal control system, the enclosure also contains a Westport Fire Department control cabinet used to preempt the traffic signals.

To determine the adequacy and stability of the bridge electric utility service, the phase-to-phase and phase-to-ground voltages were measured at both the east and west bridge approaches. The results are tabulated in Table E1 below:

	Phase A to B/ Phase A to Gnd. (Volts)	Phase B to C/ Phase B to Gnd. (Volts)	Phase A to C/ Phase C to Gnd. (Volts)	Frequency (Hz)
East Service	241/122	N/A /121	N/A	59.98
West Service	208/120	206/120	207/119	60.00

Table E1
240/208 VAC Service Voltages and Frequency

The measurements of voltage were taken with all bridge auxiliaries operational, but the bridge drive system switched off and not drawing current.

Deficiencies regarding the electric utility service were recorded as follows:

- There is minor corrosion on the interior terminals and conduits in the east **(see Photos E3 and E4)** and west **(see Photos E5 and E6)** service cabinets.
- The electric space heaters in the east and west service cabinets are not functioning **(see Photo E7).**
- The GFCI test and reset buttons are not functioning in the east and west service cabinets **(see Photo E8).**
- The west service cabinet door filter is degraded **(see Photo E9)**.

Bridge Controls & Control Panels

Electrical controls for the movable span are housed within three weatherproof enclosures located on the north side of the structure at the center of the movable span. The three enclosures are of NEMA 4X design and they are in fair condition. The internal control system components were also found to be in good condition.

The main power and control enclosure consists of all electrical controls and electrical starters for the movable span. The electrical starters for the jacking system are housed within the remaining two enclosures **(see Photos E10 and E11)**.

The electrical control system consists of the electrical starters for the span drive motor, brake, jacks, distribution equipment, relay logic, control switches, pushbuttons, and indicator lights. The control system provides the operator with status indication for the span drive, jack position, and power availability.

The control logic for bridge operation consists of control relays manufactured by Allen Bradley (Type P). The relays are properly installed within the main bridge enclosure and are clearly identified with all wiring labeled.

The electrical motor starter for the span drive motor consists of a soft-start unit manufactured by Allen-Bradley. The electrical starter equipment is properly installed within the main bridge control enclosure and clearly identified with all wiring labeled.

Each jacking system enclosure consists of motor controllers for three jack actuators; one enclosure serving the northeast jack and both center jacks system and one enclosure serving the southeast and both west jacks. Each jack actuator motor controller consists of a circuit breaker and reversing starter with properly sized thermal overload relays all manufactured by Square D. The electrical starter equipment is properly installed within the three enclosures and clearly identified with all wiring labeled.

Previous reports indicated that span centering was achieved using an automated system that jogged the span into place in one-second intervals. Over the course of several openings of the span, there was no automatic centering of the span observed. The span stopped reliably on command without any unnecessary jogging.

In general, the bridge controls functioned as designed and were found to be in satisfactory condition at the time of inspection. Although the control relays are in fair condition, they appear to have a significant portion of their useful lives remaining.

Deficiencies regarding the bridge controls and control panels were recorded as follows:

- There are miscellaneous items stored in the bottom of the left cabinet **(see Photo E12)** and the center cabinet **(see Photo E13)**.
- There are wire nut splices in violation of AASHTO Article 8.9.2 within the left cabinet **(see Photo E14)** and on the backside of the interior panel in the center cabinet **(see Photo E15)**.
- The bottom of the center cabinet is corroded **(see Photo E16)** and there is minor corrosion on various terminals within the cabinet **(see Photo E17)**.
- The southwest end jack legend plate is missing **(see Photo E18)**.
- The seated/open white indicator light is always ON when the bridge is seated, during operation, and when the bridge is fully open.
- The screw jack retracted light does not come on when all jacks are retracted.

<u>Movable Span Drive Motor</u>

The movable span drive system consists of one main drive induction motor with an associated shaft-mounted, solenoid-operated brake. The motor is provided with a double extension shaft. One shaft is connected to the brake and a speed reducer, which in turn drives a rotary cam type limit switch. The second motor shaft extension is coupled to the reducer that is coupled to the bridge machinery. The main drive motor, brake, and motor disconnects are in good condition.

Span Drive Motor Nameplate:

Manufacturer:	Reuland
Horsepower:	3 HP
Volts:	208V
Amperes:	12.4A
Hertz:	60 Hz
Phase:	3
Enclosure:	TENV
Serial No.:	13-1103A-1
RPM:	900

The main drive-reducing gearbox is provided with an auxiliary drive shaft for manual operation that can be used by hand cranking from the roadway above. This hand cranking arrangement is not provided with limit switches to prevent electrical operation of the bridge with the hand crank inserted.

The span motor is provided with a 120V, 50 watt heater and the brake has a 120V, 25 watt heater.

The disconnect for the span motor also disconnects the power to the brake. A separate disconnect is provided for the motor heaters and brake limit switch.

The main span drive motor was found to be in good external condition, and the internal winding resistance is in good condition.

In an effort to determine the quality and life expectancy of the main span drive motor, the motor electrical insulation resistance levels were measured with respect to ground using a 500 Volt "megger." The results are tabulated in Table E2 below:

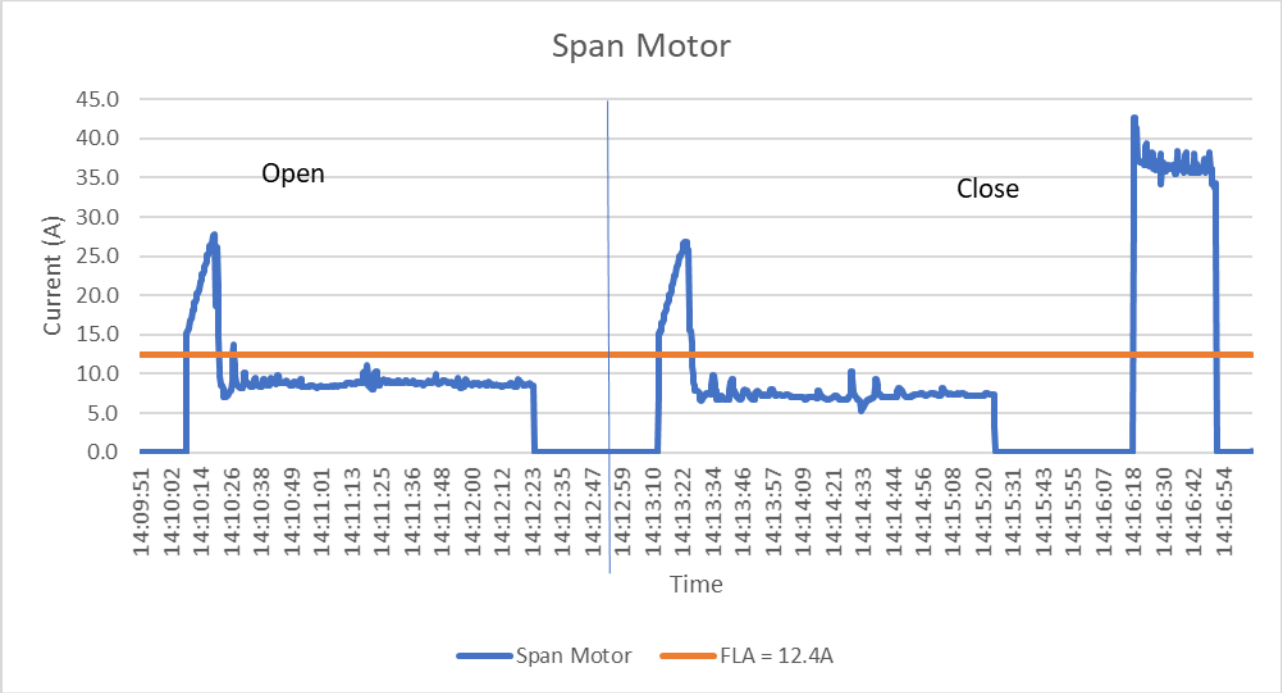
	Motor and Feeders Phase to Ground (meg Ohms)	
	2020	2022
Span Drive Motor	>550	206

Table E2
Span Drive Motor Insulation Resistance Measurement

The weather conditions during the measurements were dry and the temperature was approximately 81°F.

The insulation resistance level of the main span drive motor indicates that the motor winding insulation levels are acceptable.

In an effort to determine the operating characteristics of the main span motor and to determine its operating loads, its stator load currents were measured during opening and closing operating cycles as shown in the chart below:



From the above results, it can be seen that the steady state load current of the main span drive motor is within the nameplate rating of the motor.

The motor and associated equipment is located directly below the deck of the bridge in a confined space with little room to carry out maintenance or replacement. Additionally, there is no lighting in this area.

Deficiencies regarding the movable span drive motor were recorded as follows:

- The auxiliary shaft of the main gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
- The conductor color coding in the span drive motor disconnect switch is inconsistent between the line and load sides of the switch **(see Photo E19)**.

<u>Motor Brake</u>

The single motor brake in the drive system is of the solenoid type and is provided with a hand release mechanism to enable bridge operation in the event of brake or electric power failure. The hand release mechanism is furnished with a limit switch that is interlocked with the bridge control logic to prevent operation of the bridge drive system with the brake hand-released. No brake “Set” or brake “Released” limit switches are

provided with the brake for indication of status of the brake and for interlocking with the bridge drive system.

The motor brake is in good condition and is installed with a safety disconnect switch. This disconnect switch is housed in a NEMA 4X stainless steel enclosure and mounted in close proximity to the main drive motor.

Deficiencies regarding the motor brake were recorded as follows:

- There are wire nut splices in the motor brake disconnect switch **(see Photo E20)**.

Field Feedback Devices

For the barrier gates, the arm position of each gate is monitored by one lever arm limit switch located under the gate arm. This switch provides control for the arm lights and warning gongs.

The jack positions are monitored by limit switches in order to provide interlocks to prevent operation of the drive motor unless all jacks are fully raised. Each jack is provided with a “Pulled” and “Driven” proximity type limit switch at the jack, as well as a rotary cam limit switch located near the jack motor after the right-angle reducer.

A single rotary cam limit switch associated with the span drive provides span position data for the bridge control logic system (fully centered, nearly closed, nearly open and span fully open). The rotary cam limit switch has been properly installed with all conductors well terminated and labeled. The limit switch exhibits light corrosion.

A separate fully centered lever arm limit switch is provided as backup in the event of rotary cam limit switch failure and is used to prevent over-travel of the span. This limit switch is a sealed lever-arm type unit.

A sealed lever-arm type limit switch is installed at the centering pin. This switch prevents the span from operating when the centering pin is in place. This limit switch is well installed and is well integrated into the bridge control system.

The centering pin and fully centered limit switches are in fair condition **(see Photo E21)**.

Deficiencies regarding the field feedback devices were recorded as follows:

- The NE jack rotary cam limit switch is missing the gasket along top of door **(see Photo E22)**.
- It was reported in the previous inspection report that the east barrier gate arm lever arm limit switch can seize in the actuated position **(see Photo E23)**. During the current inspection, the limit switch did not seize, but could still occur.
- The west barrier gate arm lever arm limit switch is permanently seized in the actuated position and there is minor corrosion on the conduit fitting **(see Photo E24)**.

Jacks

The swing span is equipped with four end jacks, one at each corner, and two center jacks. The motors are provided with integral motor brakes. The primary shaft of the motor is connected to a gearbox which has an auxiliary shaft for manual operation. The secondary shaft of the motor is not in use.

The motors are provided with a 120V, 50 watt heater and the brake has a 120V, 25 watt heater.
Each jack motor is provided with a NEMA 4X stainless steel disconnect switch within reach. The disconnects each have an auxiliary contact that disconnects power to the heaters.

The jack motors are in good condition.

Nameplate data for the jack motors were recorded as follows:

Jack Motor Nameplate:	
Manufacturer:	Reuland
Horsepower:	3.3
Volts:	208V
Amperes:	10.6A
Hertz:	60Hz
Phase:	3
Enclosure:	TENV
RPM:	1800

Jack Brake Nameplate:	
Manufacturer:	Stearns
Model:	108701200111
Torque:	10 lb-ft
Amps Inrush:	4.3A
Amps Holding:	0.3A
Volts:	200V

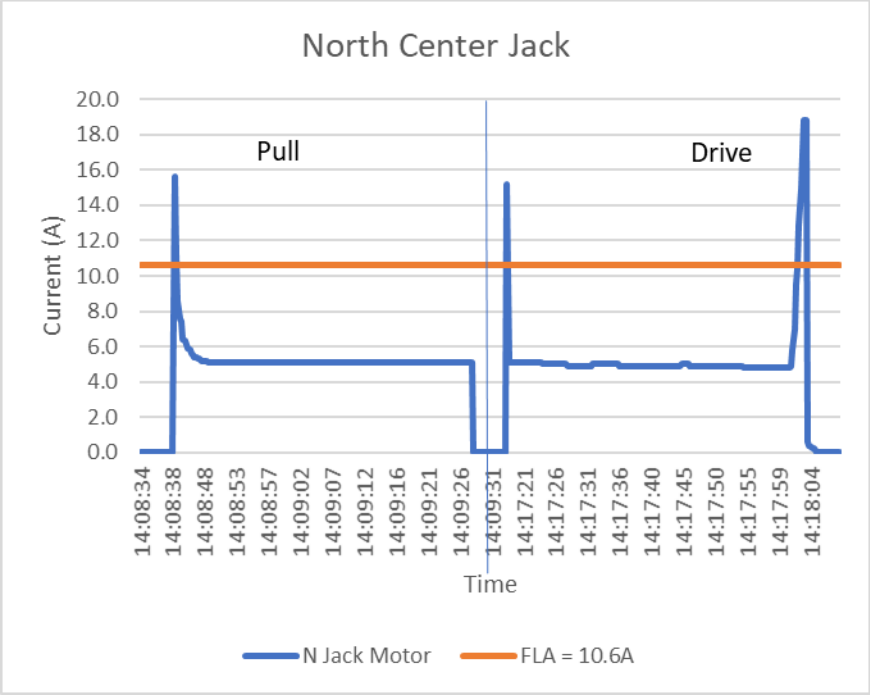
In an effort to determine the quality and life expectancy of the span jack electrical installation, span jack motor windings and motor feeder insulation resistance levels were measured with respect to ground using a 500 Volt "megger." The results are tabulated in Table E4 below:

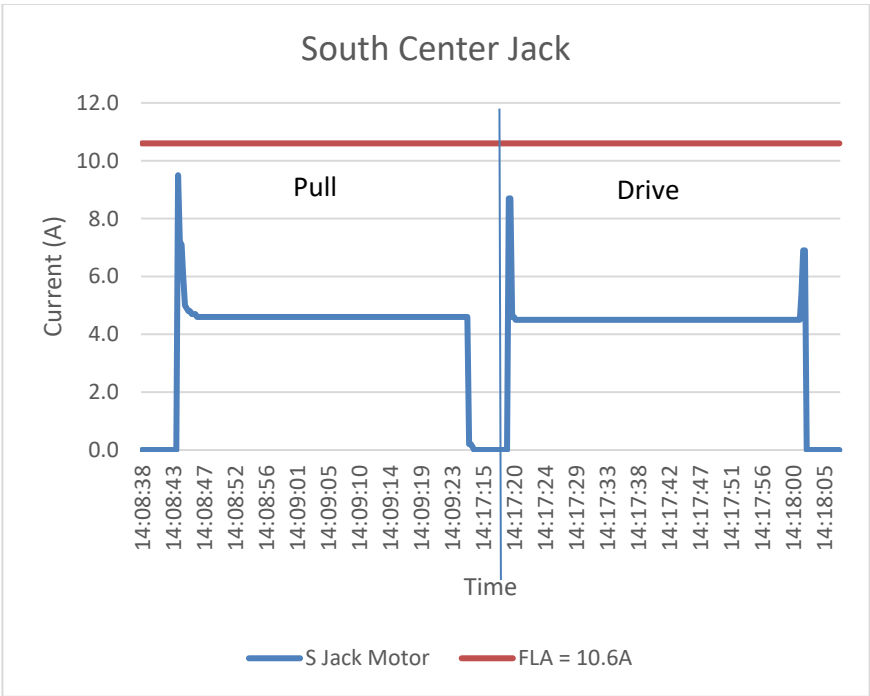
	Motor and Feeders Phase to Ground (meg Ohms)	
	2020	2022
North Center Jack Motor	>10 GΩ	210
South Center Jack Motor	>10 GΩ	<550
Northeast Jack Motor	9.0 GΩ	<550
Northwest Jack Motor	2.6 GΩ	<550
Southeast Jack Motor	>10 GΩ	<550
Southwest Jack Motor	>10 GΩ	<550

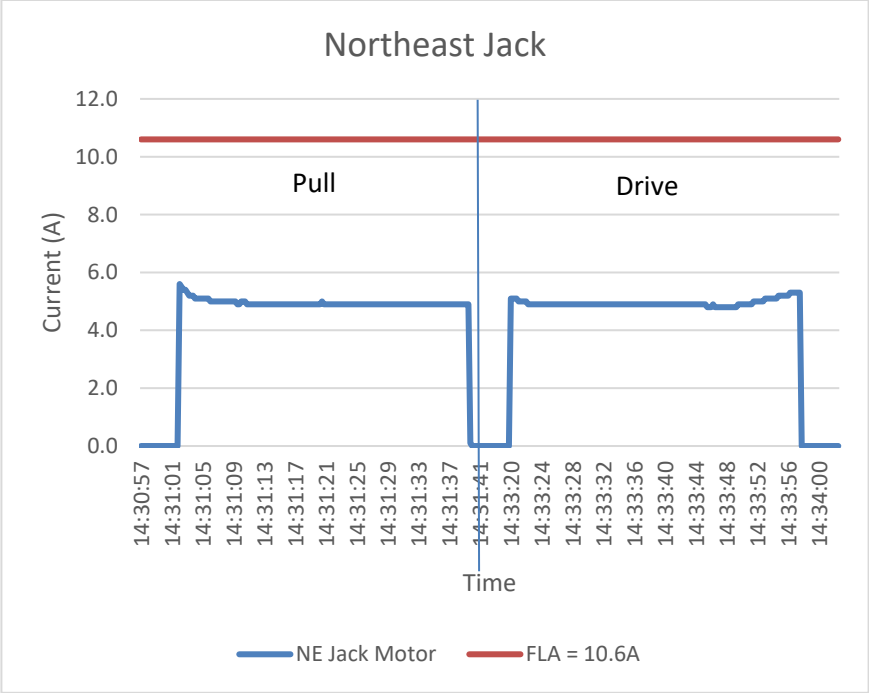
Table E4
Span Jack Motor Insulation Resistance Measurements

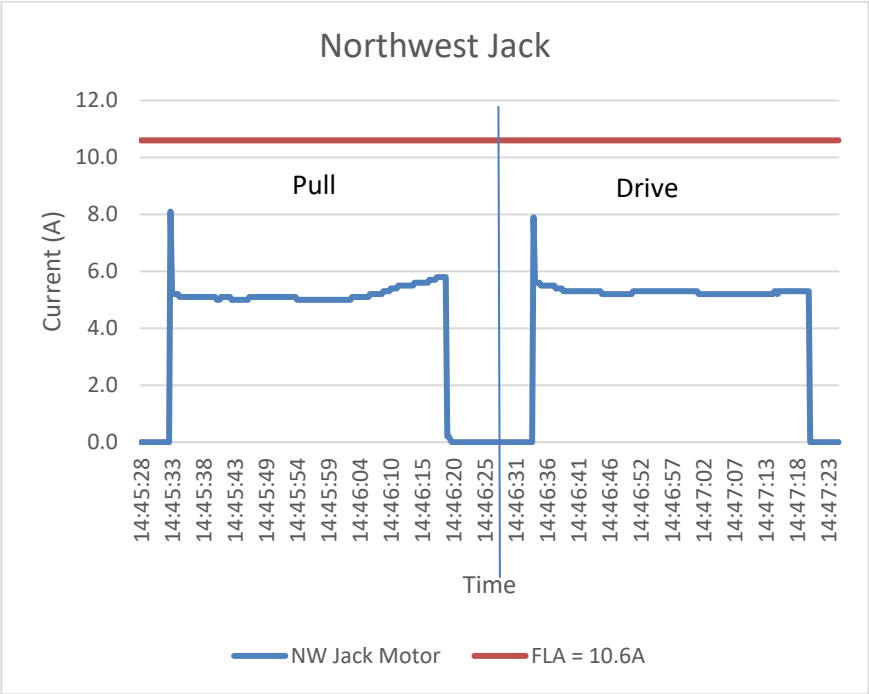
The weather condition during the measurements was dry and the temperature was approximately 81°F.

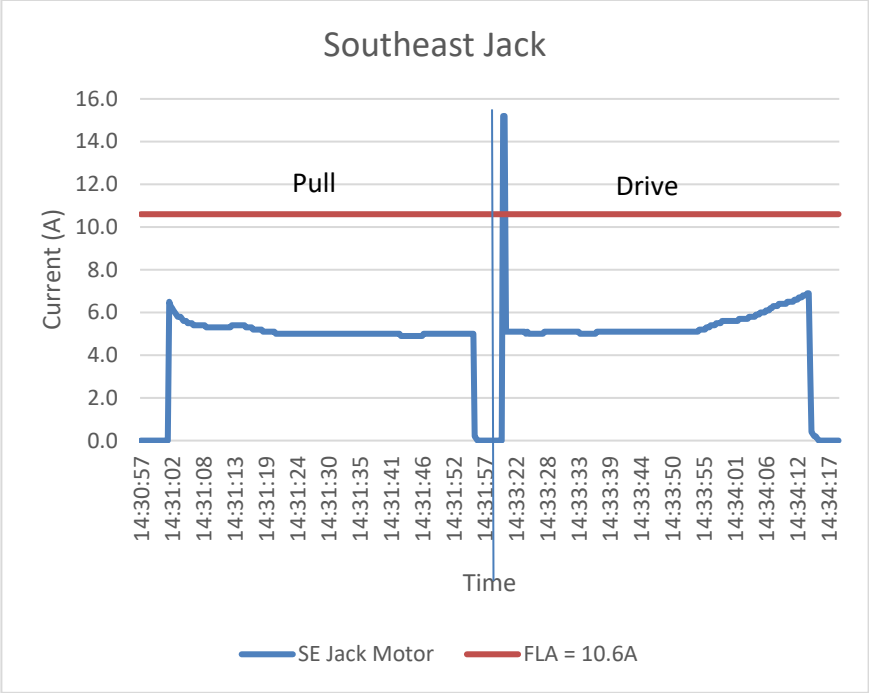
The span jack motor load currents were measured for each of the six jack motors to determine their loading and operating characteristics. The measured values are presented in the charts below:

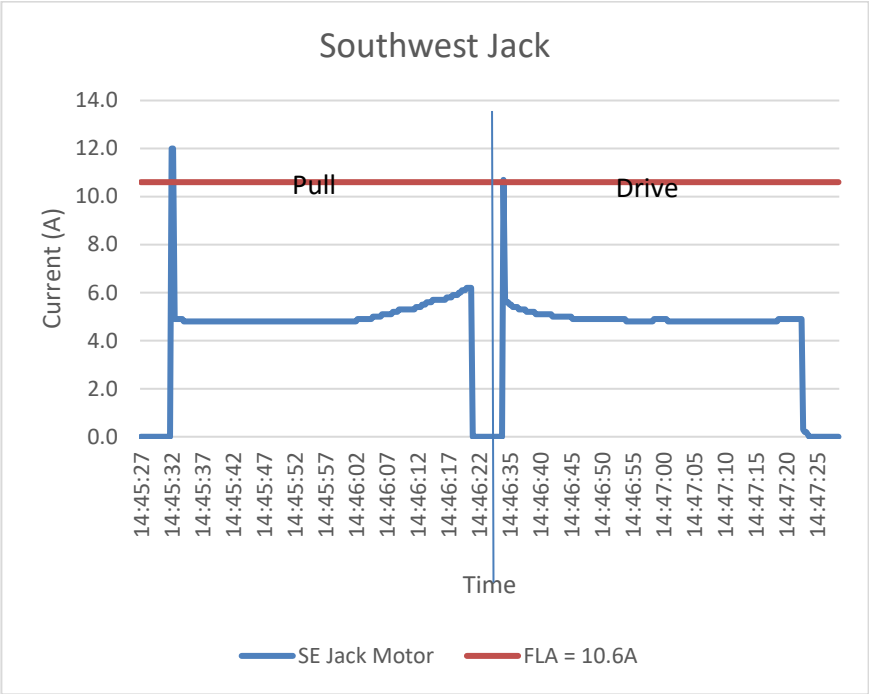





Northeast Jack
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Current (A)
Pull
Drive
14:30:57
14:31:01
14:31:05
14:31:09
14:31:13
14:31:17
14:31:21
14:31:25
14:31:29
14:31:33
14:31:37
14:31:41
14:33:20
14:33:24
14:33:28
14:33:32
14:33:36
14:33:40
14:33:44
14:33:48
14:33:52
14:33:56
14:34:00
Time
NE Jack Motor
FLA = 10.6A


Northwest Jack
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Current (A)
Pull
Drive
14:45:28
14:45:33
14:45:38
14:45:43
14:45:49
14:45:54
14:45:59
14:46:04
14:46:10
14:46:15
14:46:20
14:46:25
14:46:31
14:46:36
14:46:41
14:46:46
14:46:52
14:46:57
14:47:02
14:47:07
14:47:13
14:47:18
14:47:23
Time
NW Jack Motor
FLA = 10.6A





From the above results, it can be seen that the steady state load currents of each of the span jack motors are within their nameplate ratings.

Each actuator is provided with a means of hand cranking, but no electrical interlocks are provided to prevent electrical operation of the jacks while they are being hand-cranked.

Deficiencies regarding the jacks were recorded as follows:

- The auxiliary shaft of the jack gearbox connected to the motor does not have a limit switch to prevent the motor from operating when the auxiliary shaft is being hand cranked.
- The conductor color coding is inconsistent for phases B & C between the line and the load side of the local disconnect switch for all jack locations with the exception of the northwest end jack **(see Photo E25)**.
- Missing nameplate and minor corrosion on cover and conduit fitting of the SE end jack motor disconnect **(see Photo E26)**.
- There is oily residue in the bottom of the south center jack disconnect switch **(see Photo E27)**.

Span Lock

A span lock is provided at the west end of the movable span and is used to lock the span in the centered position. This lock is manually operated and is provided with a limit switch to prevent operation of the span when the lock is inserted.

Conduit, Raceways, and Junction Boxes

PVC coated Rigid Galvanized Steel (RGS) is the primary conduit type used throughout the structure. Conductors are copper stranded with insulations suitable for the application.

The electrical system of the bridge was found to be in fair overall condition.

Deficiencies regarding the bridge electrical installation were recorded as follows:

- Minor to moderate corrosion on conduit clamps throughout bridge **(see Photo E28)**.
- Moderate corrosion on flexible conduit fittings to north center jack rotary cam limit switch and disconnect switch **(see Photo E29)**.
- Severe corrosion on underground conduit at the east shore service cabinet **(see Photo E30)**.
- The PVC coating is peeling and worn on the conduit near the air horn and aerial connection at the center of the span **(see Photo E31)**.
- There is light corrosion on the east barrier gate junction box SO cable fitting **(see Photo E32)**.
- There is light corrosion on a terminal block within the east barrier gate junction box **(see Photo E33)**.

Navigation Lighting and Horn

Each fender system facing the navigable channel is provided with three pedestal type 180-degree red navigation lights. The center fender navigation lights are always on.

Four navigation lights consisting of alternate 90-degree red and green lenses are located on the movable span and are used to signal marine traffic. The lights are fed by a conduit installation and controlled via a photo-controller. Span mounted navigation lights appear to have been properly installed and exhibit only minor signs of corrosion.

A separate navigation horn is mounted on the bridge truss, on the north side of the span with trumpets facing both the north and south channels. The horn warns the approaching marine traffic that the bridge is about to be operated. The horn was operated at the time of the inspection and performed adequately.

Deficiencies regarding navigation lights and horn were recorded as follows:

- Both lights at the southeast swing span were lit, indicating a faulty transfer relay **(see Photo E34)**.
- Conduit feeding the east center axis light is damaged **(see Photo E35)**.

Traffic Signals

The east bridge approach is provided with two sets of traffic signals. The traffic signals are of the three-aspect type and are suspended over the roadway from a pole-mounted cantilevered arm **(see Photo E36)**. The traffic signals are manually operated from a switch at the bridge approach and timed switching is achieved via timing devices located in the electric utility enclosure. The west bridge approach was previously equipped similarly to the east approach; however, the lights and the pole have been removed and capped with a PVC junction box. MUTCD section 4J.02 states that “Traffic control at movable bridges shall include both signals and gates.” The current configuration at the west approach provides neither, and is not considered an exception.

Deficiencies regarding the traffic signals were recorded as follows:

- The traffic signals and gong at the west approach have been removed. As a result, the equipment within the west service enclosure is abandoned in place. MUTCD Section 4J.02 requires the use of signals at each bridge approach.
- The warning gong at the east bridge approach is inoperable **(see Photo E37)**.

Traffic Gates

The bridge had previously been provided with one manually operated traffic gate at each approach. These gates have been completely removed. Manually operated pedestrian gates are provided at each approach.

Deficiencies regarding the traffic signals were recorded as follows:

- Striping on the west pedestrian gates stops before the end of the gate **(see Photo E38)**.

Traffic Barriers

The bridge is provided with one traffic barrier gate at each approach. Each traffic barrier is provided with 3 arm lights for increased visibility and safety. During the inspection the limit switch for each barrier gate was tested for functionality, with the west switch found to be seized in the actuated position.

These barrier gates are not provided with interlock limit switches to prevent operation of the movable span.

Deficiencies regarding the traffic barriers were recorded as follows:

- The east barrier gate was not fully engaged in the receiver when lowered. Proper engagement can be achieved if the gate arm is properly latched in the closed position **(see Photo E39)**.
- The west barrier gate lights were not operational.
- The lights at the east barrier gate do not flash in accordance with MUTCD articles 8C.04 and 4J.02. The inner lamp has failed and both outer lamps flash.

General, Utility, and Emergency Lighting

No maintenance lighting or receptacles are provided on the bridge.

Deficiencies regarding general lighting and receptacles were recorded as follows:

- No lighting or receptacles for maintenance are provided on the bridge.

Interlock Testing

Interlock testing is typically performed to determine whether all AASHTO required safety interlocks are incorporated into the bridge control system.

There is no control connection between approaches and the movable span resulting in the barrier gates not interlocked with the movement of the span. No test was needed to confirm the absence of this interlock.

The following interlock testing was performed:

1. With the span partially open (end clear of abutment) and the centering device vertical rod removed, attempt to drive an end jack. Result: FAIL - Jack was driven.
2. With the span partially open, centering device vertical rod removed, and one end jack fully driven, attempt to open and close the span. Result: PASS - Span did not move in either direction.
3. With the span partially open, all jacks retracted, and the centering device vertical rod installed, attempt to open and close the span. Result: PASS - Span did not move in either direction.

CONCLUSION

Several bridge openings were performed during this inspection. The bridge operated efficiently and without any major incidents. The subject bridge is generally in fair condition. Operation of the jacks, span drive controllers, and span drive motor appears to be reliable and safe except as noted within this report. The traffic control devices have largely failed, however, span operations are performed with the road closed and blocked by police at the nearest intersections.

RECOMMENDATIONS

Based on this inspection, the following recommendations are made to ensure long-term safe and reliable operation of the bridge. These recommendations have been prioritized based on the priority code provided at the end of this section.

Item	Description	Priority
1.	Remove the corrosion on the interior terminals and conduits in the east and west service cabinets. Coat with protective coating.	D
2.	Replace the space heaters in the east and west service cabinets.	D
3.	Replace the GFCI receptacles in the east and west service cabinets.	D
4.	Replace the door filter in the west service cabinet.	D
5.	Remove miscellaneous items stored in the bottom of the left control cabinet and the center control cabinet.	D
6.	Replace wire nut splices within the left control cabinet and on the backside of the interior panel in the center control cabinet with mechanical crimps.	D
7.	Remove the corrosion from the bottom of the center cabinet and on various terminals within the cabinet, coat with protective coating.	D
8.	Replace the legend plate at the southwest end jack.	D
9.	Replace the fully open/seated limit switch and/or rewire the indicator light.	C
10.	Replace the screw jack retracted indicator light.	C
11.	Install limit switch on the auxiliary shaft of the main gearbox connected to the motor and wire into control system.	D
12.	Swap conductors on both ends of the load side of the span drive motor disconnect switch to correct color coding.	D
13.	Replace the wire nut splices in the motor brake disconnect switch with mechanical crimps	D
14.	Install a new cover gasket at the northeast jack rotary cam limit switch.	D
15.	Replace the east and west barrier gate limit switches.	D
16.	Replace "Pulled" proximity limit switch at the southeast span jack.	C
17.	Install limit switch on the auxiliary shaft of the jack gearbox connected to the motor and wire into control system.	D
18.	Swap conductors on both ends of the load side of all jack disconnect switches, with the exception of the northwest, to correct color coding.	D
19.	Replace the nameplate at the southeast end jack motor disconnect switch, remove the corrosion, and coat with protective coating.	D
20.	Clean oil from interior of the south center jack disconnect switch.	D
21.	Clean and paint corrosion on the conduit clamps throughout the bridge.	D
22.	Clean and paint the flexible conduit fittings at the north center jack rotary cam limit and disconnect switch.	D
23.	Replace corroded section of conduit at the east shore service cabinet.	D
24.	Repair PVC coating on the conduit near the air horn and aerial connection at the center of the span, following the conduit manufacturer’s procedures.	D
25.	Clean and paint the east barrier gate junction box SO cable fitting.	D
26.	Clean and protect corroded terminals within the east barrier gate junction box.	D
27.	Repair or replace southeast swing span navigation light transfer relay.	D

28.	Replace the damaged conduit feeding the east center axis light.	D
29.	Install traffic signals at the west approach.	C
30.	Repair the east approach gong.	C
31.	Replace striping on the west pedestrian gate arm.	C
32.	Secure the barrier gates when lowered.	C
33.	Repair the west barrier gate arm lights.	C
34.	Configure the flasher at the east barrier gate to flash in accordance with the MUTCD, replace the inner lamp.	C
35.	Install lighting and receptacles in maintenance and access areas.	D
36.	Interlock barrier gates with control system.	D
37.	Interlock centering device with jack control.	D

Priority Key

- **A** Critical Finding - IMMEDIATE response by Bridge Maintenance
- **B** Critical Finding - Response within 1 WEEK.
- **C** Priority Repair - Safety Concerns
- **D** Routine Repair

PHOTOS
APPENDIX I

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E1: **Utility Service Transformers, West Approach.**



Photo E2: **Utility Service Transformers, East Approach.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E3: East Service Cabinet. Corrosion on conduit stubs.

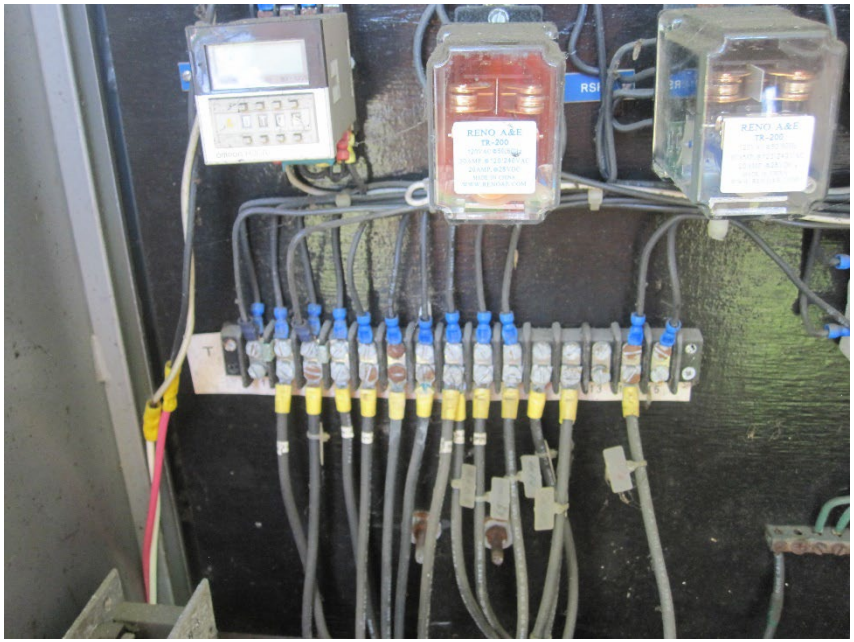


Photo E4: East Service Cabinet. Corrosion on terminal blocks.

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E5: **West Service Cabinet. Corrosion on conduit stubs.**

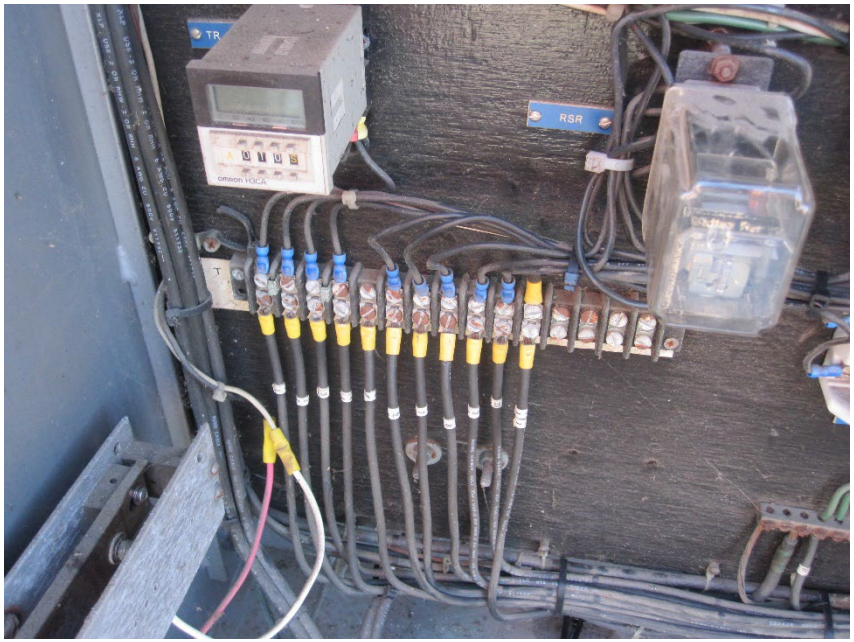


Photo E6: **West Service Cabinet. Corrosion on terminal blocks.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E7: **East Service Cabinet. Cabinet heater is inoperable. Typical at west.**

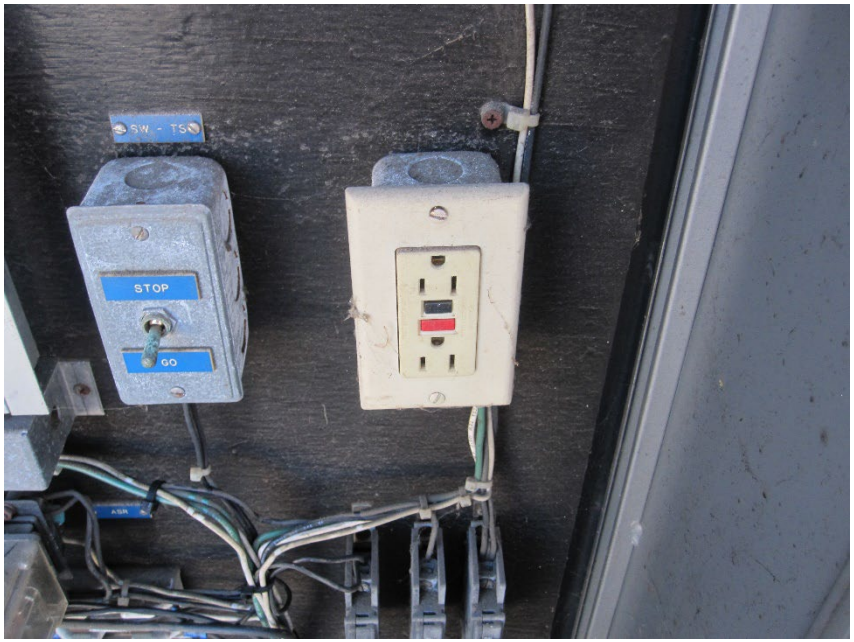


Photo E8: **West Service Cabinet. GFCI receptacle is inoperable. Typical at east.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E9: **West Service Cabinet. Door filter is degraded.**



Photo E10: **Center Control Cabinet. Control panel.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044

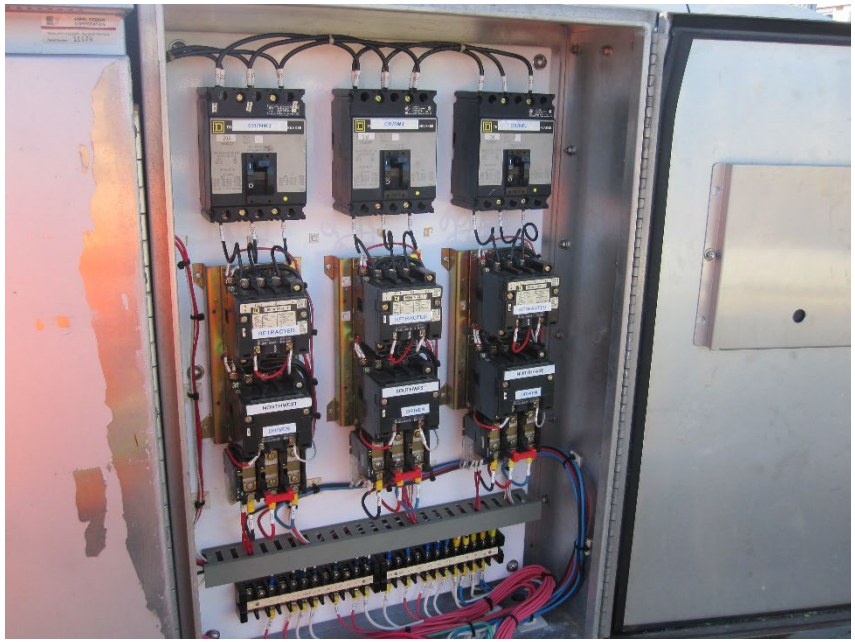


Photo E11: **Right Control Cabinet. Interior view, left typical.**

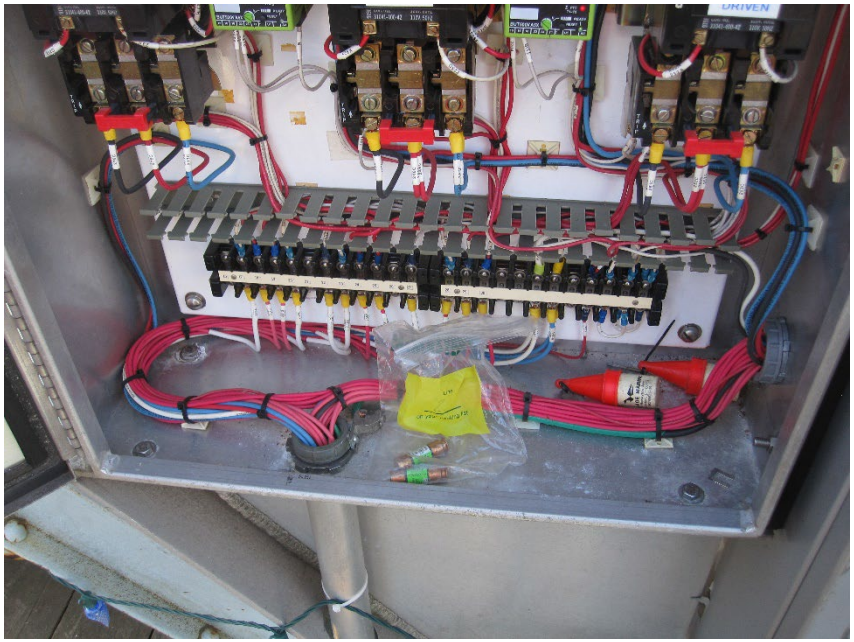


Photo E12: **Left Control Cabinet. Miscellaneous items stored within cabinet.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044

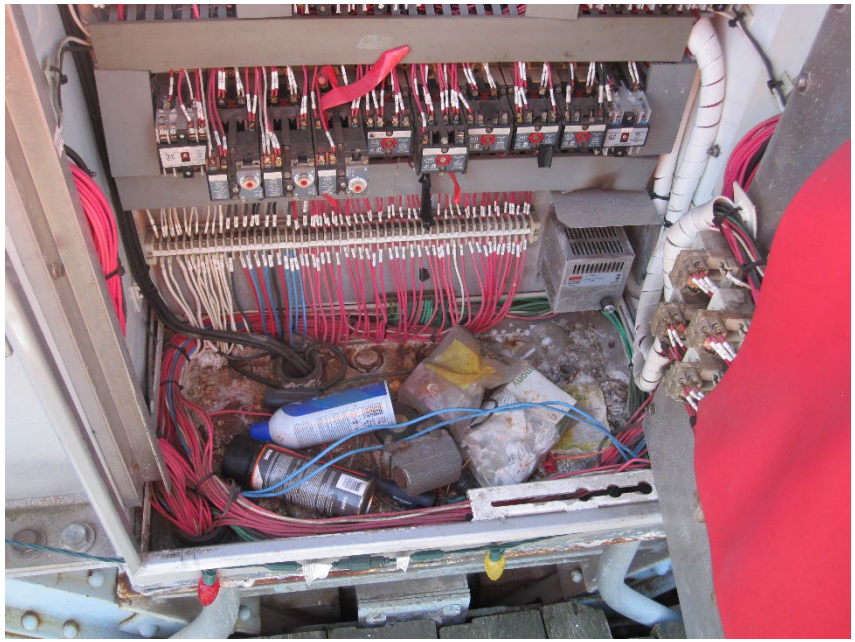


Photo E13: **Center Control Cabinet. Miscellaneous items stored within cabinet.**

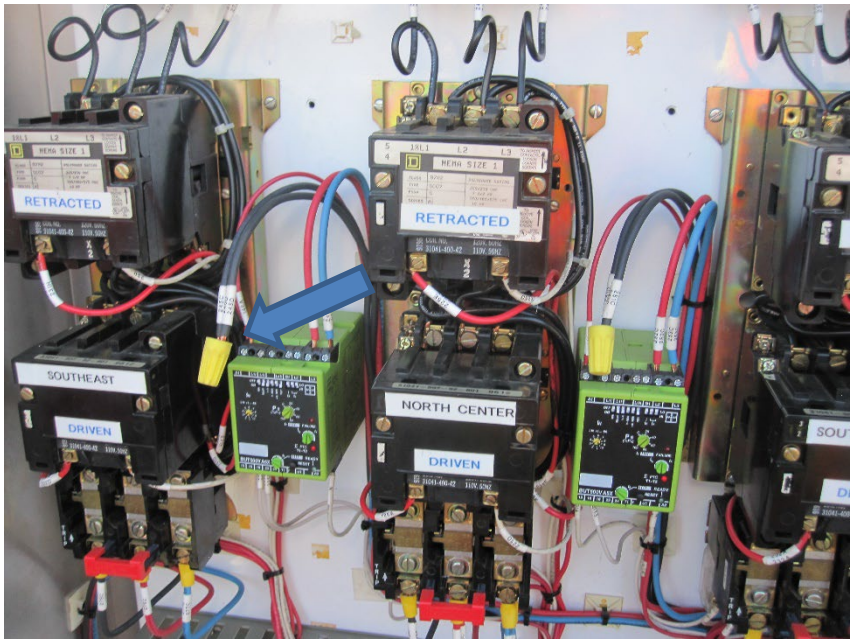


Photo E14: **Left Control Cabinet. Wire nut splices.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044

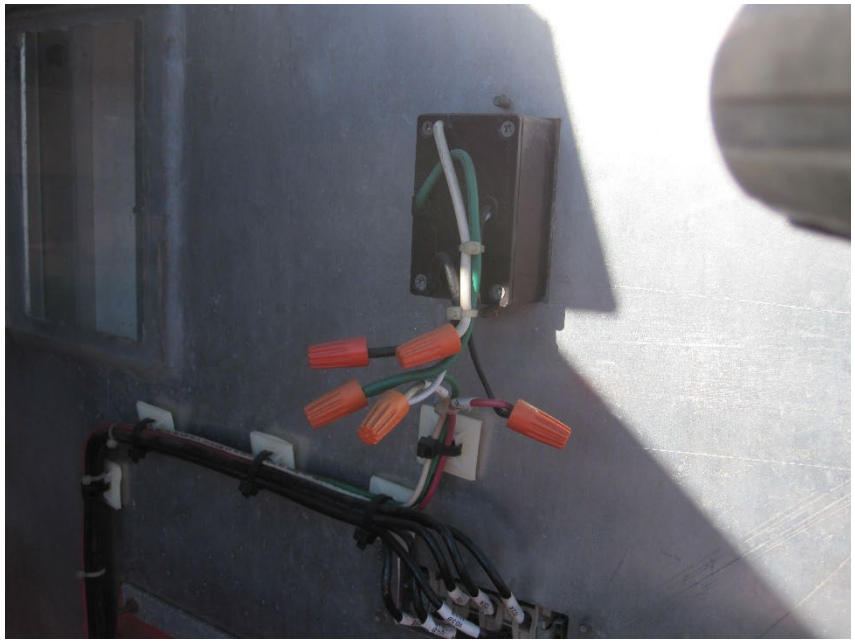


Photo E15: **Center Control Cabinet. Wire nut splices within.**



Photo E16: **Center Control Cabinet. Corrosion on bottom of cabinet.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E17: **Center Control Cabinet. Corrosion on terminals within cabinet.**

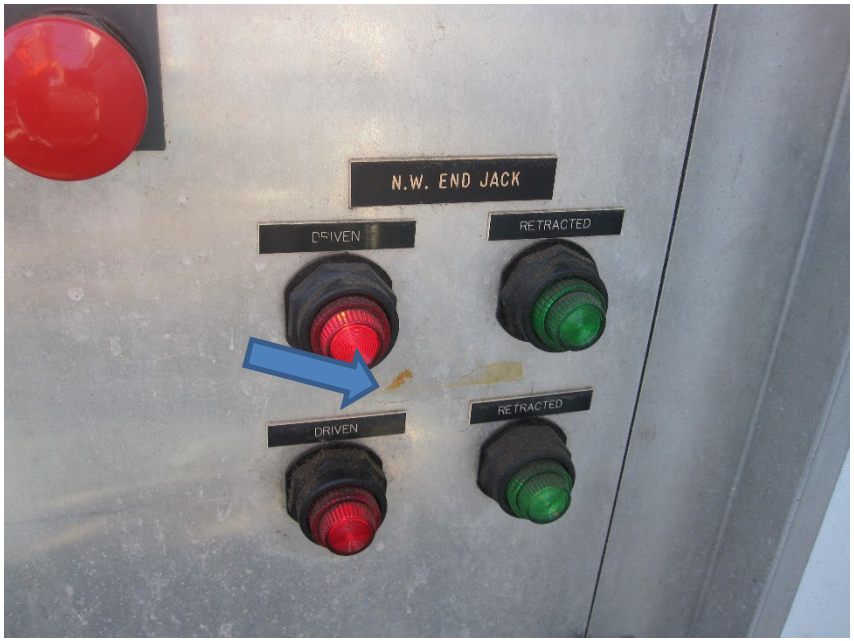


Photo E18: **Center Control Cabinet. Southwest end jack legend plate is missing.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044

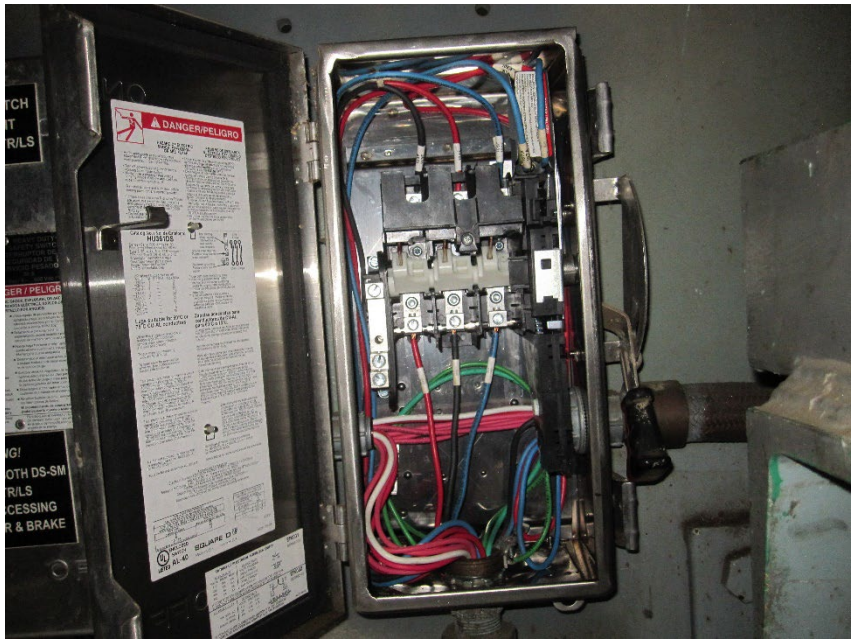


Photo E19: **Span Motor. Inconsistent conductor color coding in disconnect switch..**

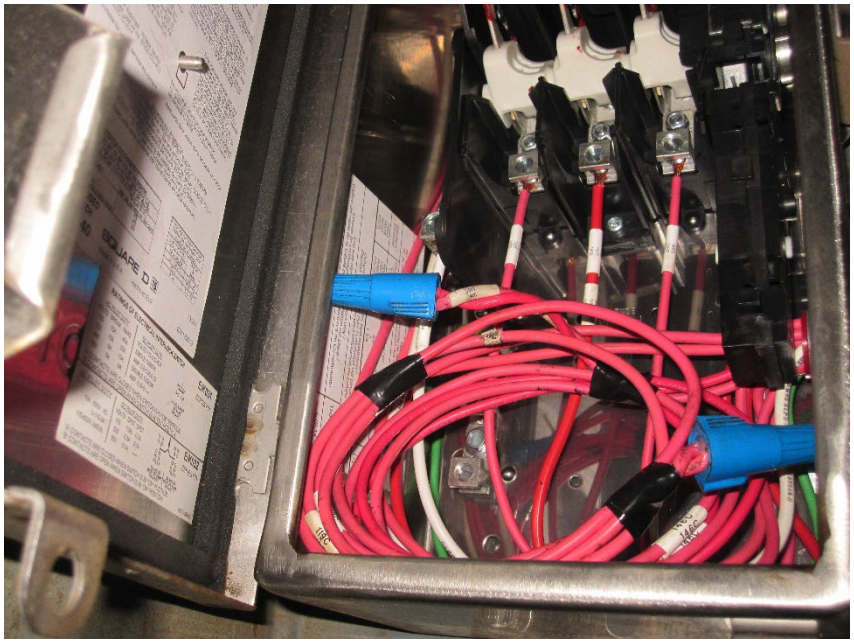


Photo E20: **Motor Brake. Wire nut splices in disconnect switch.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E21: **Centering Pin. Centering pin and fully closed limit switches in fair condition.**

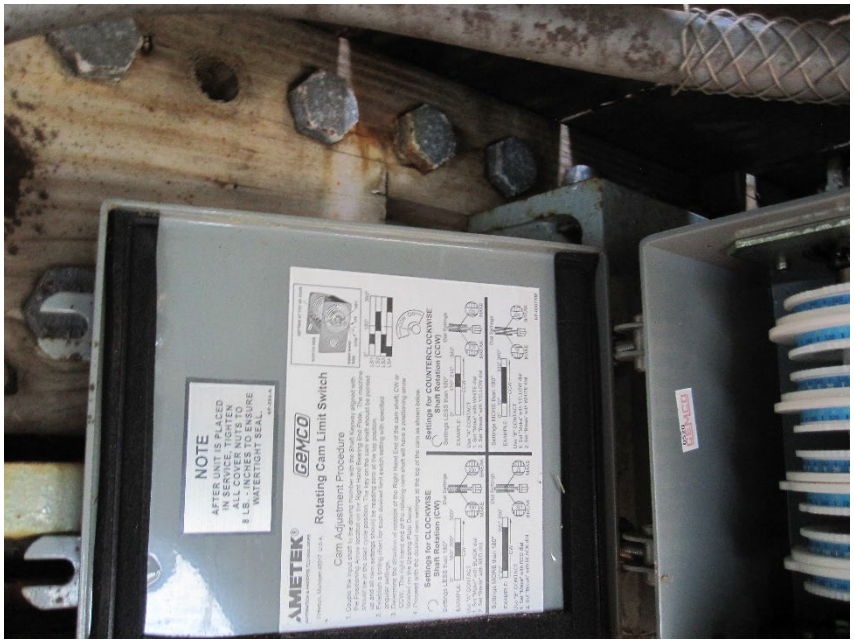


Photo E22: **Northeast Jack. Rotary cam limit switch missing top gasket.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044

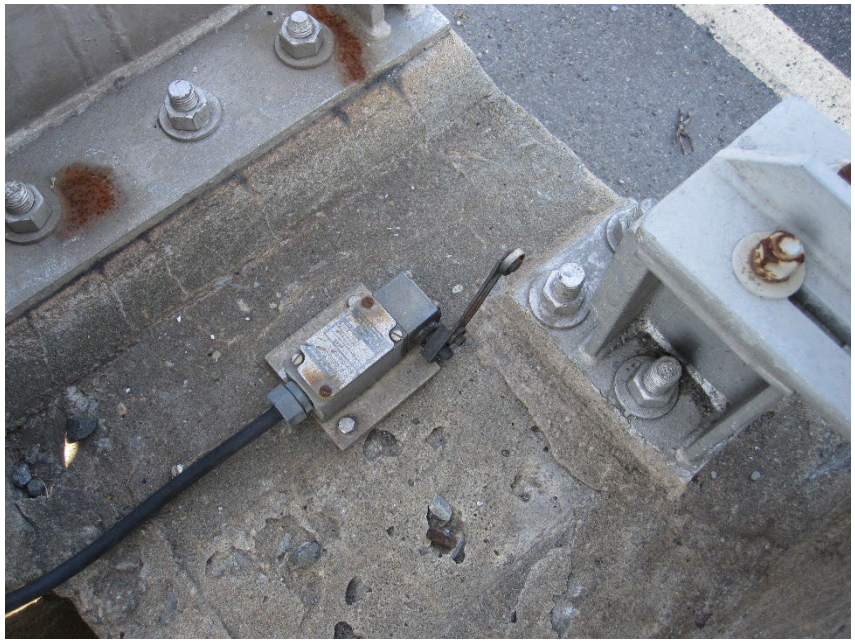


Photo E23: **East Barrier Gate. Switch was previously noted as seized, but was free. Switch was not replaced.**



Photo E24: **West Barrier Gate. Limit switch is seized in actuated position.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044

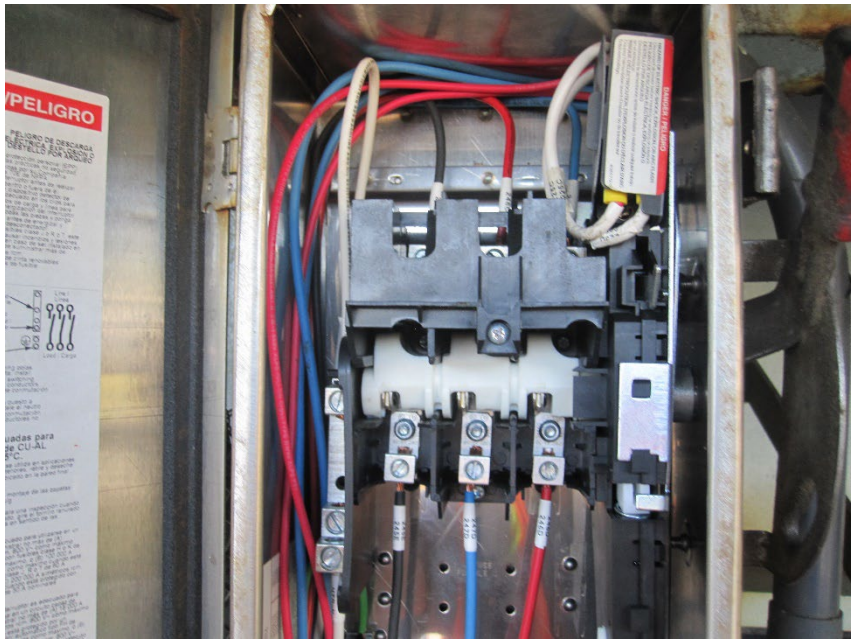


Photo E25: **North Center Jack. Inconsistent conductor color coding. Typical at five of six locations.**



Photo E26: **Southeast End Jack. Missing nameplate and minor corrosion on disconnect switch.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044

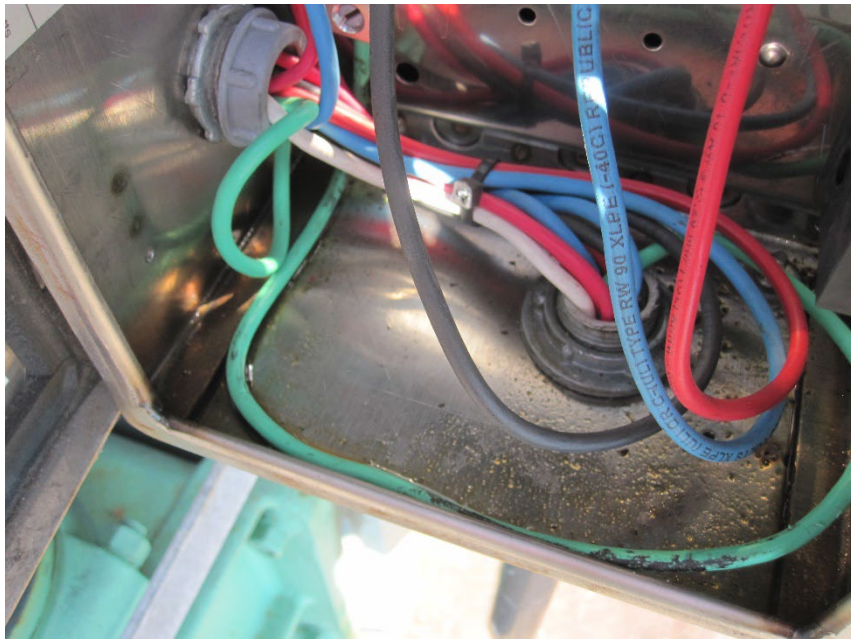


Photo E27: **South Center Jack. Oily residue in disconnect switch.**



Photo E28: **Center Span. Typical corrosion on conduit clamps.**

Prepared by

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E29: **North Center Jack. Corrosion on flexible conduit fittings.**



Photo E30: **East Service Cabinet. Corroded conduit with 100% section loss.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E31: **Center Span. PVC coating peeling from conduit.**



Photo E32: **East Barrier Gate Junction Box. Light corrosion on SO cable fittings.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044

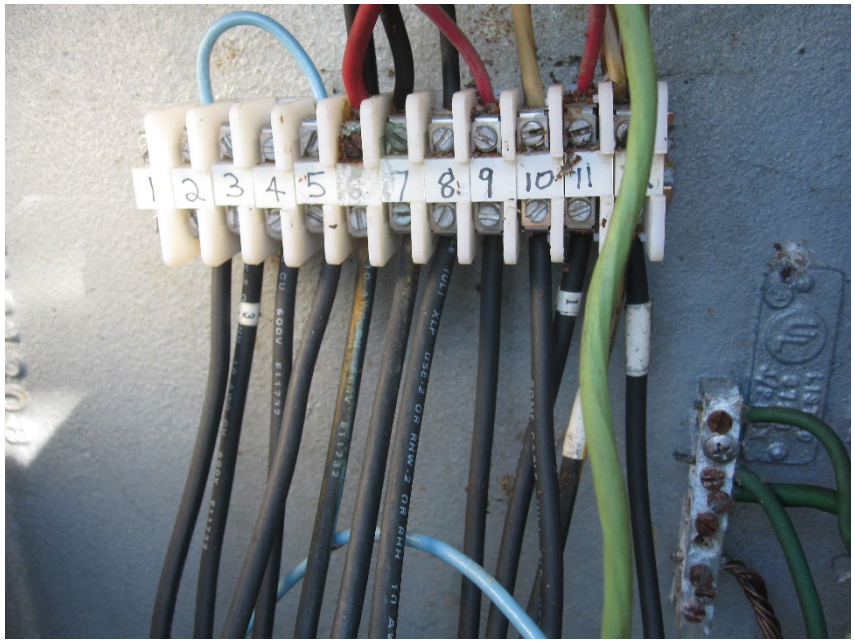


Photo E33: **East Barrier Gate Junction Box. Corrosion on terminal block.**



Photo E34: **Southeast Swing Span Light. Both lamps are illuminated.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E35: **East Center Axis Light. Conduit feeding the light is damaged.**



Photo E36: **East Approach. Traffic signals.**

Prepared by

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E37: **East Approach. Gong mounted to traffic signal mast arm is inoperable.**



Photo E38: **West Pedestrian Gate. Arm striping does not extend the length of the gate arm.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	NGS
Town:	Westport	**Inspected by 2:**	
Feature Carried:	Route 136	**Date Inspected:**	August 31st, 2022
Feature Crossed:	Saugatuck River	**Project No.:**	P712210044



Photo E39: **East Barrier Gate. Gate not fully engaged in receiver.**

Prepared by TranSystems

NUMERICAL CONDITION INSPECTION REPORT
APPENDIX II

MOVABLE SPANS
NUMERICAL CONDITION INSPECTION REPORT
ELECTRICAL COMPONENTS

BRIDGE NUMBER: 1349 **INSPECTION DATE: 8-31-2022**

COMMON COMPONENTS		BASCULE SPANS		LIFT SPANS	
COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*	COMPONENT TITLE	NCR*
WIRING AND CABLE	5	SPAN SEATED LIMIT SWITCH	N/A	FESTOONED CABLE	N/A
CONDUIT AND RACEWAY	5			SPAN SEATED LIMIT SWITCH	N/A
UTILITY SERVICE	7	TOE LOCK MOTORS	N/A		
SPAN DRIVE MOTORS	7	HEEL LOCK MOTORS	N/A	SPAN LOCKS	N/A
SWITCHGEAR	6			WEDGE MOTORS	N/A
MOTOR CONTROLS	7			DRIVE SYNC. SYSTEM	N/A
CONTROL DESK	7	SWING SPANS			
PLC CONTROLS	N/A	END OF TRAVEL LIMIT SWITCH	5		
ROTARY CAM LIMIT SWITCH	7			MISC. COMPONENTS	
SPAN POSITION INDICATOR	N/A	CENTERING DEVICE	5	CONTROL LOGIC/ INTERLOCKS	3
SUBMARINE CABLE	N/A	WEDGE MOTORS	N/A		
DISCONNECT SWITCHES	7	JACK MOTORS	7		
GENERAL LIGHTING	3				
ROADWAY LIGHTING	N/A				
TRAFFIC SIGNALS	3				
TRAFFIC GATES	N/A				
RESISTANCE BARRIERS	5				
NAVIGATION LIGHTS	6				
STANDBY GENERATOR	N/A				

ELECTRICAL CONDITION OVERALL RATING: 5

*NCR IS AN ABBREVIATION FOR NUMERICAL CONDITION RATING; SEE BELOW:

NUMERICAL CONDITION RATING INFORMATION

9 EXCELLENT: No defects noted, component appears to be in new condition and functions as designed.

8 VERY GOOD: Displays insignificant wear and/or deterioration: performs intended function with very high degree of reliability and effectiveness.

7 GOOD: Minor deterioration or wear noted, component appears to be functional

6 SATISFACTORY: Early measurable wear/deterioration: performs with little reduction in reliability and/or effectiveness.

5 FAIR: Moderate wear/deterioration: performs with moderate reduction in reliability and/or effectiveness.

4 POOR: Advanced wear/deterioration: performance marginal: corrective action required within one year.

3 SERIOUS: Severe wear/deterioration: performance poor and/or unreliable: corrective actions required within six months.

2 CRITICAL: Movable span operation highly unreliable or dangerous and should be restricted: corrective action required as soon as possible.

1 "IMMINENT" FAILURE: Movable span operation prohibited pending replacement or repair.

0 FAILED: Movable span will not operate without replacement or repair.

N/A Not Applicable.

APPENDIX K: River Users Memo

FITZGERALD & HALLIDAY, INC.
Innovative Planning, Better Communities

416 Asylum Street
Hartford, CT 06103
t (860) 247-7200
www.fhiplan.com

MEMORANDUM

To:	File	Project:	William F. Cribari Memorial Bridge Route 136 over the Saugatuck River (P1427.01)
From:	Ron Gautreau	Date:	October 16, 2020
Subject:	Summary of Research and Coordination Conducted on Saugatuck River Users		

The purpose of this memorandum is to summarize the results of coordination conducted in 2019 and 2020 by CJM and FHI to:

1. Identify current commercial and recreational users of the Saugatuck River, upstream and downstream of the Cribari Bridge
2. Receive input on concerns about passage during the construction period if a build alternative is advanced.

The input received is summarized in **Table 1**. Original correspondence is included as **Attachment A**.

Table 1: Summary of Stakeholders Survey

#	From*	Stakeholder	Date	Summary of Input Received
1	CJM	Robert Giunta (Westport Harbormaster)	Dec 3, 2019 (via email)	• There is only one marina upstream of the bridge that accommodates boats requiring bridge openings • Bridge openings, especially during the winter, may be required for the passage of construction equipment for dock repairs • The VFW Marina and the Saugatuck Rowing Club do not have an issue with any of the vessels docked at their facilities fitting under the bridge
2	CJM	Robbie Guimond (Bridgebrook Marina)	May 12, 2020 (via email)	• Approximately a dozen passages a year for sailboats and commercial barges with construction equipment • Dredging of three boat basins are in the pipeline, the timing of which may coincide with the proposed bridge project
			May 18, 2020 (via phone conversation)	• Little to no issue with the 18-foot clearance of the proposed temporary bridge other than for the passage of sailboats going to and from storage at his marina in the spring and fall

#	From*	Stakeholder	Date	Summary of Input Received
				• Existing bridge clearance and cumbersome process required to schedule openings results in turning away boat rental requests • Additional clearance would allow more vessels to travel beneath the bridge without requiring a scheduled bridge opening, thereby avoiding the existing issue of scheduling conflicts and coordination difficulties. By reducing the existing situation where rental requests are denied, there is potential for improving business for the Bridgebrook Marina • The project is anticipated to bring a rise in the river usage, and if combined with a higher vertical clearance if a replacement option is pursued, it could bring in about 70-80 boat slips for the combined docks
3	CJM	Deputy Chief Sam Arciola (Westport Police Dept.)	May 21, 2020 (via email)	• No issues with temporary bridge height for passage of police boats and emergency vessels • He did not recall any on-water incidents or issues with the 1990s temporary structure
4	DOT	Stephanie E. Lopez (USCG)	July 31, 2020 (via email)	• Acknowledges being informed about the proposed project and will review the findings when the project plans are further advanced
5	FHI	Alicia Mozian (Westport Conservation Director and liaison to the Shellfish Commission) (includes responses from Copps Island Oysters and Hummock Island Oysters)	July 14, 2020 (via phone conversation)	• A new bridge would not provide any socioeconomic benefit to shellfish businesses in that they presently have no issues going back and forth under the bridge • A temporary bridge with 18 feet clearance to MHW would be more than sufficient for passage

*CJM – Close Jensen & Miller; DOT - Connecticut Department of Transportation; FHI - Fitzgerald & Halliday, Inc.

Conclusions

The primary concerns and key observations identified through this coordination effort are:

- Bridge openings for sailboats occur primarily in the spring and fall; construction vessels would also anticipate requiring openings during this time period posing a potential conflict.
- The temporary fixed bridge would not allow for the passage of sailboats during fall transit to storage and spring launching from Bridgebrook Marina.
- A new bridge with greater clearance could promote additional boat usage upstream of the bridge.
- Municipal emergency vessels only need 15 feet of clearance; therefore, there would not be a clearance issue with the temporary bridge.
- Shellfishermen currently do not have a clearance issue with existing bridge and would not have an issue with clearance of the temporary bridge either.

Attachment A

Correspondence with Stakeholders

Email Correspondence with Robert Giunta (Harbormaster) on December 3, 2019

From: rjgg3@att.net [mailto:rjgg3@att.net]
Sent: Tuesday, December 3, 2019 12:54 PM
To: Jeff Fontaine
Subject: Re: Bridge 01349 (Project No. 158-214) Cribari Bridge upstream marine users

There only one marina Guimond marine Riverside Ave that will require bridge openings spring and fall . Spring launch from winter storage fall larger vessels heading to winter storage . During the season there are vessels heading up river for repairs at Guimond's Marina . There are always dock projects every year these have permits. This winter if we have heavy ice build up there be more openings barge traffic dock repairs . The VFW marina and the Saugatuck rowing club they fit under the bridge without any issue .
Note the rowing club operates year round no ice they are on the river . I have only granted one permit for a mooring between RT 1 bridge and RT 136 bridge 22 ft outboard . I don't have a list of property owners along the river . If you need anything else I will try to help contact me .

Robert Giunta HARBORMASTER. P.O. Box 56 Westport Ct 06881. 203 856 8420 rjgg3@att.net

On Dec 3, 2019, at 11:47 AM, Jeff Fontaine <JFontaine@cjmpc.com> wrote:

> Good morning Mr. Giunta,
>
> The Connecticut Department of Transportation (CTDOT) is in the preliminary process of coordinating with the US Coast Guard (USCG) regarding the subject bridge project. The USCG requests, as part of our early coordination with them, that they be provided with a list of all upstream users of the bridge as well as either a summary or list of the types of vessels that require the Cribari Bridge be opened for passage.
>
> If you can provide us with any information that we can then offer the Coast Guard, it would be much appreciated. If you have any questions, please feel free to contact me, or Priti Bhardwaj of the CTDOT.
>
> Thank you,
>
> Jeff Fontaine, P.E.
> Close, Jensen and Miller, P.C.
> 1137 Silas Deane Highway
> Wethersfield, CT 06109
> Telephone: (860) 563-9375 ext. 2700

Email Correspondence with Robbie Guimond (Bridgebrook Marina) on May 12, 2020

From: Robbie Guimond
Sent: Tuesday, May 12, 2020 9:53 AM
To: Jeff Fontaine <JFontaine@cjmpc.com>
Subject: Re: William F. Cribari Bridge over the Saugatuck River in Westport, temporary bridge impacts

Morning, probably a dozen passages a year. Including sail and commercial barges with cranes, pile driving and dredge equipment , keep in mind dedging of three boat basins are in the pipe line and with any luck some river maintence, In all probability at the exact time of the bridge project. Thx R

On Tue, May 12, 2020, 9:13 AM Jeff Fontaine <JFontaine@cjmpc.com> wrote:

> Good morning Robbie,
>
> I hope all is going well with you and your family.
>
> Work is continuing to proceed on the EA/EIE for the Cribari Bridge; however, we would just like to verify a few items with you with regards to marine traffic so that we can ensure the document considers all potential impacts. We have coordinated a bit with the Harbormaster; however, as one of the primary businesses that would be affected by marine traffic impacts, we feel you can provide us with additional insight.
>
> As discussed during the PAC meetings, we anticipate that the temporary bridge proposed for several of the action alternatives would be similar in size and height as the temporary bridge installed during the 1990's project. Another similar aspect would be that the bridge would be fixed. Therefore, vessels using the Saugatuck during construction activities would be restricted by the vertical clearance of the temporary bridge, which was approximately 18 feet according to the 1990's as-built plans.
>
> As a marina owner upstream of the bridge, do you work with or witness boats on the Saugatuck that would exceed the 18-foot clearance and would not be able to pass beneath the temporary

bridge? If so, approximately how many vessels would be restricted and how greatly would that impact businesses? What are the typical sizes of vessels that you work with at your marina? Any information you can provide would be much appreciated.

Thank you again for you time and help.

Jeff Fontaine, P.E.
Close, Jensen and Miller, P.C.
1137 Silas Deane Highway
Wethersfield, CT 06109
Telephone: (860) 563-9375 ext. 2700

Summary of Phone Correspondence with Robbie Guimond (Bridgebrook Marina) on May 18, 2020

From: Jeff Fontaine <JFontaine@cjmpc.com>
Sent: Monday, May 18, 2020 4:18 PM
To: Fadul, Francisco T.; Murphy, Lynn D.
Cc: Mark Levesque; Tom Ryan; Bhardwaj, Priti S.; 'Laurel Stegina'
Subject: FW: William F. Cribari Bridge over the Saugatuck River in Westport, temporary bridge impacts

Hello All,

I just got off the phone with Robbie Guimond (he felt it would be easier to have a phone conversation as opposed to an email response) discussing the questions noted in the email below.

To basically summarize what we talked about, he stated that he had little to no issue with the 18-foot clearance the concept temporary bridge would propose. He noted that any issues would be with sailboats that he would take in for storage; however, recently his business for storing sailboats has been stagnant as a result of the shallow channel as well as difficulty with opening the bridge (explained more below), to where the fixed span would not be much of an impact. Any other larger vessels that he works with or barges with equipment would be able to navigate beneath the 18'.

With regards to other impacts, he brought up some interesting points. With the COVID pandemic closing many summer events (summer camps, gatherings, etc.) he noticed a huge spike in boat rentals and purchases within the area as families are looking for a way to be isolated, while also being able to enjoy outdoor activities. Unfortunately, he has been forced to turn away several calls, losing a fair amount of business, as a result of the existing bridge clearance height – the difficulty being in the opening of the bridge (2 hours notice required prior to opening). He noted that scheduling the opening for vessels to leave is no problem; however, the return is the issue since return times are typically unknown. As he's mentioned at each of the meetings for the project, the additional feet of clearance would allow him to avoid this issue, and allow him to accept more business.

He mentioned the dredging project as this is something that will be impacting him, the VFW, and Saugatuck Rowing club docks. The project is anticipated to bring a rise in the river usage, and if combined with a higher vertical clearance, could bring in about 70-80 boat slips for the combined docks.

Hopefully phone call coordination is sufficient, but if you need a written or email response to document this information, let me know and I can request it from Robbie.

Thank you,
Jeff

From: Jeff Fontaine
Sent: Monday, May 18, 2020 2:38 PM
To: Robbie Guimond <robbieguimond@gmail.com>
Cc: Mark Levesque <mlevesque@cjmpc.com>
Subject: RE: William F. Cribari Bridge over the Saugatuck River in Westport, temporary bridge impacts

Hello Robbie,

Thank you for the response as it is a big help. I guess we just need a little more information regarding the vessels you mentioned.

Of those larger vessels you mentioned, approximately how many would you expect would have a difficult time navigating beneath an 18' clearance height? While it is understood that not much could be done for vessels with sails and masts taller than this height, we would hope that barges with equipment would be a bit more compact during transport. Approximately how tall is the largest vessel you typically work with?

Thanks again for your help,

Jeff Fontaine, P.E.
Close, Jensen and Miller, P.C.
1137 Silas Deane Highway
Wethersfield, CT 06109
Telephone: (860) 563-9375 ext. 2700

Email Correspondence with Deputy Chief Sam Arciola (Westport Police) on May 21, 2020

From: Arciola, Samuel
Sent: Thursday, May 21, 2020 12:01 PM
To: Jeff Fontaine <JFontaine@cjmpc.com>; Yost, Robert <RYOST@westportct.gov>; Koskinas, Fotios <fkoskinas@westportct.gov>
Cc: Mark Levesque <mlevesque@cjmpc.com>
Subject: RE: William F. Cribari Bridge (Project No. 158-214) Bridge Street over the Saugatuck River in Westport

Jeff,

Our largest police boat would need 15 feet of clearance. With that said, the 18-foot vertical clearance for the temporary bridge would not be a problem for our municipal emergency vessels. Other than being another structure in the water, I do not foresee any issues with the temporary bridge in regards to emergency operations or up river users. Regarding the 1990's temporary structure, I do not recall any incidents or issues on the water during that time period. Please feel free to contact me with any questions.

Sam

Deputy Chief Sam Arciola
Westport Police Department
50 Jesup Road
Westport, CT 06880
Phone: 203-341-6035
Fax: 203-341-6094
E-mail: **s.arciola@westportct.gov**

From: Jeff Fontaine [mailto:JFontaine@cjmpc.com]
Sent: Monday, May 18, 2020 3:23 PM
To: Yost, Robert <RYOST@westportct.gov>; Arciola, Samuel <sarciola@westportct.gov>; Koskinas, Fotios <fkoskinas@westportct.gov>
Cc: Mark Levesque <mlevesque@cjmpc.com>
Subject: William F. Cribari Bridge (Project No. 158-214) Bridge Street over the Saugatuck River in Westport

CAUTION: This email originated from outside of the Town of Westport's email system. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good afternoon,

We hope all is going well with you and your families. We appreciate your help as we continue to coordinate regarding the subject bridge project.

As we continue to gather information for the project, we would just like to gain some additional input/insight from the Town Emergency Services groups regarding the temporary bridge proposed in several of the alternatives presented in the draft EA/EIE. At this point, we envision the temporary bridge to be of similar design to the one used during the 1990's rehabilitation project for this bridge. The concept temporary bridge would be a fixed-span structure; therefore, vessels navigating the channel would be restricted by the vertical clearance above the water, which we envision would be approximately 18 feet (also similar to the 1990's project).

Do you anticipate the 18-foot vertical clearance being an issue for Police, Fire, or other emergency response vessels navigating within the Saugatuck River? If so, what is the approximate height of your largest aquatic vessel, and how much of a clearance envelope would be required? Do you foresee any other impacts the presence of the temporary bridge may have with regards to emergency operations (or upstream users) within the Saugatuck?

Also, were there any issues encountered during the 1990's rehabilitation project, that you recall, that we could account for as part of this project in the event an alternative proposing the temporary bridge is selected?

Any information you can provide would be much appreciated. If you know of any other town emergency service groups that may have vessels that use the Saugatuck in this area that we should be also coordinating with, please let us know.

Thank you,

Jeff Fontaine, P.E.
Close, Jensen and Miller, P.C.
1137 Silas Deane Highway
Wethersfield, CT 06109
Telephone: (860) 563-9375 ext. 2700

Email Correspondence with Stephnie E. Lopez (USCG) on July 21, 2020

From: Lopez, Stephanie E CIV <Stephanie.E.Lopez@uscg.mil>
Sent: Friday, July 31, 2020 2:40 PM
To: Davis, Andrew H
Cc: Lesay, Kimberly C; McMillan, Mark J.; Murphy, Lynn D.; Samorajczyk, Christopher W; Rousseau, James L CIV
Subject: RE: Federal Navigational Limits, Route 136 Bridge, Westport CT

Good afternoon Andrew,

Thank you for informing me of the ConnDOT upcoming plans. I look forward to reading your findings and see which direction ConnDOT is going to go with the Rte 136 Bridge.
Have a good weekend.

Stephanie E. Lopez
Bridge Management Specialist
First Coast Guard District
1 South Street Battery Bldg, Room 306
New York, NY 10004-1466
Ph: (212) 514-4335
Stephanie.E.Lopez@uscg.mil

From: Davis, Andrew H <Andrew.H.Davis@ct.gov>
Sent: Thursday, July 30, 2020 2:27 PM
To: Lopez, Stephanie E CIV <Stephanie.E.Lopez@uscg.mil>
Cc: Lesay, Kimberly C <Kimberly.Lesay@ct.gov>; McMillan, Mark J. <Mark.McMillan@ct.gov>; Murphy, Lynn D. <Lynn.Murphy@ct.gov>; Samorajczyk, Christopher W <Christopher.Samorajczyk@ct.gov>
Subject: [Non-DoD Source] Federal Navigational Limits, Route 136 Bridge, Westport CT

Stephanie, The Connecticut Department of Transportation is preparing a joint Environmental Assessment/Environmental Impact Evaluation to address the functional, structural and safety deficiencies of the Swing Bridge, Route 136, over the Saugatuck River in Wesport CT. I have attached a location map for your convenience.

The alternatives being studied are no build, conservation of the existing bridge, rehabilitation of the existing bridge, the on alignment alternative that replaces the existing bridge with a new moveable bridge on the existing alignment, and the off alignment alternative that replaces the existing bridge with a new moveable bridge on a new alignment just to the north of the existing bridge.

For the new on alignment bridge alternative, a temporary fixed bridge would be constructed just to the north of the existing bridge. For both the on alignment and off alignment alternatives, it is anticipated that short term closures both partial or full closures would be necessary for removal of the existing swing span superstructure and movable span piers and fender system and during construction of the new movable span and the associated piers and fender system

As part of the study we are going to discuss potential impacts to navigation as well as to the boating community . Your input on navigational issues at this time would be appreciated. Thank you for your assistance and please let me know if you have any questions, comments or concerns.

Andrew Davis
Natural Resource Planning
Office of Environmental Planning
Connecticut Department of Transportation
andrew.h.davis@ct.gov

FITZGERALD & HALLIDAY, INC.
Innovative Planning, Better Communities

416 Asylum Street
Hartford, CT 06103
t (860) 247-7200
www.fhiplan.com

TELECOM

Call from:	Laurel Stegina	Project:	William F. Cribari Memorial Bridge Route 136 over the Saugatuck River (P1427.01)
Call to:	Alicia Mozian (Westport Conservation Director)	Date:	July 14, 2020
Subject:	River Users Survey Questions to Westport Shellfish Commission		

July 10, 2020: Initial conversation with Alicia Mozian, Westport Conservation Director, and staff liaison to Westport Shellfish Commission. Provided questions to her.

July 14, 2020: Alicia Mozian provided responses from:

- Copps Island Oysters (Norm Bloom)
- Hummock Island Oysters (Jeff Northrup)

Question #1: Would you please provide us with the current locations of shellfish beds about 1,000 feet north and south of the Cribari Bridge?

Response #1:

- There is no current mapped shellfish beds; however, shellfish beds and seed beds are present and widespread both north and south of the bridge.
- Transplanting of shellfish occurs annually.
- Prolific; varies from year to year.
- Nursery is northern part of river; commercial shellfishermen don't do a lot of harvesting north of the bridge.

Question #2: In your opinion, would a new bridge provide any socioeconomic benefit to those who make a living on the water and who rely on the bridge for access to their business-related activities?

Response #2: A new bridge would not provide any socioeconomic benefit to shellfish businesses. They presently have no issues going back and forth under the bridge. Not an obstruction now.

Question #3: Would a temporary fixed bridge (with approximately 18 feet clearance to MHW) address any of the impacts anticipated to the shellfish industry during the replacement of the Cribari Bridge?

Response #3: They presently have no issues going back and forth under the bridge. A temporary bridge with 18 feet clearance to MHW would be more than sufficient.

Question #4: Are there times of the year that would be particularly disruptive to your industry?

Response #4: Avoid spawning season (June-September); when water temperature reaches 50 degrees F. Best time for construction activity would be October 1st-April 1st.

APPENDIX L: Storm Surge Criteria Report

CONNECTICUT DEPARTMENT OF TRANSPORTATION



STORM SURGE DESIGN CRITERIA

Bridge No. 01349 William F Cribari Memorial Bridge

Route 136 over Saugatuck River, Westport, CT

Hardesty & Hanover, LLC
59 Elm Street, Suite 406, New Haven, CT 0651

Revision 1: July 2018
Issued: June 2018

Table of Contents

Table of Contents 1

Existing Bridge 2

Report Purpose 2

Location Map 3

Design Criteria for Establishing the Design Water Level (DWL) 4

A. Sea-Level Rise 4

1. CIRCA 4

2. USACE / NOAA 4

B. Current Extreme Water Level (EWL) 6

1. Historical (Observed) (EWL) 6

2. USACE Computed 100-year Water Level 7

3. FEMA Flood Insurance Study (FIS) Water Levels 7

Design Water Level 8

C. Coastal Jurisdiction Line (CJL) 9

Appendix A 10

Appendix B 11

Appendix C 12

Appendix D 16

Appendix E 19

Appendix F 20

Appendix G 21

Existing Bridge

Bridge No. 01349, also known as the William F. Cribari Memorial Bridge, built in 1884 and reconstructed in 1993, carries two lanes of traffic (one each direction) over the Saugatuck River in Westport, CT. The structure is located between exits 17 and 18 of I-95. The existing bridge is a two-span fixed bridge and a two-span swing bridge with an ornamental Pratt truss (original 1884). The structure length is 287-ft, with a maximum span length of 70-ft. The movable span opens to allow a 50-ft clear channel for local boating and the marina.

The drainage area of the Saugatuck River at the Route 136 Bridge is 89.2 sq. mi., classifying the facility as a Large structure per ConnDOT Drainage Manual Chapter 9.

Report Purpose

The purpose of this report is to review the current flood elevations and tidal surges at the bridge site along with the potential for future increases to these elevations due to sea level rise and determine the design water level (DWL) elevation for critical components of the replacement structure. At the current condition, the mechanical and electrical equipment is susceptible to flood damage and is between elevations 6.0 and 8.4 feet (NAVD88). The equipment became submerged during Hurricane Sandy in 2012 resulting in considerable damage and expense. The Connecticut Department of Transportation plans to rehabilitate or replace the bridge in a manner that improves costal resiliency and reduces the likelihood of mechanical and electrical component damage during future extreme weather events.

Location Map

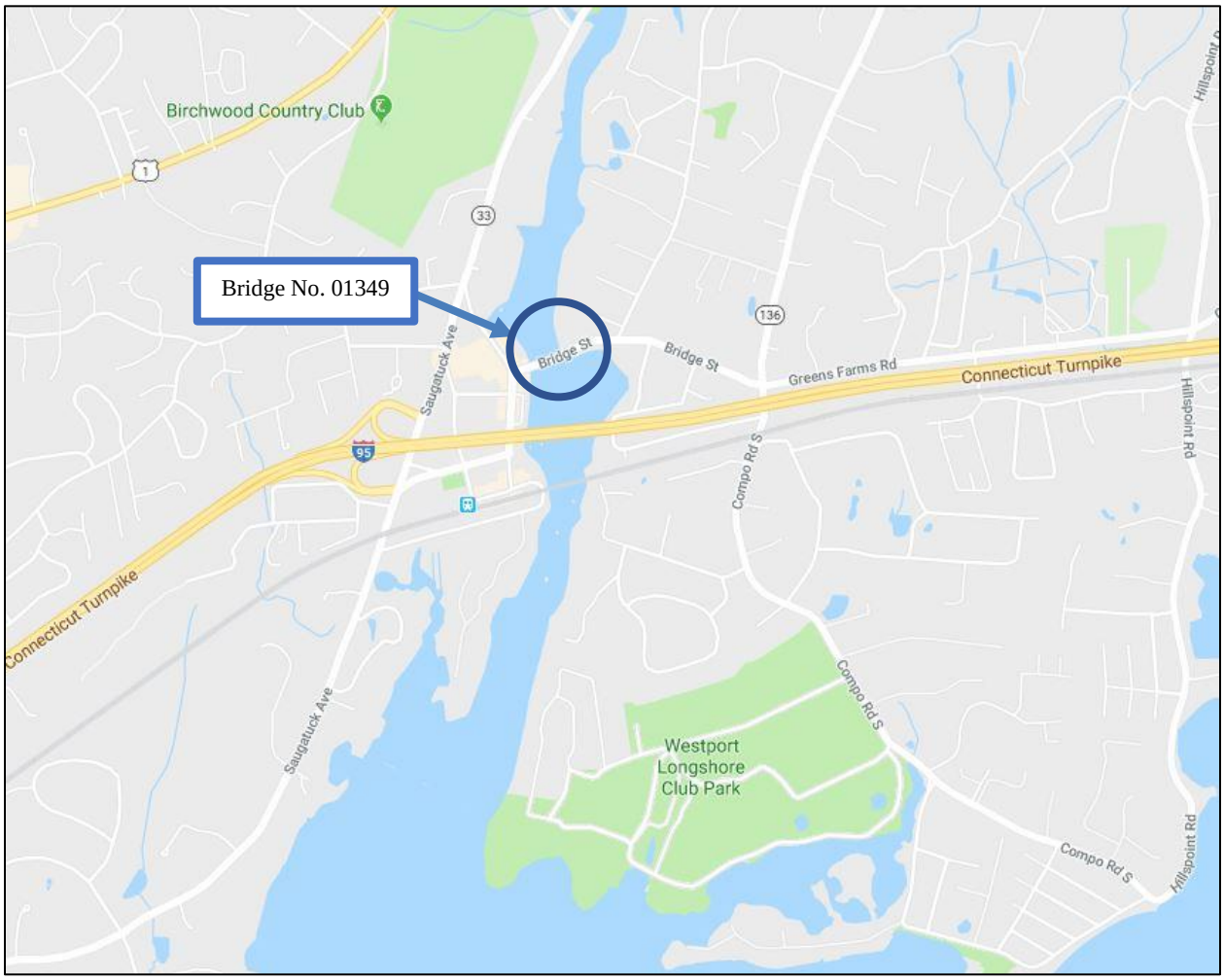


Figure 1: The picture shows a location map of the bridge location in Westport, Connecticut. Note that the existing bridge is parallel to I-95 and spans the Saugatuck River.

Design Criteria for Establishing the Design Water Level (DWL)

Sensitive mechanical and electrical components for the rehabilitated bridge or for any replacement bridge structure will be placed in a position to provide 1 ft of clearance (freeboard) above the Design Water Level (DWL). The governing criteria for establishing the DWL are the FEMA 100-year base flood elevation (BFE), adjusted for sea level rise (SLR), combined with 1' of freeboard or the 500 year flood elevation adjusted for SLR. These criteria are found in the Department's Drainage Manual, Chapter 9. Placing the mechanical and electrical components above the anticipated DWL elevation with sufficient freeboard is critical to the proper function of the movable structure during and immediately following coastal storm events of significant magnitude.

The 1989 Reconstruction of Bridge No. 01349 Route 136 Over Saugatuck River CTDOT contract plans were based on NGVD29. The conversion factor for this structure is approximately NGVD29 – NAVD88 = 1.1ft (Appendix A). All values in this report are based on the NAVD88 datum.

A. Sea-Level Rise

Consideration of sea level rise (SLR) is necessary for the design of a replacement structure. Based on current information, projections, and Department preferences, the *Connecticut Institute for Resilience & Climate Adaptation* (CIRCA) recommended Planning Threshold has been chosen for this project. The CIRCA estimate is the more conservative of the two methods of SLR estimation that are referenced below.

1. CIRCA

Connecticut Institute for Resilience & Climate Adaptation (CIRCA) has released a report authored by Executive Director and Professor of Marine Sciences, James O'Donnell that includes consideration of multiple models and provides a recommended planning value of 1.64ft (0.5m) for 'mid-century' sea level rise (Appendix B). The report can be found at:

CIRCA Sea Level Rise Projections for the State of Connecticut

2. USACE / NOAA

The United States Army Corps of Engineers (USACE) method for computing sea level rise can be found using the Sea-level Change Curve Calculator (2017.55), which includes input from the National Oceanic and Atmospheric Administration (NOAA). Sea Level Rise (SLR) values

determined using the USACE calculator are based on a 75-year design life or 2095 design horizon assuming the intermediate estimate (USACE Int / NOAA Int Low). The calculation results in an SLR projection of 1.59ft from 2012 water levels (Appendix C). The calculator uses data available for NOAA Coastal Gauge No. 8467150 in Bridgeport, CT. The USACE calculator and can be found at:

http://www.corpsclimate.us/ccaceslcurves.cfm

B. Current Extreme Water Level (EWL)

Multiple methods and data sets are available for determining the current maximum water levels. This report will rely on the most conservative estimate of the highest water level, or extreme water level (EWL) to determine the DWL.

1. Historical (Observed) (EWL)

During Superstorm Sandy the nearest USGS provisional storm sensor No. CTFI00006, just north of the existing bridge, recorded a peak high-water mark (HWM) elevation at 10.1ft (NAVD88). Note that the storm elevation south of the bridge likely exceeded the sensors recorded elevation, as the bridge acts as the limit of moderate wave action (Appendix D). This recorded value, reconciles with the FEMA Flood Insurance Rate Map (FIRM) which shows a 1% annual chance flood elevation of 10ft at the location of the sensor. It can be inferred that because the bridge functions as a breakwater and prevents wave action from progressing upstream beyond the bridge, the total water level downstream (south) of the bridge would be higher than the 10.1ft previously recorded. However, no historical data exists within the region of moderate wave action.

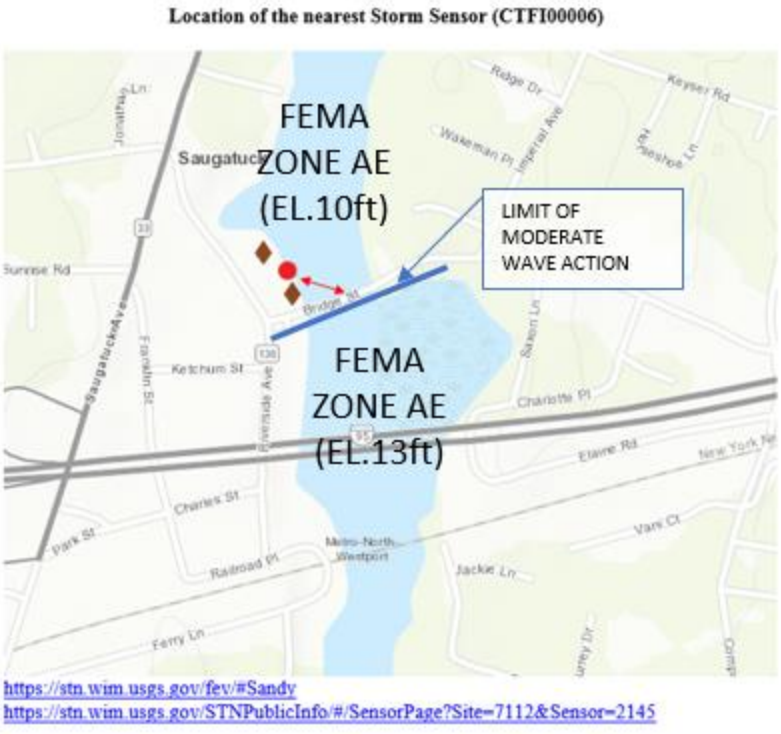


Figure 2: This image shows the location of USGS storm sensors north of the limit of moderate wave action (the existing bridge). Note that the EWL elevation from the sensor corresponds to the FEMA 100-yr BFE of 10ft north of the bridge. The 100-yr FEMA BFE of 13ft south of the bridge is applicable for this design.

2. USACE Computed 100-year Water Level

The USACE Sea-Level Change Curve Calculator, noted in Section A.2. of this report and included in Appendix C identifies a 100-year water surface in addition to computing the SLR. The 2012 Extreme Water level (EWL) with 1% Probability of Annual Exceedance (100-Year event) is presented as 9.06ft. This is less than the HWM value observed during the Superstorm Sandy Event and would not govern design.

3. FEMA Flood Insurance Study (FIS) Water Levels

FEMA Flood Insurance Study (Volume 1 of 6), Study No. 09001CV001C, revised 10/16/2016 determines the Stillwater, Total Water Level, and Base Flood elevations (Figure 3) at the coastal regions of Fairfield County, Connecticut. The design water surface computed for Transect No. 29 identifies the following 100-yr storm (1% annual chance) event elevations: a Stillwater elevation (lunar effects) of 10.4ft, a Total Water Level (including wave setup) of 12.7ft, and a Base Flood Elevation (BFE) of 13ft. For a 500-yr storm (0.2% annual chance), the Stillwater elevation increases to 11.8ft. Transect 29 runs parallel to the Saugatuck river inlet and reasonably reflects the flood conditions at the bridge location. The bridge is in Zone AE (base flood elevations have been determined) with moderate breaking wave action. Using the BFE value for the 100-yr event at Transect 29 and comparing that value to the 500-yr event is appropriate for the determination of the EWL.

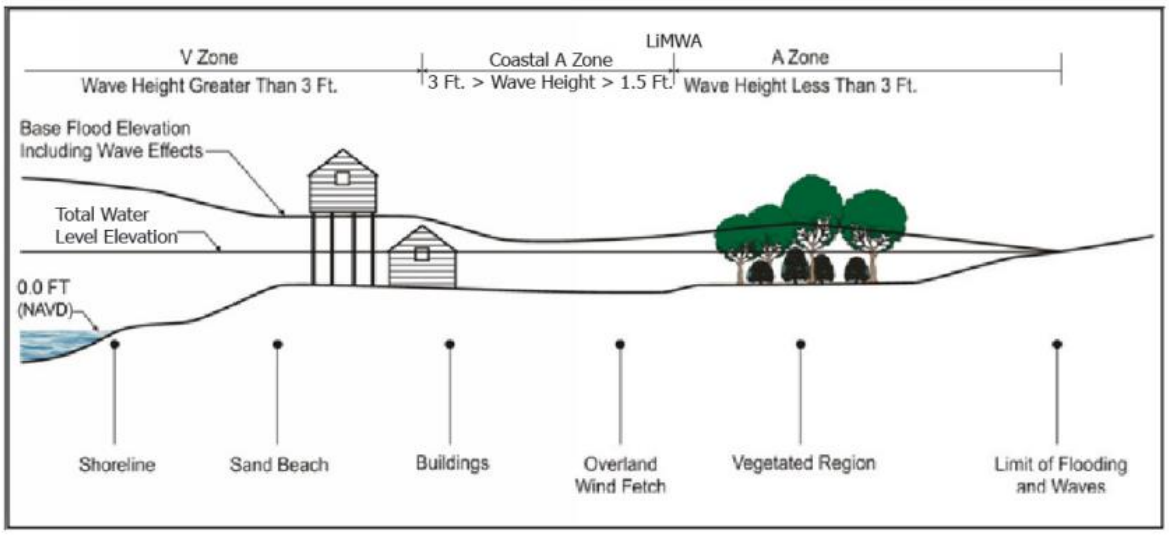


Figure 3: The figure shows the transect schematic for the FEMA FIS. Note that the bridge is in between the 'Coastal A Zone' and the 'A Zone' with wave heights less than 3ft.

Design Water Level

The governing design criteria requires the mechanical and electrical components of a new or rehabilitated bridge to be above the Design Water Level (DWL) which will be defined as the SLR plus the EWL. The chosen SLR estimate is the CIRCA Planning Threshold SLR and the chosen EWL is the 100-yr FEMA Base Flood Elevation for Zone AE.

The recommended DWL is thus:

13.00 ft	FEMA FIS study BFE for Zone AE (100-yr)
1.64 ft	CIRCA Planning Threshold SLR
14.64 ft	DWL

Due to challenges associated with bridge rehabilitation and reconstruction in the vicinity of the Cribari Bridge, including neighborhood considerations, approach roadway & sidewalk grades, and other contextual impacts, freeboard to the structure and under clearance between the bridge and the either the DWL or the BFE may not be achievable. This report focuses on the positioning of mechanical and electrical components that are essential to the reliable functioning of the bridge in the event of extreme costal weather events.

All sensitive mechanical and electrical components shall be placed to provide 1 ft of freeboard above the DWL, or above elevation 15.64 ft.

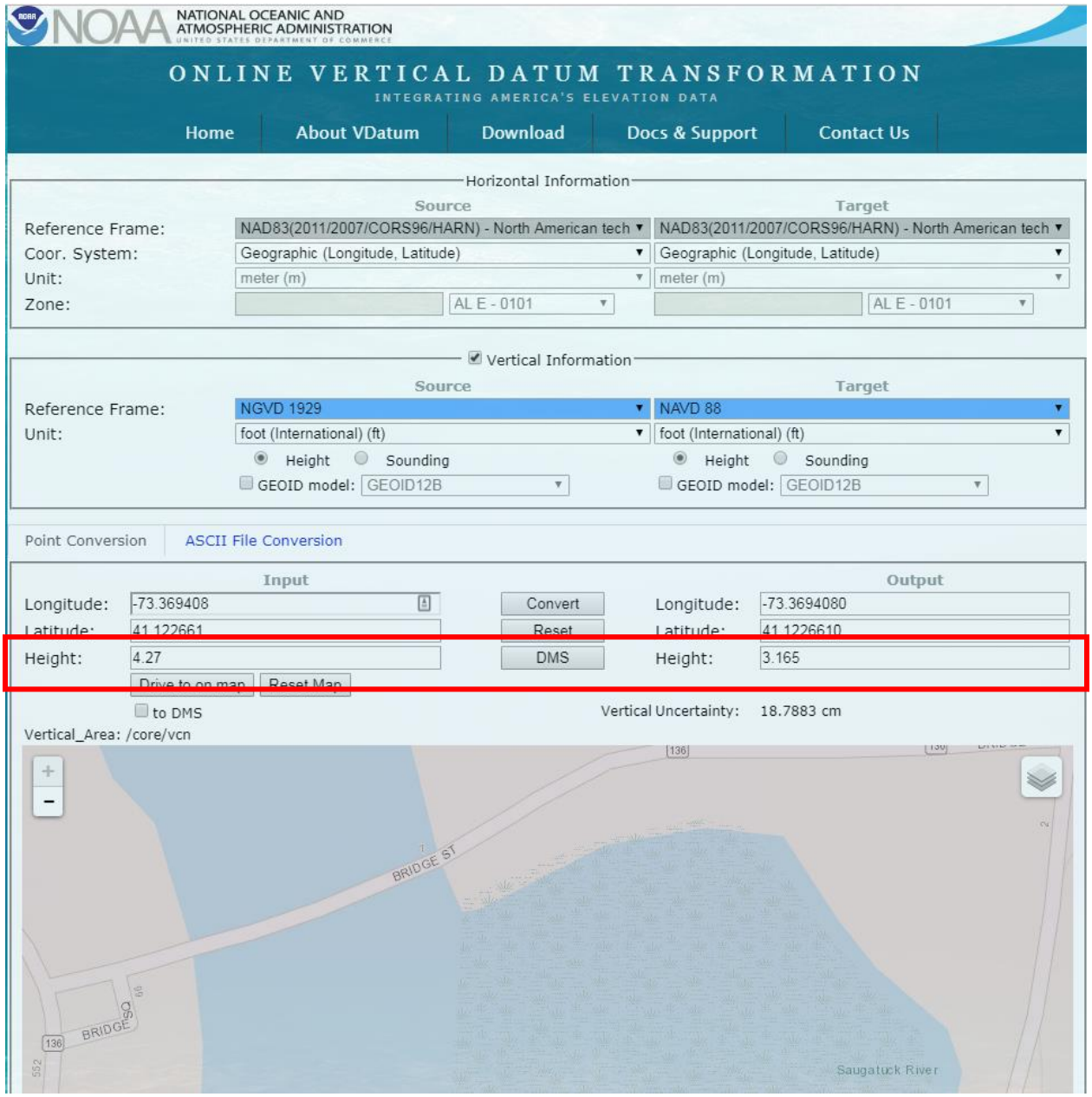
C. Coastal Jurisdiction Line (CJL)

In accordance to the Connecticut Department of Energy and Environmental Protection (DEEP), the CJL is described as follows:

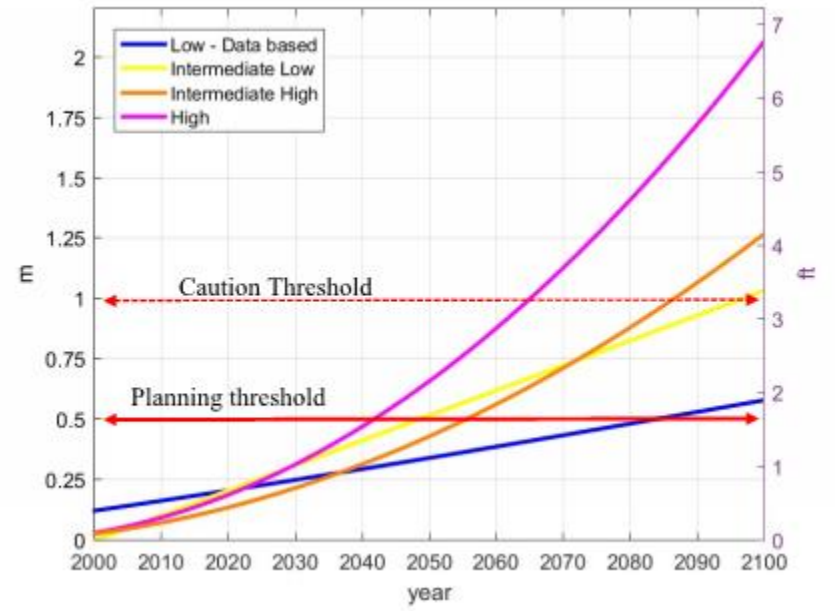
> In 2012, the Connecticut General Assembly passed PA 12-101 which included a revision to the State's regulatory jurisdiction under Connecticut General Statutes (CGS) Section 22a-359. In essence, this revision changes the regulatory jurisdiction limit from the "high tide line" to the area up to and including the elevation of the "coastal jurisdiction line" (CJL) as determined for the State's major tidal waterbodies. The change goes into effect on October 1, 2012.
>
> The high tide line had been used as the State's coastal jurisdictional limit since 1987. It was clear that the high tide line statute required that the boundary be determined through analysis of field evidence including wrack lines, vegetation patterns, or other evidence. However, due to the fluctuating nature of the sea surface it was difficult in some circumstances to pinpoint the location of the jurisdictional line. The new statute instead requires the use of a specifically determined elevation as the regulatory limit instead of field evidence of the water surface elevation.
>
> In working with the Connecticut Association of Land Surveyors (CALS), the new statute was drafted which identified a process using the heights of specific predicted tides through which a regulatory elevation could be calculated. Working collaboratively DEEP and CALS have calculated CJL elevations for each coastal municipality and the three major tidal rivers.
>
> These elevations are for use in all Structures, Dredging and Fill and Certificate of Permission applications submitted on or after October 1, 2012.

The CJL elevation in Westport, CT is 5.3ft (Appendix F). SLR + CJL = 6.89ft. This value is presented for informational purposes and does not govern the establishment of the DWL.

Appendix A


NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ONLINE VERTICAL DATUM TRANSFORMATION
INTEGRATING AMERICA'S ELEVATION DATA
Home
About VDatum
Download
Docs & Support
Contact Us
Horizontal Information
Source
Target
Reference Frame:
NAD83(2011/2007/CORS96/HARN) - North American tech
NAD83(2011/2007/CORS96/HARN) - North American tech
Coor. System:
Geographic (Longitude, Latitude)
Geographic (Longitude, Latitude)
Unit:
meter (m)
meter (m)
Zone:
AL E - 0101
AL E - 0101
Vertical Information
Source
Target
Reference Frame:
NGVD 1929
NAVD 88
Unit:
foot (International) (ft)
foot (International) (ft)
Height
Sounding
GEOID model:
GEOID12B
Point Conversion
ASCII File Conversion
Input
Output
Longitude:
-73.369408
Convert
-73.3694080
Latitude:
41.122661
Reset
41.1226610
Height:
4.27
DMS
3.165
Drive to on map
Reset Map
to DMS
Vertical Uncertainty:
18.7883 cm
Vertical_Area: /core/vcn
BRIDGE ST
Saugatuck River

Appendix B



Source: Connecticut Institute for Resilience & Climate Adaptation (CIRCA)

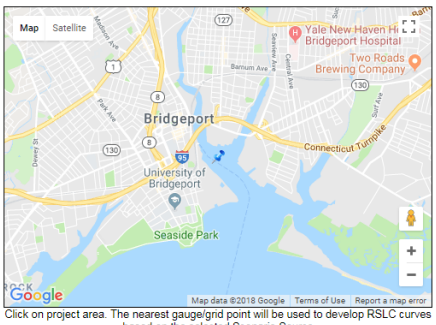
Report | Sea Level Rise in Connecticut | Draft | March 27, 2018

The blue line shows the upper bound on the prediction interval for the extrapolation of the annual average sea level at the Long Island Sound tide gages as shown in Figure 6. The yellow line shows the upper bound of the ensemble of predictions of the mean sea level off southern New England in simulations of RCP4.5 from IPCC (2013) and shown as Figure 12 in the Circa Draft Report. The Orange and Magenta lines are the same as in CPO-1, but with the effect of vertical land movement included. The thick red line shows the 0.5 m level which is the center of the range of predictions at 2050.The red dashed line is the upper bound of the model predictions at 2100.

Appendix C

USACE Sea Level Change Curve Calculator (2017.55)

Project Name: Westport - Storm Surge Design Criteria
Select Gauge: Bridgeport, CT
Scenarios Source: USACE2013/NOAA2012
Output Units: Feet Meters
Critical Elevation #1 (ft) : 0 NAVD88 - Description:
Critical Elevation #2 (ft) : 0 NAVD88 - Description:
SLC Rate:? NOAA 2006 Rates or enter rate (ft/yr) Display Data
FEMA BFE (ft): ? Information 0 (NAVD88) Search for BFE here
Project Start Year: 2012
Interval Year: 5
Project End Year: 2100
Output Datum: LMSL NAVD88
User's Index (ft): ? 0 Description:
Datum Shift from NAVD88 to MSL: 0.22 feet
EWL Type: Highs Lows
EWL Source: NOAA Website NOAA (GEV) USACE (Percentile) 100 yr difference (m) = 0.08
Plot EWL/BFE/Tides: None Select Curve: USACE High



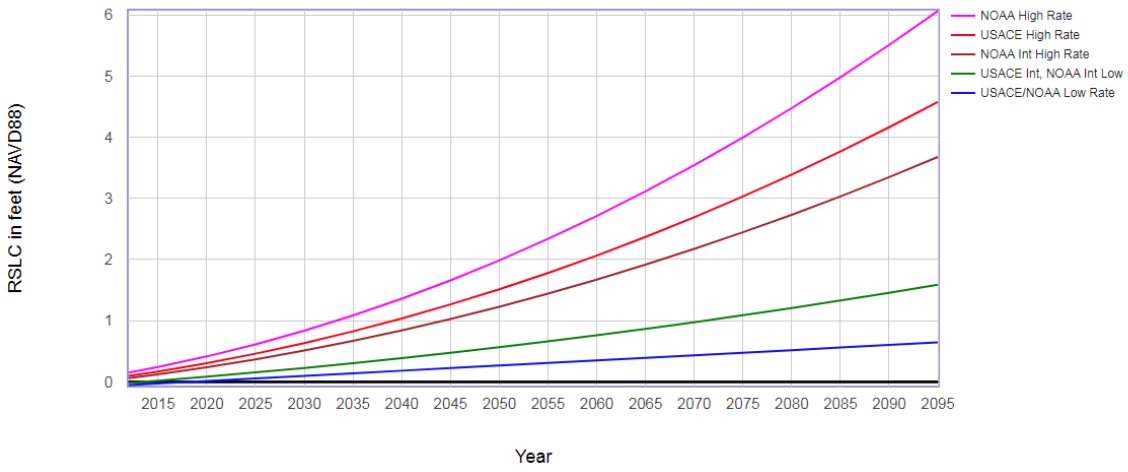
Click on project area. The nearest gauge/grid point will be used to develop RSLC curves based on the selected Scenario Source

*** note - there may be factors other than proximity to consider when selecting a gauge ***

Compliant
Non-Compliant
Inactive

Westport - Storm Surge Study
8467150, Bridgeport, CT
NOAA's 2006 Published Rate: 0.00840 feet/yr

Estimated Relative Sea Level Change Projections - Gauge: 8467150, Bridgeport, CT



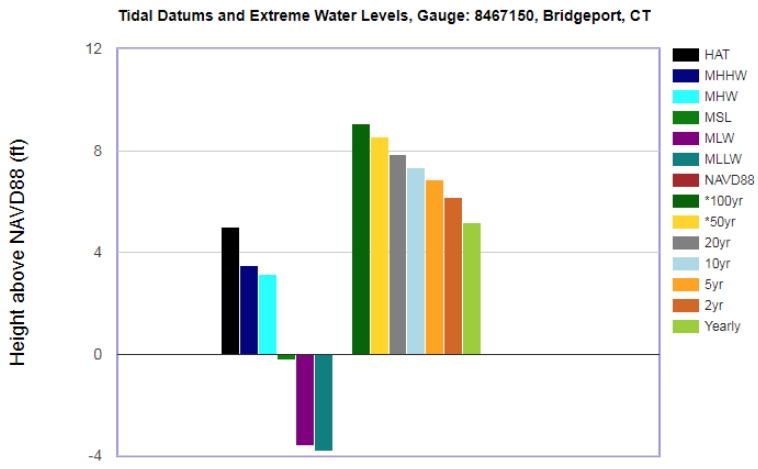
Westport - Storm Surge Study
8467150, Bridgeport, CT
NOAA's 2006 Published Rate: 0.00840 feet/yr
All values are expressed in feet relative to NAVD88

Year	USACE Low NOAA Low	USACE Int NOAA Int Low	NOAA Int High	USACE High	NOAA High
2012	-0.05	-0.02	0.06	0.10	0.15
2015	-0.03	0.02	0.12	0.17	0.24
2020	0.02	0.09	0.24	0.31	0.42
2025	0.06	0.15	0.37	0.46	0.61
2030	0.10	0.23	0.51	0.63	0.84
2035	0.14	0.31	0.67	0.83	1.09
2040	0.18	0.39	0.84	1.04	1.36
2045	0.23	0.48	1.03	1.27	1.66
2050	0.27	0.57	1.23	1.51	1.99
2055	0.31	0.66	1.44	1.78	2.34
2060	0.35	0.76	1.67	2.07	2.71
2065	0.39	0.87	1.92	2.37	3.12
2070	0.44	0.98	2.17	2.69	3.54
2075	0.48	1.09	2.45	3.03	4.00
2080	0.52	1.21	2.73	3.39	4.47
2085	0.56	1.33	3.03	3.77	4.98
2090	0.60	1.46	3.35	4.16	5.51
2095	0.65	1.59	3.68	4.58	6.06

Version of Data :	05/17/2017
ID:	8467150
Reference Datum:	NAVD88
Name:	Bridgeport, CT
HAT:	4.98 (ft)
MHHW:	3.48 (ft)
MHW:	3.14 (ft)
MSL:	-0.22 (ft)
MLW:	-3.60 (ft)
MLLW:	-3.84 (ft)
NAVD88:	0.00 (ft)
EWL Type:	NOAA GEV (NAVD88)
EWLs adjusted to 2012 using the historic rate	
*100 Yr:	9.06 (ft)
*50 Yr:	8.52 (ft)
20 Yr:	7.85 (ft)
10 Yr:	7.35 (ft)
5 Yr:	6.87 (ft)
2 Yr:	6.18 (ft)
Yearly:	5.15 (ft)
Monthly:	NaN (ft)
From:	1964
To:	2007
Years of Record:	43

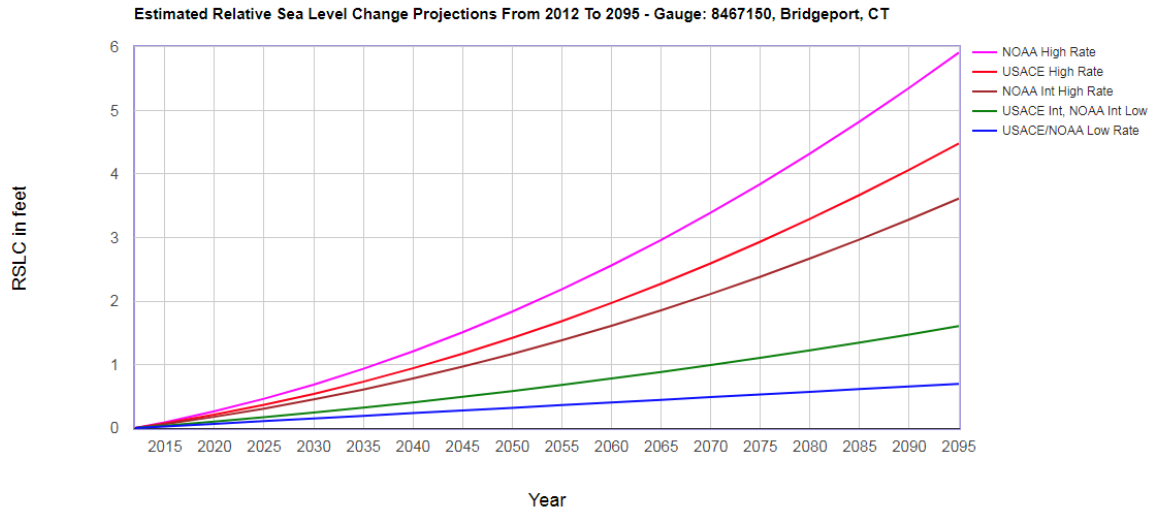
* Caution: period of record is less than return period *

Print Gauge Datums & EWL



* Caution: period of record is less than return period *

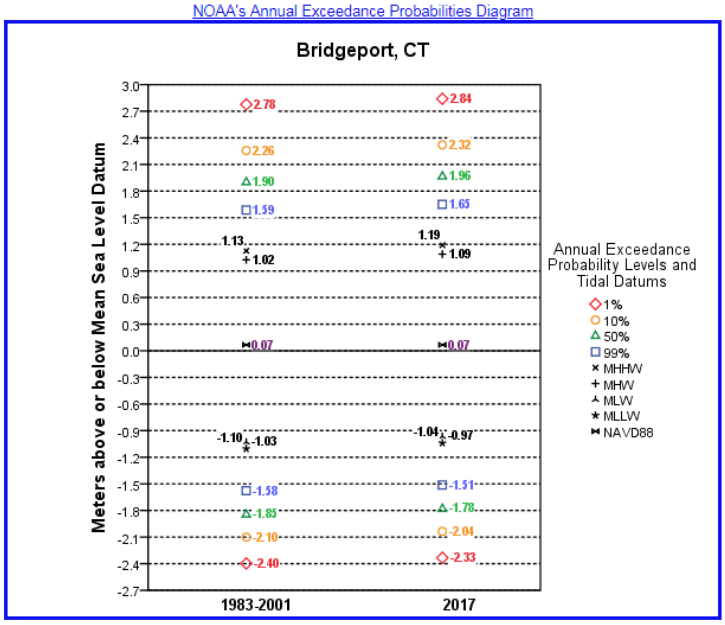
Print Gauge Datum Chart



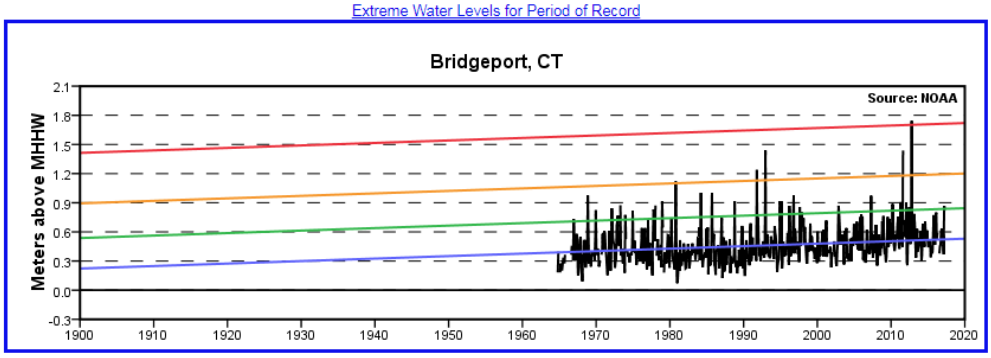
Estimated Relative Sea Level Change
from 2012 To 2095 Westport - Storm Surge Study
8467150, Bridgeport, CT
NOAA's 2006 Published Rate: 0.00840 feet/yr
All values are expressed in feet

Year	NOAA Low	USACE Low	NOAA Int Low	USACE Int	NOAA Int High	USACE High	NOAA High
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.03	0.03	0.04	0.04	0.06	0.07	0.09
2020	0.07	0.07	0.10	0.10	0.18	0.21	0.26
2025	0.11	0.11	0.17	0.17	0.31	0.37	0.46
2030	0.15	0.15	0.24	0.24	0.45	0.54	0.68
2035	0.19	0.19	0.32	0.32	0.61	0.73	0.93
2040	0.24	0.24	0.40	0.40	0.78	0.94	1.21
2045	0.28	0.28	0.49	0.49	0.97	1.17	1.51
2050	0.32	0.32	0.58	0.58	1.17	1.42	1.83
2055	0.36	0.36	0.68	0.68	1.38	1.68	2.18
2060	0.40	0.40	0.78	0.78	1.61	1.97	2.56
2065	0.45	0.45	0.88	0.88	1.85	2.27	2.96
2070	0.49	0.49	0.99	0.99	2.11	2.59	3.39
2075	0.53	0.53	1.11	1.11	2.38	2.94	3.84
2080	0.57	0.57	1.22	1.22	2.67	3.29	4.32
2085	0.61	0.61	1.35	1.35	2.97	3.67	4.83
2090	0.66	0.66	1.47	1.47	3.29	4.07	5.36
2095	0.70	0.70	1.61	1.61	3.61	4.48	5.91

NOAA's Annual Exceedance Probabilities Diagram



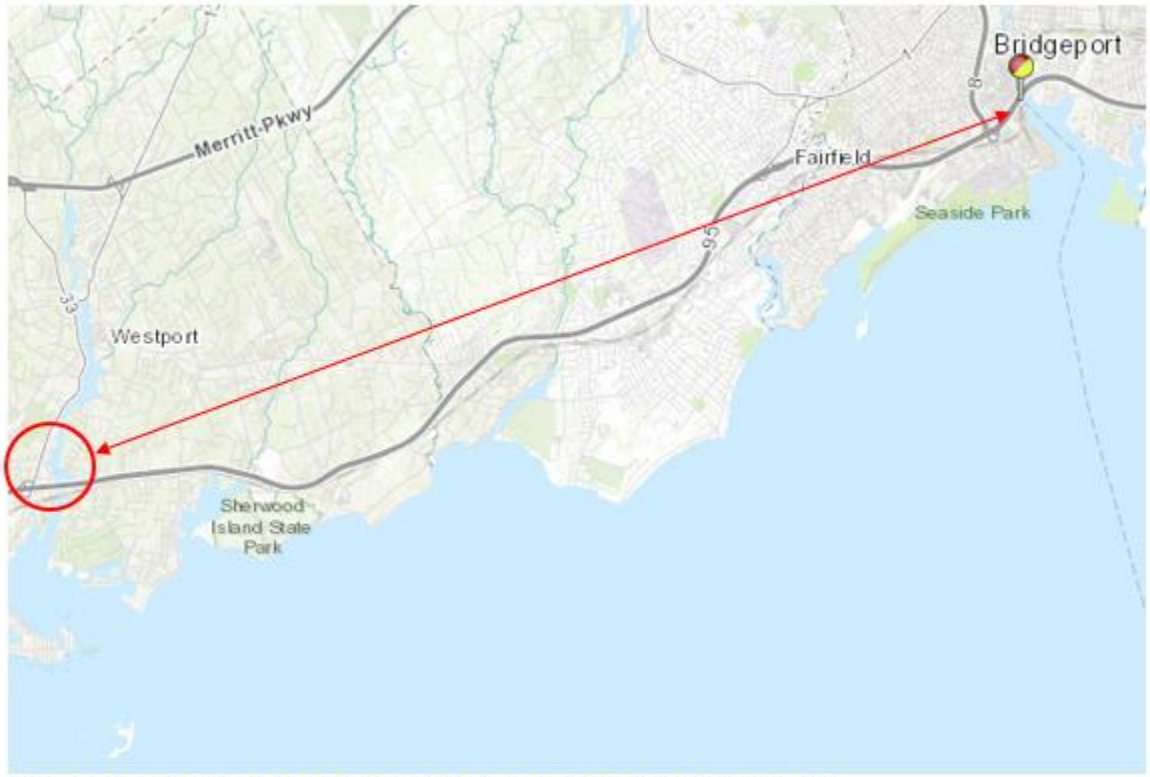
Extreme Water Levels for Period of Record



Appendix D

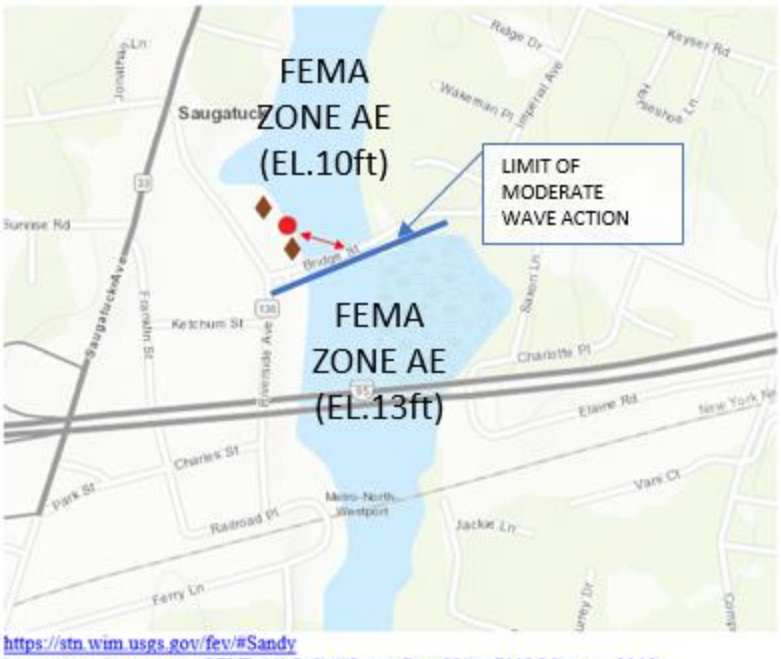
The nearest NOAA Coastal Gauge was located to account for the sea level rise in the expected lifespan of the new bridge (2095). The station nearest to the project is based in Bridgeport Connecticut. The most recent Extreme Event Water Level was seen during Hurricane Sandy in 2012. During the storm, storm sensor CTFI00006, located slightly north of the bridge, recorded high water mark elevations of 10.1ft (NAVD88).

Location of the nearest NOAA Coastal Gauge (No. 8467150)



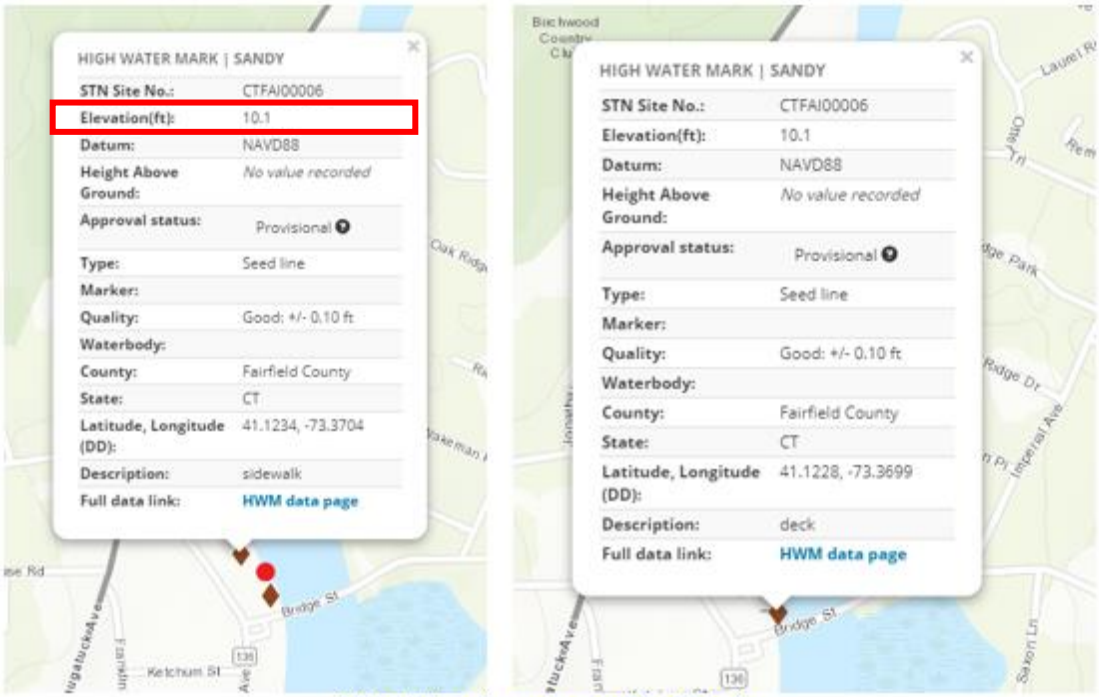
https://tidesandcurrents.noaa.gov/map/index.shtml?region=Connecticut

Location of the nearest Storm Sensor (CTFI00006)



https://stn.wim.usgs.gov/fev/#Sandy
https://stn.wim.usgs.gov/STNPublicInfo/#/SensorPage?Site=7112&Sensor=2145

High Water Mark Elevations recorded by the storm sensor during Hurricane Sandy



https://stn.wim.usgs.gov/fev/#Sandy

Table 1b: Maximum recorded water levels in geographic order for Hurricane Sandy, October 2012, referenced to MLLW and NAVD88 (where available). Storm Tide includes both tidal and meteorological forces and storm surge represents the observed water level (storm tide) minus predicted astronomical tide. Stations where the historical maximum water level was exceeded are highlighted in gray.

Station Name	Station ID	Date & Time GMT	Storm Tide (m, MLLW)	Predicted (m, MLLW)	Storm Surge/ Residual (m)	Storm Tide (m, NAVD88)	Storm Tide (ft, MLLW)	Predicted (ft, MLLW)	Storm Surge/ Residual (ft)	Storm Tide (ft, NAVD88)
Washington, DC	8594900	10/31/2012 00:06	1.863	0.887	0.976	1.438	6.11	2.91	3.20	4.72
[1] Solomons Island, MD	8577330	10/30/2012 22:48	0.894	0.267	0.627	0.635	2.93	0.88	2.05	2.08
Annapolis, MD	8575512	10/30/2012 13:00	1.183	0.192	0.991	0.948	3.88	0.63	3.25	3.11
Baltimore, MD	8574680	10/30/2012 10:36	1.420	0.351	1.069	1.166	4.66	1.15	3.51	3.83
Chesapeake City, MD	8573927	10/30/2012 13:54	1.808	0.787	1.021	n/a	5.93	2.58	3.35	n/a
Tolchester Beach, MD	8573364	10/30/2012 11:24	1.460	0.410	1.050	n/a	4.79	1.35	3.44	n/a
Cambridge, MD	8571892	10/29/2012 21:30	1.386	0.633	0.753	1.049	4.55	2.08	2.47	3.44
[3] Bishops Head, MD	8571421	10/30/2012 18:36	1.310	0.661	0.649	0.930	4.30	2.17	2.13	3.05
Ocean City Inlet, MD	8570283	10/29/2012 13:42	1.847	0.707	1.140	1.348	6.06	2.32	3.74	4.42
Lewes, DE	8557380	10/29/2012 13:00	2.654	1.478	1.176	1.853	8.71	4.85	3.86	6.08
[2] Brandywine Shoal Light, DE	8555889	10/29/2012 12:00	2.470	1.682	0.788	n/a	8.10	5.52	2.58	n/a
Reedy Point, DE	8551910	10/30/2012 05:42	2.774	1.306	1.468	1.869	9.10	4.28	4.82	6.13
[3] Delaware City, DE	8551762	10/30/2012 05:54	2.968	1.332	1.636	n/a	9.74	4.37	5.37	n/a
Newbold, PA	8548989	10/30/2012 09:18	3.731	2.117	1.614	n/a	12.25	6.95	5.30	n/a
[3] Philadelphia, PA	8545240	10/30/2012 08:06	3.237	1.602	1.635	2.292	10.62	5.26	5.36	7.52
[3] Marcus Hook, PA	8540433	10/30/2012 06:48	3.100	1.450	1.650	n/a	10.17	4.76	5.41	n/a
Burlington, Delaware River, NJ	8539094	10/30/2012 09:12	3.563	1.882	1.681	n/a	11.69	6.17	5.52	n/a
Tacony-Palmyra Bridge, NJ	8538886	10/30/2012 08:36	3.324	1.707	1.617	n/a	10.91	5.60	5.31	n/a
[3] Ship John Shoal, NJ	8537121	10/30/2012 04:12	2.872	1.531	1.341	n/a	9.42	5.02	4.40	n/a
[3] Cape May, NJ	8536110	10/29/2012 13:42	2.717	1.645	1.072	1.797	8.91	5.40	3.51	5.89
Atlantic City, NJ	8534720	10/30/2012 00:24	2.712	1.242	1.470	1.915	8.90	4.07	4.83	6.28
[2,3] Sandy Hook, NJ	8531680	10/29/2012 23:36	4.033	1.422	2.611	3.175	13.23	4.67	8.56	10.42
[3] Bergen Point West Reach, NY	8519483	10/30/2012 01:24	4.443	1.571	2.872	n/a	14.58	5.15	9.43	n/a
[3] The Battery, NY	8518750	10/30/2012 01:24	4.284	1.418	2.866	3.438	14.06	4.65	9.41	11.28
[3] Kings Point, NY	8516945	10/30/2012 02:06	4.361	1.758	2.603	n/a	14.31	5.77	8.54	n/a
Montauk, NY	8510560	10/30/2012 00:12	2.169	0.574	1.595	1.691	7.12	1.88	5.24	5.55
[3] Bridgeport, CT	8467150	10/30/2012 02:06	4.007	1.617	2.390	2.836	13.15	5.31	7.84	9.30

[1] Sensor reached physical limit on measurements and did not record a maximum value.
[2] Sensor was damaged or destroyed and likely did not record a maximum water level
[3] Maximum recorded water level value exceeded historical maximum value.

NOAA NOS Hurricane Sandy Water Level & Meteorological Data Report 9

Appendix E

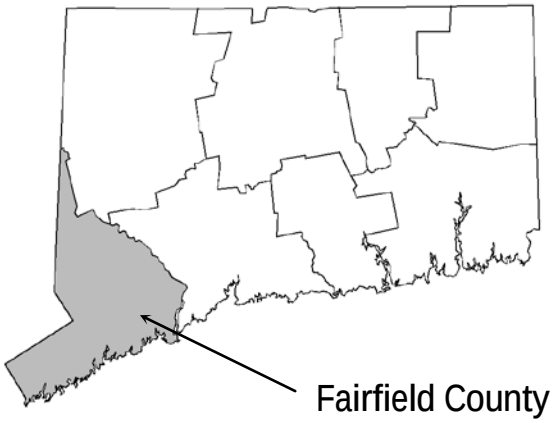
FEMA Flood Insurance Study (Volume 1 of 6), Study No. 09001CV001C, revised 10/16/2016

FLOOD INSURANCE STUDY



VOLUME 1 OF 6

FAIRFIELD COUNTY, CONNECTICUT
(ALL JURISDICTIONS)



COMMUNITY NAME	COMMUNITY NUMBER
BETHEL, TOWN OF	090001
BRIDGEPORT, CITY OF	090002
BROOKFIELD, TOWN OF	090003
DANBURY, CITY OF	090004
DARIEN, TOWN OF	090005
EASTON, TOWN OF	090006
FAIRFIELD, TOWN OF	090007
GREENWICH, TOWN OF	090008
MONROE, TOWN OF	090009
NEW CANAAN, TOWN OF	090010
NEW FAIRFIELD, TOWN OF	090188
NEWTOWN, TOWN OF	090011
NORWALK, CITY OF	090012
REDDING, TOWN OF	090141
RIDGEFIELD, TOWN OF	090013
SHELTON, CITY OF	090014
SHERMAN, TOWN OF	090166
STAMFORD, CITY OF	090015
STRATFORD, TOWN OF	090016
TRUMBULL, TOWN OF	090017
WESTON, TOWN OF	090018
WESTPORT, TOWN OF	090019
WILTON, TOWN OF	090020

Revised:
October 16, 2013

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
09001CV001C

3.3 Coastal Hydrologic Analyses

The stillwater elevation is the elevation of the water due to the effects of the astronomic tides and storm surge on the water surface. Hydrologic analyses carried out to establish the peak discharge-frequency relationships for Long Island Sound flooding sources affecting the communities of Bridgeport, Darien, Fairfield, Greenwich, Norwalk, Stamford, Stratford, and Westport serve as a basis of coastal hydraulic analyses using detailed methods in accordance with Appendix D of the "Guidance for Coastal Flooding Analyses and Mapping," of the April 2003 FEMA "Guidelines and Specifications for Flood Hazard Mapping Partners" (Reference 113).

For this effective study, the 10-, 2-, 1-, and 0.2-percent-annual-chance floods for the nearest gages to Fairfield County on Long Island Sound were obtained from the "Regional Frequency Analyses using L-Moments" memorandum developed by STARR (Reference 114) for areas subject to coastal flooding. Table 8 contains the stillwater elevations determined at the nearest tide gage stations to Fairfield County. These values were linearly interpolated to all coastal transects throughout the county for use in coastal hydraulic analyses.

TABLE 8 - SUMMARY OF COASTAL STILLWATER ELEVATIONS

	ELEVATION (feet NAVD88)			
FLOODING SOURCE AND LOCATION	10-PERCENT-ANNUAL-CHANCE	2-PERCENT-ANNUAL-CHANCE	1-PERCENT-ANNUAL-CHANCE	0.2-PERCENT-ANNUAL-CHANCE
LONG ISLAND SOUND				
Willets Point, Tide Station ID: 8516990	8.9	10.7	11.4	13.0
Stamford Hurricane Barrier (41°2.2'N, 73° 32.1' W)	8.5	10.2	10.9	12.3
Bridgeport, Tide Station ID: 8467150	7.8	9.3	10.0	11.3
New Haven, Tide Station ID: 8465705	6.9	8.3	8.9	10.1

Transects (profiles) were located for coastal hydrologic and hydraulic analyses perpendicular to the average shoreline along areas subject to coastal flooding and extending inland to a point where wave action ceased in accordance with the "Users Manual for Wave Height Analysis" (Reference 115). Transects were placed with consideration of topographic and structural changes of the land surface, as well as the cultural characteristics of the land so that they would closely represent local conditions.

Coastal transect topography data was obtained from Light Detection and Ranging (LiDAR) data collected in December 2006 by Terrapoint USA for Dewberry & Davis LLC. Data is accurate to 2-ft contours (Reference 116). Vertical accuracy is 0.33 ft at a 95-percent confidence interval. Bathymetric data was obtained from the National Oceanographic and Atmospheric Administration (NOAA) National Ocean Service (NOS) Hydrographic Data Base (NOSHDB) and Hydrographic Survey Meta Data Base (HSMDB) (NOAA, May 27, 2010) (Reference 117). The sounding datum of mean low low water (MLLW) was converted to vertical datum NAVD88.

Transects were spaced close together in areas of complex topography and dense development. In areas having more uniform characteristics, transects were spaced at larger intervals. It was also necessary to locate transects in areas where unique flooding existed and in areas where computed wave heights varied significantly between adjacent transects.

3.4 Coastal Hydraulic Analyses

Wave height is the distance from the wave trough to the wave crest. The height of a wave is dependent upon wind speed and duration, water depth, and length of fetch. Offshore (deep water) and near shore (shallow water) heights and wave periods were calculated for restricted and unrestricted fetch settings following the methodology described in the February 2007 FEMA "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" (Reference 118), for each coastal transect.

An extremal analysis of historical wind gage records was performed to determine the thresholds for peak wind speeds using three Peaks Over Threshold (POT) statistical methods. The wind speed calculated from the extremal analysis for Sikorsky Airport was used for Fairfield County wave height calculations at each coastal transect location. Wind speed data sets used in the extremal analyses were for the period December 1942 – May 2010.

Wave setup was assumed to be an important factor in determining total water level, since the coastline has historically experienced flooding damage above the predicted storm surge elevations. Wave setup is based upon wave breaking characteristics and profile slope. As stated in the "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" (Reference 118), "Wave setup can be a significant contributor to the total water level landward of the +/- MSL shoreline and should be included in the determination of coastal BFEs." Wave setup values were calculated to the entire open coast shoreline in each community. Wave setup for each coastal transect was calculated by the Direct Integration Method (DIM) developed by Goda (2000) as described in the FEMA "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" (Reference 118). For those coastal transects where a structure was located, the wave setup against the coastal structure was also calculated. For profiles with vertical structures or revetments, a failed structure analysis was performed and a new profile of the failed structure was generated and analyzed, in accordance with the USACE, Coastal Engineering Research Center report "Criteria for Evaluating Coastal Flood Protection Structures," (TR CERC-89-15) (Reference 119). The more conservative result of the two analyzed conditions was mapped.

Erosion analysis using FEMA's Coastal Hazard Analysis Modeling Program (CHAMP) Version 2.0 (Reference 120) was performed for profiles with erodible dunes and without coastal structures, such as vertical walls or revetments. The dune subject to erosion is a sandy feature with potentially light vegetation. Any thickly vegetated, rocky, silty, or clayey dune features or bluffs are assumed not subject to erosion. Predicted post-storm erosion profiles were used for analysis of wave heights associated with coastal storm surge flooding, where appropriate.

The methodology for analyzing the effects of wave heights is described in a report entitled "Methodology for Calculating Wave Action Effects Associated with Storm Surges," prepared by the National Academy of Sciences (Reference 121). This method is based on three major concepts. First, depth-limited waves in shallow water reach maximum breaking height that is equal to 0.78 times the stillwater depth. The wave crest is 70 percent of the total wave height above the stillwater level. The second major concept is that wave height may be diminished by dissipation of energy due to the presence of obstructions such as sand dunes, dikes and seawalls, buildings, rising topography, and vegetation. The amount of energy dissipation is a function of the physical characteristics of the obstruction and is determined by procedures prescribed in the NAS report. The third major concept is that wave height can be regenerated in open fetch areas due to the transfer of wind energy to the water. This added energy is related to fetch length and depth.

Along each transect, overland wave propagation was computed considering the combined effects of changes in ground elevation, vegetation, and physical features. Wave heights were calculated to the nearest 0.1 foot, and wave crest elevations were determined at whole-foot increments. The calculations were carried inland along the transect until the wave crest elevation was permanently less than 0.5 foot above the total water elevation or the coastal flooding met another flood source (i.e. riverine) with an equal water-surface elevation. The results of the calculations are accurate until local topography, vegetation, or cultural development of the area undergoes any major changes.

Areas of the coastline subject to significant wave attack are referred to as coastal high hazard zones. The USACE has established the 3-foot breaking wave as the criterion for identifying the limit of coastal high hazard zones (Reference 122). The 3-foot wave has been determined as the minimum size wave capable of causing major damage to conventional wood frame or brick veneer structures. This criterion has been adopted by FEMA for the determination of V-zones.

It has been shown in laboratory tests and observed in post storm damage assessments that wave heights as little as 1.5 feet can cause damage to and failure of typical Zone AE construction. Therefore, for advisory purposes only, a Limit of Moderate Wave Action (LiMWA) boundary has been added in coastal areas subject to moderate wave action. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave, and was delineated for all areas subject to significant wave attack in accordance with "Procedure Memorandum No. 50 – Policy and Procedures for Identifying and Mapping Areas Subject to Wave Heights Greater than 1.5 feet as an Informational Layer on Flood Insurance Rate Maps (FIRMS)."

The effects of wave hazards in the Zone AE (or shoreline in areas where VE Zones are not identified) and the limit of the LiMWA boundary are similar to, but less severe than, those in Zone VE where 3-foot breaking waves are projected during a 1-percent-annual-chance flooding event.

In areas where wave runup elevations dominate over wave heights, such as areas with steeply sloped beaches, bluffs, and/or shore-parallel flood protection structures, there is no evidence to date of significant damage to residential structures by runup depths less than 3 feet. However, to simplify representation, the LiMWA was continued immediately landward of the VE/AE boundary in areas where wave runup elevations dominate. Similarly, in areas where the Zone VE designation is based on the presence of a primary frontal dune (PFD) or wave overtopping, the LiMWA was also delineated immediately landward of the Zone VE/AE boundary.

Wave runup is the uprush of water caused by the interaction of waves with the area of shoreline where the stillwater hits the land or other barrier intercepting the stillwater level. The wave runup elevation is the vertical height above the stillwater level ultimately attained by the extremity of the uprushing water. Wave runup at a shore barrier can provide flood hazards above and beyond those from stillwater inundation. Guidance in the February 2007 FEMA "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" (Reference 118) suggests using the 2-percent wave runup value, the value exceeded by 2 percent of the runup events. The 2-percent wave runup value is particularly important for steep slopes and vertical structures. Wave runup was calculated for each coastal transect using methods from the Shore Protection Manual (SPM) (Reference 123) for vertical structures, Technical Advisory Committee for Water Retaining Structures (TAW) method for sloped structures with a slope steeper than 1:8, and mean runup height calculated by the FEMA Wave Runup Model RUNUP 2.0 multiplied by 2.2 was used to obtain the 2-percent runup height for non-vertical structures and profiles with a slope less than 1:8, as described in the February 2007 "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" to Appendix D, "Guidance for Coastal Flooding Analysis and Mapping" (Reference 118).

When the runup is greater than or equal to 3 feet above the maximum ground elevation, the BFE was determined to be 3 feet above the ground crest elevation, in accordance with guidance in Appendix D. Computed runup was not adjusted if less than three feet above the ground crest.

When runup overtops a barrier such as a partially eroded bluff or a structure, the floodwater percolates into the bed and/or runs along the back slope until it reaches another flooding source or a ponding area. Standardized procedures for the treatment of shallow flooding and ponding were applied as described in Appendix D of the "Guidance for Coastal Flooding Analysis and Mapping" (Reference 113).

Where uncertified coastal structures such as vertical walls and revetments were present, additional analysis for wave setup and wave runup was performed on profiles assuming the structure will partially fail during the base flood. The post-failure slopes applied for this analysis were 1:3 for sloped revetments, and 1:1.5 for vertical walls, which are

within the range suggested by the February 2007 "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update" to Appendix D (Reference 118).

In accordance with 44 CFR Section 59.1 of the NFIP the effect of the PFD on coastal high hazard area (V Zone) mapping was evaluated for the Cities of Bridgeport, Norwalk, Stamford and the Towns of Darien, Fairfield, Greenwich, Stratford and Westport. Identification of the PFD was based upon a FEMA approved numerical approach for analyzing the dune's dimensional characteristics. This approach utilized LiDAR data for the study areas (Reference 116) and assessed change in back slope to determine the landward toe of the PFD. In areas where the PFD defines the landward limit of the V Zone, the V Zone extends to the landward toe of the dune. The PFD defined the landward limit of the V Zone along portions of the shoreline were identified in the Cities of Bridgeport, Stamford and Norwalk and Towns of Stratford, Fairfield, Greenwich and Westport.

Because wave height calculations are based on such parameters as the size and density of vegetation, natural barriers such as sand dunes, buildings, and other man-made structures, detailed information on the physical and cultural features of the study area were obtained from aerial photography. LiDAR data of the shorelines of the Cities of Bridgeport, Norwalk, Stamford and the Towns of Darien, Fairfield, Greenwich, Stratford and Westport was used for the topographic data. The land-use and land cover data were obtained from USGS 2008 High Resolution Orthoimagery for the Bridgeport, Hartford, and New Haven, Connecticut Urban Areas (Reference 124).

Figure 2 represents a sample transect which illustrates the relationship between the stillwater elevation, the wave crest elevation, the ground elevation profile, and the location of the A/V zone boundary. Actual wave conditions may not include all the situations illustrated in Figure 2.

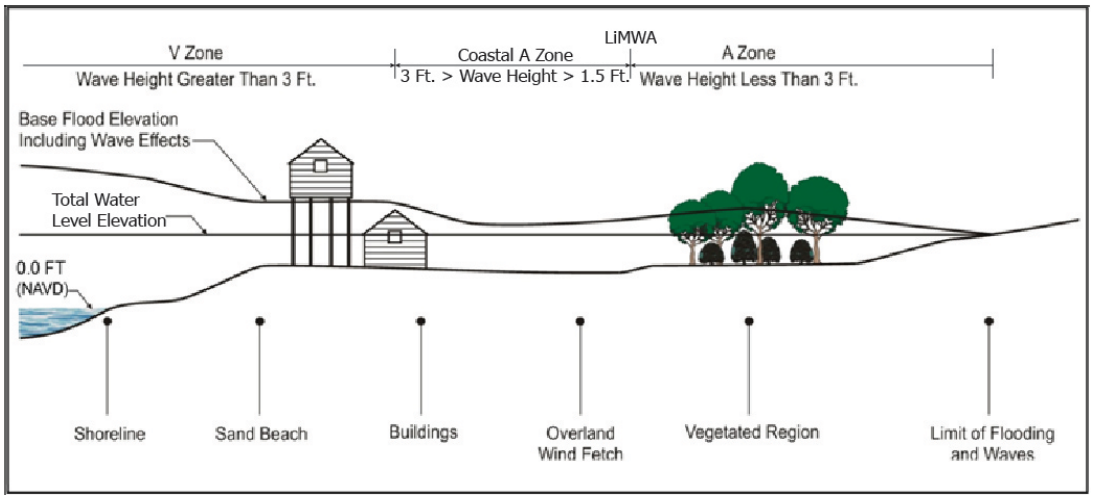


FIGURE 10 – TRANSECT SCHEMATIC

After analyzing computed wave heights along each transect, wave elevations were interpolated between transects. Various source data were used in the interpolation, including the topographic work maps, aerial photographs, and engineering judgment. Controlling features affecting the elevations are identified and considered in relation to their positions at a particular transect and their variation between transects.

Along each transect, wave envelope elevations were computed considering the combined effects of changes in ground elevation, vegetation, and physical features. Between transects, elevations were interpolated using the previously cited topographic maps, land-use data, land-cover data, and engineering judgment to determine the areal extent of flooding. The results of the calculations are accurate until local topography, vegetation, or cultural development within the community undergoes any major changes.

Table 9 provides a description of the transect locations, the 1-percent-annual-chance stillwater elevations, and the maximum 1-percent-annual-chance wave crest elevations. Figure 3, "Transect Location Map," illustrates the location of the transects for the county.

TABLE 9 - TRANSECT DESCRIPTIONS

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
1	At the shoreline of Long Island Sound, in the Town of Greenwich, the western corporate limits east of Byram Point	11.0	17	Primary Frontal Dune
2	At the shoreline of Long Island Sound, in the Town of Greenwich, to Byram Shore Road	11.0	20	Runup
3	At the shoreline of Long Island Sound, in the Town of Greenwich, West of Byram Harbor to Game Cock Road	11.0	22	Wave Overtopping Splash Zone
4	At the shoreline of Long Island Sound, in the Town of Greenwich, at Byram Harbor Game Cock Road to Harbor Drive	11.0	17	Runup
5	At the shoreline of Long Island Sound, in the Town of Greenwich, east of Byram Harbor from Harbor Drive to Glenwood Drive	9.2	20	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS - continued

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
6	At the shoreline of Long Island Sound, in the Town of Greenwich, from Glenwood Drive to the Eastern Line of Field Point Circle	11.0	20	Wave Overtopping Splash Zone
7	At the shoreline of Long Island Sound, in the Town of Greenwich, at Greenwich Harbor to Smith Cove	11.0	19	Wave Overtopping Splash Zone
8	At the shoreline of Long Island Sound, in the Town of Greenwich, East of Indian Harbor, Horse Island and Saw Island, to Nipowin Lane	11.0	19	Wave Overtopping Splash Zone
9	At the shoreline of Long Island Sound, in the Town of Greenwich, at Cos Cob Harbor, Nipowin Lane to Indian Point Lane	10.9	16	Wave Overtopping Splash Zone
10	At the shoreline of Long Island Sound, in the Town of Greenwich, between Cos Cob Harbor and Greenwich Cove	10.9	18	Breaking Wave Height
11	At the shoreline of Long Island Sound, in the Town of Greenwich, at Greenwich Cove including Greenwich Point to Tod's Driftway	10.9	19	Wave Overtopping Splash Zone
12	At the shoreline of Long Island Sound, in the Town of Greenwich, east of Greenwich Point between East Point Lane and Rocky Point Road	10.8	18	Wave Overtopping Splash Zone
13	At the shoreline of Long Island Sound, in the City of Stamford, Rocky Point Lane to Dolphin Cove Quay	10.8	17	Wave Overtopping Splash Zone
14	At the shoreline of Long Island Sound, in the City of Stamford, at Stamford Harbor, Dolphin Cove Quay to Downs Avenue	10.8	19	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS – continued

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
15	At the shoreline of Long Island Sound, in the City of Stamford, from Downs Avenue to Saddle Rock Road	10.8	17	Wave Overtopping Splash Zone
16	At the shoreline of Long Island Sound, in the City of Stamford, Southwest of Westcott Cove, From Saddle Rock Road to Wallacks Drive	10.8	19	Breaking Wave Height
17	At the shoreline of Long Island Sound, in the City of Stamford, east of Westcott Cove at Cove Harbor From Wallacks Drive to Cove Island Park	10.7	19	Wave Overtopping Splash Zone
18	At the shoreline of Long Island Sound, in the City of Stamford, at Cove Island and Holly Pond, from Cove Island Park to Pratt Island	10.7	16	Breaking Wave Height
19	At the shoreline of Long Island Sound, in the Town of Darien, from Pratt Island to Pear Tree Point Road	10.7	18	Wave Overtopping Splash Zone
20	At the shoreline of Long Island Sound, in the Town of Darien, at Longneck Point, from Pear Tree Point Road to Long Neck Point Road	10.7	19	Wave Overtopping Splash Zone
21	At the shoreline of Long Island Sound, in the Town of Darien, at Scotts Cove, from Long Neck Point Road to Contentment Island Road	10.6	17	Runup
22	At the shoreline of Long Island Sound, in the Town of Darien, at the eastern shore of Contentment Island Road to Five Mile River	10.6	19	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS – continued

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
23	At the shoreline of Long Island Sound, in the City of Norwalk, at Crescent Beach, from Five Mile River to Rocky Point Road	10.6	18	Breaking Wave Height
24	At the shoreline of Long Island Sound, in the City of Norwalk, between Wilson Cove and Tavern Island	10.5	19	Wave Overtopping Splash Zone
25	At the shoreline of Long Island Sound, in the City of Norwalk, between Hoyt Island and Keyser Point	10.5	16	Breaking Wave Height
26	At the shoreline of Long Island Sound, in the City of Norwalk, at Harbor View Beach, from Keyser Point to Neptune Avenue	10.5	19	Breaking Wave Height
27	At the shoreline of Long Island Sound, in the City of Norwalk, at Norwalk Harbor, from Neptune Avenue to Charles Creek	10.5	17	Breaking Wave Height
28	At the shoreline of Long Island Sound, in the City of Norwalk, east of Norwalk Harbor near Calf Pasture Island, from Charles Creek to Caufield Island Creek	10.4	17	Runup
29	At the shoreline of Long Island Sound, in the Town of Westport, between Corporate Limits and Bluff Point including Saugatuck River (Lower Reach)	10.4	19	Wave Overtopping Splash Zone
30	At the shoreline of Long Island Sound, in the Town of Westport, between Bluff Point and Saugatuck River (Lower Reach)	10.4	20	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS – continued

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
31	At the shoreline of Long Island Sound, in the Town of Westport, at the shoreline south of Owenoke Park, from Sagauck River (Lower Reach) to Compo Beach Road	10.4	19	Wave Overtopping Splash Zone
32	At the shoreline of Long Island Sound, in the Town of Westport, Compo Beach Road to Compo Road South	10.3	17	Breaking Wave Height
33	At the shoreline of Long Island Sound, in the Town of Westport, at Compo Cover, from Compo Road South to Sherwood Island Connector	10.3	18	Wave Overtopping Splash Zone
34	At the shoreline of Long Island Sound, in the Town of Westport, at the shoreline of Sherwood Island State Park, from Sherwood Island Connector to Burying Hill Road	10.3	18	Primary Frontal Dune
35	At the shoreline of Long Island Sound, in the Town of Westport, from Burying Hill Beach to south of Sasco Creek Beach	10.2	19	Runup
36	At the shoreline of Long Island Sound, in the Town of Fairfield, at Southport Harbor, from Beachside Lane to the East Bank of Mill River	10.2	17	Breaking Wave Height
37	At the shoreline of Long Island Sound, in the Town of Fairfield, at Sasco Hill Breach, from the East Bank of Mill River to Sasco Hill Road	10.2	17	Breaking Wave Height
38	At the shoreline of Long Island Sound, in the Town of Fairfield, from Sasco Hill Road to South Pine Creek Road	10.2	20	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS – continued

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
39	At the shoreline of Long Island Sound, in the Town of Fairfield, at South Pine Creek Beach, from South Pine Creek Road to Intersection of French Street and Pine Creek Avenue	10.2	19	Wave Overtopping Splash Zone
40	At the shoreline of Long Island Sound, in the Town of Fairfield, from the intersection of French Street and Pine Creek Avenue to Fairfield Beach Road	10.2	21	Runup
41	At the shoreline of Long Island Sound, in the Town of Fairfield, at Pine Creek Point, from Fairfield Beach Road to Old Dam Road	10.2	18	Breaking Wave Height
42	At the shoreline of Long Island Sound, in the Town of Fairfield, from Old Dam Road to College Place	10.1	18	Runup
43	At the shoreline of Long Island Sound, in the Town of Fairfield, from College Place to the West Bank of Ash Creek	10.1	17	Breaking Wave Height
44	At the shoreline of Long Island Sound, in the City of Bridgeport, from the West Bank of Ash Creek to Black Rock Harbor	10.0	19	Runup
45	At the shoreline of Long Island Sound, in the City of Bridgeport, from Black Rock Harbor to Iranistan Avenue	10.0	17	Wave Overtopping Splash Zone
46	At the shoreline of Long Island Sound, in the City of Bridgeport, at the eastern side of Seaside Park, from Iranistan Avenue to Monument Drive	9.9	19	Wave Overtopping Splash Zone

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

TABLE 9 - TRANSECT DESCRIPTIONS – continued

Transect	Location	Elevation (Feet NAVD88)		V Zone Mapping Method
		Stillwater 1-percent-annual-chance	Max. Wave Crest 1-percent-annual-chance [1]	
47	At the shoreline of Long Island Sound, in the City of Bridgeport, at Bridgeport Harbor, from Monument Drive to Pleasure Beach	9.8	18	Wave Overtopping Splash Zone
48	At the shoreline of Long Island Sound, in the Town of Stratford, at Long Beach and Lewis Gut, from Pleasure Beach to Oak Bluff Avenue	9.8	17	Wave Overtopping Splash Zone
49	At the shoreline of Long Island Sound, in the Town of Stratford, from Oak Bluff Avenue to Jefferson Street	9.7	17	Runup
50	At the shoreline of Long Island Sound, in the Town of Stratford, at Lordship Beach, from Jefferson Street to Cove Place	9.7	18	Breaking Wave Height
51	At the shoreline of Long Island Sound, in the Town of Stratford, at Stratford Point, from Cove Place to Ryegate Place	9.6	20	Wave Overtopping Splash Zone
52	At the shoreline of Long Island Sound, in the Town of Stratford, from Ryegate Place to Housatanic River	9.6	18	Wave Overtopping Splash Zone
53	At the shoreline of Long Island Sound, in the Town of Stratford, from Housatonic River to eastern corporate limits	9.6	15	Breaking Wave Height

[1] Because of map scale limitations, maximum wave elevations may not be shown on the FIRM.

The results of the coastal analysis using detailed methods are summarized in Table 10, "Transect Data," which provides the flood hazard zone and base flood elevations for each coastal transect, along with the 10-, 2-, 1- and 0.2-percent-annual-chance flood stillwater elevations from the Long Island Sound flooding source, including effects of wave setup where applicable. Historic flood damage information was also used in the determination of floodprone areas along the Fairfield shoreline.

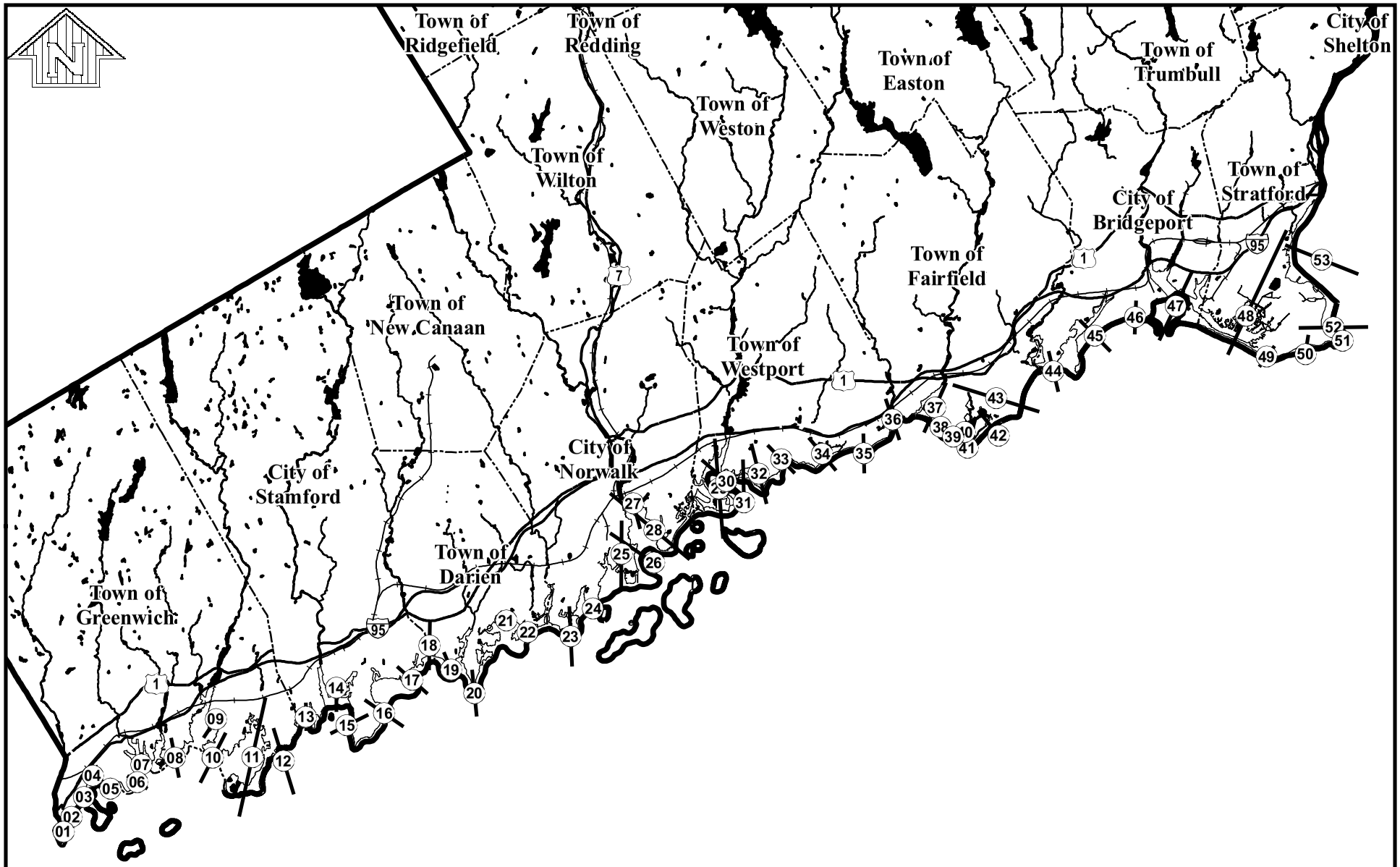


FIGURE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

FAIRFIELD COUNTY, CT

(ALL JURISDICTIONS)

TRANSECT LOCATION MAP

TABLE 10 - TRANSECT DATA

Flooding Source and Transect Number	Stillwater Elevation				Total Water Level [1]	Zone	Base Flood Elevation (Feet NAVD88) [2]
	10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance	1-percent-annual-chance		
LONG ISLAND SOUND							
Transect 1	8.6	10.4	11.0	12.5	12.1	AE	13-14
						VE	13-17
Transect 2	8.6	10.3	11.0	12.5	13.6	VE	17-20
Transect 3	8.6	10.3	11.0	12.5	14.9	AE	17
						VE	17-22
Transect 4	8.6	10.3	11.0	12.5	12.3	AE	13-14
						VE	14-17
Transect 5	8.6	10.3	11.0	12.5	13.8	AE	15-16
						VE	16-20
Transect 6	8.6	10.3	11.0	12.5	13.5	AE	15-16
						VE	16-20
Transect 7	8.6	10.3	11.0	12.5	12.9	AE	13-15
						VE	15-19
Transect 8	8.6	10.3	11.0	12.4	13.1	AE	13-15
						VE	15-19
Transect 9	8.6	10.2	10.9	12.4	11.4	AE	12-14
						VE	14-16
Transect 10	8.5	10.2	10.9	12.4	12.1	AE	12-14
						VE	14-18
Transect 11	8.5	10.2	10.9	12.4	13.8	AE	14-16
						VE	16-19
Transect 12	8.5	10.2	10.8	12.3	12.7	AE	13-15
						VE	15-18
Transect 13	8.5	10.1	10.8	12.3	11.8	AE	12-14
						VE	14-17
Transect 14	8.4	10.1	10.8	12.2	12.7	AE	13-15
						VE	15-19
Transect 15	8.4	10.1	10.8	12.2	11.9	AE	12-14
						VE	14-17

[*] Data not available.

[1] Including stillwater elevation and effects of wave setup.

[2] Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted.

TABLE 10 - TRANSECT DATA – continued

Flooding Source and Transect Number	Stillwater Elevation				Total Water Level [1]	Zone	Base Flood Elevation (Feet NAVD88) [2]
	10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance	1-percent-annual-chance		
LONG ISLAND SOUND - continued							
Transect 16	8.4	10.1	10.8	12.2	12.5	AE	13-15
						VE	15-19
Transect 17	8.4	10.0	10.7	12.2	13.3	AE	13-15
						VE	15-19
Transect 18	8.4	10.0	10.7	12.1	11.5	AE	12-14
						VE	14-16
Transect 19	8.4	10.0	10.7	12.1	12.6	AE	13-15
						VE	15-18
Transect 20	8.3	10.0	10.7	12.1	12.9	AE	13-15
						VE	15-19
Transect 21	8.3	10.0	10.6	12.1	11.6	AE	12-14
						VE	14-17
Transect 22	8.3	9.9	10.6	12.0	12.8	AE	13-15
						VE	15-19
Transect 23	8.3	9.9	10.6	12.0	12.7	AE	13-15
						VE	15-18
Transect 24	8.2	9.9	10.5	12.0	12.6	AE	13-15
						VE	15-19
Transect 25	8.2	9.8	10.5	11.9	10.9	AE	11-13
						VE	13-16
Transect 26	8.2	9.8	10.5	11.9	12.8	AE	14-15
						VE	15-19
Transect 27	8.2	9.8	10.5	11.9	11.6	AE	13-14
						VE	14-17
Transect 28	8.2	9.8	10.4	11.9	12.1	AE	12-14
						VE	14-17
Transect 29	8.1	9.7	10.4	11.8	12.7	AE	13-15
						VE	15-19
Transect 30	8.1	9.7	10.4	11.8	13.4	AE	13-16
						VE	17-20

* Data not available.

[1] Including stillwater elevation and effects of wave setup.

[2] Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted.

TABLE 10 - TRANSECT DATA – continued

Flooding Source and Transect Number	Stillwater Elevation				Total Water Level [1]	Zone	Base Flood Elevation (Feet NAVD88) [2]
	10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance	1-percent-annual-chance		
LONG ISLAND SOUND - continued							
Transect 31	8.1	9.7	10.4	11.8	12.6	AE	13-15
						VE	15-19
Transect 32	8.1	9.7	10.3	11.7	11.4	AE	11-13
						VE	13-17
Transect 33	8.1	9.7	10.3	11.7	12.3	AE	12-14
						VE	14-18
Transect 34	8.0	9.6	10.3	11.7	12.0	AE	12-14
						VE	14-18
Transect 35	8.0	9.6	10.2	11.6	12.8	AE	13-15
						VE	15-19
Transect 36	8.0	9.6	10.2	11.6	11.5	AE	12-14
						VE	14-17
Transect 37	8.0	9.5	10.2	11.6	11.4	AE	12-13
						VE	13-17
Transect 38	8.0	9.5	10.2	11.5	13.4	AE	14-16
						VE	16-20
Transect 39	8.0	9.5	10.2	11.5	12.7	AE	13-15
						VE	15-19
Transect 40	8.0	9.5	10.2	11.5	13.8	AE	14-16
						VE	16-21
Transect 41	7.9	9.5	10.2	11.5	11.9	AE	12-14
						VE	14-18
Transect 42	7.9	9.5	10.1	11.5	12	AE	13-14
						VE	14-18
Transect 43	7.9	9.5	10.1	11.5	11.1	AE	11-13
						VE	13-17
Transect 44	7.9	9.4	10.0	11.4	12.9	AE	14-15
						VE	15-19

[*] Data not available.

[1] Including stillwater elevation and effects of wave setup.

[2] Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted.

TABLE 10 - TRANSECT DATA – continued

Flooding Source and Transect Number	Stillwater Elevation				Total Water Level [1]	Zone	Base Flood Elevation (Feet NAVD88) [2]
	10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance	1-percent-annual-chance		
LONG ISLAND SOUND - continued							
Transect 45	7.8	9.3	10.0	11.3	11.6	AE	12-14
						VE	14-17
Transect 46	7.7	9.3	9.9	11.2	12.8	AE	14-15
						VE	15-19
Transect 47	7.7	9.2	9.8	11.1	12.2	AE	12-14
						VE	15-18
Transect 48	7.6	9.2	9.8	11.1	11.7	AE	12-14
						VE	14-17
Transect 49	7.6	9.1	9.7	11.1	11.3	AE	11-13
						VE	13-17
Transect 50	7.6	9.1	9.7	11.0	12.2	AE	13-14
						VE	14-18
Transect 51	7.6	9.0	9.6	11.0	13.3	AE	13-14
						VE	17-20
Transect 52	7.5	9.0	9.6	10.9	11.9	AE	12-14
						VE	14-18
Transect 53	7.5	9.0	9.6	10.9	11.3	AE	12-13
						VE	13-15

* Data not available.

[1] Including stillwater elevation and effects of wave setup.

[2] Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted.

3.5 Vertical Datum

All FISs and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the NAVD88, many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRMs are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be

referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities.

Versions of the FIS report and FIRM prior to June 18, 2010 were referenced to NGVD29. When a datum conversion is effected for a FIS report and FIRM, the Flood Profiles, BFEs and ERMs reflect the new datum values. To compare structure and ground elevations to 1-percent-annual-chance (100-year) flood elevations shown in the FIS and on the FIRM, the subject structure and ground elevations must be referenced to the new datum values.

As noted above, the elevations shown in the FIS report and on the FIRM for Fairfield County are referenced to NAVD88. Ground, structure, and flood elevations may be compared and/or referenced to NGVD29 by applying a standard conversion factor to the NAVD88 values. The conversion factor is 1.0 foot, where NGVD29 = NAVD88 + 1.0 foot.

The BFEs shown on the FIRM represent whole-foot rounded values. For example, a BFE of 102.4 will appear as 102 on the FIRM and 102.6 will appear as 103. Therefore, users that wish to convert the elevations in this FIS to NGVD29 should apply the stated conversion factor(s) to elevations shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1 foot.

The BFEs shown on the FIRM represent whole-foot rounded values. For example, a BFE of 102.4 will appear as 102 on the FIRM and 102.6 will appear as 103. Therefore, users that wish to convert the elevations in this FIS to NGVD29 should apply the stated conversion factor(s) to elevations shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1 foot.

For more information on NAVD88, see "Converting the National Flood Insurance Program to the North American Vertical Datum of 1988," FEMA Publication FIA-20/June 1992, or contact the Spatial Reference System Division, National Geodetic Survey, NOAA, Silver Spring Metro Center, 1315 East-West Highway, Silver Spring, Maryland 20910 (Internet address http://www.ngs.noaa.gov).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS provides 1-percent-annual-chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent-annual-chance flood elevations; delineations of the 1- and 0.2-percent-annual-chance floodplains; and 1-percent-annual-chance floodway. This information is presented on the FIRM and in many components of the FIS, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

Appendix F

CJL Elevations in NAVD88 (includes land up to and including referenced elevations)

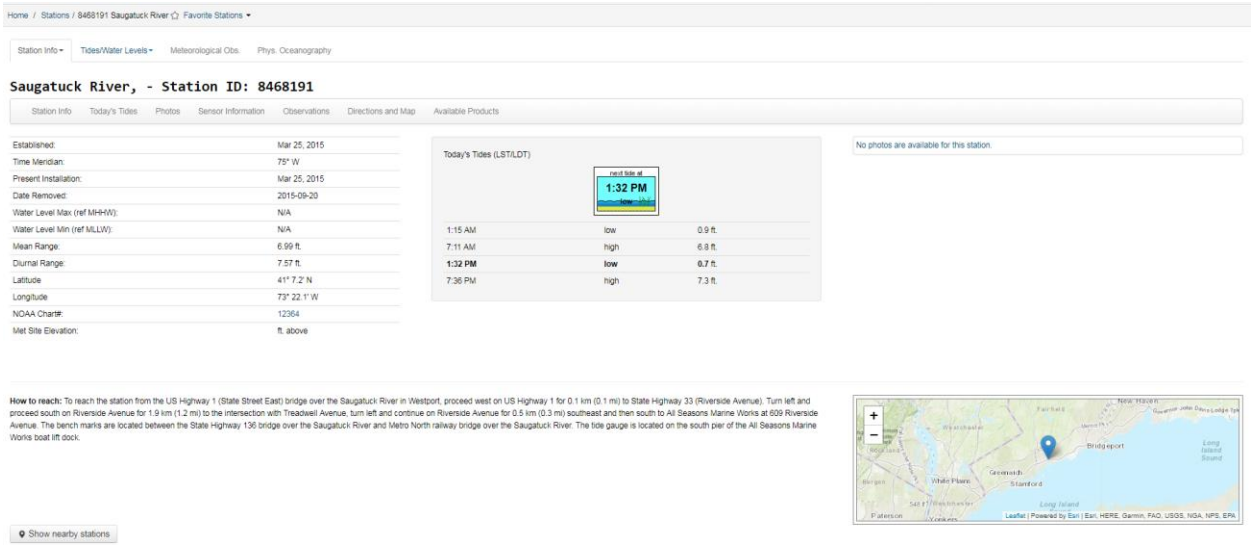
Long Island Sound		Connecticut River		Housatonic River	
Greenwich	5.5'	Old Lyme	2.9'	Stratford	5.0'
Stamford	5.5'	Old Saybrook	2.9'	Milford	5.1'
Darien	5.5'	Lyme	2.9'	Shelton	5.4'
Norwalk	5.4'	Essex	2.8'	Orange	5.4'
Westport	5.3'	Deep River	2.9'	Ansonia	5.4'
Fairfield	5.2'	Chester	2.9'	Derby	5.4'
Bridgeport	5.0'	East Haddam	3.0'		
Stratford*	4.8'	Haddam	3.0'		
Milford*	4.7'	East Hampton	3.0'	**Thames River**	
Orange*	4.7'	Middletown	3.1'	New London	2.1'
West Haven	4.6'	Portland	3.3'	Groton	2.1'
New Haven	4.6'	Cromwell	3.3'	Waterford	2.2'
Hamden	4.6'	Rocky Hill	3.4'	Ledyard	2.3'
North Haven	4.6'	Glastonbury	3.5'	Montville	2.3'
East Haven	4.5'	Wethersfield	3.6'	Preston	2.3'
Branford	4.3'	East Hartford	3.8'	Norwich	2.4'
Guilford	4.0'	Hartford	3.8'		
Madison	3.7'	South Windsor	3.9'		
Clinton	3.4'	Windsor	3.9'		
Westbrook	3.2'	East Windsor	15.0'		
Old Saybrook*	2.9'	Windsor Locks	15.0'		
Old Lyme*	2.6'	Suffield	40.5'		
East Lyme	2.3'	Enfield	40.5'		
Waterford*	2.1'				
Groton*	2.0'				
Stonington	2.0'				

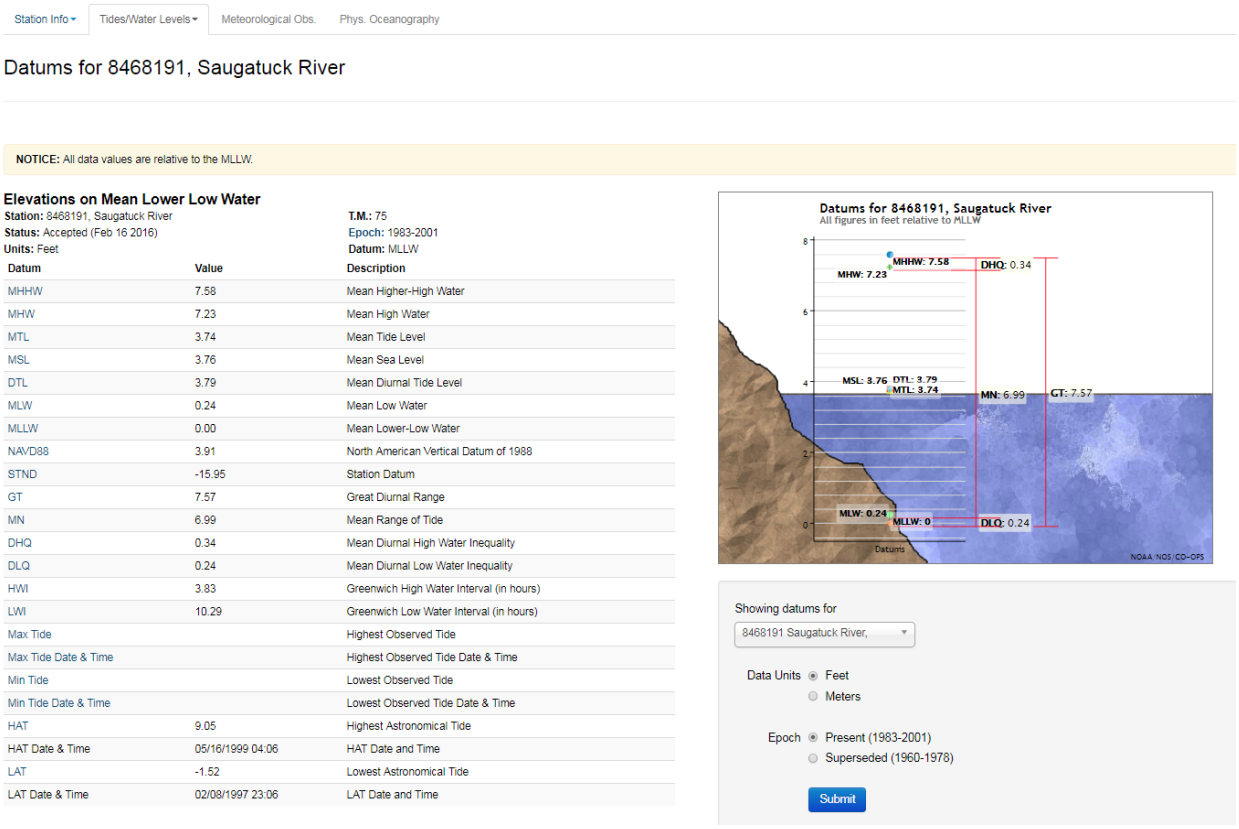
*Municipalities with multiple CJL elevations

In addition, please refer to the maps of the geographical boundary between Long Island Sound and the Connecticut River, Thames River, or Housatonic River.

Appendix G

https://tidesandcurrents.noaa.gov/datums.html?id=8468191





https://vdatum.noaa.gov/vdatumweb/vdatumweb?a=135104120180613

NOAA Tides/Water Levels

Date:	02/16/2016
Location	Saugatuck River
Station ID	8468191
Latitude	41° 7.2' N
Longitude	73° 22.1' W
Base Datum	MLLW

Conversion of base datum from MLLW to NAVD88

MLLW	0	
NAVD88	3.91	
Delta	-3.91	=MLLW-NAVD88

Conversions of Datums

Datum	MLLW	NAVD88
MHHW	7.58	3.67
MHW	7.23	3.32
MTL	3.74	-0.17
MSL	3.76	-0.15
DTL	3.79	-0.12
MLW	0.24	-3.67
MLLW	0	-3.91
NAVD88	3.91	0
STND	-15.95	-19.86
GT	7.57	3.66
MN	6.99	3.08
DHQ	0.34	-3.57
DLQ	0.24	-3.67
HWI	3.83	-0.08
LWI	10.29	6.38
HAT	9.05	5.14
LAT	-1.52	-5.43

APPENDIX M: Distribution List

Distribution List

1.1 Federal

Advisory Council on Historic Preservation
Office of the Executive Director
Reid Nelson, Executive Director
401 F Street, NW, Suite 308
Washington, DC 20001-2637

Office of the Assistant Secretary of Defense for Sustainment
Pentagon 1E518
3500 Defense Pentagon
Washington, DC 20301-3500

Federal Emergency Management Agency, Region 1
Frederick Doucette, Regional Administrator
99 High Street
Boston, MA 02110

Federal Railroad Administration
Office of Railroad Development
Paul Nissenbaum, Associate Administrator for Railroad Development
1200 New Jersey Avenue SE, MS-20
Washington, DC 20590

Federal Transit Administration, Region 1
Peter Butler, Regional Administrator
220 Binney St Suite 940
Cambridge, MA 02142

FHWA CT Division Office
450 Main Street, Suite 612
Hartford, CT 06103

National Oceanic and Atmospheric Administration (NOAA) Fisheries
Greater Atlantic Regional Office
Michael Pentony, Regional Administrator
55 Great Republic Drive
Gloucester, MA 01930-2276

National Park Service, Interior Region 1 Office (Northeast Regional Office)
Steve Sims, Acting Regional Director
1234 Market Street 20th Floor
Philadelphia, PA 19107

United States Army Corps of Engineers, New England District
Colonel Justin R. Pabis, PE
696 Virginia Road
Concord, MA 01742-2751

United States Coast Guard, Northeast District
Rear Admiral Michael E. Platt, U.S. Coast Guard Northeast Commander
408 Atlantic Avenue
Boston, MA 02110

United States Department of Energy
Office of NEPA Policy and Compliance (GC-54)
1000 Independence Avenue SW
Washington, DC 20585

United States Department of the Interior
Office of Environmental Policy & Compliance
1849 C Street NW STE 2607
Washington, DC 20240

United States Department of the Interior, Interior Region 1 - North Atlantic-Appalachian
Andrew L. Raddant, Regional Environmental Officer
5 Post Office Square, Room 18011
Boston, MA 02109

United States Environmental Protection Agency
Office of Federal Activities
NEPA Compliance Division
Mail Code 2203-A
1200 Pennsylvania Ave, N.W.
Washington, DC 20460

United States Environmental Protection Agency, Region I
Office of Environmental Review
Timothy Timmerman, Director
5 Post Office Square, Suite 100
Boston, MA 02109-3912

United States Fish and Wildlife Service Northeast Regional Office
Sharon Marino, Acting Regional Director
300 Westgate Center Drive
Hadley, MA 01035-9589

1.2 State

Connecticut Department of Economic and Community Development
Office of Arts and Historic Preservation
Elizabeth Shapiro, Director of Arts, Preservation and Museums
450 Columbus Boulevard, Ste 5
Hartford, CT 06103

Connecticut Department of Economic and Community Development
Office of Statewide Marketing and Tourism
Rachel Lenda, Director of Tourism
450 Columbus Boulevard, Ste 5
Hartford, CT 06103

Connecticut Council of Environmental Quality
Paul Aresta, Executive Director
79 Elm Street
Hartford, CT 06106

Connecticut Department of Agriculture
Bureau of Aquaculture and Laboratory Services
David H. Carey, Director
P.O. Box 97
190 Rogers Avenue
Milford, CT 06460

Connecticut Department of Administrative Services, Construction Services
Michelle Halloran Gilman, Commissioner
450 Columbus Boulevard
Hartford, CT 06103

Connecticut Department of Economic and Community Development
Daniel H. O'Keefe, Commissioner
450 Columbus Boulevard
Hartford, CT 06103

Connecticut Department of Energy and Environmental Protection
Katie Dykes, Commissioner
79 Elm Street
Hartford, CT 06106-5127

Connecticut Department of Housing
Seila Mosquera-Bruno, Commissioner
505 Hudson Street
Hartford, CT 06106-7106

Connecticut Department of Public Health
Manisha Juthani, MD, Commissioner
410 Capitol Avenue PO Box 340308
Hartford, CT 06134

Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, CT 06131

Connecticut Office of Policy and Management
Joshua Wojcik, Acting Secretary
450 Capitol Avenue
Hartford, CT 06106-1379

Connecticut State Historical Preservation Office
Cory Atkinson, Staff Archaeologist
450 Columbus Boulevard
Hartford, CT 06103

Preservation Connecticut
Christopher Wigren, Deputy Director
940 Whitney Ave
Hamden, CT 06517

1.3 Elected Officials

State Senator Ceci Maher
Legislative Office Building, Room 3300
300 Capitol Avenue
Hartford, CT 06106-1591

State Representative Dominique Johnson
Legislative Office Building, Room 4006
300 Capitol Avenue
Hartford, CT 06106-1591

State Representative Jonathan Steinberg
Legislative Office Building, Room 3902
300 Capitol Avenue
Hartford, CT 06106-1591

U.S. Representative Jim Himes, 4th District
350 Fairfield Ave. Suite 603
Bridgeport, CT 06604

U.S. Senator Christopher Murphy
Colt Gateway
120 Huyshope Avenue, Suite 401
Hartford, CT 06106

U.S. Senator Richard Blumenthal
90 State House Square, 10th Floor
Hartford, CT, 06103

1.4 Regional

South Western Region Metropolitan Planning Organization/Western CT Council of Governments
Francis Pickering, Executive Director
1 Riverside Road
Sandy Hook, CT 06482

1.5 Local

Town of Westport, Board of Selectman
Sara Amaro, Administrative Assistant Selectman's Office
110 Myrtle Avenue, Room 310
Westport, CT 06880

Town of Westport, Town Clerk
Jeffery Dunkerton
110 Myrtle Avenue, Room 105
Westport, CT 06880

Town of Westport, Conservation Commission
Michele Berglund, Administrative Assistant Conservation Department
110 Myrtle Avenue
Westport, CT 06880

Town of Westport, Department of Public Works
Peter Ratkiewich, Director
110 Myrtle Avenue, Room 210
Westport, CT 06880

Town of Westport, Fire Department
Matthew Cohen, Deputy Chief
515 Post Rd E
Westport, CT 06880

Town of Westport, Historic District Commission
Donna Douglass, Historic District Commission Coordinator
110 Myrtle Avenue, Room 108
Westport, CT 06880

Town of Westport, Marinas and Boating
Robert Giunta, Harbor Master
60 Compo Beach Road.
Westport, CT 06880

Town of Westport, Parks and Recreation Department
Erik Barbieri, Director
110 Myrtle Avenue
Westport, CT 06880

Town of Westport, Planning and Zoning Commission
Paul Lebowitz, Chair
110 Myrtle Avenue
Westport, CT 06880

Town of Westport, Police Department
David Farrell, Chief
50 Jesup Rd
Westport, CT 06880

Town of Westport, Representative Town Meeting
110 Myrtle Avenue
Westport, CT 06880

Town of Westport, Shellfish Commission
Colin Kelly, Director of Conservation
110 Myrtle Avenue
Westport, CT 06880

Westport-Weston Chamber of Commerce
Matthew Mandell, Executive Director and President
41 Riverside Avenue
Westport, CT 06880

The Westport Library
20 Jesup Road
Westport, CT 06880

APPENDIX N: Applicable Notices to Contractors, Standard Specifications

SECTION 1.10 - ENVIRONMENTAL COMPLIANCE

In Article 1.10.03-Water Pollution Control:
REQUIRED BEST MANAGEMENT PRACTICES

Add the following after Required Best Management Practice Number 13:

14. The Contractor is hereby notified that the State listed species of Special Concern Northern diamondback terrapin (*Malaclemys t. terrapin*), is present within the Project limits. Northern diamondback terrapins are the only species of turtle in North America that spends its life in brackish water (water that is less salty than sea water). They are most abundant in tidal estuaries and will also be found in salt marshes and tidal creeks. Northern diamondback terrapins nest on the sandy borders of these habitats from June to July. Northern diamondback terrapins hibernate during the winter submerged in the mud of tidal creeks. They enter hibernation as early as November and emerge as early as April through the end of May depending on water temperature.

    All construction activities taking place within the Project limits will need to be coordinated with the Office of Environmental Planning (OEP) through the Engineer. At least 10 days prior to the commencement of any physical construction activities, the Contractor shall, through the Engineer, arrange for a CTDOT OEP Environmental Inspector, or their authorized delegate, to meet and discuss proper protocol for maintaining environmental commitments made for the protection of this species and habitat. OEP will provide oversight through the Engineer to ensure that the following protocols are followed and maintained during the course of the Project.

    During the terrapin's dormant period (November 1 to May 31):
    - Once the areas within the Project limits have been inspected and cleared of any nest sites, construction activities will be allowed in upland areas.
    - Work is not allowed in wetland/watercourse and sandy border areas unless these areas were in active construction prior to November 1, and additionally, do not contain any areas of terrapin habitat.

    For any work done during the terrapin's active period, which includes the nesting and hatching period, (April 1 to October 31), the CTDOT will require the following precautionary measures to protect the terrapin and terrapin habitat:

    a. All construction personnel working within Northern diamondback terrapin habitat must be apprised of the species description and the possible presence of this listed species.

    b. Exclusionary practices will be required in order to prevent any Northern diamondback terrapin access to construction areas. These measures will need to be installed at the limits of disturbance as shown on the plans.

c. Exclusionary fencing shall be at least 20 inches tall and must be secured to and remain in contact with the ground. The Contractor shall regularly inspect and maintain the fencing to prevent any gaps or openings at ground level. Standard silt fence is adequate; fencing with netting shall not be used.

d. The Contractor must search the work area each morning for the presence of this listed species prior to any work being done.

e. Any Northern diamondback terrapins encountered within the immediate work area shall be carefully moved to an adjacent area outside of the excluded area and the Engineer shall be immediately informed to contact OEP with the location.

f. All staging and storage areas in the vicinity of Northern diamondback terrapin habitat, outside of previously paved locations, regardless of the duration of time they will be used, must be reviewed by and receive written approval from OEP through the Engineer.

g. No heavy machinery or vehicles may be parked in any identified Northern diamondback terrapin habitat.

h. Exclusionary fencing shall be removed when it is no longer needed, and silt fence shall be removed as soon as the area is stable, to allow for reptile and amphibian passage to resume.

i. If a safety boat or barge is required for this Project, the Contractor must use special caution when navigating within tidal creeks. Terrapins tend to congregate close to the surface during their active period. Maintaining slow speeds will ensure the turtles' safety.

These practices will be applied to the entire Project unless a sketch is attached which identifies specific areas of concern.

This species is protected by State laws, which prohibit killing, harming, taking, or keeping them in your possession. Photographs and the laws protecting Northern diamondback terrapin shall be posted in the Contractor's and CTDOT field offices (species ID sheet will be provided by OEP).

NOTICE TO CONTRACTOR – INVASIVE PLANT SPECIES

Invasive Plant Species[1] Are Not Permitted In the Inland/Tidal Wetland Mitigation Site(s): Only plant materials native and indigenous to the Northeast shall be used within the Inland/Tidal Wetland Mitigation Site(s). Species not specified in the Mitigation Planting Plan shall not be used without written approval from the Connecticut Department of Transportation's Office of Environmental Planning (OEP). All woody debris stockpiled in accordance with the special provision for "Clearing and Grubbing" must be free from the invasive species.

All invasive vegetation listed on the following websites will be subject to eradication:

- Connecticut Invasive Plant Working Group (CIPWG) Invasive Plants Council (http://cipwg.uconn.edu/invasive_plant_list/)
- US Army Corps of Engineers (ACOE) New England District Compensatory Mitigation Guidance Appendix K (http://www.nae.usace.army.mil/portals/74/docs/regulatory/Mitigation/2016_New_England_Compensatory_Mitigation_Guidance.pdf)

Project specific invasive species additional to those listed on the website will be subject to removal at the Environmental Scientist's discretion.

[1]Scientific names are those used primarily in National Wetland Plant List (http://wetland_plants.usace.army.mil/) and secondarily in USDA PLANTS database (http://plants.usda.gov/).

SECTION 1.10 ENVIRONMENTAL COMPLIANCE

In Article 1.10.03-Water Pollution Control:
REQUIRED BEST MANAGEMENT PRACTICES

Add the following after Required Best Management Practices Number 13:

14. The peregrine falcon (*Falco peregrinus*) is a State threatened species and Connecticut's largest falcon, measuring up to 20 inches. Adults are slate gray above and pale underneath with fine bars and spots of black; they have long pointed wings with a narrow tail. Young falcons have the same composition, but are darker underneath and browner all over. Peregrine falcons have adapted to life in urban settings. In Connecticut, they sometimes utilize bridges for nesting and brood rearing purposes. Peregrines will actively and aggressively defend the nest. The peregrine will attack anyone or anything that comes within the area of its nest. The peregrine falcon nesting season occurs between the months of April and July. For this reason, special conditions regarding the timing of work on the structures, and immediate area that have nesting falcons must be adhered to.

    In order to protect this species and project personnel, any construction and/or inspection activities which are within 500 feet of an identified nest shall not be permitted during nesting season (between April 1st and July 31st). Any change in construction sequencing or timing affecting work within 500 feet of a known nest shall not be permitted.

    The Contractor shall, through the Engineer, at least 10 days prior to the commencement of any construction activities, arrange for a CT DOT Environmental Inspector from the Office of Environmental Planning (OEP) or their authorized delegate to be available to meet and identify the nest location as well as discuss proper protocol for maintaining environmental commitments made to the protection of this species and habitat.

    This species is protected by State laws which prohibit killing, harming, taking, or keeping them in your possession. Workers shall be notified of the existence of peregrine falcons in the area and be apprised of the laws protecting them. Photographs of, and the laws protecting, peregrine falcons shall be posted in the Contractor's and DOT field offices (species ID sheets will be provided by OEP). Any observations of this species are to be immediately reported to the Department.

SECTION 1.10
ENVIRONMENTAL COMPLIANCE

1.10.01—General
1.10.02—Compliance with Laws and Regulations
1.10.03—Water Pollution Control
1.10.04—Vacant
1.10.05—Construction Noise Pollution
1.10.06—Protection of Archaeological and Paleontological Remains and Materials
1.10.07—Controlled and Hazardous Materials
1.10.08—Vehicle Emissions

1.10.01—General: During and following Project construction, the Contractor shall exercise precaution and care to prevent or minimize negative effects on the environment, including the State's waters, wetlands, and other natural resources.

The Contractor shall comply with all Project permits and permit applications as though the Contractor were the permittee.

The Contractor must comply with the environmental provisions specified in the Contract, and any Federal, State or municipal laws or regulations. If the Contractor fails to comply with these environmental provisions, the Contractor shall be penalized as specified in this Section and elsewhere in the Contract.

1.10.02—Compliance With Laws and Regulations: The Contractor shall conduct its operations in conformance with the permit requirements established by Federal, State and municipal laws and regulations.

The Department will be responsible for obtaining all environmental permits required for Contract work. If at the time such a permit is issued, its contents differ from those described in the Contract, the permit shall govern. Should the permit be issued after the solicitation of bid proposals, and should the permit requirements significantly change the character of the work as described in the Department's Project bid documents, Contract adjustments will be made in accordance with the applicable articles in Section 1.04 herein.

The Contractor shall be responsible for, and hold the State harmless from, any penalties or fines assessed by any authority due to the Contractor's failure to comply with any term of an applicable environmental permit.

Any request by the Contractor for the Department's authorization of an activitiy or use of a method not specifically called for or allowed by the applicable permits issued for the Project must be submitted by the Contractor in writing to the Engineer. Such a request must include a detailed description of the proposed alternate activity or method, and must include justifications for same, along with supporting documentation, showing that the proposed alternate activity or method will not create a risk of damage to the environment., increase the permitted wetland impact footprint, or increase fill within a floodplain. If such request is granted by the Engineer, the Department will forward to the appropriate regulatory agency or agencies any permit modification, permit revision, *de minimis* change or new permit required for the Contractor to carry out the proposed alternate activity or method in question. The Department does not, however, guarantee that it will be able to obtain such approval from the regulatory agency or agencies, and the Department will not be liable for the effects of such inability to do so.

The Contractor will not be entitled to any extension of Contract time as a result of the Engineer's granting of such a request from the Contractor. If changes to the permit are not necessary except to accommodate changes requested by the Contractor, then no claim may be made by the Contractor based on the amount of time taken by the Department to review the Contractor's request or to secure approval of related permit changes from the regulatory agency or agencies. The proposed alternate activity or method shall not commence until and unless the Engineer has approved the Contractor's request.

1.10.03—Water Pollution Control: The Contractor shall, throughout the duration of the Contract, control and abate siltation, sedimentation and pollution of all waters, including but not limited to under-ground water systems, inland wetlands, and tidal wetlands, and coastal or navigable waters.

Construction methods proposed by the Contractor must comply with the approved permit requirements and permit applications. The Contractor shall be responsible for all obligations and costs incurred as a result of the Contractor's failure to comply with the terms and conditions of such permits or permit applications.

The following are Required Best Management Practices for prevention and control of water pollution. Provisions of the Required Best Management Practices may be superseded as specified in Article 1.05.04. The Contractor shall not make any design change in the Contract work that requires a variance from the requirements of the following items until and unless the Contractor has first submitted a detailed written proposal for such variance to the Engineer for review by the Department and for transmittal to and review by the Federal, State or municipal environmental authority, and has then received written approval from the Department of the proposed variance.

REQUIRED BEST MANAGEMENT PRACTICES

1. Prior to commencing Project Site work, the Contractor shall submit in writing to the Engineer an "Erosion and Sedimentation Control Plan" and a "Dust Control Plan" for all Project construction stages. The Contractor shall install all control measures specified in said Plans prior to commencement of Project construction activities. The Plans shall be consistent with the Connecticut Guidelines for Soil Erosion and Sediment Control, the Connecticut Stormwater Quality Manual, and all environmental laws and regulations established by Federal, State or municipal agencies, as well as the Department's published environmental policies and standards. If the Contractor elects to work during a winter shut-down period, the Contractor shall submit to the Engineer a separate Winter Erosion and Sedimentation Control Plan, obtain the Engineer's written approval of it, and implement it before the Contractor begins Project work during the winter shut-down period.
2. The Contractor shall inspect erosion and sedimentation controls at least weekly, immediately after each rainfall event of at least 0.1 inch, and daily during periods of prolonged rainfall. The Contractor shall maintain all erosion and sedimentation control devices in a functional condition, in accordance with the Contract plans, relevant permits, Special Provisions, and Connecticut Guidelines for Soil Erosion and Sediment Control. In the event that the Contractor fails to maintain such devices in accordance with said documents, and the Contractor does not correct such a failure within 24 hours after receipt of written notice of such a failure from the Engineer, the Department may proceed with its own or other forces to remedy such failures. The cost to the Department of curing any such specified failure will be deducted from

monies owed to the Contractor under the Contract or under any other State contract.

3. Washout of applicators, containers, vehicles, and equipment that have been used with concrete (including bituminous concrete), paint or other such possible contaminants shall be conducted: (i) at least 50 ft from any stream, wetland or other sensitive resource; and (ii) in an entirely self-contained washout system. Such materials shall be collected and disposed of in accordance with all applicable Federal, State and municipal laws and regulations.
4. No materials resulting from Project construction activities shall be placed in or allowed to contribute to the degradation of a wetland, watercourse or storm drainage system. Good housekeeping of the Site by the Contractor for the purpose of preventing construction-related debris or runoff from entering a regulated area is required. The Contractor shall not leave waste or debris within the travel way or roadside where it might create a safety hazard to the traveling public. The Contractor shall dispose of all construction-related materials in accordance with Federal, State and municipal laws and regulations.
5. In accordance with CGS Section 22a-38, the Contractor shall not withdraw water from any watercourse system, except as allowed by applicable permits.
6. The Contractor shall not dispose of any material until and unless it has proposed a location for its disposal to the Engineer and the Engineer has approved said location in writing.

   If the proposed disposal location is on private property, the Contractor must include in the disposal location proposal to the Engineer letters from the property owner and the affected municipality, agreeing to the proposed location for disposal.

   The Contractor shall ensure that proposed disposal locations are outside of wetlands or watercourses, floodplains and water or natural resource areas.
7. Before commencing any work in or adjacent to a regulated area shown on the plans, permit(s), or identified by the Engineer, the Contractor must submit in writing to the Engineer a construction-sequencing plan, a water-handling plan, and a flood contingency plan, and obtain from the Engineer written approval of said plans..
8. When dewatering is necessary, the Contractor must not allow pumps used for same to discharge directly into a wetland or watercourse. Prior to any dewatering, the Contractor must submit to the Engineer a written proposal for specific methods and devices to be used for same, and must obtain the Engineer's written approval of such methods and devices, including, but not limited to, the pumping of water into a temporary sedimentation basin, providing surge protection at the inlet or outlet of pumps, floating the intake of a pump, or any other method for minimizing or retaining the suspended solids. If the Engineer determines that a pumping operation is causing turbidity in a regulated area, the Contractor shall halt said operation until a means of controlling the turbidity is submitted by the Contractor in writing to the Engineer, approved in writing by the Engineer, and implemented by the Contractor.
9. Whenever possible, work within or adjacent to watercourses shall be conducted during periods of low flow. The Engineer shall remain aware of flow conditions during the conduct of such work, and shall order such work stopped if flow conditions threaten to cause excessive erosion, siltation or turbidity. Before predicted major storms (i.e., a storm predicted by NOAA Weather Service, with warnings of flooding, severe thunderstorms, or similarly severe weather conditions

or effects), the Contractor shall make every effort to secure the Site to the satisfaction of the Engineer. Unless allowed by a DEEP permit, the Contractor shall store no materials and place no staging areas below the 100-year elevation. The Contractor shall not store below the 500-year flood level any materials which are buoyant, hazardous, flammable, explosive, soluble, expansive, radioactive, and any other materials that could be injurious to human, animal or plant life in the event of a flood.

10. Upon completion of the associated work, the Contractor shall immediately clear all areas of all forms, false work, piling, debris or other obstructions created or caused by construction operations.
11. If the Contractor wants to make a change in construction operations, staging or scheduling that would affect the use of or necessity for any pollution controls, the Contractor must submit to the Engineer a written proposal detailing the proposed change, and must receive the Engineer's approval of such change, before implementing it. Such submission must include a plan showing what erosion and sedimentation controls above and beyond those called for in the Contract would be necessitated by the proposed change.
12. Dumping of oil, fuel, chemicals or other harmful materials on the ground or into a regulated area is forbidden. The Contractor shall provide to the Engineer a written Spill Prevention and Remediation Plan for the Project, outlining the Contractor's intended means of catching, retaining, and properly disposing of drained oil, removed oil filters, fuel, chemicals and other harmful material. Such plan shall also include the information and protocols needed for the remediation of any spill that might occur on the Site, including emergency contact information. No construction activities shall commence until such a plan has been approved in writing by the Engineer.
13. The Contractor shall restore all areas within or outside the State right-of-way that have been disturbed as a result of construction activities, in accordance with Article 1.08.11.

1.10.04—Vacant

1.10.05—Construction Noise Pollution: The Contractor shall take measures to minimize the noise caused by its construction operations, including but not limited to noise generated by equipment used for drilling, pile-driving, blasting, excavation or hauling.

All methods and devices employed to minimize noise shall be subject to the continuing approval of the Engineer. The maximum allowable level of noise at the residence or occupied building nearest to the Site shall be 90 decibels on the "A" weighted scale (dBA). The Contractor shall halt any Project operation that violates this standard at any time until the Contractor develops and implements a methodology that enables it to keep the noise from its Project operations within the 90-dBA limit.

1.10.06—Protection of Archaeological and Paleontological Remains and Materials: The Contractor shall be alert to the possibility that Project operations may disturb or uncover significant archaeological or paleontological resources or other such remains which in many cases are protected by Federal laws, State laws or both. Archaeological resources are minimally defined by Federal regulations as materials 50 years of age

or older. They typically consist of subsurface concentrations of metal, bone, ceramic, or flaked or other shaped stone artifacts. They might also consist of *features* such as buried building foundations, linear or circular walls made of individual stones rather than concrete or cement, trash-filled pits, patches of burned earth, or distinct patterns of nearly-circular, elliptical, or squared discolorations in newly-exposed soil, accompanied by the types of *artifacts* described above.

Paleontological resources are defined as any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust. These typically include fossilized bones, teeth, shells, eggs, or distinct impressions made in bedrock.

When archaeological or paleontological materials are inadvertently encountered, the Contractor shall immediately halt operations in the location of same and shall notify the Engineer of said discovery. The Contractor shall make every effort to preserve archaeological or paleontological materials intact in their original positions, in order to preserve the geological context and information content of the remains in relation to one another and to the enclosing soil.

The Engineer shall have the authority to suspend Project work in the area of such discovery for the purpose of preserving or recovering and documenting the archaeological or paleontological materials. The Contractor shall carry out all instructions of the Engineer for the protection of such materials, including steps to protect the site from vandalism, unauthorized investigations, accidental damage, and damage from such causes as heavy rainfall or runoff. The Contractor shall reschedule its work to minimize any loss of the time needed to complete the Project while the State evaluates, records and salvages the archaeological or paleontological materials.

Extra work ordered by the Engineer in this connection will be paid for in accordance with Articles 1.04.05 and 1.09.04. Delays caused by archaeological or paleontological preservation and protection, which the Contractor demonstrates have delayed completion of the Project, will be treated under the provisions for extension of time, Article 1.08.08.

1.10.07—Controlled and Hazardous Materials: The Department will acquire any "Hazardous Waste Generator Permit(s)" required under the Resource Conservation and Recovery Act, for the management and disposal of hazardous materials on the Project site, provided that:

1. such material is within the construction limits defined in the Contract,

2. such material was not generated by the Contractor.

If the Department has designated in the Contract an area of known or suspected contamination within the Project limits, the Contractor shall dispose of such material in accordance with the relevant Special Provisions.

In the event that the Contractor encounters or exposes any material, not previously known or suspected to be contaminated, but exhibiting properties that may indicate the presence of controlled or hazardous material, the Contractor shall cease all operations in the material's vicinity, and shall immediately notify the Engineer of the material's discovery. The presence of barrels, discolored earth, metal, wood, visible fumes or smoke, abnormal odors or excessively hot earth may indicate the presence of controlled or hazardous material, and shall be treated with extreme caution.

If controlled or hazardous materials, other than those required for Contract operations, are discovered at the Site, the Department may engage a specialty contractor to handle and dispose of the materials.

When the Contractor performs support work incidental to the removal, treatment or disposal of controlled or hazardous material, the Department will pay for same at the applicable Contract unit prices. When the Contract does not include appropriate pay items for such work, the Department will pay for it in accordance with Article 1.04.05.

The Contractor shall observe all security precautions established pursuant to 29 CFR 1910.120 and 1926.65, including all revisions and amendments thereof, and shall not work in any area known to contain or suspected of containing controlled or hazardous material without prior written approval from the Engineer.

The Contractor shall observe all security precautions established pursuant to 29 CFR 1910.120 and 1926.65, including all revisions and amendments thereof, and shall not work in any area known to contain or suspected of containing controlled hazardous material without prior written approval to do so from the Engineer.

The Contractor shall assume sole responsibility for the proper storage, handling, management, and disposal of all regulated materials and wastes associated with its operations, including, but not limited to, lubricants, antifreeze, engine fluids, paints, and solvents. All costs associated with any failure by the Contractor to properly manage such materials in accordance with Federal, State and municipal regulations, and all remedial and punitive costs incurred by the Department as a result of such failure by the Contractor, shall be borne by the Contractor.

This article does not apply to coatings removed by the Contractor.

1.10.08–Vehicle Emissions: All motor vehicles and construction equipment (both on-highway and non-road) shall comply with all Federal, State and municipal regulations concerning exhaust emission controls or safety.

The Contractor shall establish staging zones for vehicles that are waiting to load or unload at the Site. Such zones shall be located where the emissions from the vehicles will have minimum impact on abutting properties and the general public.

Idling of delivery trucks, dump trucks, and other equipment shall not be permitted for longer than 3 minutes during periods of non-activity, except as allowed by the Regulations of Connecticut State Agencies Section 22a-174-18(b)(3)(c):

No mobile source engine shall be allowed "*to operate for more than 3 consecutive minutes when the mobile source is not in motion, except as follows:*

1. *When a mobile source is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control,*
2. *When it is necessary to operate defrosting, heating or cooling equipment to ensure the safety or health of the driver or passengers,*
3. *When it is necessary to operate auxiliary equipment that is located in or on the mobile source to accomplish the intended use of the mobile source,*
4. *To bring the mobile source to the manufacturer's recommended operating temperature,*
5. *When the outdoor temperature is below 20 degrees Fahrenheit,*
6. *When the mobile source is undergoing maintenance that requires such mobile source be operated for more than 3 consecutive minutes, or*
7. *When a mobile source is in queue to be inspected by U.S. military personnel prior to gaining access to a U.S. military installation.*"

The Contractor shall conduct all of its Project work in a way that causes no harm to

adjacent sensitive receptors. Sensitive receptors include but are not limited to hospitals, schools, daycare facilities, elderly housing, and convalescent facilities. The Contractor shall see to it that any engine exhaust is not directed toward fresh air intakes, air conditioners, or windows.

Before performing extensive work within less than 50 ft of a sensitive receptor, the Contractor must (1) submit to the Engineer a Vehicle Emissions Mitigation plan, proposing detailed means for minimizing vehicle emissions from vehicles and construction equipment in the affected area, including a proposed sequence of construction; (2) obtain the Engineer's written approval of the Plan, making any revisions of same necessary to obtain said permisssion; and (3) implement the Plan, as it may have been revised.

Any costs associated with this "Vehicle Emissions" Article shall be included in the general cost of the Contract. In addition, there shall be no additional time granted to the Contractor for compliance with this Article. The Contractor's compliance with this Article and any associated laws or regulations shall not be grounds for claims as outlined in Section 1.11 – "Claims."

SECTION 1.10–ENVIRONMENTAL COMPLIANCE

In Article 1.10.03-Water Pollution Control:
REQUIRED BEST MANAGEMENT PRACTICES

Add the following after Required Best Management Practices Number 13:

14. The Contractor is hereby notified that one or more State listed species of bat has been documented within the Project limits**.** In Connecticut, the Eastern small-footed bat (*Myotis leibii*), tri-colored bat (*Perimyotis subflavus*), little brown bat (*Myotis lucifugus*), Northern long-eared bat (*Myotis septentrionalis*) and the Indiana bat (*Myotis sodalis*) are listed as endangered; while the silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*) and the red bat (*Lasiurus borealis*) are listed as special concern. The Northern long-eared bat and the Indiana bat are also federally listed species. Bats are the only mammals capable of actual flight and are primarily nocturnal. During the daylight bats roost in trees and caves, but many have now adapted to roost in buildings including barns, houses, tunnels and bridges. Within the Project limits, bats will use the snags, cavities and underside of flakey bark to roost and raise young. Young bats are incapable of flight for their first four to five weeks; therefore this Project will have a Time of Year (TOY) restriction for tree clearing to protect the young.

    The Contractor shall, through the Engineer and at least 10 days prior to the commencement of any construction activities, arrange for a CT DOT Environmental Scientist from the Office of Environmental Planning (OEP) or their authorized delegate to be available to meet and discuss proper protocol for maintaining environmental commitments made for the protection of these species and their habitat. OEP will provide oversight through the Engineer to ensure that the following protocols are followed and maintained during the course of the Project:

    a. Clearing of any tree three (3) inches diameter at breast height (DBH) or greater will be prohibited between the time of May 15th and August 15th.

    b. The Contractor, through the Engineer, shall arrange a pre-construction tree-clearing Site walk to review all trees proposed to be removed for the Project.

    c. If the installation of a bat house within the project corridor is required for the Project, an item, detail and specification will be provided in the Contract. The installation location of the bat house will be coordinated with OEP through the Engineer.

    These practices will be applied to the entire Project unless a sketch is attached which identifies specific areas of concern.

    All listed bat species are protected by State laws which prohibit killing, harming, taking, or keeping them in your possession. Any observations of a bat species are to be immediately reported to the Engineer in order to contact OEP with the location.

ITEM # 0210306A - TURBIDITY CONTROL CURTAINS

Description: This work consists of furnishing, assembling, installing, relocating, maintaining, and removing turbidity control curtains to minimize the drift of suspended sediment within the watercourse. The layout of the turbidity control curtains shall be as indicated on the plans, permits or as directed by the Environmental Scientist from the Office of Environmental Planning (OEP) or their authorized delegate.

Materials: The Contractor shall use Type 3 Permeable Turbidity Barriers when working within tidally influenced waters.

Length: The length of the turbidity control curtain shall be as specified in the plans, permit.

Fabric: Turbidity control curtains fabric shall consist of 22 oz./yd^2 Nylon reinforced Vinyl Fabric (PVC), with UV inhibitors. The material shall have a tensile strength of not less than 200 lbs. when measured lengthwise or crosswise.

Skirt Depth: The depth of the skirt shall be measured to maintain a 1-foot offset above the bottom of the watercourse at all locations during high tide.

Color: The color of the turbidity control curtains shall be yellow.

Seams: All horizontal seams shall be 100% heat welded and all vertical seams shall be 100% RF welded.

Flotation Units: The flotation unit shall be a 12 inch polystyrene float with a buoyancy of 50 lbs./ft^2 and shall be capable of keeping the turbidity control curtain at a minimal elevation of 3 inches above the water line.

Top Tension Cables: The top tension cable shall be 5/16 inch galvanized steel cable placed on each side of the curtains. The breaking strength of the tension cable shall be 10,000 lbs. per cable with a total breaking strength of 20,000 lbs.

Bottom Ballast Chain: The bottom ballast chain shall be 3/8 inch galvanized steel chain placed at the bottom of the skirt. The chain shall be finished on both ends with stress plates with a 1-ton hook on one end and ring on the other end. The breaking strength shall be 10,600 lbs. and the weight shall be 1.50 lb./ft.

Fasteners: The top 18 inches shall consist of marine grade aluminum slide connectors and grommets for lacing from below the connector to the bottom edge of skirt. The edges shall be reinforced with 5/8 inch poly rope with a minimum breaking strength of 800 lbs.

Anchors: The anchor shall consist of a leader chain, nylon rope, heavy duty marker buoy and 6 feet of painted line. The anchor can be a grappling hook, plow or fluke-type that digs into the watercourse bottom/harbor. The nylon rope shall act as an anchor line between the anchor and buoy. The anchor line shall have enough slack to allow the barrier to float freely with tidal changes

without pulling the curtain below the water surface. The anchors shall be placed every 50 to 100 feet. Alternate anchoring methods such as heavy concrete weights, driven pilings, or stakes may be used, if approved prior to use by the Environmental Scientist or their authorized delegate.

Product Data: Prior to any watercourse disturbance within the Project limits, the Contractor shall submit to the Environmental Scientist for review and approval, through the Engineer, Product Data for the Type 3 Permeable Turbidity Barriers to be used. Within 30 days of receipt of the submittal, the Engineer will notify the Contractor whether the submittal is approved, rejected or requires modifications. If any part of the proposed barriers are not approved, the Contractor shall promptly make any necessary changes and re-submit for approval. The proposed barriers must be approved in writing prior to beginning any in-water work on the Project.

Construction Methods: When assembling and installing turbidity control curtains, the Contractor shall follow the directions of the manufacturer.

Unless otherwise directed by the Environmental Scientist or their authorized delegate, the Contractor shall begin installation at high tide from a shoreline anchorage and work with the current in a downstream direction.

The turbidity control curtains shall form a continuous vertical and horizontal barrier able to contain suspended sediment or turbidity within the watercourse. The bottom skirt shall be suspended a minimum of 12 inches above the bottom of the watercourse for the entire length of the turbidity curtains at high tide.

Installation of Turbidity Curtains: The turbidity control curtains shall be floated into position, attached to the anchor lines, and then unfurled.

The Contractor shall securely attach curtain panel ends together using rope lashings. The top lashing shall be securely tied to the anchor line.

The Contractor shall place the anchors such that the turbidity control curtains remain in the proper location and none of the flotation devices are pulled under the water surface. If directed by the Engineer, the Contractor shall supply and place additional anchorage.

Maintenance of Turbidity Curtains: Throughout the Project duration, the Contractor shall maintain the turbidity control curtains so that no sediment caused by the Project enters the watercourse beyond the limits of the turbidity control curtains.

Turbidity control curtains damaged prior to installation, during installation, or during the life of the Contract shall be repaired or replaced to the satisfaction of the Environmental Scientist or their authorized delegate.

Removal of Turbidity Curtains: The turbidity control curtains shall remain in place until all regulated in-water work for the Project is complete.

When directed by the Environmental Scientist or their authorized delegate, the turbidity control curtains shall be furled in place, then released from the anchors and towed out of the water. The turbidity control curtains and all materials incidental to the assembly of the turbidity control curtains shall be removed in such a manner as to minimize turbidity within the watercourse.

The turbidity control curtains and related components shall be removed from the Project and shall become the property of the Contractor after removal.

Method of Measurement: This work will be measured for payment by the actual number of linear feet of turbidity control curtains installed and accepted.

Basis of Payment: Payment for this work will be made at the Contract unit price per linear foot of "Turbidity Control Curtains," completed in place, which shall include all materials, equipment, tools and labor incidental to the furnishing, assembling, installing, maintaining, relocating and removing of the turbidity control curtains.

Pay Item	Pay Unit
Turbidity Control Curtains	l.f.

APPENDIX O: USFWS IPaC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 02/28/2025 15:10:23 UTC
Project code: 2025-0062363
Project Name: Rehabilitation/Replacement of William F. Cribari Memorial Bridge

Federal Nexus: yes
Federal Action Agency (if applicable): Connecticut Department of Transportation

Subject: Federal agency coordination under the Endangered Species Act, Section 7 for 'Rehabilitation/Replacement of William F. Cribari Memorial Bridge'

Dear Chelsea Zakas:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on February 28, 2025, for "Rehabilitation/Replacement of William F. Cribari Memorial Bridge" (here forward, Project). This project has been assigned Project Code 2025-0062363 and all future correspondence should clearly reference this number.

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into the IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC or the Northeast Determination Key (DKey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative effect(s)), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (See § 402.17). Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no further consultation with, or concurrence from, the Service is

required (ESA §7). If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required (except when the Service concurs, in writing, that a proposed action "is not likely to adversely affect" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13]).

The IPaC results indicated the following species is (are) potentially present in your project area and, based on your responses to the Service's Northeast DKey, you determined the proposed Project will have the following effect determinations:

Species	Listing Status	Determination
Rufa Red Knot (*Calidris canutus rufa*)	Threatened	No effect

Conclusion If there are no updates on listed species, no further consultation/coordination for this project is required for the species identified above. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project implements any changes which are final or commits additional resources.

In addition to the species listed above, the following species and/or critical habitats may also occur in your project area and are not covered by this conclusion:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered

To complete consultation for species that have reached a "May Affect" determination and/or species may occur in your project area and are not covered by this conclusion, please visit the "New England Field Office Endangered Species Project Review and Consultation" website for step-by-step instructions on how to consider effects on these listed species and/or critical habitats, avoid and minimize potential adverse effects, and prepare and submit a project review package if necessary: https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review

Please Note: If the Action may impact bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d) by the prospective permittee may be required. Please contact the Migratory Birds Permit Office, (413) 253-8643, or PermitsR5MB@fws.gov, with any questions regarding potential impacts to Eagles.

If you have any questions regarding this letter or need further assistance, please contact the New England Ecological Services Field Office and reference the Project Code associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Rehabilitation/Replacement of William F. Cribari Memorial Bridge

2. Description

The following description was provided for the project 'Rehabilitation/Replacement of William F. Cribari Memorial Bridge':

> A joint Environmental Assessment/Environmental Impact Evaluation (EA/EIE) has been prepared to help CTDOT and FHWA decide whether to take no action, rehabilitate, or replace the Cribari Bridge in Westport, CT.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.1227217,-73.36919844800916,14z



QUALIFICATION INTERVIEW

1. As a representative of this project, do you agree that all items submitted represent the complete scope of the project details and you will answer questions truthfully?

   Yes

2. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed species?

   Note: This question could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered, or proposed species.

   No

3. Is the action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   Yes

4. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) the lead agency for this project?

   Yes

5. FHWA, FRA, and FTA have completed a rangewide programmatic biological opinion for transportation projects within the range of the Indiana bat and northern long-eared bat. Does your proposed project fall within the scope of this programmatic consultation?

   Note: If you are using the Northeast Key to satisfy consultation requirements for species not covered by the FHWA programmatic (e.g., species other than Indiana bat or northern long-eared bat), select "No" and continue through the key. If you are unsure whether your project qualifies for the FHWA programmatic, please select "Yes" and use the FHWA, FRA, FTA Assisted Determination Key to determine if the programmatic biological opinion is applicable to your project. If it is not applicable, you can return to this key.

   No

6. Are you including in this analysis all impacts to federally listed species that may result from the entirety of the project (not just the activities under federal jurisdiction)?

   Note: If there are project activities that will impact listed species that are considered to be outside of the jurisdiction of the federal action agency submitting this key, contact your local Ecological Services Field Office to determine whether it is appropriate to use this key. If your Ecological Services Field Office agrees that impacts to listed species that are outside the federal action agency's jurisdiction will be addressed through a separate process, you can answer yes to this question and continue through the key.

   Yes

7. Are you the lead federal action agency or designated non-federal representative requesting concurrence on behalf of the lead Federal Action Agency?

   No

8. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)?

   No

9. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

   No

10. Is the lead federal action agency the Natural Resources Conservation Service?

    No

11. Will the proposed project involve the use of herbicide where listed species are present?

    No

12. Are there any caves or anthropogenic features suitable for hibernating or roosting bats within the area expected to be impacted by the project?

    Yes

13. Does any component of the project associated with this action include activities or structures that may pose a collision risk to **birds** (e.g., plane-based surveys, land-based or offshore wind turbines, communication towers, high voltage transmission lines, any type of towers with or without guy wires)?

    Note: For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

    No

14. Does any component of the project associated with this action include activities or structures that may pose a collision risk to **bats** (e.g., plane-based surveys, land-based or offshore wind turbines)?

    Note: For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

    No

15. Will the proposed project result in permanent changes to water quantity in a stream or temporary changes that would be sufficient to result in impacts to listed species?

    For example, will the proposed project include any activities that would alter stream flow, such as water withdrawal, hydropower energy production, impoundments, intake structures, diversion structures, and/or turbines? Projects that include temporary and limited water reductions that will not displace listed species or appreciably change water availability for listed species (e.g. listed species will experience no changes to feeding, breeding or sheltering) can answer "No". Note: This question refers only to the amount of water present in a stream, other water quality factors, including sedimentation and turbidity, will be addressed in following questions.

    No

16. Will the proposed project affect wetlands where listed species are present?

    This includes, for example, project activities within wetlands, project activities within 300 feet of wetlands that may have impacts on wetlands, water withdrawals and/or discharge of contaminants (even with a NPDES).

    Yes

17. Will the proposed project activities (including upland project activities) occur within 0.125 miles of the water's edge of a stream or tributary of a stream where listed species may be present?

    Yes

18. Will the proposed project directly affect a streambed (below ordinary high water mark (OHWM)) of the stream or tributary where listed species may be present?

    Yes

19. Will the proposed project bore underneath (directional bore or horizontal directional drill) a stream where listed species may be present?

    Yes

20. Will the proposed project involve a new point source discharge into a stream or change an existing point source discharge (e.g., outfalls; leachate ponds) where listed species may be present?

    No

21. Will the proposed project involve the removal of excess sediment or debris, dredging or in-stream gravel mining where listed species may be present?

    No

22. Will the proposed project involve the creation of a new water-borne contaminant source where listed species may be present?

    Note New water-borne contaminant sources occur through improper storage, usage, or creation of chemicals. For example: leachate ponds and pits containing chemicals that are not NSF/ANSI 60 compliant have contaminated waterways. Sedimentation will be addressed in a separate question.

    No

23. Will the proposed project involve perennial stream loss, in a stream of tributary of a stream where listed species may be present, that would require an individual permit under 404 of the Clean Water Act?

    No

24. Will the proposed project involve blasting where listed species may be present?

    No

25. Will the proposed project include activities that could negatively affect fish movement temporarily or permanently (including fish stocking, harvesting, or creation of barriers to fish passage).

    No

26. Will the proposed project involve earth moving that could cause erosion and sedimentation, and/or contamination along a stream or tributary of a stream where listed species may be present?

    Note: Answer "Yes" to this question if erosion and sediment control measures will be used to protect the stream.

    Yes

27. Will the proposed project impact streams or tributaries of streams where listed species may be present through activities such as, but not limited to, valley fills, large-scale vegetation removal, and/or change in site topography?

    No

28. Will the proposed project involve vegetation removal within 200 feet of a perennial stream bank where aquatic listed species may be present?

    Yes

29. Will erosion and sedimentation control Best Management Practices (BMPs) associated with applicable state and/or Federal permits, be applied to the project? If BMPs have been provided by and/or coordinated with and approved by the appropriate Ecological Services Field Office, answer "Yes" to this question.

    Yes

30. Is the project being funded, lead, or managed in whole or in part by U.S Fish and Wildlife Restoration and Recovery Program (e.g., Partners, Coastal, Fisheries, Wildlife and Sport Fish Restoration, Refuges)?

    No

31. Will the proposed project result in changes to beach dynamics that may modify formation of habitat over time?

    Note: Examples of projects that result in changes to beach dynamics include 1) construction of offshore breakwaters and groins; 2) mining of sand from an updrift ebb tidal delta; 3) removing or adding beach sands; and 4) projects that stabilize dunes (including placement of sand fences or planting vegetation).

    No

32. [Hidden Semantic] Is the project area located within the red knot AOI?

    Automatically answered

    Yes

33. If you have determined that the red knot is unlikely to occur within your project's action area or that your project is unlikely to have any potential effects on the red knot, you may wish to make a "no effect" determination for the red knot. Additional guidance on how to make this decision can be found in the project review section of your local Ecological Services Field Office's website. CBFO: https://www.fws.gov/office/chesapeake-bay-ecological-services/project-review ; MEFO: https://www.fws.gov/office/maine-ecological-services ; NJFO: https://www.fws.gov/office/new-jersey-ecological-services/new-jersey-field-office-project-review-guide ; NEFO: https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review#Step5 ; WVFO: https://www.fws.gov/office/west-virginia-ecological-services/project-planning. If you are unsure, answer "No" and continue through the key.

    Would you like to make a no effect determination for the red knot?

    Yes

34. [Semantic] Does the project intersect the Virginia big-eared bat critical habitat?

    Automatically answered
    No

35. [Semantic] Does the project intersect the Indiana bat critical habitat?

    Automatically answered
    No

36. [Semantic] Does the project intersect the candy darter critical habitat?

    Automatically answered
    No

37. [Semantic] Does the project intersect the diamond darter critical habitat?

    Automatically answered
    No

38. [Semantic] Does the project intersect the Big Sandy crayfish critical habitat?

    Automatically answered
    No

39. [Hidden Semantic] Does the project intersect the Guyandotte River crayfish critical habitat?

    Automatically answered
    No

40. Do you have any other documents that you want to include with this submission?

    No

PROJECT QUESTIONNAIRE

1. Approximately how many acres of trees would the proposed project remove?

   0.25

2. Approximately how many total acres of disturbance are within the disturbance/ construction limits of the proposed project?

   1.5

3. Briefly describe the habitat within the construction/disturbance limits of the project site.

   Little vegetation due to highly developed nature. Little plant life on the west bank of the river, and federal and state tidal wetlands on the eastern bank of the river. No submerged aquatic vegetation within the study area. Upland vegetation includes various tree types.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Chelsea Zakas
Address: 115 Broad Street
Address Line 2: 6th Floor
City: Boston
State: MA
Zip: 02110
Email czakas@fando.com
Phone: 8607834671

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Connecticut Department of Transportation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 02/28/2025 14:12:15 UTC
Project Code: 2025-0062363
Project Name: Rehabilitation/Replacement of William F. Cribari Memorial Bridge

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Updated 4/12/2023 - Please review this letter each time you request an Official Species List, we will continue to update it with additional information and links to websites may change.

About Official Species Lists

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Federal and non-Federal project proponents have responsibilities under the Act to consider effects on listed species.

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested by returning to an existing project's page in IPaC.

Endangered Species Act Project Review

Please visit the "**New England Field Office Endangered Species Project Review and Consultation**" website for step-by-step instructions on how to consider effects on listed

species and prepare and submit a project review package if necessary:

https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review

NOTE Please do not use the **Consultation Package Builder** tool in IPaC except in specific situations following coordination with our office. Please follow the project review guidance on our website instead and reference your **Project Code** in all correspondence.

Northern Long-eared Bat - (**Updated 4/12/2023**) The Service published a final rule to reclassify the northern long-eared bat (NLEB) as endangered on November 30, 2022. The final rule went into effect on March 31, 2023. You may utilize the **Northern Long-eared Bat Rangewide Determination Key** available in IPaC. More information about this Determination Key and the Interim Consultation Framework are available on the northern long-eared bat species page:

https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis

For projects that previously utilized the 4(d) Determination Key, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective. If your project was not completed by March 31, 2023, and may result in incidental take of NLEB, please reach out to our office at newengland@fws.gov to see if reinitiation is necessary.

Additional Info About Section 7 of the Act
Under section 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether projects may affect threatened and endangered species and/or designated critical habitat. If a Federal agency, or its non-Federal representative, determines that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Federal agency also may need to consider proposed species and proposed critical habitat in the consultation. 50 CFR 402.14(c)(1) specifies the information required for consultation under the Act regardless of the format of the evaluation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/service/section-7-consultations

In addition to consultation requirements under Section 7(a)(2) of the ESA, please note that under sections 7(a)(1) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Please contact NEFO if you would like more information.

Candidate species that appear on the enclosed species list have no current protections under the ESA. The species' occurrence on an official species list does not convey a requirement to

consider impacts to this species as you would a proposed, threatened, or endangered species. The ESA does not provide for interagency consultations on candidate species under section 7, however, the Service recommends that all project proponents incorporate measures into projects to benefit candidate species and their habitats wherever possible.

Migratory Birds

In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see:

https://www.fws.gov/program/migratory-bird-permit

https://www.fws.gov/library/collections/bald-and-golden-eagle-management

Please feel free to contact us at **newengland@fws.gov** with your **Project Code** in the subject line if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat.

Attachment(s): Official Species List

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

PROJECT SUMMARY

Project Code: 2025-0062363
Project Name: Rehabilitation/Replacement of William F. Cribari Memorial Bridge
Project Type: Bridge - Replacement
Project Description: A joint Environmental Assessment/Environmental Impact Evaluation (EA/EIE) has been prepared to help CTDOT and FHWA decide whether to take no action, rehabilitate, or replace the Cribari Bridge in Westport, CT.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.1227217,-73.36919844800916,14z



Counties: Fairfield County, Connecticut

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Rufa Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Chelsea Zakas
Address: 115 Broad Street
Address Line 2: 6th Floor
City: Boston
State: MA
Zip: 02110
Email czakas@fando.com
Phone: 8607834671

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Connecticut Department of Transportation