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	

K. V

SUPERVISOR:	Reviewed by Supervisor Leo Cain Jr.	Date	2/4/2015

SUPPORT:	Date Copies Made		BMM No	15-070 + 15-071	
	Scanned By: LC	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

<u>ConnDOT BRIDGE NO. 01349</u>

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

STATE OF CONNECTICUT
MUHAMMAD AMMAD
No. 0024756
LICENSED
PROFESSIONAL ENGINEER

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

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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~~ 5, ~~"Satisfactory"~~ 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.

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

Bridge Number: **01349**

Inspected By: Y. SKOPLYAK & J. MCKENNA

Sufficiency Rating: ~~58.35~~ 58.38

Previous Inspection Date: 11/9/2012

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

Copies Made ☐ Data Entry Date: 1/21/2015

90) Inspection Date	Inspection Team	91) Frequency	Class:
110314	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 13500 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	NBIS Length	
Town Name	WESTPORT	Yes	287
Facility Carried	ROUTE 136		
Feature Crossed	SAUGATUCK RIVER		

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 (A)
66) Inventory Rating	59.2		

CONDITION

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

APPRAISALS

	Rating		By
67) Structure Evaluation	5	5	MA
68) Deck Geometry	2	2	YS
69) Under Clear Vert & Horiz	N	N	YS
71) Waterway Adequacy	8	8	YS
72) Approach Rdwy Alignment	6	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 p/ 5/15	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 Span4) 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

RDD 10/5/15

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	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. 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.

RDD 10/5/15

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 - L6U7 removed, due damage.
South Truss Span 3 - L4U5 - one of 2 bars severed

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 RDT 10/5/15	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. RDT 10/5/15
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

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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. RDT 10/5/15 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: Pier2 bracing between H-Piles with severe deterioration Rated 2 (Bracing Only)	5 RDT 10/5/15	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.
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: Note - The limited undermining is due to the rotting away / erosion of the timber cribbing.	N RDT 10/5/15	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'.
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: @ Pier/Bent - Pile Bent	5 — 2 RDT 10/5/15 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.
PAINT:	N	-

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

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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.

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

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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) [signature] Date: 12/18/2014

2) [signature] 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

RECEIVED
DEC 19 2014
CONNECTICUT - DOT
BRIDGE SAFETY & EVALUATION

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

Form BRI12, Rev 9/97

Fracture Critical Inspection Date: 11/03/14
FC Insp Freq: 24 Months **FC Type Code:** J

Bridge No: 01349
Year Built: 1884
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 Prone

Fatigue Category:
Steel Type: A-588
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 Prone

Fatigue Category:
Steel Type: A-588
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:~~ NE SAFETY BOAT (NAME/TIME) 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: (NAME/TIME) John Cabral (#1983) West. PD Dan Frantino (#3600) 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 installed
1. Provide lock nuts at the turnbuckles for the barrier gates to secure wires.
2. Provide pigeon screens that are removable for mechanical inspection access.
3. Repair or replace joint (20 LF).

replaced

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

NOT DONE

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.

1B

33

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

MEMORANDUM

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

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

△ 11/11/10 RB/BB (TSC) △2 12/7/12 NOH/ALV (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:

~~△ ITEMS 1-5 NOT DONE~~ △3

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. ~~5~~ ~~16, 17 &~~ ~~13 △~~ △3 ~~△ REPORT PHOTO 12, 16~~ △3 △2 PIER 2 AND △ △2 REPORT PHOTOS ~~26 & 32~~
2. △2 NC ~~The ends of the north bridge rail are touching at Pier 2.~~
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. △ UP TO 3.5' DEEP 4' △2 22"x10"x4" △2 △ DRY SET
4. The stone masonry retaining walls have missing ~~or non-existent grout and~~ up to 2.5' ~~of~~ △ STONES △ ~~penetration~~. A void is present near the top of the southeast wall up to 2' x 3' x 2' deep. See Photo No. ~~22.~~ ~~12 & 36 △~~ VOID & NW RET WALL @ DRAIN 4'⌀ x 3'D±
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. △ x 9" DP See Photo No. ~~24.~~ ~~29 &~~ △ ~~LATEST UNDERWATER INSP. REPORT~~ △3

Please direct persons under your jurisdiction to:

1. Repair the impact damage. △2 NOT DONE
2. ~~Reset or adjust the terminal ends so that they no longer touch when the swing span closes.~~ △ NOT DONE
3. Repoint the abutment joints and patch the spall. Total 70 LF. △ NOT DONE
4. Repair the voids. Total 12CF.
5. Repair/patch areas of spalled concrete and repair steel jacket. Total < 1 CY △2 NOT DONE

NOT TOUCHING AT TIME OF INSPECTION △3

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. ~~△ ITEM 1 PARTIALLY DONE, ITEM 2 NOT DONE~~ △3

~~△ ITEMS 1 & 2 NOT DONE~~ △2 50% (TYP) W/ DOWNSPOUTS CLEAN ~~△ UP TO 40%~~

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.~~ △ ALL SCUPP. PIPES ~~CLOGGED SP. 1 & 2 ON NORTH SIDE~~ △ CLEAN
	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.

△ & END FLOORBEAM / AT PIER 2

~~△ 13, 20 & 22~~ ~~△2 31-36~~ △3

△ DAMP DURING THIS INSP. △2 NO CHANGE △3

△ ALSO OUTSIDE OF BOT. FLG. OF END FLOORBEAMS UNDER OPEN JOINTS ~~REPORT PHOTO 21~~

1C

34

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

BMM No.
Bridge No. 01349

06-091

ITEMS 1-3
NOT DONE
NOT DONE

6 SC w/ 3/8" REMAINING

3.5'   10"D

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~~ ~~35~~ 3
2. The timber sidewalk stringers in span 3 have ~~two~~ ONE backed off nuts with ~~two~~ THREE 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. ~~17~~ ~~58~~ 3
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% WEB 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~~ ~~56~~ 3

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.

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Field Notes

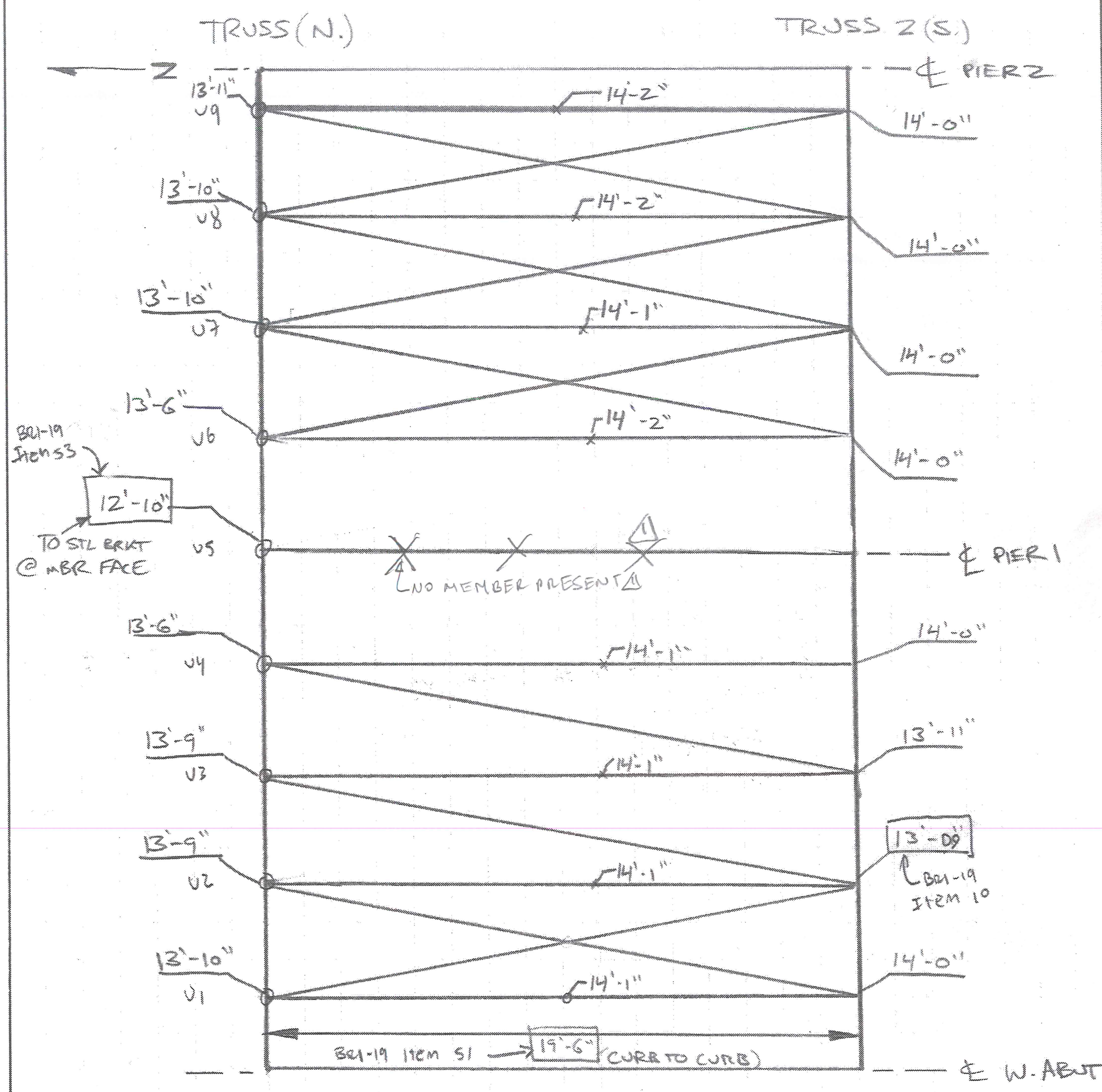
PROJECT NO. P7R10004

BRIDGE NO. 01349

DATE 11/9/12

SHEET 2

CREW ASW/NPH/GAH



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

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Field Notes

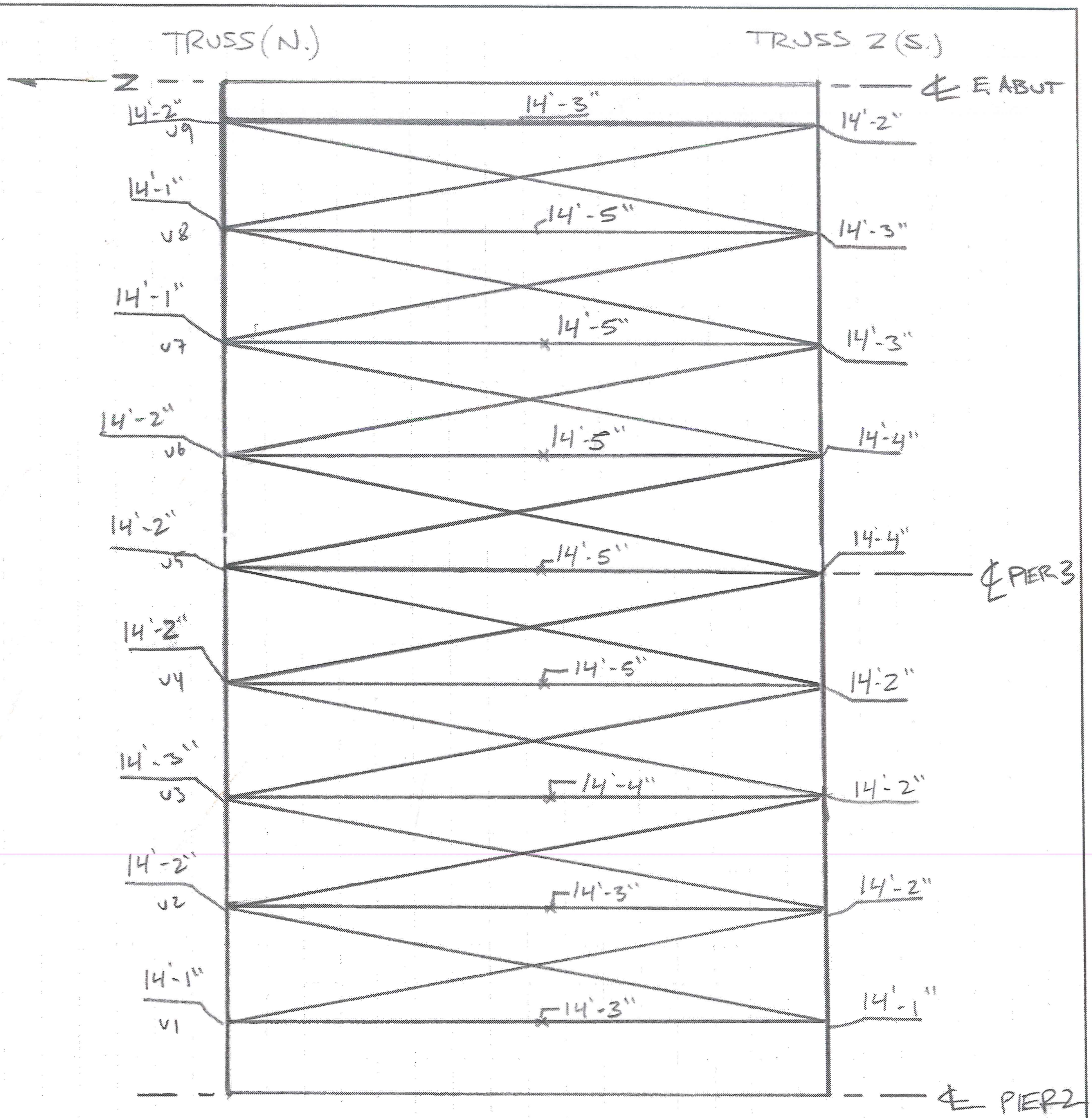
PROJECT NO. P712100021

DATE 11/9/12

CREW ASW/NPM/GAH

BRIDGE NO. 01349

SHEET 3



CLEARANCE DIAGRAM SPANS 3 & 4

GENERAL NOTES:

- ALL MSMTS @ TRUSSES ARE PAVMT TO BOLT.
- CHANGES IN CLEARANCES DUE TO PVMT WEAR & RUTTING.

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

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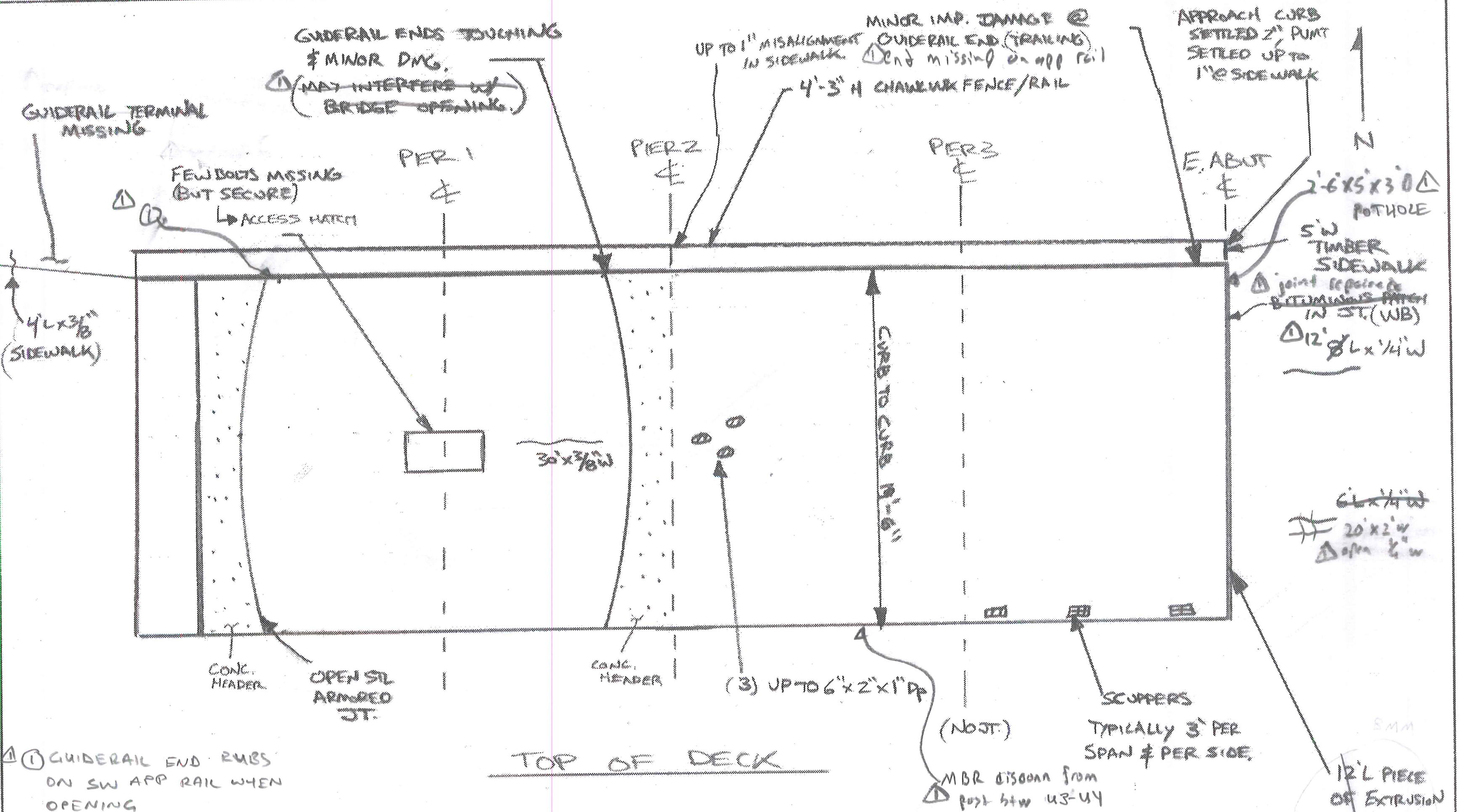
Field Notes

PROJECT NO P7I2100021
DATE 11/9/12
CREW ASW/GAH/NPH

BRIDGE NO 01349
SHEET 4



① ① GUIDERAIL END RUBS ON SW APP RAIL WHEN OPENING

TOP OF DECK

GENERAL NOTES:

- OVERLAY RUTTING UP TO 2" & HVY WEAR.
- MOST SCUPPERS 50% CLOGGED. ALL DOWN PIPES APPEAR OPEN. SOME GRATES SETTLED UP TO 1" VS. PVMT.
- SOME MINOR DAMAGE @ THE SOUTH RAIL WEST ~~END~~, & NORTH RAIL EAST END.
- AVG CURB REVEAL IS 7" (SPANS 1-2) & 6" (SPANS 3-4). STL CHANNEL CURBS.

LEGEND:

~ HAIRLINE CRACK
⊘ SPALL/POTHOLE

Calculations for 1/4 US Grid

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

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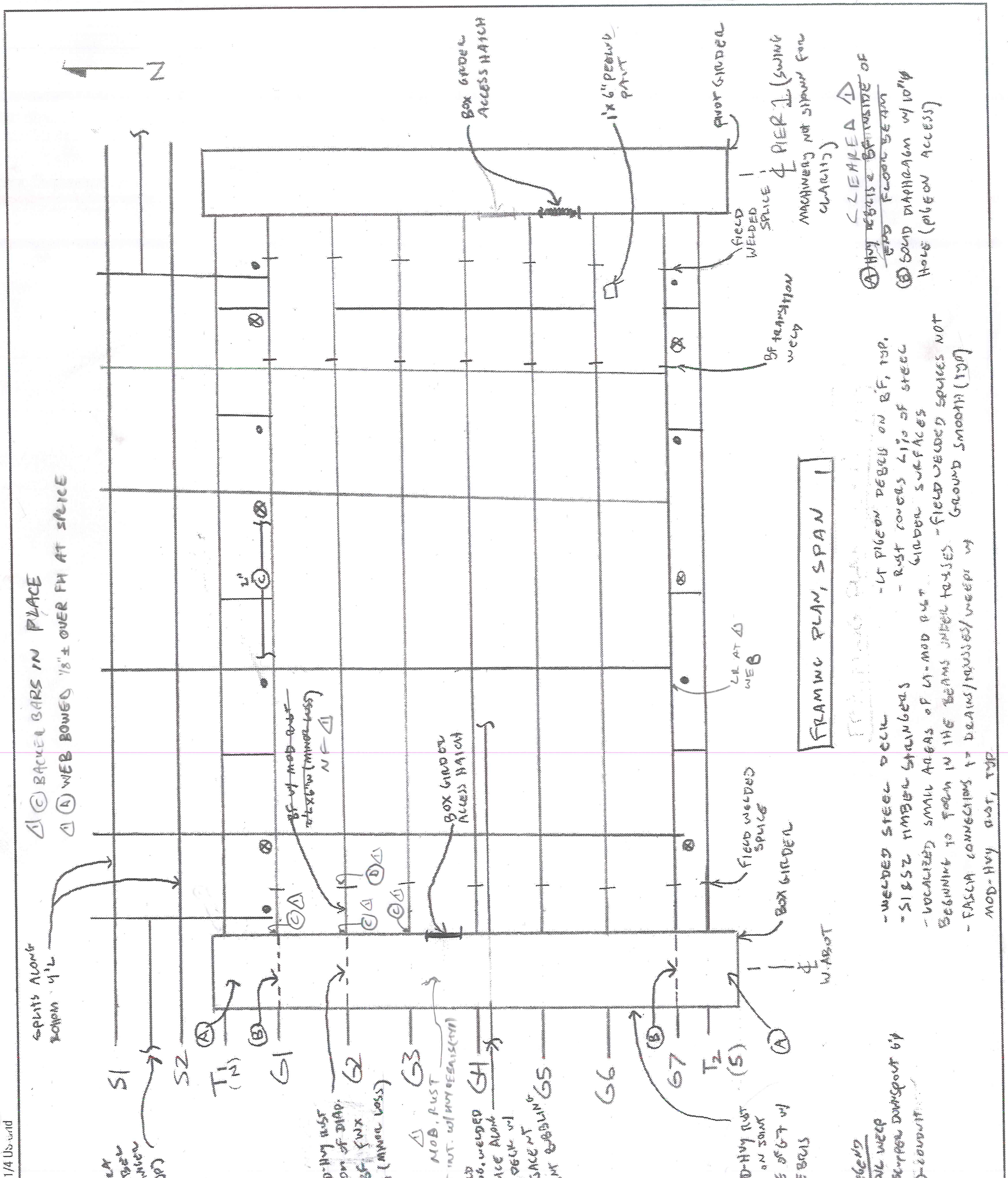
Field Notes

PROJECT NO. P7R100021
DATE 11/9/2012
CREW NPH / ASW / GAH

BRIDGE NO. 0131.9
SHEET 5



Calculations for 1/4 US Std

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

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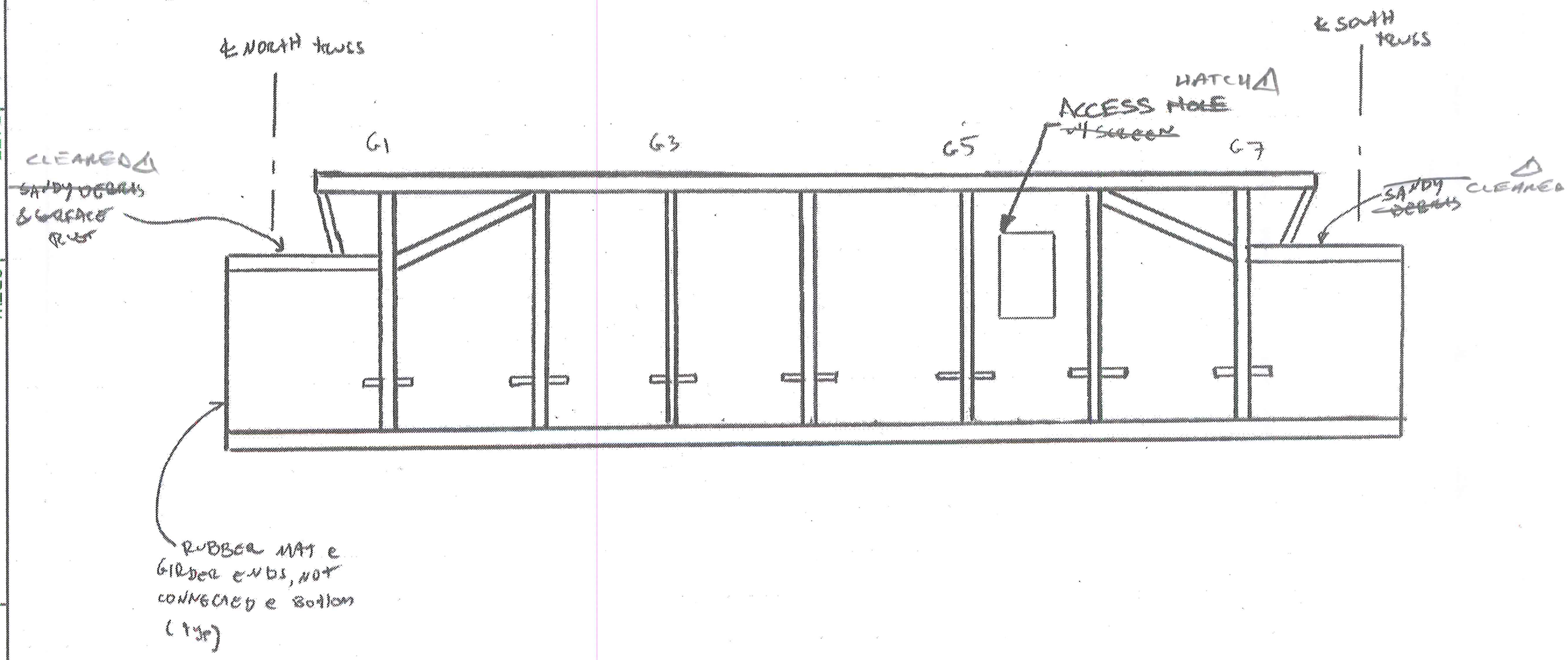
Field Notes

PROJECT NO P7721000?
DATE 11/9/12
CREW NDH/ASW/GAH

BRIDGE NO 01349
SHEET 6



PIVOT GIRDER @ PIER 1

GENERAL NOTES: 1

- FLOOR W/ EVIDENCE OF MOISTURE THROUGHOUT ~~& EVIDENCE OF PONDING INSIDE @ NORTH END~~
- MOD. TO HVY LAMINATED RUST ON FLOOR x FL x FW W/ ~~MAX SL 1/8"±~~ NEGLIGIBLE LOSS 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

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

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Field Notes

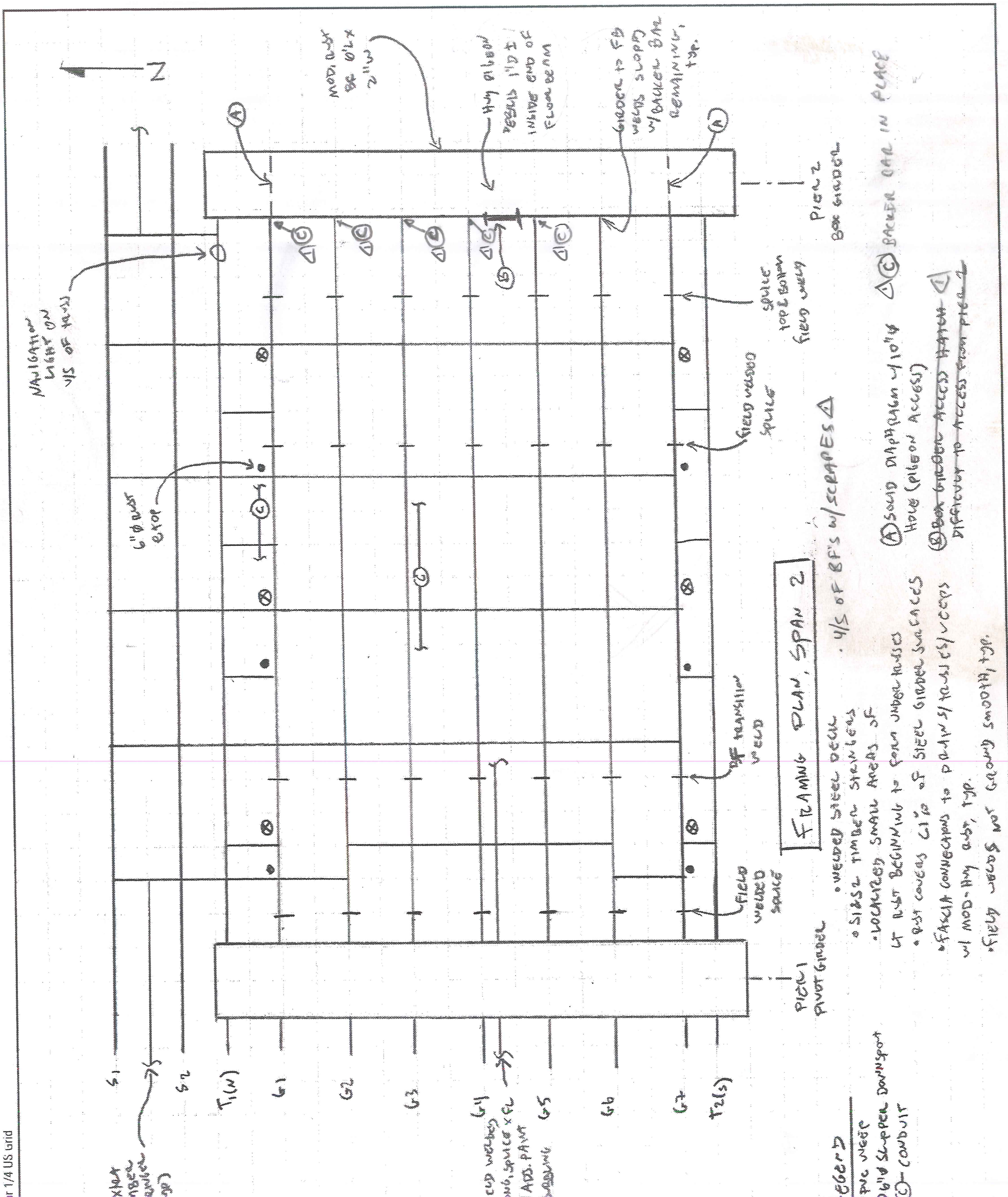
PROJECT NO. P7R100021

BRIDGE NO. 01369

DATE 11/9/2012

SHEET 7

CREW MPH/GAH/ASW



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

Field Notes

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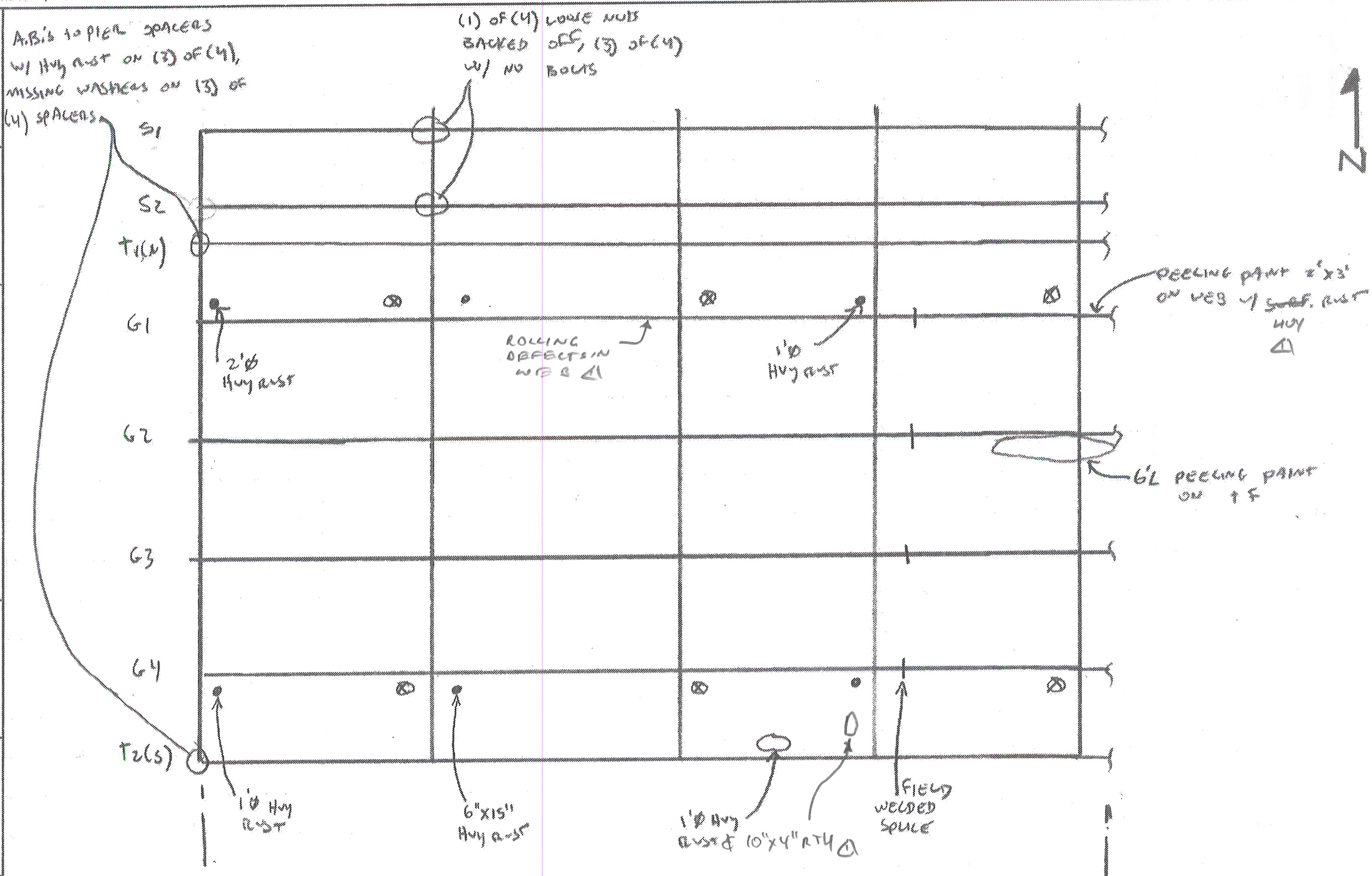
PROJECT NO P7121000?1
DATE 11/9/12
CREW NDH/ASW/GNH
BRIDGE NO 01349
SHEET 8



FRAMING PLAN SPAN 3

GENERAL NOTES:
- EXODERMIC UNDERSIDE OF DECK W/ LT RUST ON BOTTOM (TYP)
- RUST COVERS <1% OF STEEL GIRDER SURFACES
- FIELD WELDED SPLICES NOT GROUND SMOOTH
- SOLE PLATES ON TOP OF ELASTOMERIC BRGS FOR G1-G4 EP2 ARE ALL BOWED/DISHED (APPEAR AS-BUILT)
- S1 & S2 TIMBER SIDEWALK STRINGERS

LEGEND
● WEEP PIPE
⊗ SCUPPER DOWNSPOUT 6'Ø

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

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Field Notes

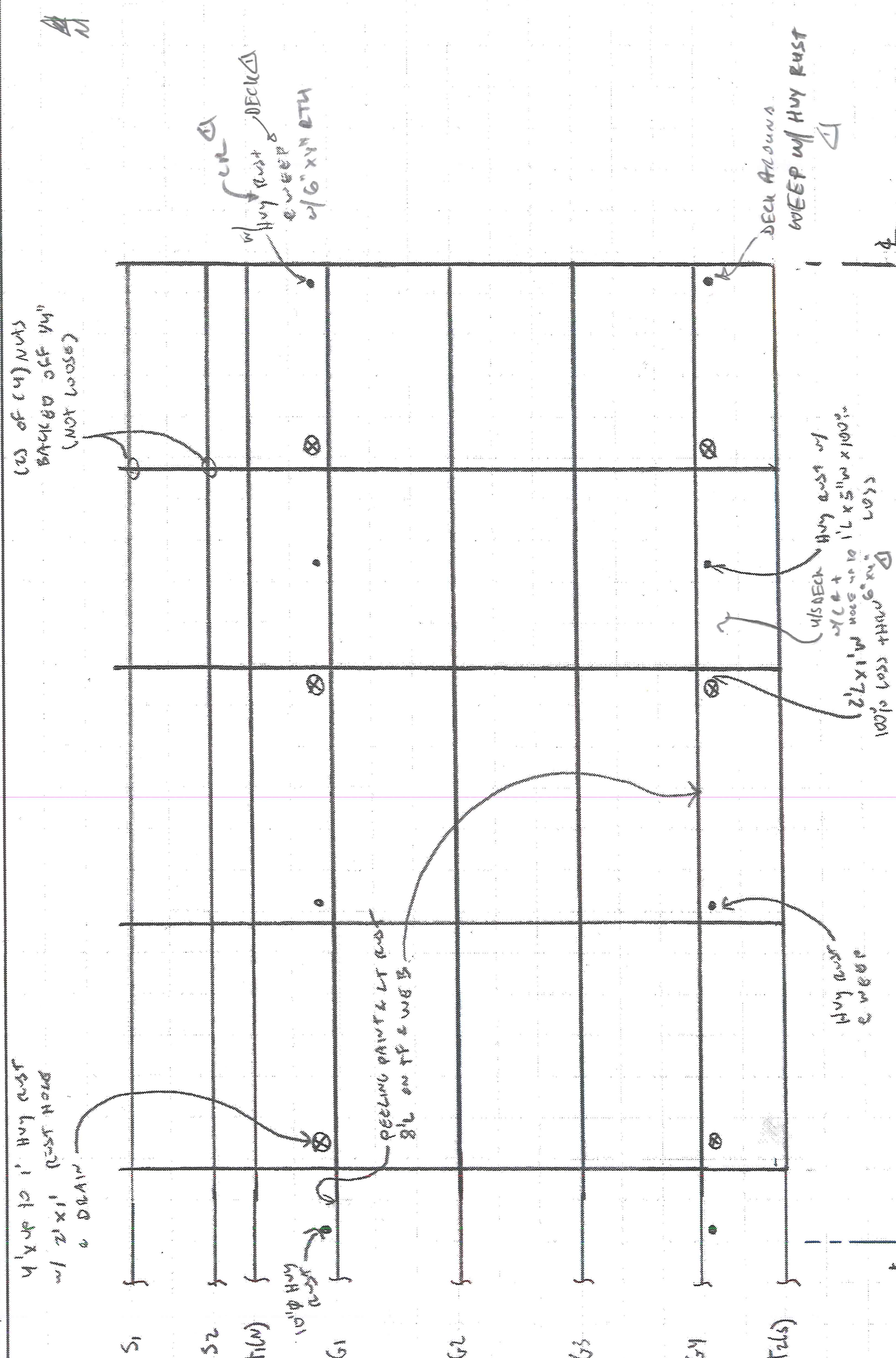
PROJECT NO P712 10 0021

DATE 12/7/2012

CREW NPH/ASW

BRIDGE NO 01349

SHEET 9



FRAMING PLAN SPAN 4

- EXODERMIC UNDERSIDE OF DECK W/ RANDOM LT RUST THROUGHOUT
- RUST COVERS <1% OF STEEL GIRDER SURFACES W/ SPOTTY PEELING PAINT
- S1 & S2 TIMBER SIDEWALK STRINGERS
- HVY RUST @ WEEPS, TYP
- ALL SOLE ℄'S ON BRGS @ P3 ARE BOWED/DISHED (APPEARS AS-BUILT)
- FLAME CUT FLANGES ON STRINGERS @ RAND LOCATIONS
- LAM, RUST @ SIDEWALK CONN, CHANNELS OVER FB'S

LEGEND

- ● PVC WEEP
- ⊗ 6"Ø SCUPPER DOWNSPOUT

REVISION 1	DATE 10/4/14	CREW YS, JAM (YSC)	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 10
CREW NPH / GAH / ASW

Calculations for 1/4 US Grid

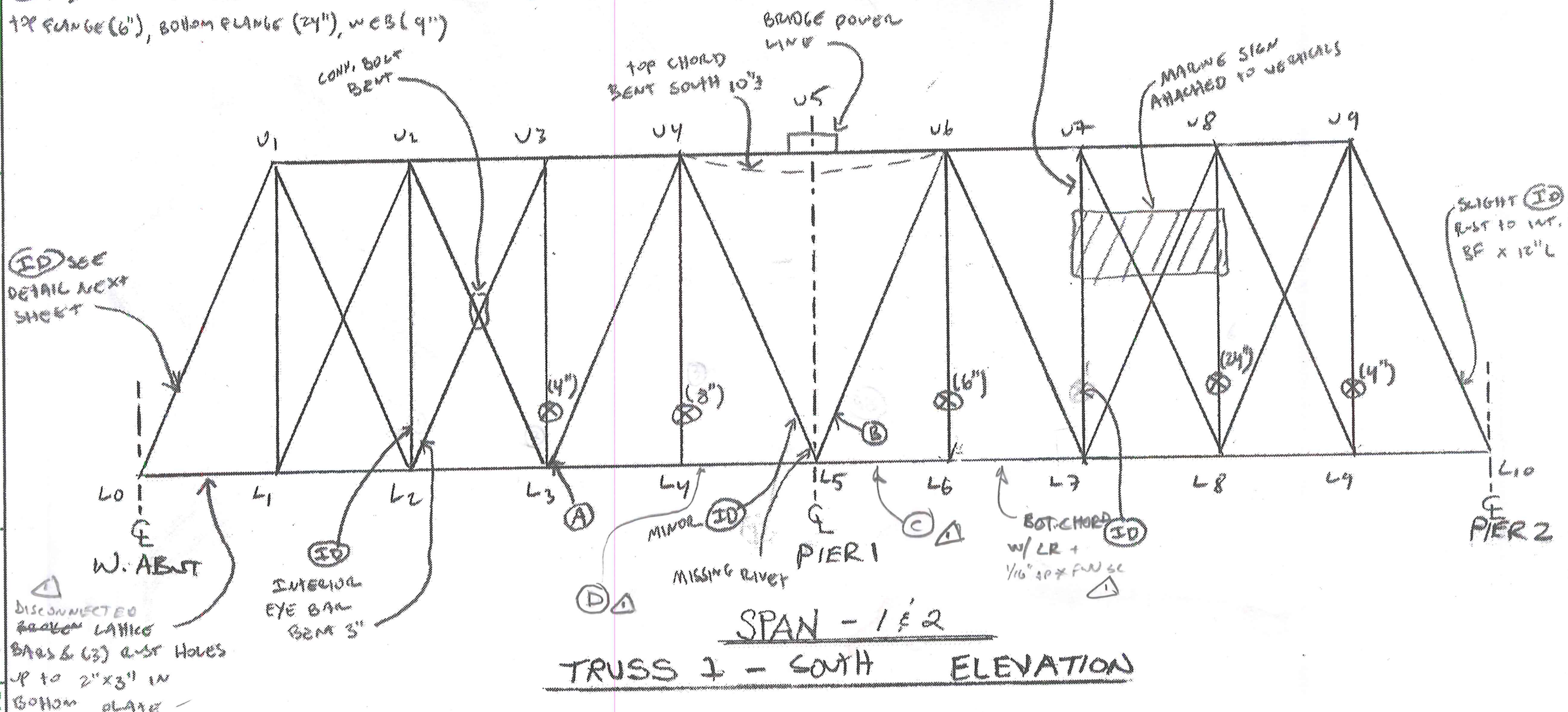
(A) 8"x3" RUST HOLE IN BOTTOM PL OF BOTTOM CHORD W/ IMPACTED RUST B/W EYE BARS & VERTICAL MEMBER - 50% SL IN (1) OF (4) DIAG. EYE BARS

(B) HVY IMPACT DAMAGE TO INT. CHANNEL W/ CRACKS TOP FLANGE (6"), BOTTOM FLANGE (24"), WEB (9")

△1 (D) BOT. CHORD BOT. PL W/ LR + 8"L x 2"W RTH W/ ADJ AREAS OF KE

U7-L7 BENT 1/2" TO NORTH

△1 (C) BOT CHORD B/W L5 & L6
BF PLATE W/ FC x FW x 1/4" MIN REM & KE AROUND HOLE; BOLTS W/ 30% SL; 1/8"± IR E/W BF PL'S



SPAN - 1 & 2
TRUSS 1 - SOUTH ELEVATION

LEGEND:

- ⊗ IMPACT DAMAGE W/ CRK (CRK LENGTH (S))
- (ID) IMPACT DAMAGE W/O CRACKS

GENERAL NOTES:

- TRUSSES ARE ORNAMENTAL & SUPPORT NO LIVE LOADS, ONLY SELF WEIGHT
- SOME DEBRIS ALONG BOTTOM CHORD
- MOST VERTICALS BENT & SHIFTED FROM IMPACT DAMAGE
- 5/10± RUST ON TRUSS
- LOCALIZED MOD. RUST ON BOTTOM CHORD UP TO 1'Ø
- NEVER XMAS LIGHTS THRU OUT

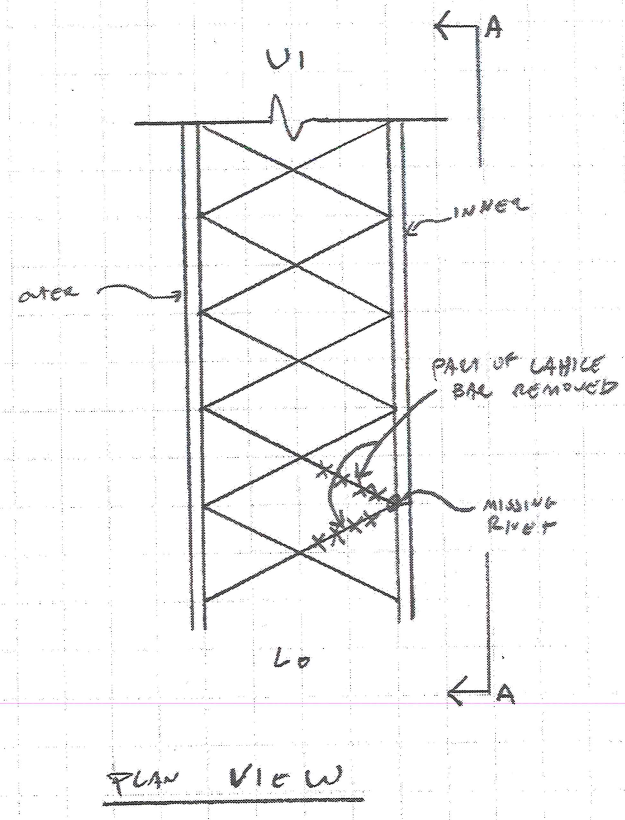
REVISION △1	DATE 11/3/14	CREW YS, JPM (TSC)	REVISION △2	DATE	CREW
REVISION △3	DATE	CREW	REVISION △4	DATE	CREW

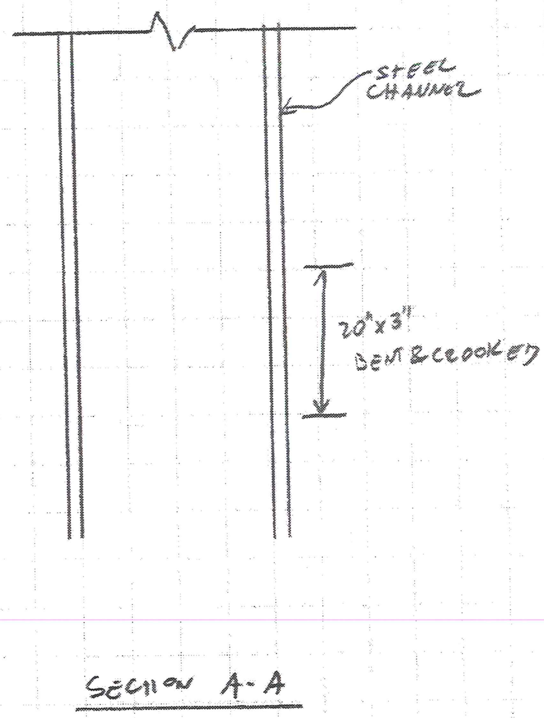
TranSystems

Field Notes

PROJECT NO P7TE100021
DATE 11/9/2012
CREW NPH/ASW/GAH

BRIDGE NO 01349
SHEET 11





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

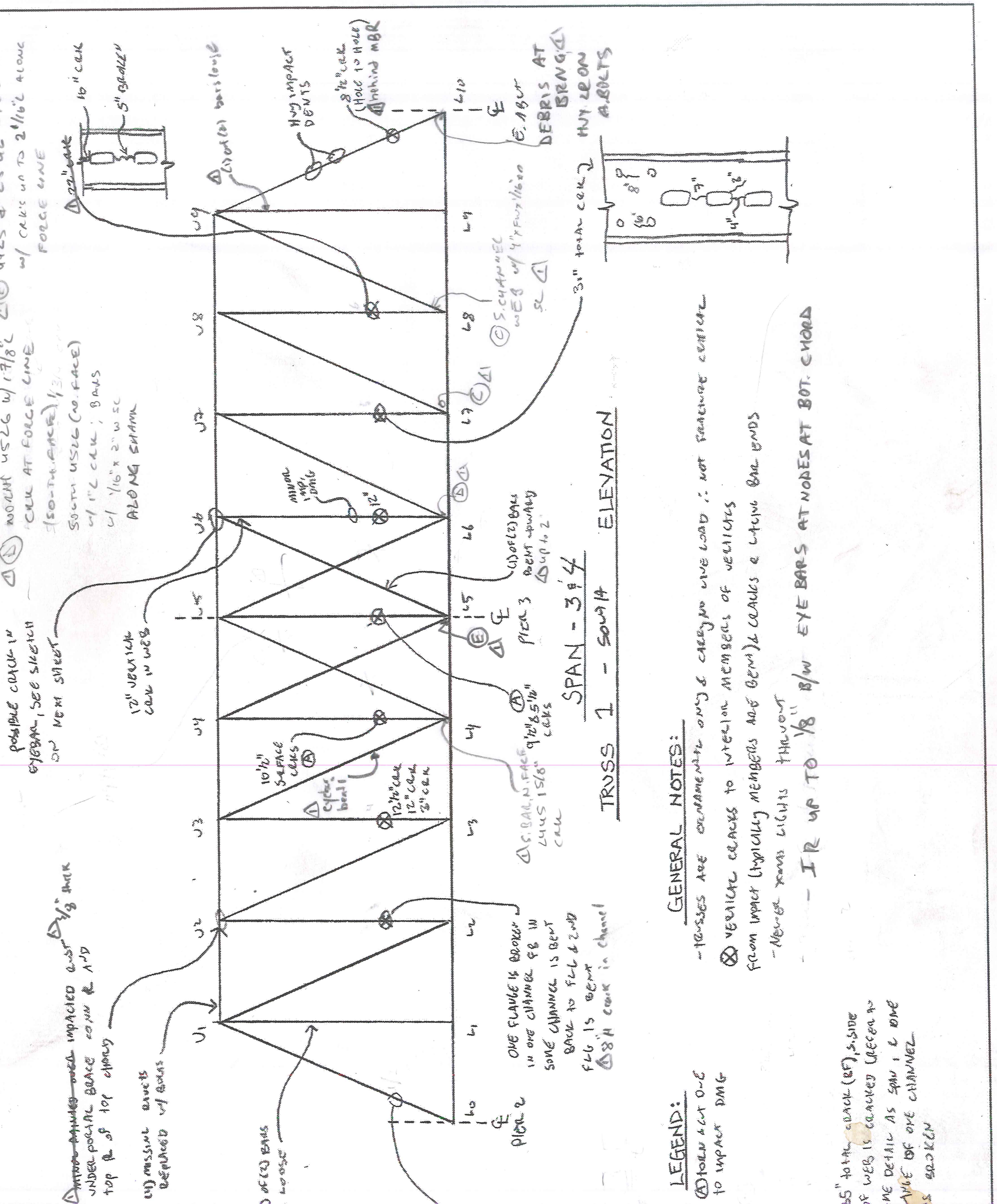
TranSystems

Field Notes

PROJECT NO P71210 0021 BRIDGE NO 01349

DATE 11/9/12 SHEET 12

CREW NPA / GAA / ASW



SPAN - 3 & 4

TRUSS 1 - SOW14 ELEVATION

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
- NEWER XMAS LIGHTS THROUGHOUT
- IR UP TO 1/8" B/W EYE BARS AT NODES AT BOT. CHORD

LEGEND:

(A) TORN ACCT DUE TO IMPACT DMG

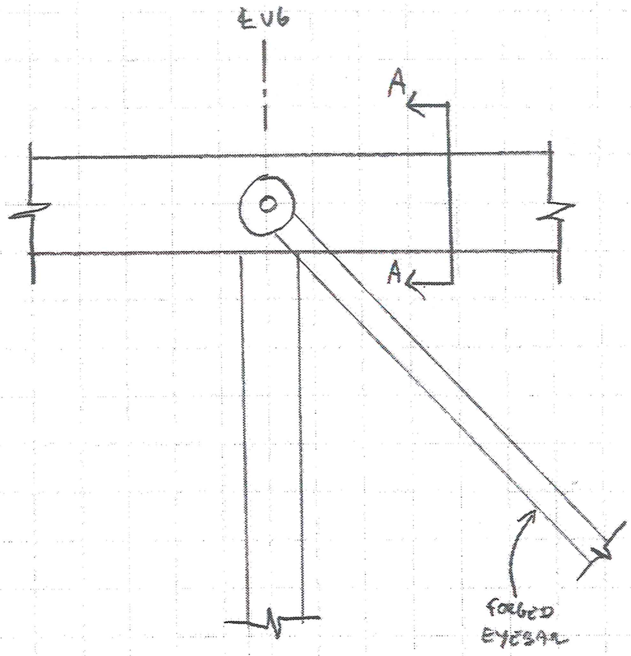
REVISION 1	DATE 11/3/14	CREW YS, JRM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4

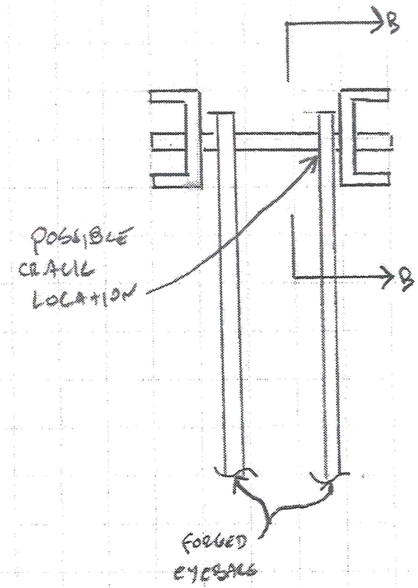
Field Notes

PROJECT NO P7R100021
DATE 11/9/12
CREW NDH/ASY GAH

BRIDGE NO 01349
SHEET 15

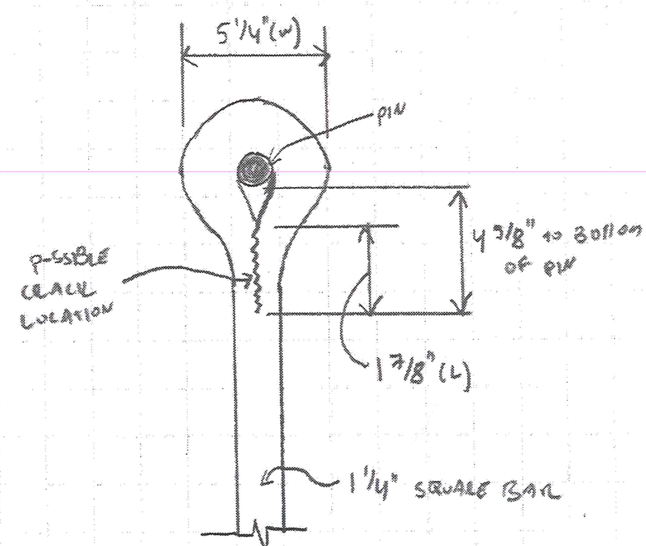


SPAN 4, NORTH TRUSS, NORTH ELEVATION



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 ① EYEBAR)

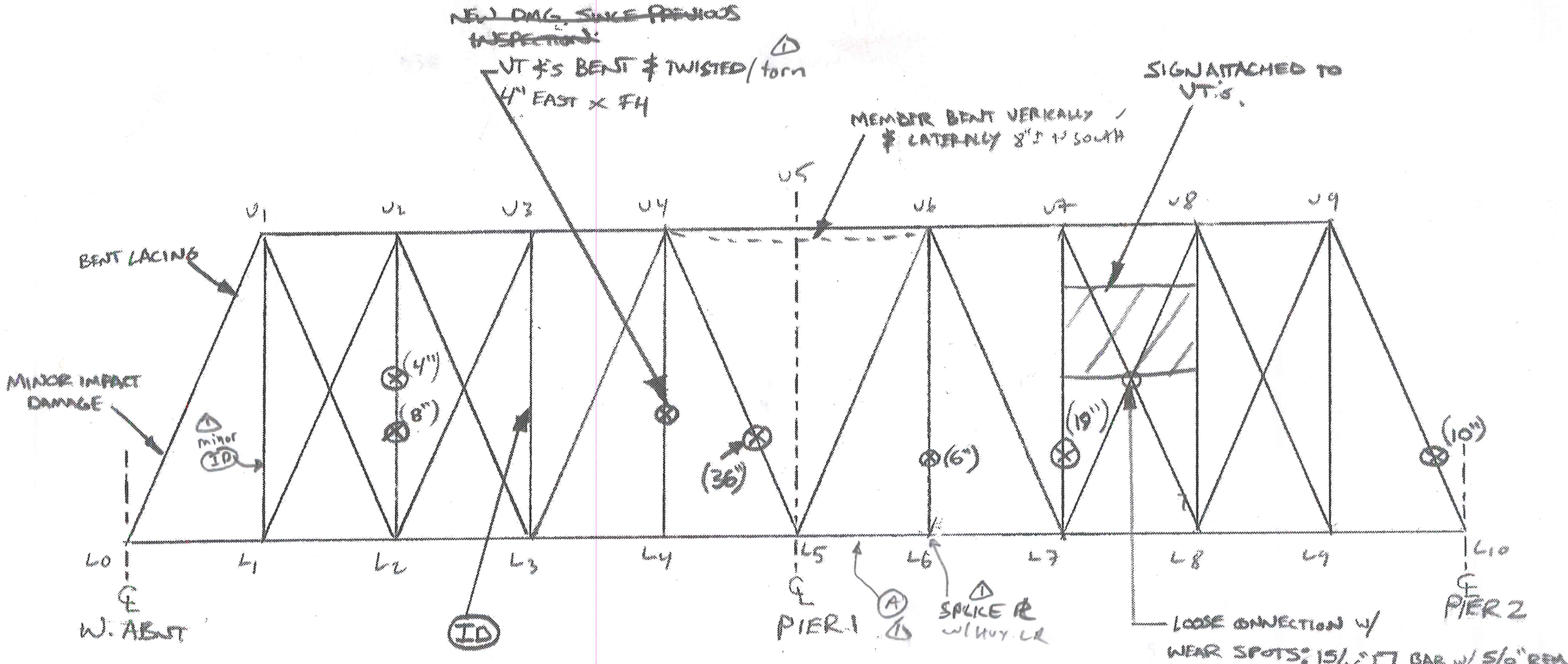
REVISION 1	DATE 11/18/14	CREW ABB (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems

Field Notes

PROJECT NO. P712100021
DATE 12/7/12
CREW NPH/ASW
BRIDGE NO. 01349
SHEET 14



SPAN - 1&2

TRUSS 2 - SOUTH ELEVATION

LEGEND:

- ⊗ IMPACT DAMAGE w/ CRACK. (CRK LENGTH'S)
- (ID) - IMPACT DAMAGE w/o CRKS

1 (A) BOT. CHORD FLANGE PL w/ LR & 3/16" REM x FW

GENERAL NOTES:

- TRUSSES ARE ORNAMENTAL & SUPPORT NO LIVE LOADS ONLY SELF WEIGHT.
- SOME DEBRIS ALONG BOTT CHORD.
- MOST VERTICALS BENT & SHIFTED FROM IMPACT DAMAGE.
- ±5% RUST ON TRUSS
- LOCALIZED MOD RUST ON BOTT CHORD UP TO 1'φ
- NEWER XMAS LIGHTS THROUGHOUT.

REVISION 1	DATE 11/18/14	CREW ABB CTSC	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

TranSystems

Field Notes

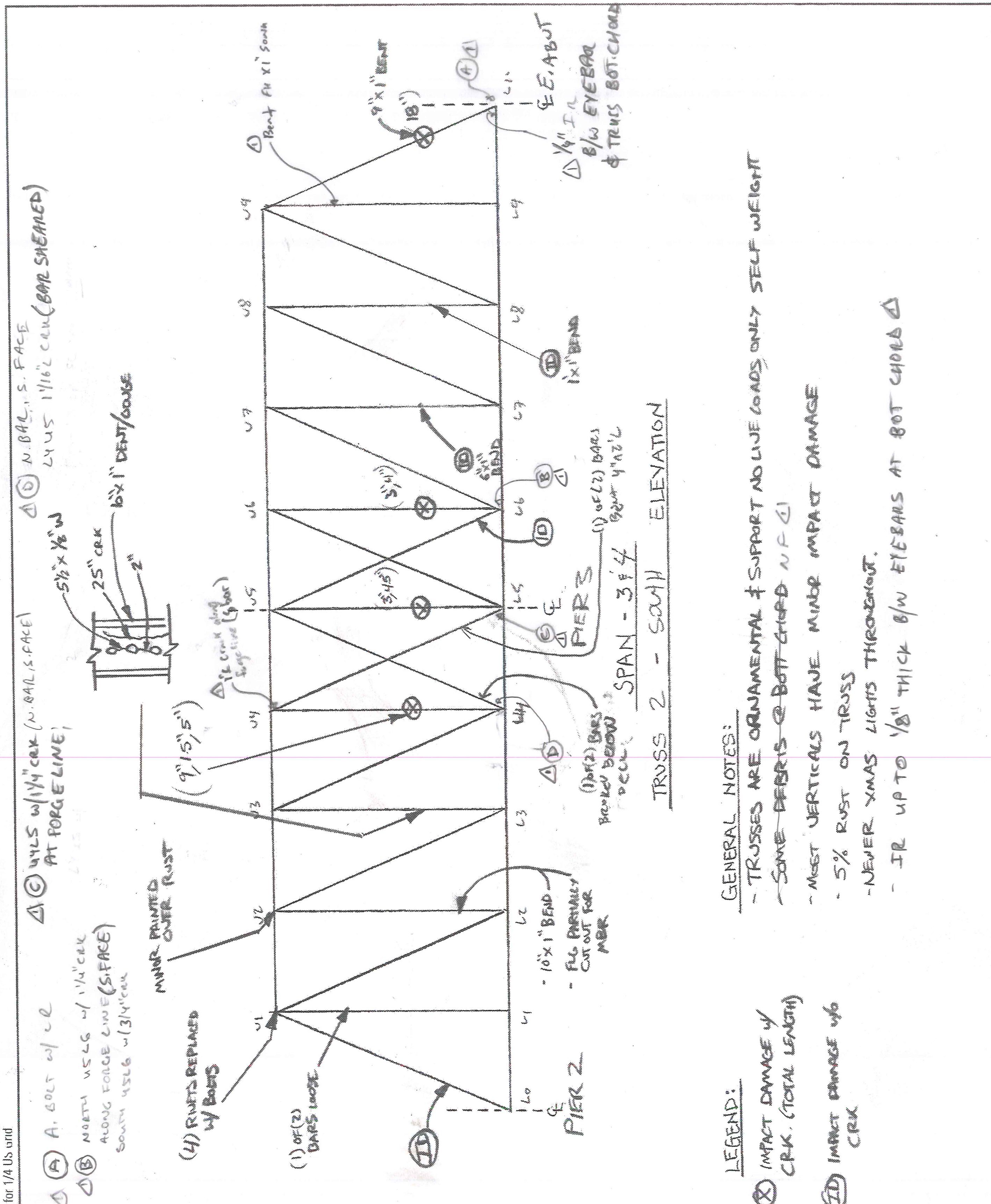
PROJECT NO P712100021

DATE 12/7/12

CREW NPM/ASW

BRIDGE NO 01349

SHEET 15



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

Calculations for 1/4 US grid

TranSystems®

Field Notes

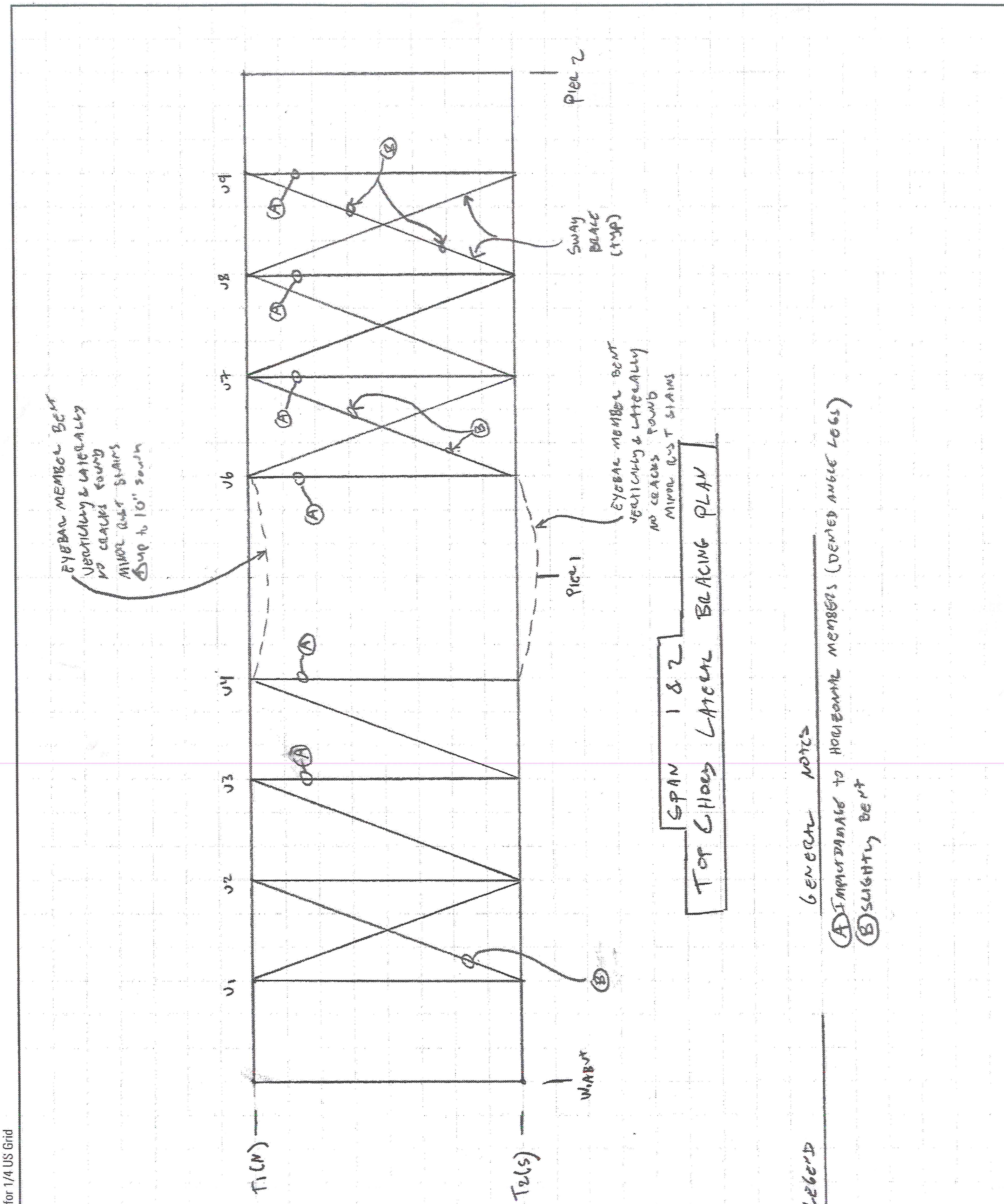
PROJECT NO. P712100021

BRIDGE NO. 01349

DATE 11/9/2012

SHEET 16

CREW NPH/ASW/GAH



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

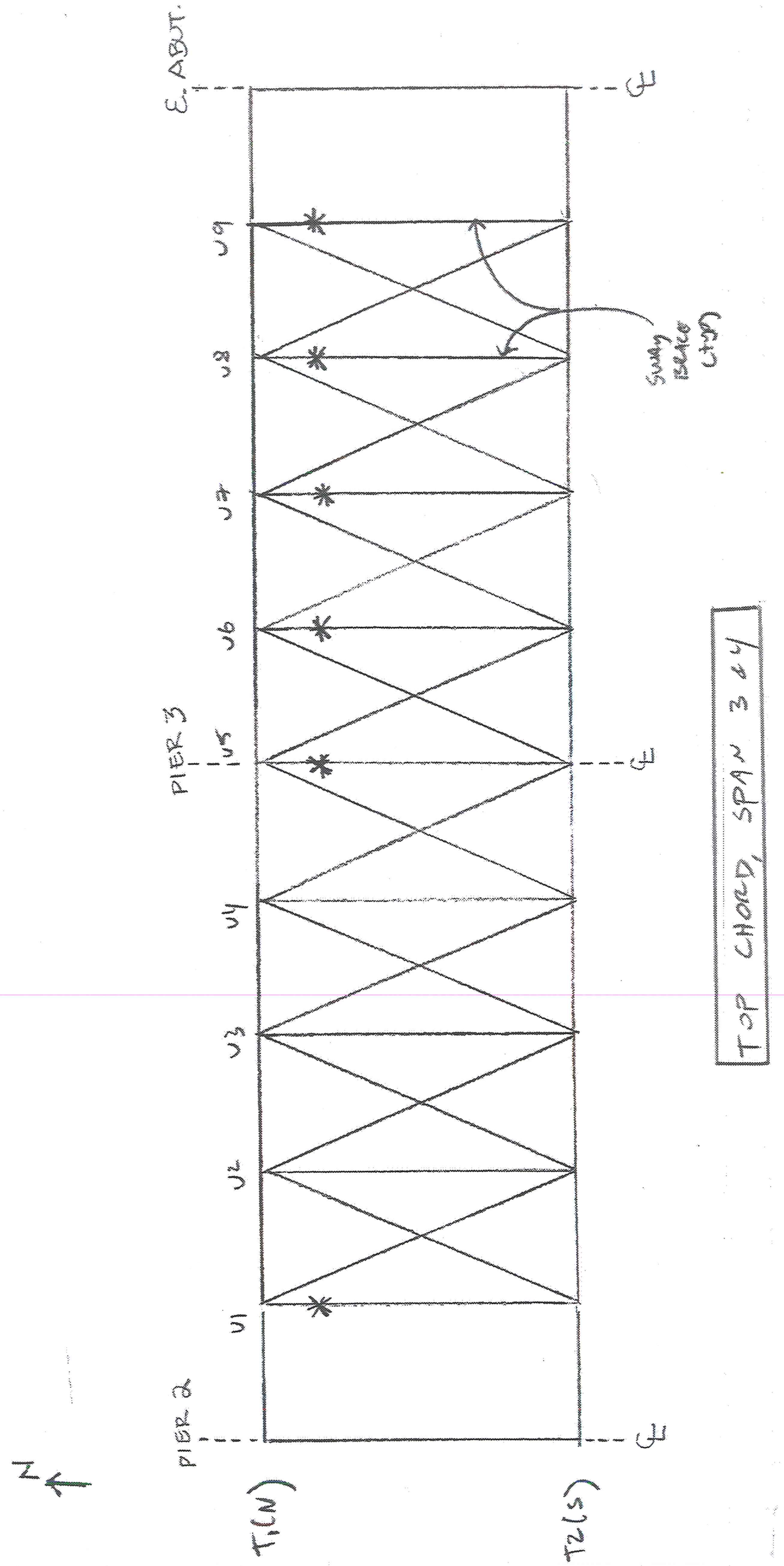
TranSystems®

Field Notes

PROJECT NO P71210002[illegible] BRIDGE NO 01349

DATE 11/9/2012 SHEET 17

CREW NPH/ASW/GAH



GENERAL NOTES

* IMPACT DAMAGE TO HORIZONTAL TOP MEMBER (DENTED & LEG)

LEGEND

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

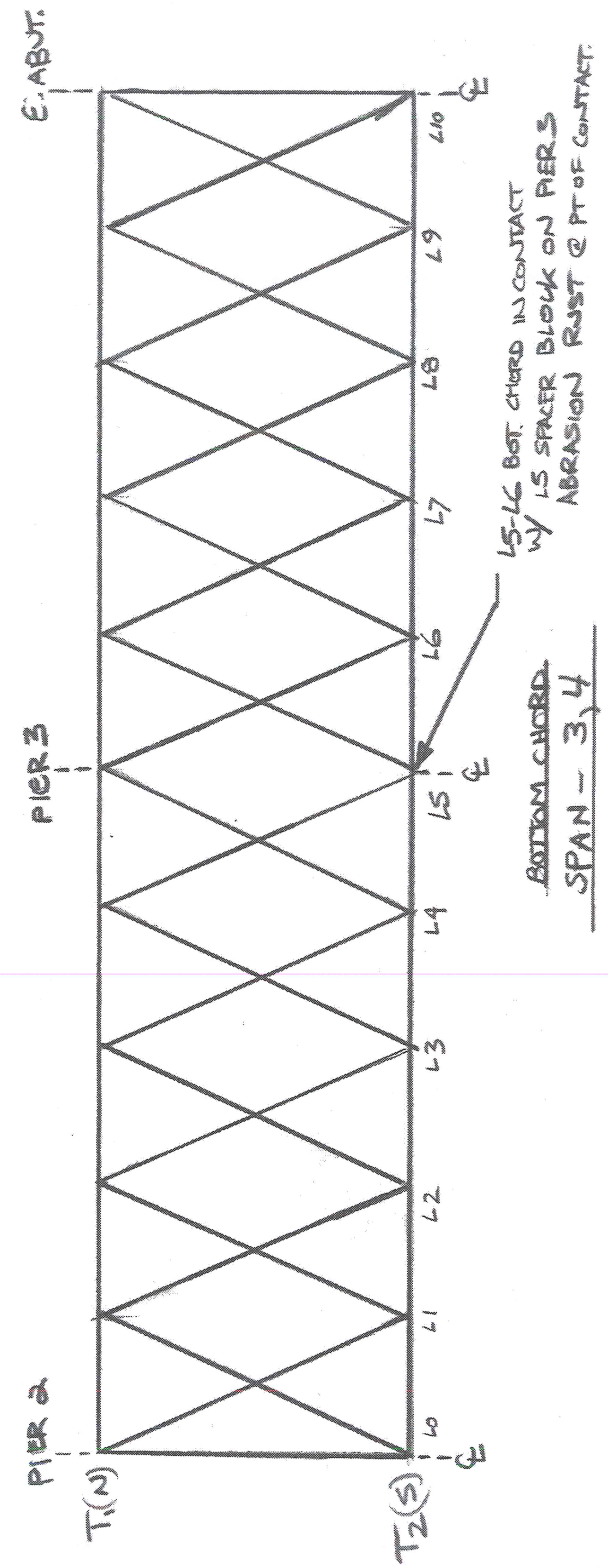
Calculations for 1/4 Us Grid

TranSystems®

Field Notes

PROJECT NO. P712100021
DATE 12/7/12
CREW ASW/NPH

BRIDGE NO 01349
SHEET 18



BOTTOM CHORD
SPAN - 3,4

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

LEGEND:

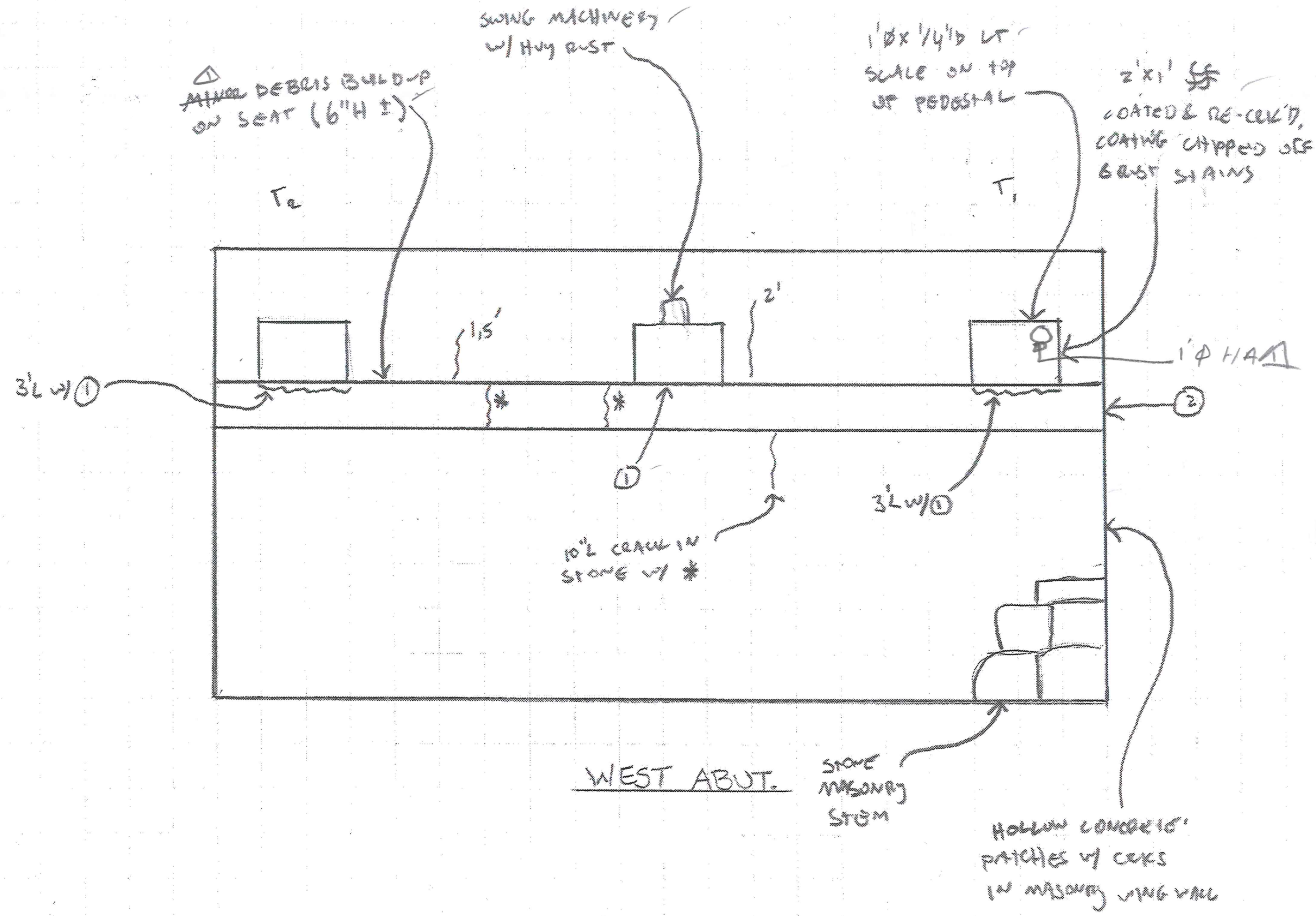
REVISION 1	DATE 11/4/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

Field Notes

TranSystems

PROJECT NO P7I2100021
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/HL MPCR
- ▭ 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

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Field Notes

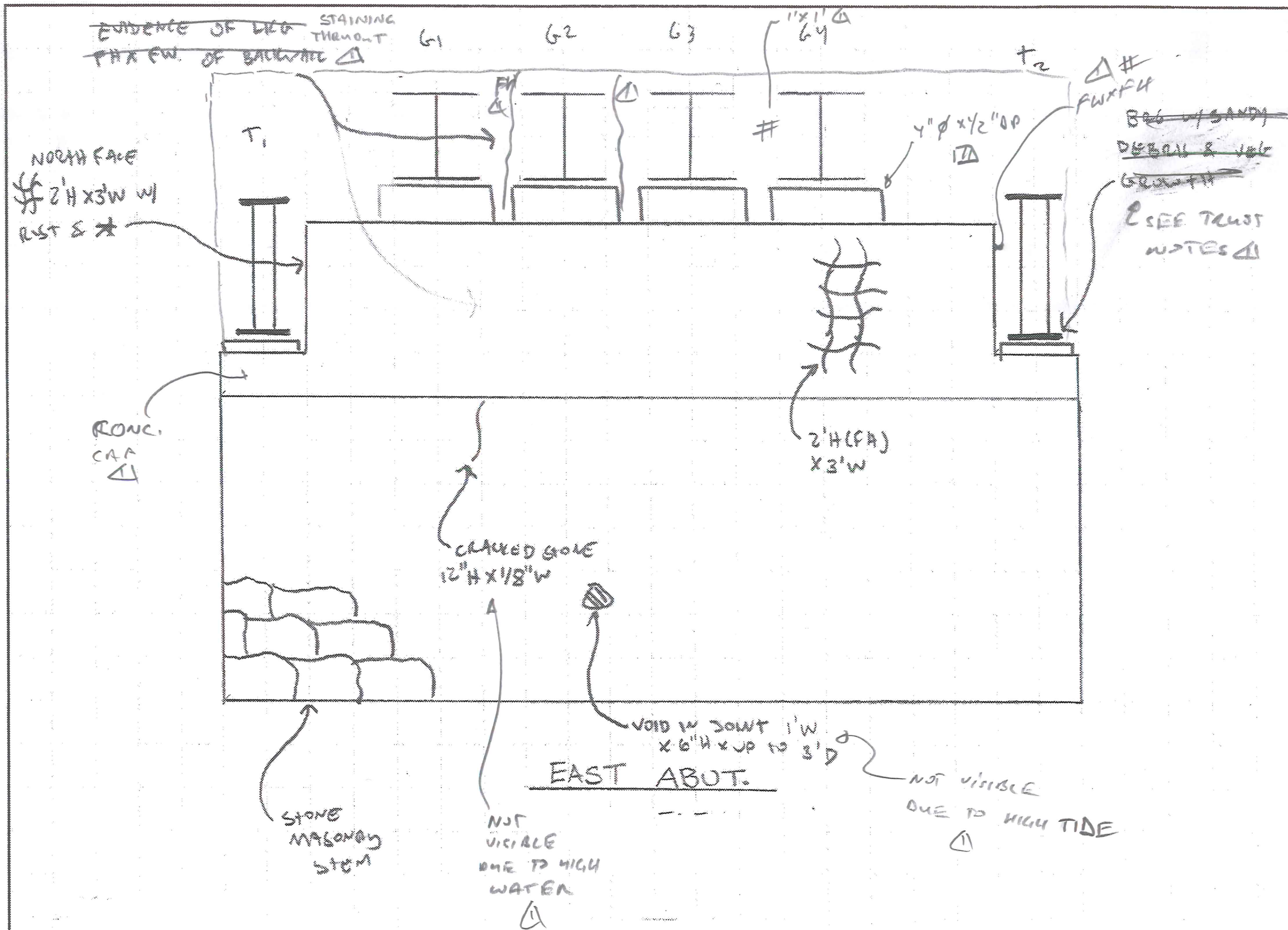
PROJECT NO. P412100021

BRIDGE NO. 01349

DATE 12/7/12

SHEET 20

CREW NDM/ASW



LEGEND

- ~ CRACK/HL CR
- # 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 △

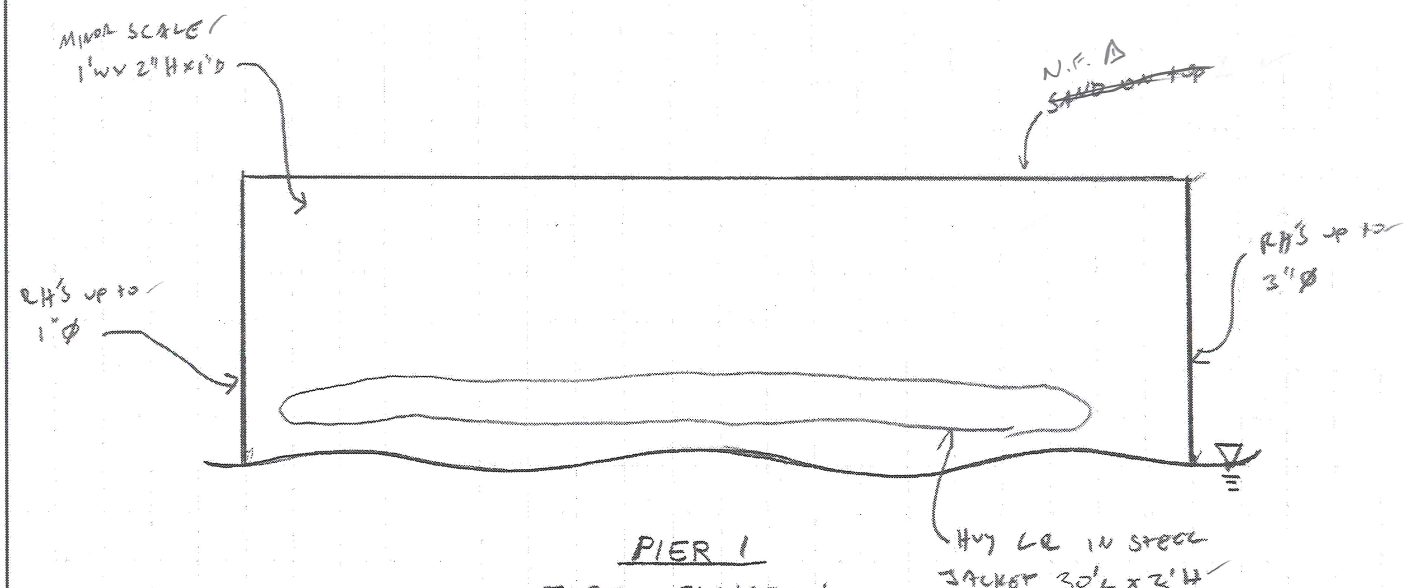
REVISION △1	DATE 11/4/14	CREW YS, JTM (TSC)	REVISION △2	DATE	CREW
REVISION △3	DATE	CREW	REVISION △4	DATE	CREW

Calculations for 1/4 US Grid

TranSystems®

Field Notes

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



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

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Field Notes

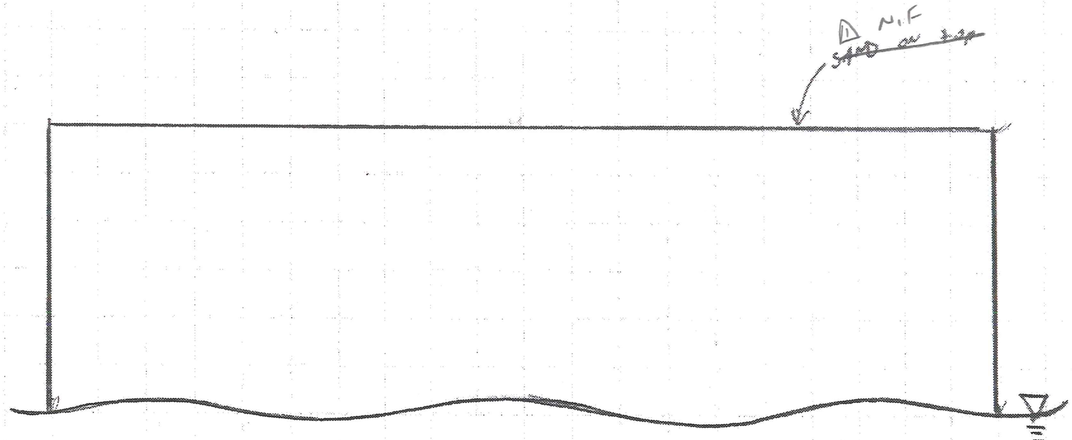
PROJECT NO P712 10 0021

DATE 11/9/12

CREW MDH/ASW GAW

BRIDGE NO 01349

SHEET 22



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

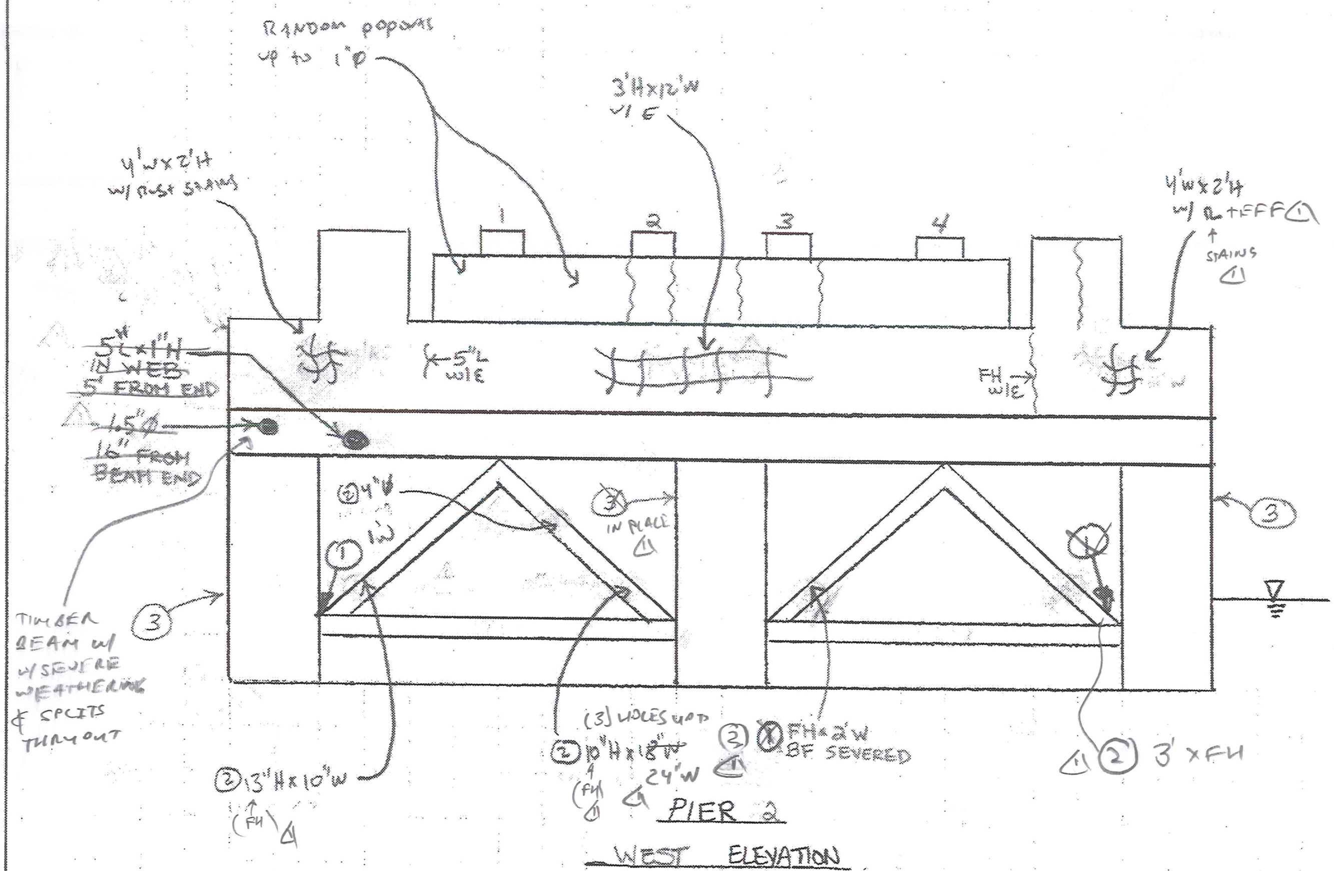
Calculations for 1/4 US Grid

TranSystems

Field Notes

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

BRIDGE NO. 01349
SHEET 23



LEGEND:

- MAPCRACKING
- HAIRLINE CRACK/CRK
- HOLE
- W/E — W/EFFLO
- 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

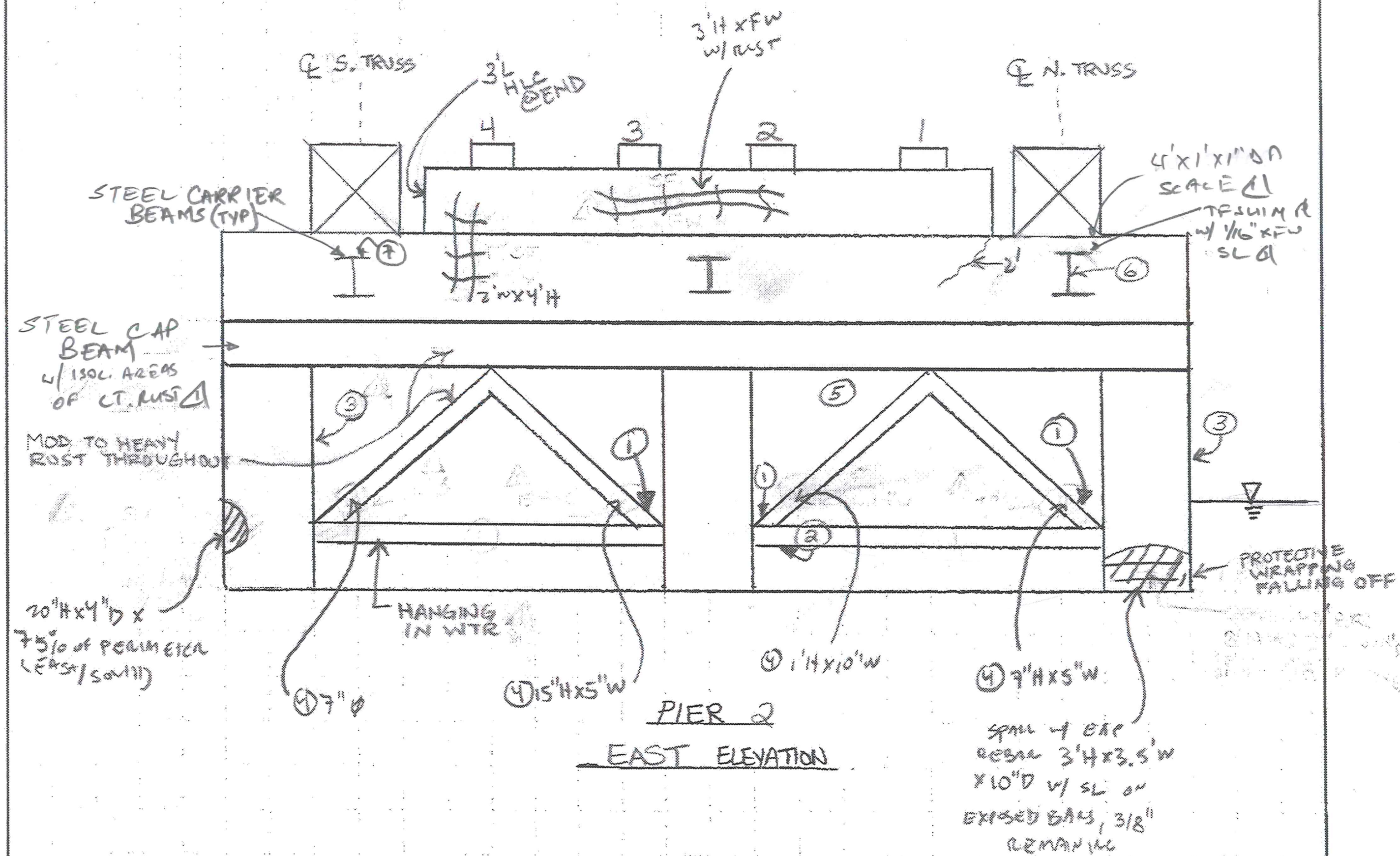
Calculations for 1/4 US Grid

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

TranSystems

Field Notes

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



PIER 2

EAST ELEVATION

NOT VISIBLE DUE TO HIGH WATER △1

△1 (7) SHIM ℞ 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 MOTAR VOID
6. STEEL CARRIER △1 BEAMS ~~ENCASED~~ △1 ~~IN PIER CAP~~ w/ ~~HVY LAM. RUST~~ AREAS OF RUST; CR IN TF SHIM. ℞ (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

Field Notes

TranSystems®

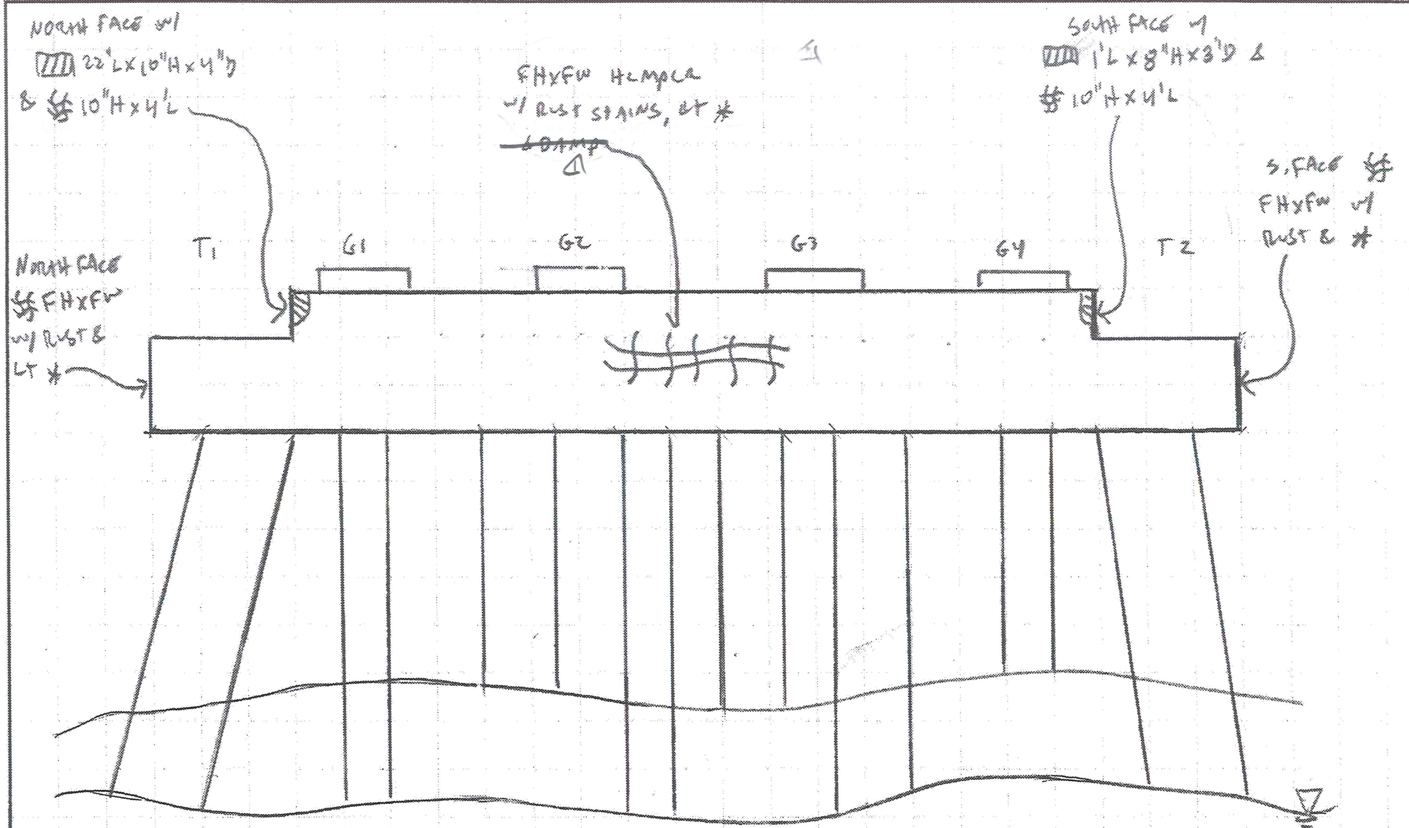
PROJECT NO. P7T210 0021

BRIDGE NO. 01349

DATE 12/7/12

SHEET 25

CREW NPH/ASW



PIER 3

WEST ELEVATION

LEGEND:

~ CRACK/HLCR

MAPCRACK/HUMPCR

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~~ SEE TRUSS
- PILES WRAPPED IN FIBERGLASS JACKET

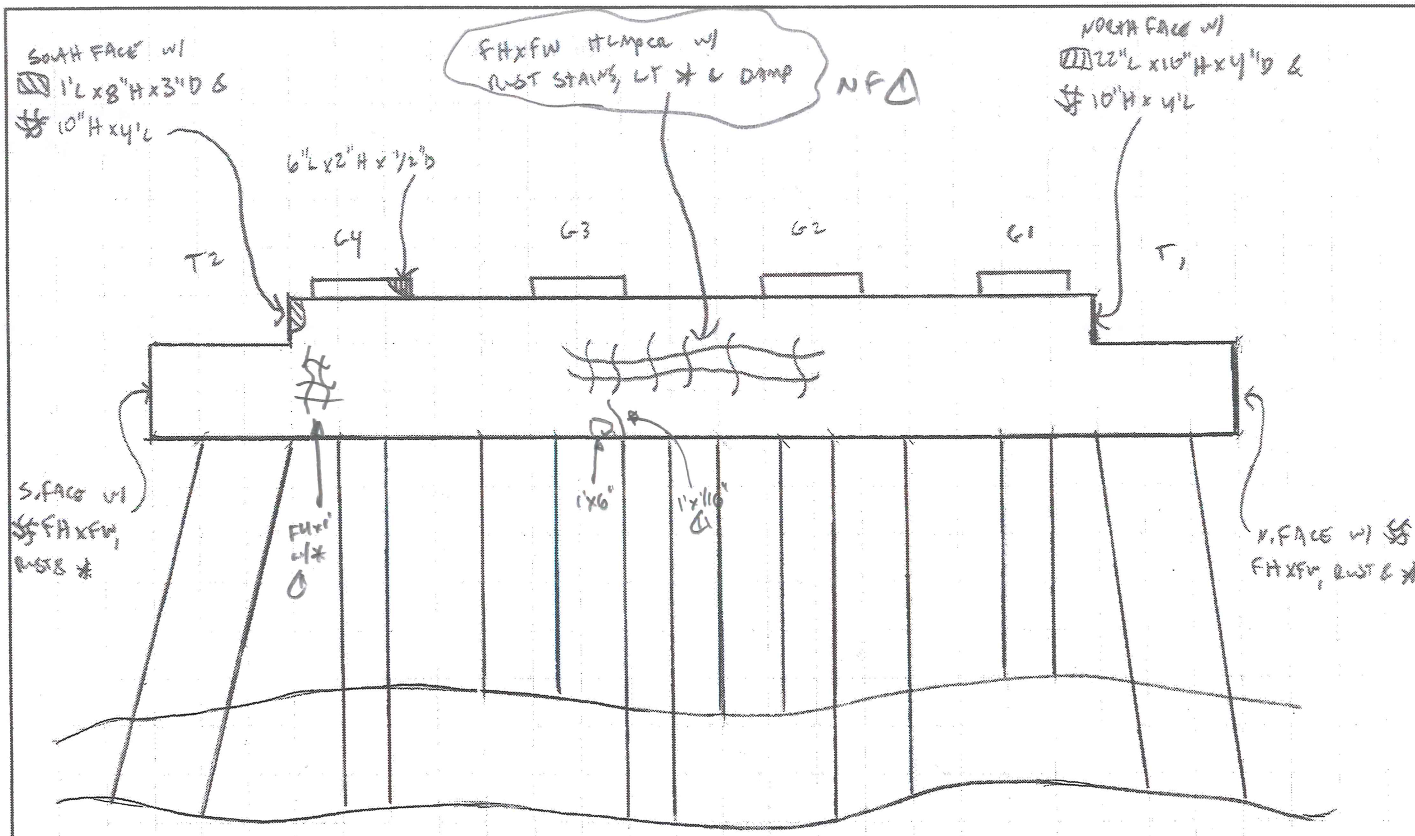
Calculations for 1/4 US Grid

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

TranSystems®

Field Notes

PROJECT NO P71210021
BRIDGE NO 01349
DATE 12/7/12
SHEET 26
CREW NPH/ASW



PIER 3

EAST ELEVATION

LEGEND:

~ CRACK/HLcrk

MAP CRACK/HLmpcr

SPALL

* EFFLORESCENCE

GENERAL NOTES:

- SEE PIER 3, WEST ELEVATION

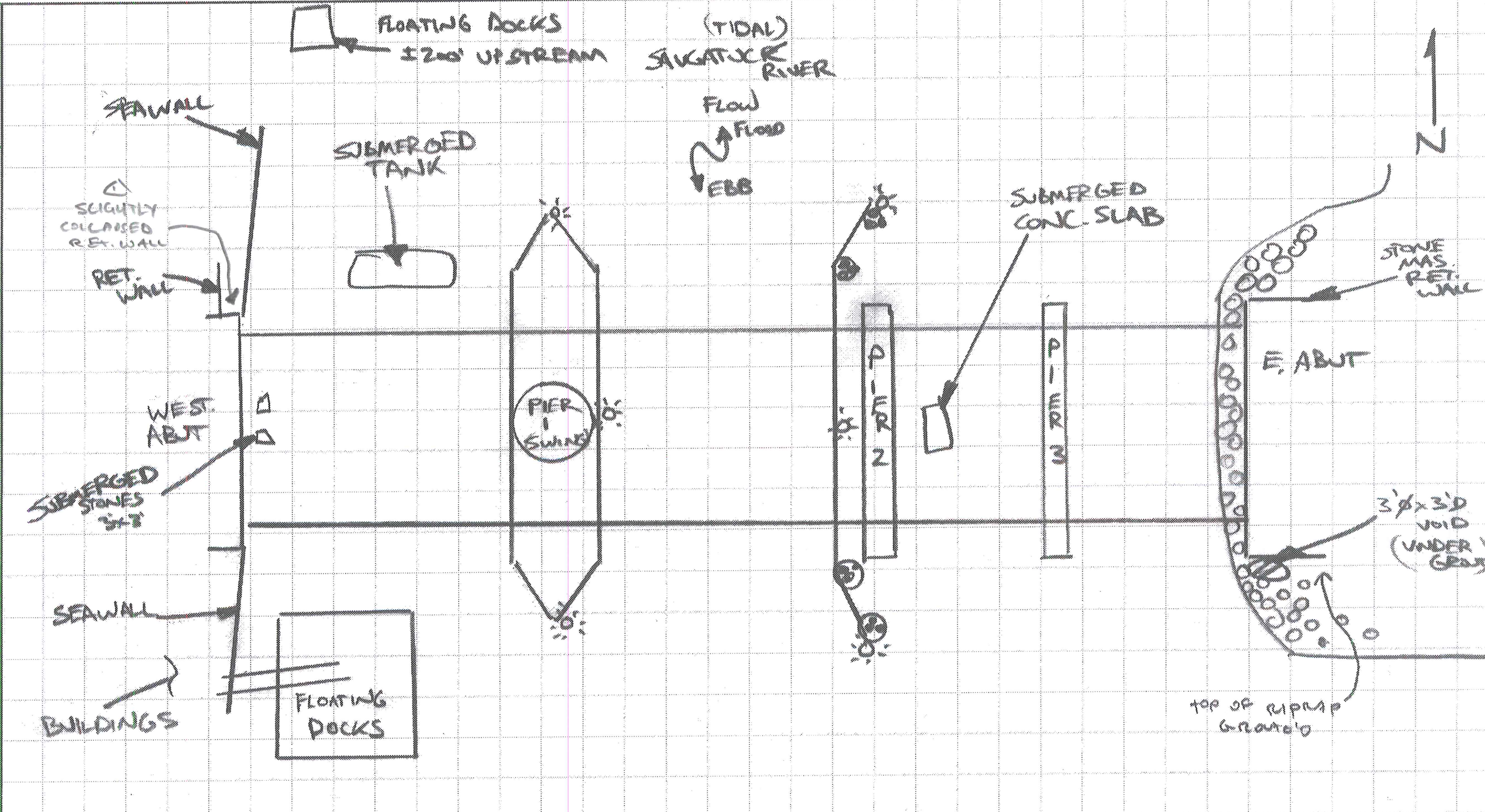
REVISION 1	DATE 11/4/14	CREW YS, JPM (TSC)	REVISION 2	DATE	CREW
REVISION 3	DATE	CREW	REVISION 4	DATE	CREW

Calculations for 1/4 US Grid

Field Notes

TranSystems®

PROJECT NO P712100021
DATE 11/19/12
CREW ASW/NPH/CAH
BRIDGE NO 01349
SHEET 27



CHANNEL DIAGRAM

LEGEND:
NAV. LIGHTS
PILES/DOLPHIN
RIP RAP

GENERAL NOTES:
- ALL NAV LIGHTS FUNCTIONAL DURING INSPECTION ~~(AFTER REPAIRS)~~
- CHANNEL IS TIDAL @ BRIDGE
- ~~SEVERAL LOCATIONS OF HVY DEBRIS FROM RECENT HURRICANE (SEA WALLS, & LOWER TRUSS CHORDS.~~
- FEW LOCATIONS OF DISPLACED/SCATTERED 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: YS/JPM

Carried / Crossed: Bridge Street / Saugatuck River

Photo #	Image Description
1 (32)	South ELEV.
2 (33)	G3 CONN. TO END FB @ 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 PARTIALLY 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 BOWED 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 RTH IN PLATE @ BOT CHORD
(48) 17	SP.1 TYP LONG SPLICE ON U/S B/W G4 + G5
(49) 18	SP 1, G7 N. ELEV PLATE W/ INTERMIT NEEDED TO WELD
(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	SP 1 G7 TYP CONNECTION TO BOX GIRDER @ PIER 1 (S. EL)
28	N. TRUSS BOT CHORD RTH IN BOT. PLATE ~~AT~~ P1
29	N. FASCIA @ PIER 1 WEEP @ WOODEN PLATFORM
30	W, ABUT
31	DOWNSTREAM
32	UP STREAM
33	W. ABUT
34	TYP U/S SP 1
35	NW WW
36	P2, W. EL.
37	T1, AT P1, BOT CHORD B/W L5 + L6 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	SP 2, 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	S. 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, W/ EXP. CONC W/ SPALLING
56	CENTER BRNG AT P1
57	MACHINERY AT P1
58	SP 1, U/S TF B/W G4+5 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 b/w EYE BAR + TRUSS BOT CHORD
8	BRNG ~~#~~ AT E. ABUT
9	N. FASCIA, AT E. ABUT RTH AT SIP AT WEEP
10	T1, TYP EYE BAR AT L9, BOT. CHORD
11	SIDEWALK AT L1, BACKED OFF NUTS
12	N. TRUSS, AT L9, EYE BAR
13	S. FASCIA B/W L8 + L9, SIP'S w/ LR + RTH'S
14	T1, L8, BOT. CHORD, IR AT EYE BARS
15	L8U8, SL IN 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. ENDFACE $\boxed{III}$
23	L5, N. TRUSS, CRACKED EYE BARS
24	SP4, 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 L4U5, 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/U4 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 L4U4, T2 span 3
148	bent bar L5U4, T2 span 3
149	bent bar L4U4, T2 span 4
150	broken bar L4U5, T2 span 3
151	L0U1 upper conn T2 span 3
152	crack eyebar L5U4 @ top, T2 span 3
153	top chord span 4 looking W
154	north truss span 4 looking W
155-156	crack eyebar L5L6, 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 warning @ 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	patch 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 pav't
106	potholes @ east app pav't
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	pav't @ 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.**

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.**

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).**

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).**

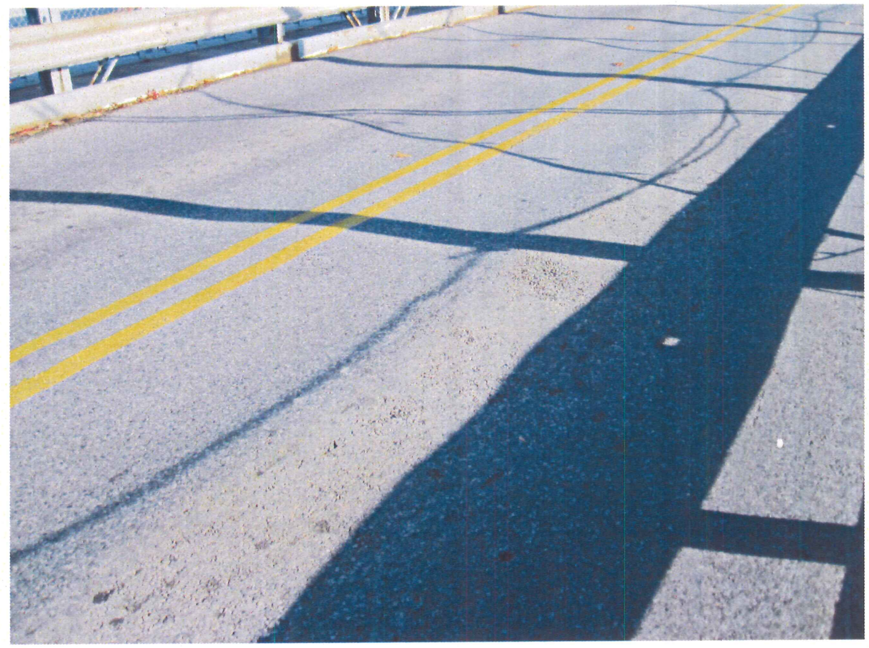


Photo 8: **Typical top of deck (span 1 shown).**

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.**

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 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

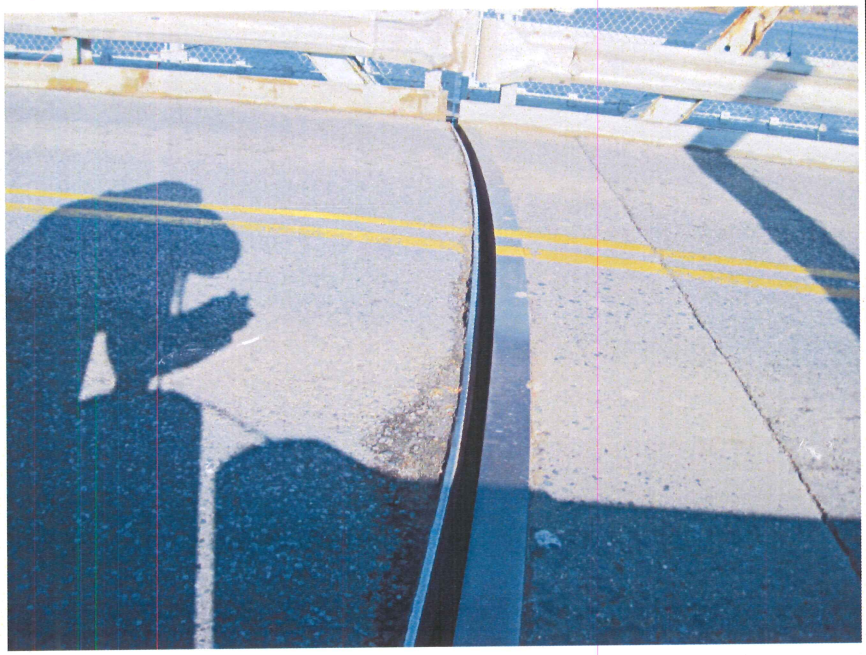


Photo 15: **Open deck joint at pier 2.**

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

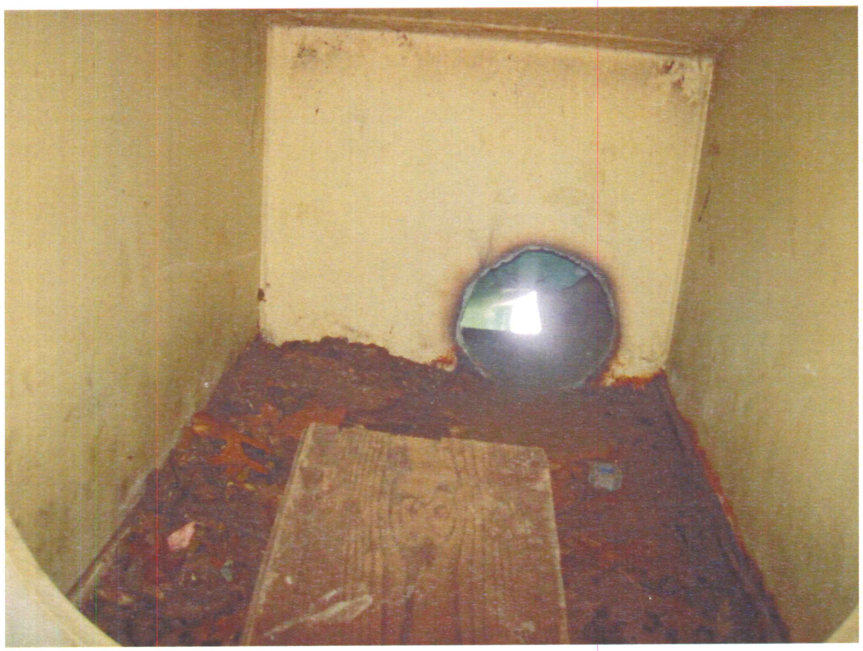


Photo 23: **Interior of cross girder at the west abutment. Note the debris on the bottom flange and the hole in the diaphragm.**

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.**

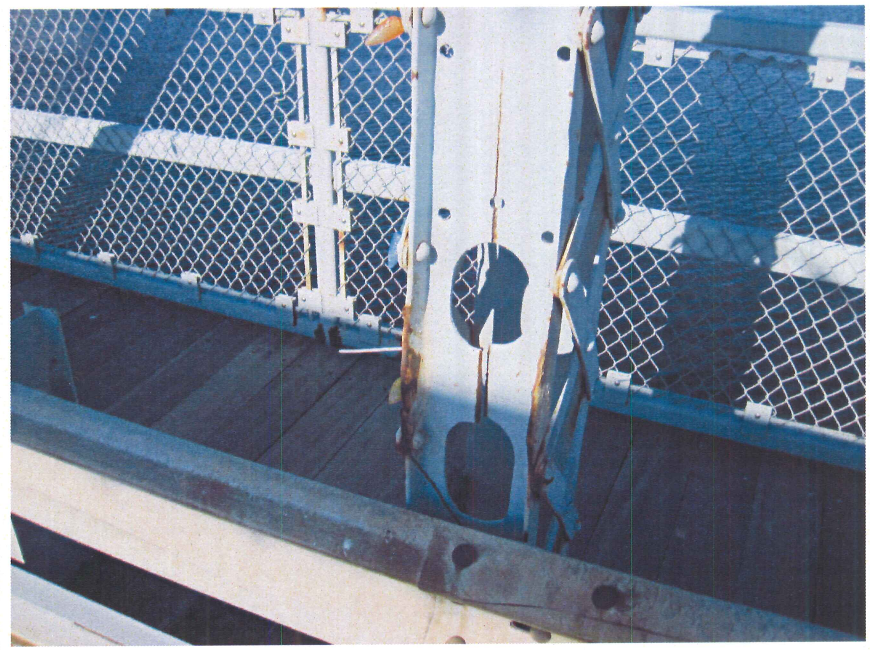


Photo 30: **Span 4, truss 1 L8U8 with cracks.**

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

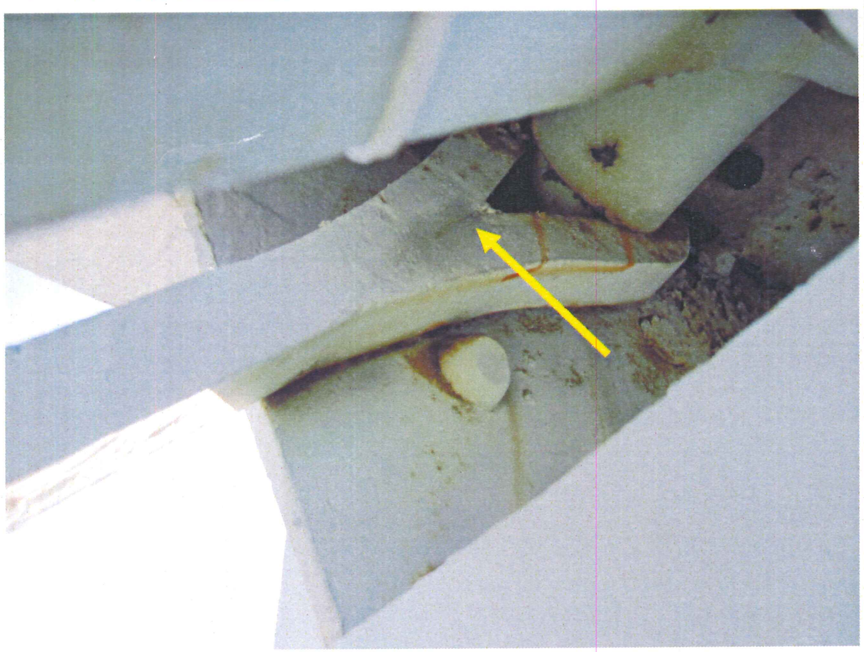


Photo 35: **Span 3, truss 2, L5U4 with a crack along the forge line.**

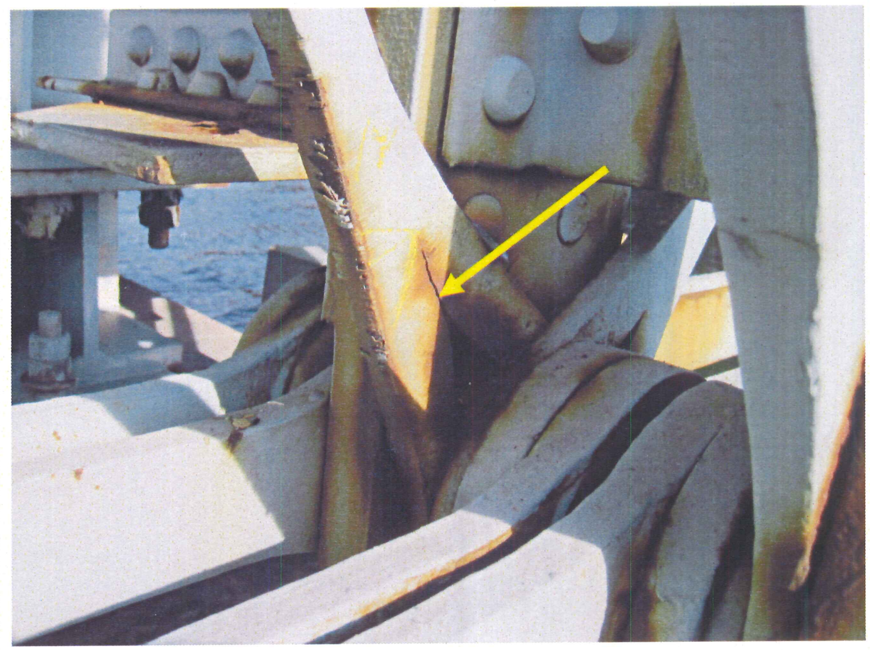


Photo 36: **Span 3, truss 2, U4L5 with a crack along the forge line.**

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

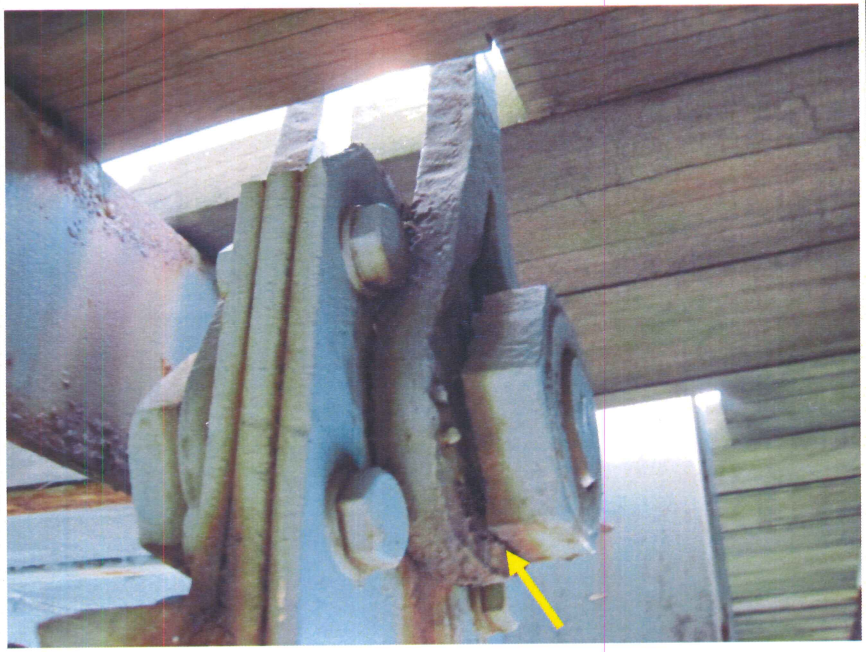


Photo 37: **Span 4, truss 1 at L9 with impact rust between the eye bar and the nut.**

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

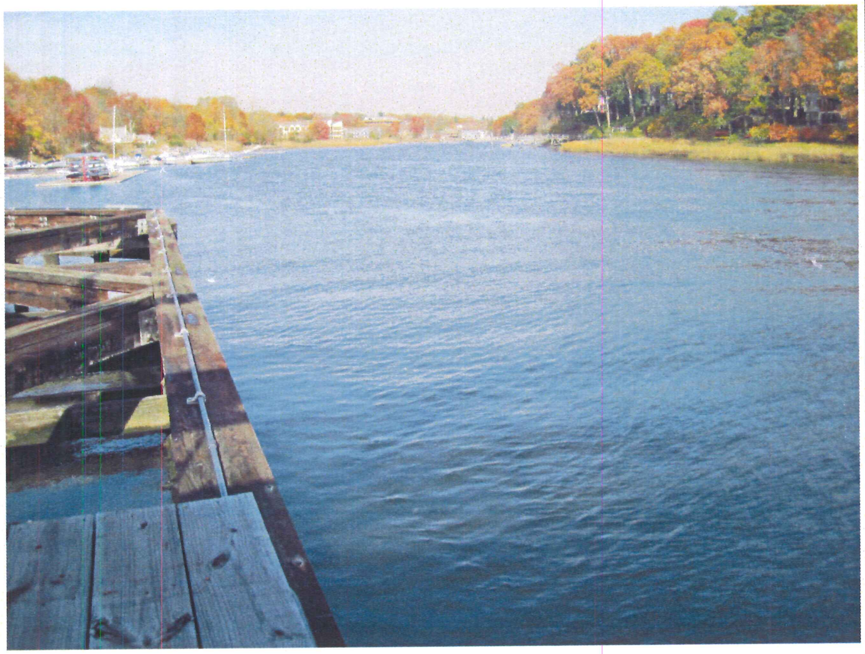


Photo 45: **Channel looking north.**

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.**

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

<u>ConnDOT BRIDGE NO. 01349</u>

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

Table of Contents

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. 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).	D

SPAN DRIVE MACHINERY

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

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. 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.	D

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. 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.	D
7.	At all end lifts there is a light buildup of hardened debris between the jack and strike plate. Clean the strike plates to bare metal and paint.	D
8.	Limit switch gears of all jacks are making a ringing noise. Remove gears and limit switches if they are not used for operation.	D
9.	Reducers have desiccant filters that are at the end of useful life span. Replace jack reducer desiccant filters.	C
10.	Reducers have oil leaks at the screw jack actuators. Clean screw jack actuator and repair source of oil leak.	C

CENTER BEARING

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

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". 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. D
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. Clean and paint the centering device. D

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. Provide new traffic warning gates and include their use in the normal operating procedure for the bridge for enhanced safety. D
16. East Barrier Gate: The arrestor cables do not engage the receiver at each end of the gate arm. Repair the barrier gate arrestor cable to engage the receivers. C
17. West Barrier Gate: The north gate arm end socket mounting bolts are corroded and are loose. Tighten the loose bolts and clean and paint the corroded components. D

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

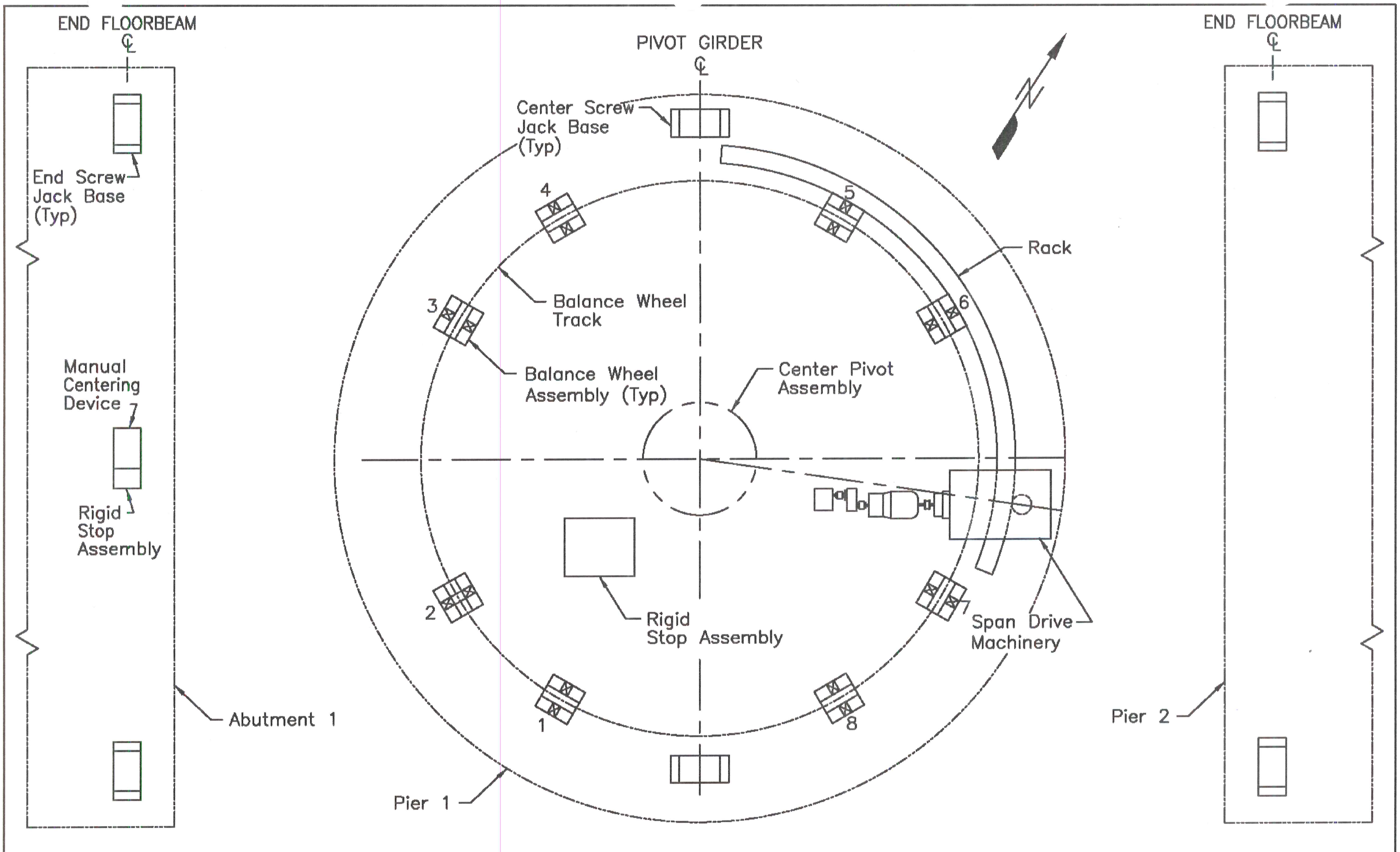


Figure 1. Plan View of Span Drive Machinery and Span Support Machinery

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

Prepared by: TranSystems

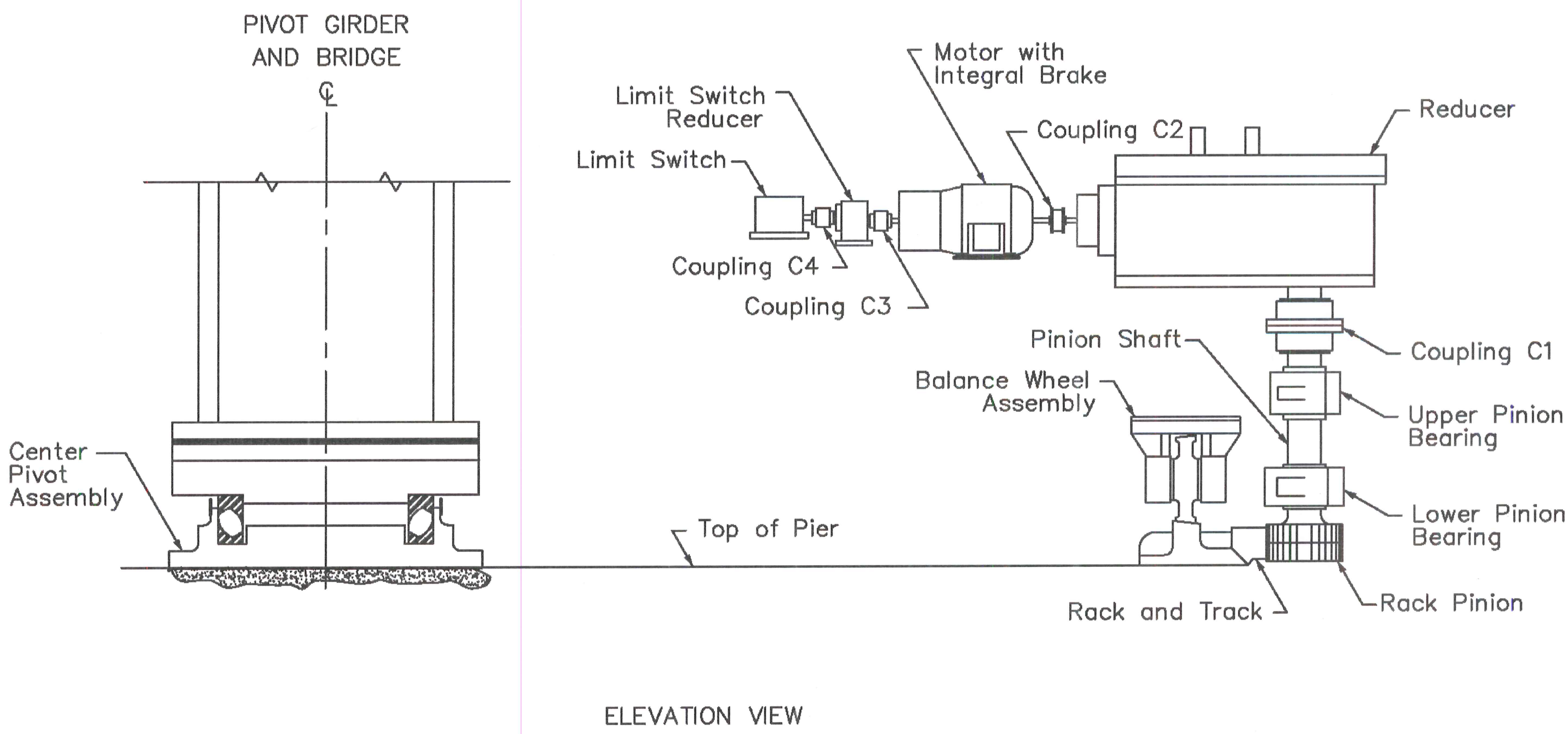


Figure 2. Span Drive Machinery

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

Prepared by: TranSystems

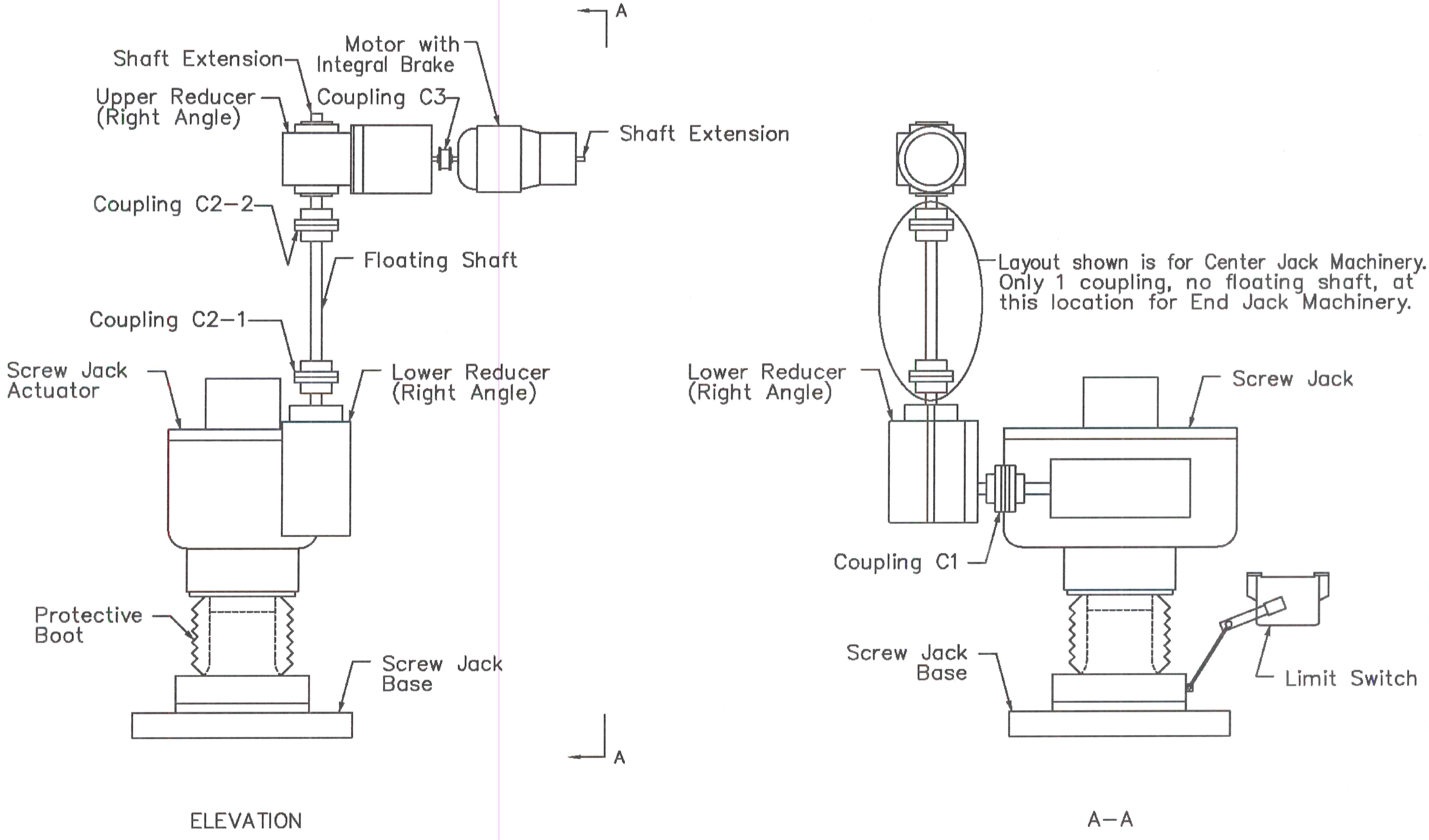


Figure 3. Screw Jack Machinery Typical Arrangement

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

Prepared by: TranSystems

APPENDIX II
MECHANICAL FIELD NOTES

1	18-Nov	SK/JPD
No.	Date	Description
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

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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.

No.	Date	Description
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EXISTING CONDITIONS

GENERAL CONDITIONS

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.

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.

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.

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.
- Coupling C1 bolts is not painted and exhibits surface corrosion. See Photo M2, Appendix M-III.
- ~~The interior sides of the motor mounting blocks are not painted.~~

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- △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.

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D) Couplings

- Coupling C4: The previously noted missing coupling cover bolt was replaced.
- 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.
- 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.
- Coupling C3: The seal is damaged. See Photo M9, Appendix M-III.
- 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.
- One rack mounting bolt at the north end of the rack is broken. See Photo M11, Appendix M-III.

G) Reducer

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:

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

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

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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 missalignment 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.

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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

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

- 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.
- 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. ✓
- 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.
- 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

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- △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:
  Operation is good Makes ringing noise in lim. switch gears
  - △1 Access for inspection of the NW screw jack is very limited as there is no support outboard of the girder.
- End Screw Jack, Southeast (SE). The following deficiencies were noted:
  Jack is leaking some oil traces
  - △1 The coupling between the upper and lower reducers (C2) is accommodating visibly excessive misalignment.
  - △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.
    C1 coupling & reducer shaft are not painted
  - △1 The oil for the upper reducer appears cloudy and foamy, unlike the oil in the remaining upper reducers. 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. Leaking ball valves on lower reducer
  - △1 The motor brake hand release is nonfunctional.
  - △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

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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.
- Bush 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.

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

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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 ~~each~~ SE 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.

Balance wheels and track clearance measurements

No	4	5	6	7	8	1	2	3
Closed	71	98	111	139	121	91	53	52
Open	180	180	5/8"	25	0	105	0	68
Bearings	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.

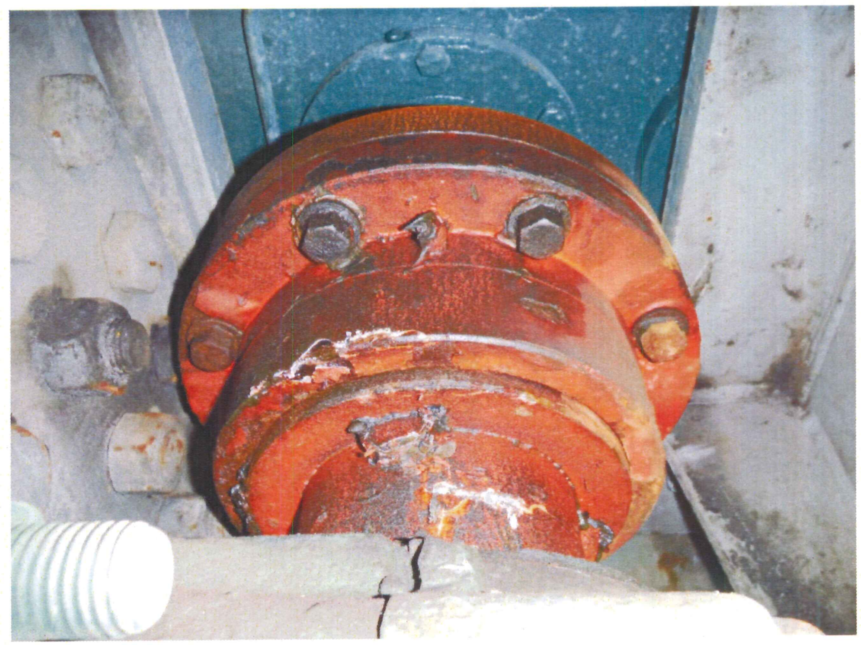

Photo M-2: Coupling C1, Span Drive Machinery.
The coupling bolts exhibit surface corrosion and is not painted.

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

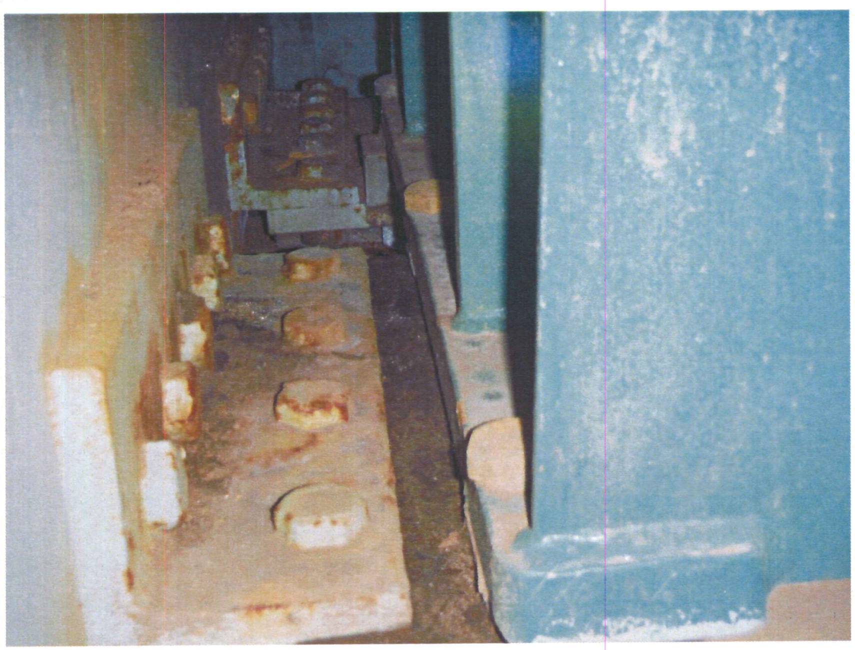

Photo M-3: **Span Drive Machinery Speed Reducer.**
The reducer base bolts exhibit moderate paint deterioration and corrosion.

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
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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

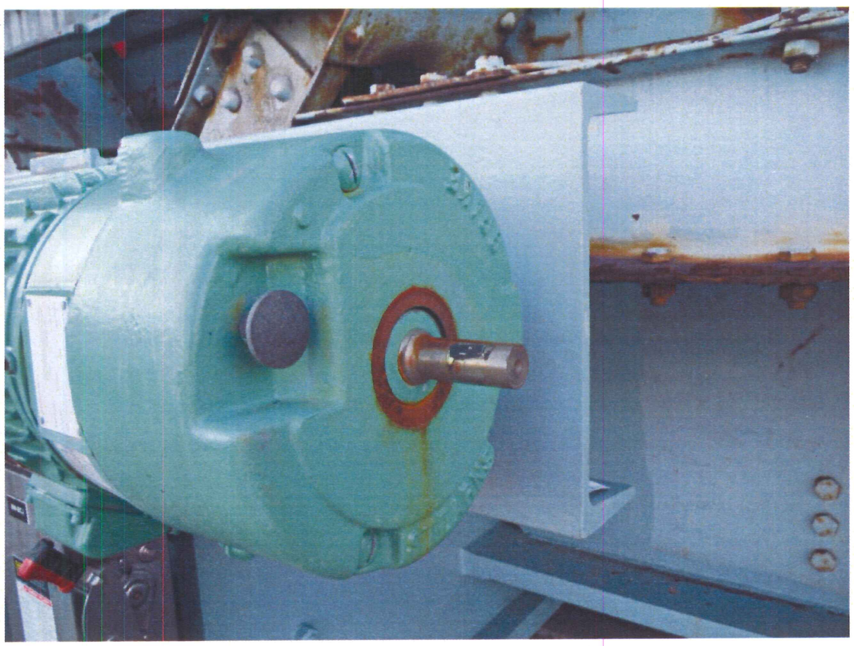

Photo M-7: **Center Screw Jack.**
The motor shaft extensions for manual operation of the screw jack are not covered or provided with limit switches to disable the motors when a hand crank is installed.

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
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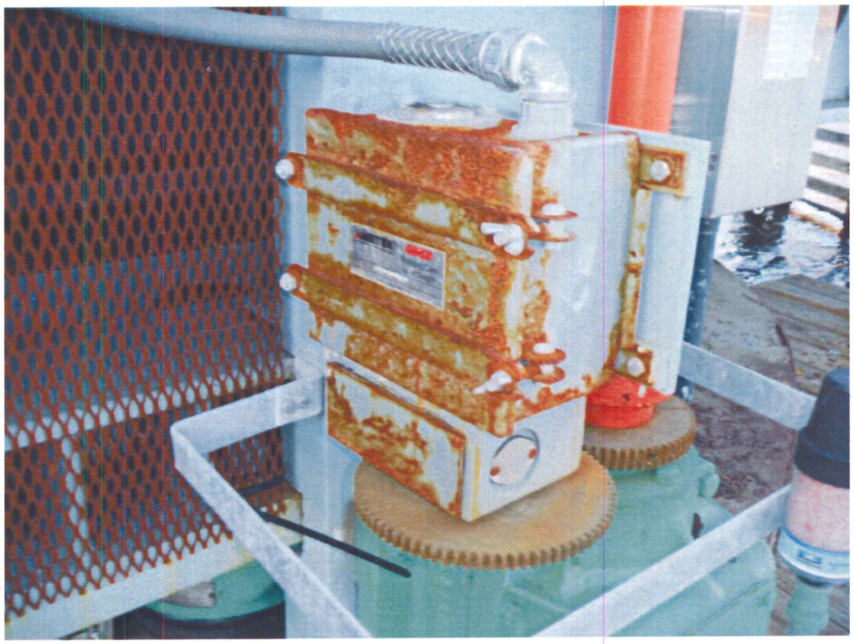

Photo M-9: Limit switch gears.
Limit switch gears of all jacks are making ringing noise.

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
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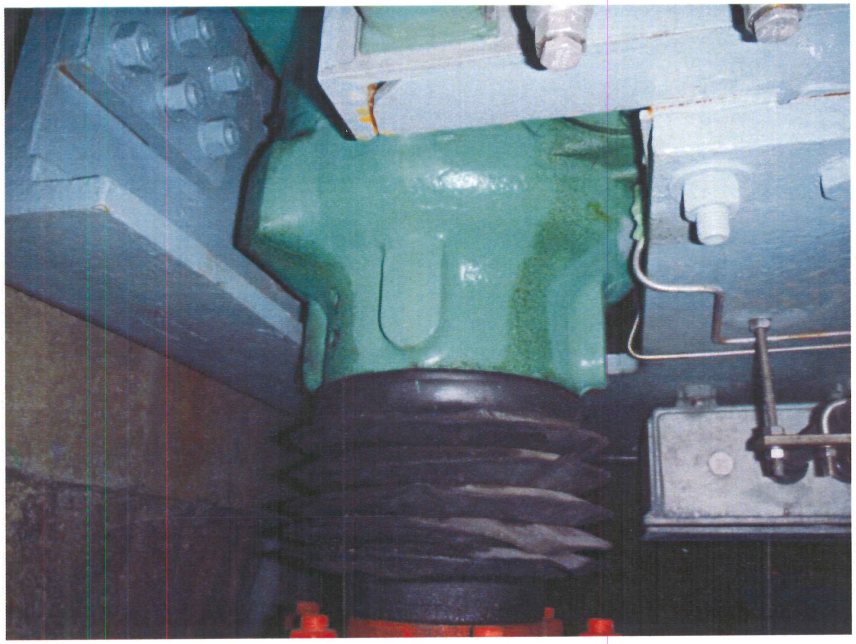

Photo M-11: Jack Reducer Oil Leak.
Reducers have oil leaks at the screw jack actuators.

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
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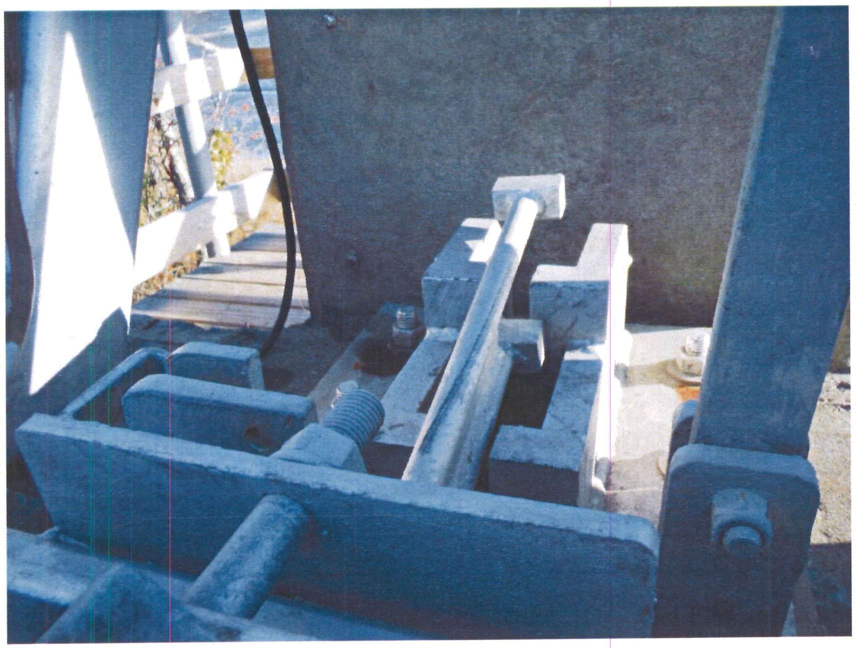

Photo M-13: East Barrier Gate
The arrestor cables do not engage the receiver at SE end of the gate arm.

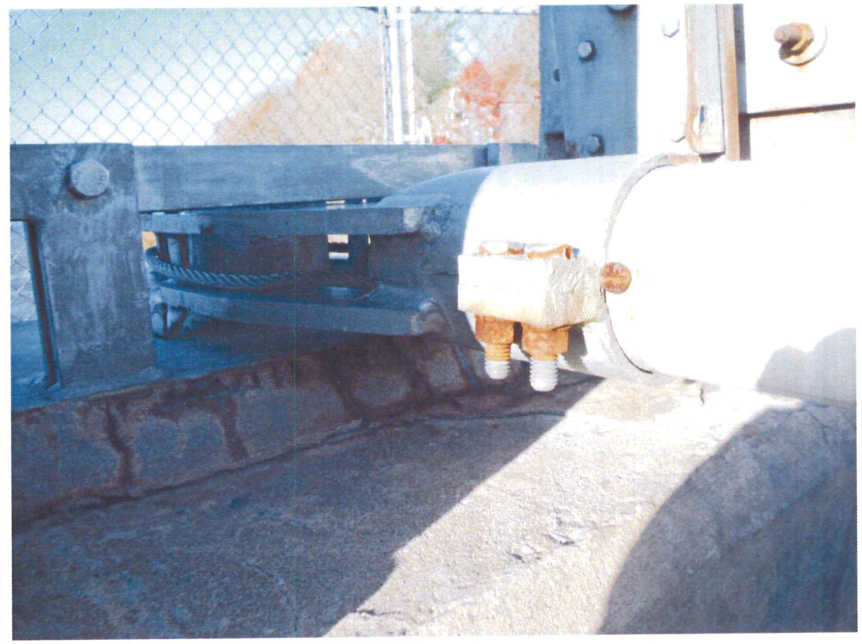

Photo M-14: West Barrier Gate
The north gate arm end socket mounting bolts are corroded and are loose.

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.

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 actions 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

BRIDGE SAFETY INSPECTION
STATE PROJECT NO. 170-3225

<u>ConnDOT BRIDGE NO. 01349</u>

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

STATE OF CONNECTICUT
JEFFREY S. FLANDERS
No. 27093
LICENSED
PROFESSIONAL ENGINEER

12/17/2014

TranSystems

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ConnDOT Bridge No. 01349

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).

<u>Bridge Controls & Control Panels</u>

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.

<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 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:	
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	>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).

<u>Span Lock</u>

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.

<u>General Electrical Installation</u>

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).

<u>Navigation Lighting and Horn</u>

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

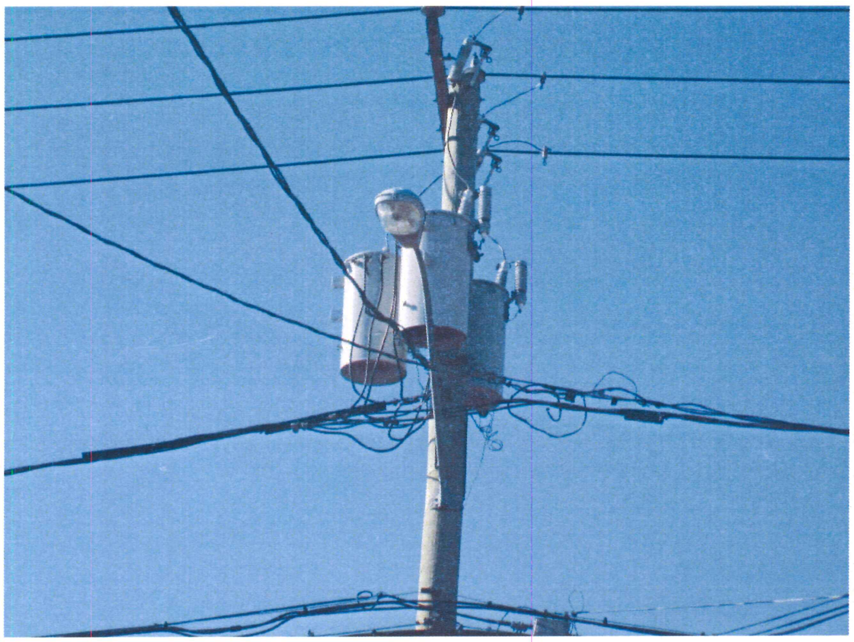

Photo E1: **Utility Service Transformers, West Approach.**

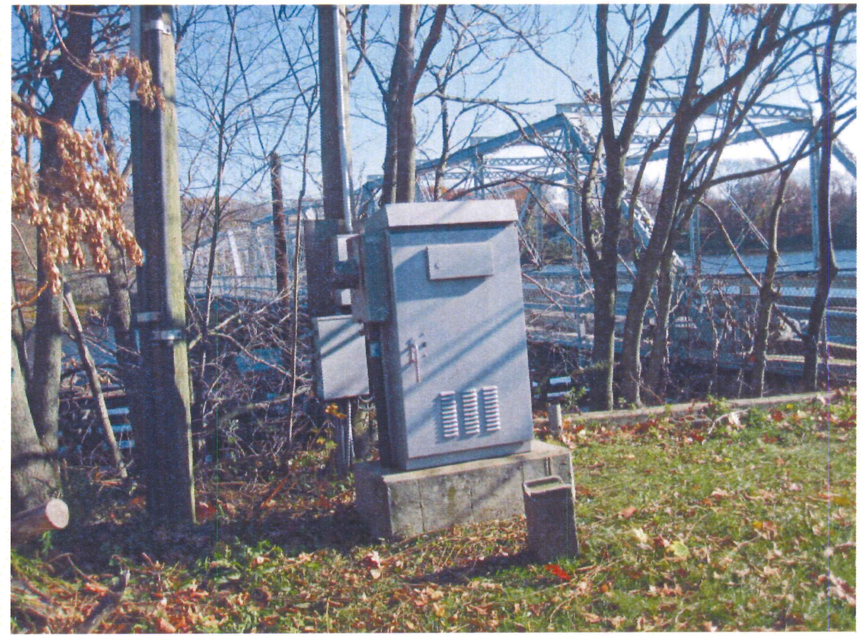

Photo E2: **West Utility Service/Traffic Control Enclosure.**

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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

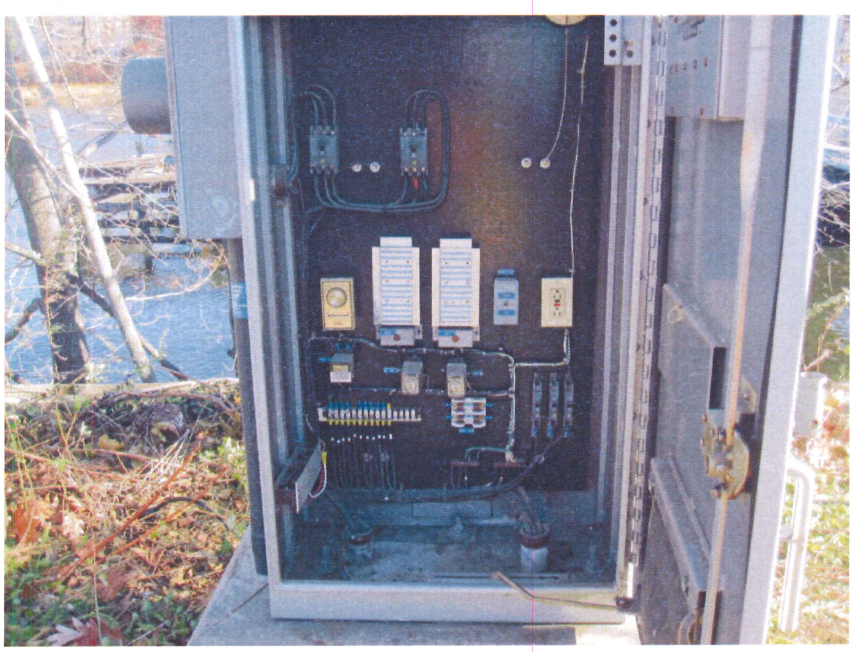

Photo E3: **West Utility Service/Traffic Control Enclosure Interior.**

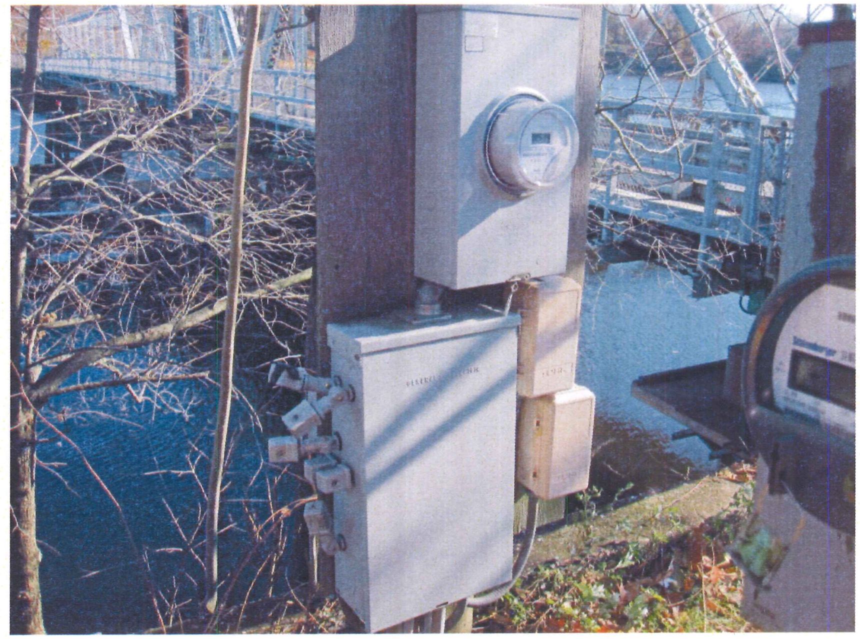

Photo E4: **West Auxiliary Service/Panelboard.**

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.**

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Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

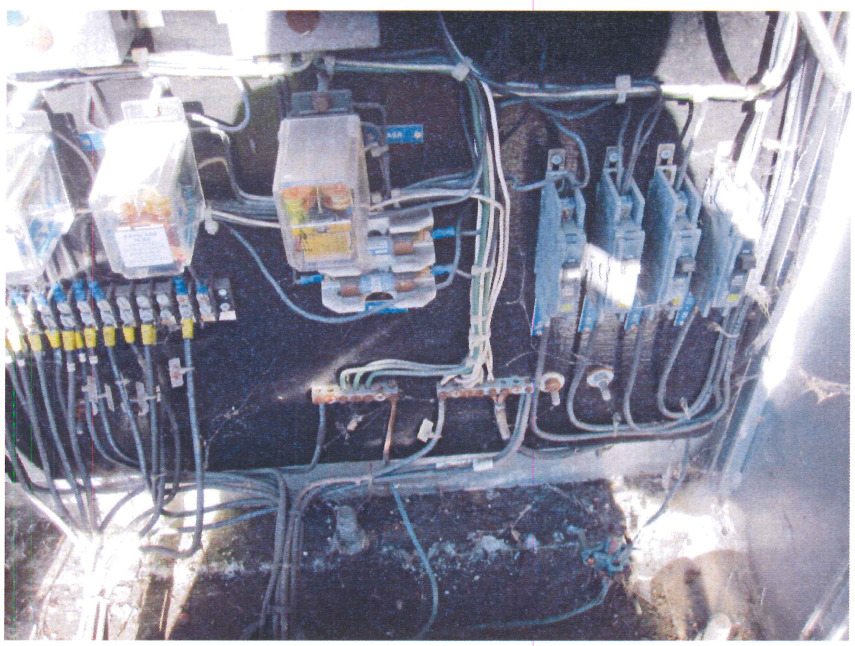

Photo E7: West Utility Service/Traffic Control Enclosure. Note the corroded terminal fasteners.

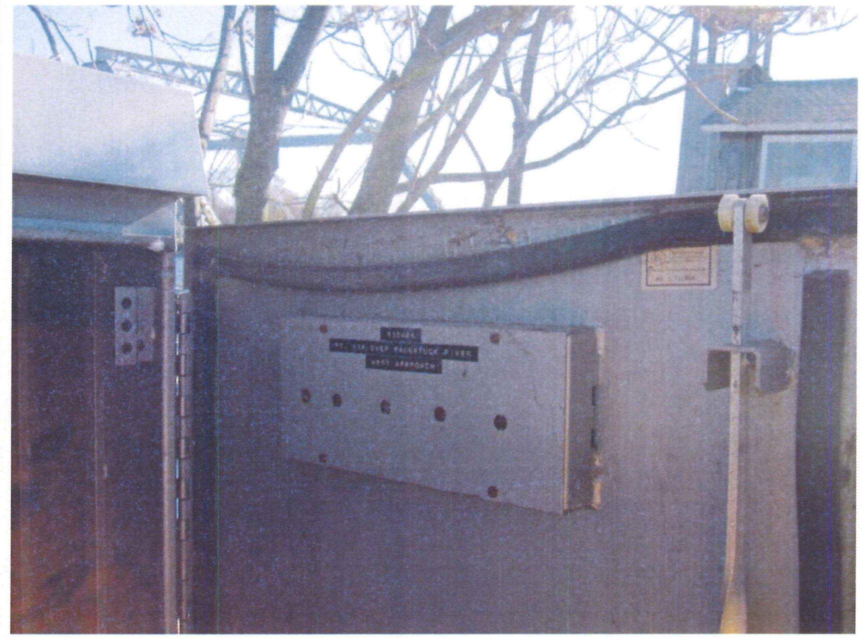

Photo E8: West Utility Service/Traffic Control Enclosure. Note the failed gasket.

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Bridge No.	01349	**Inspected by 1:**	JSF
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Feature Crossed:	Saugatuck River	**Project No.:**	170-3225

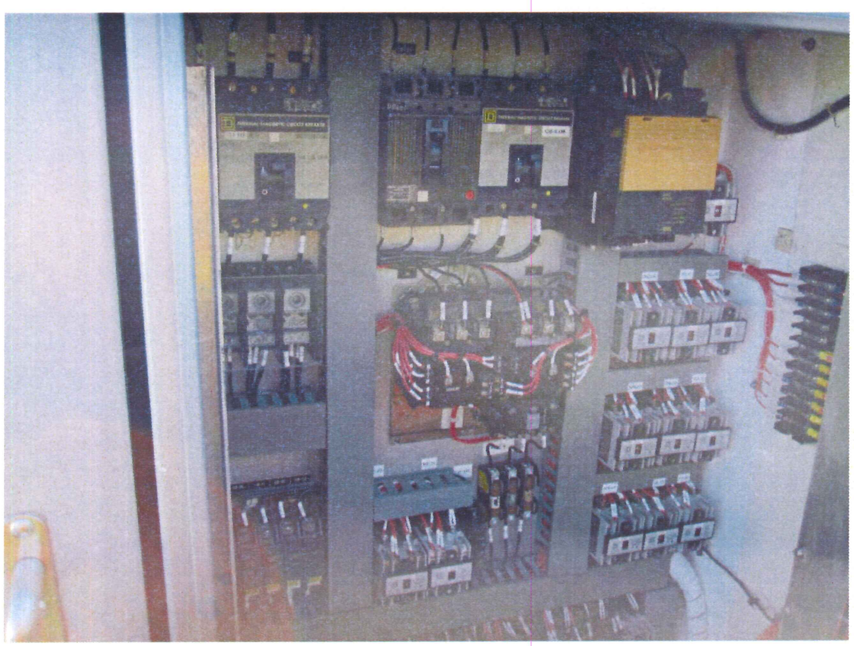

Photo E9: **Main Power and Control Enclosure.**

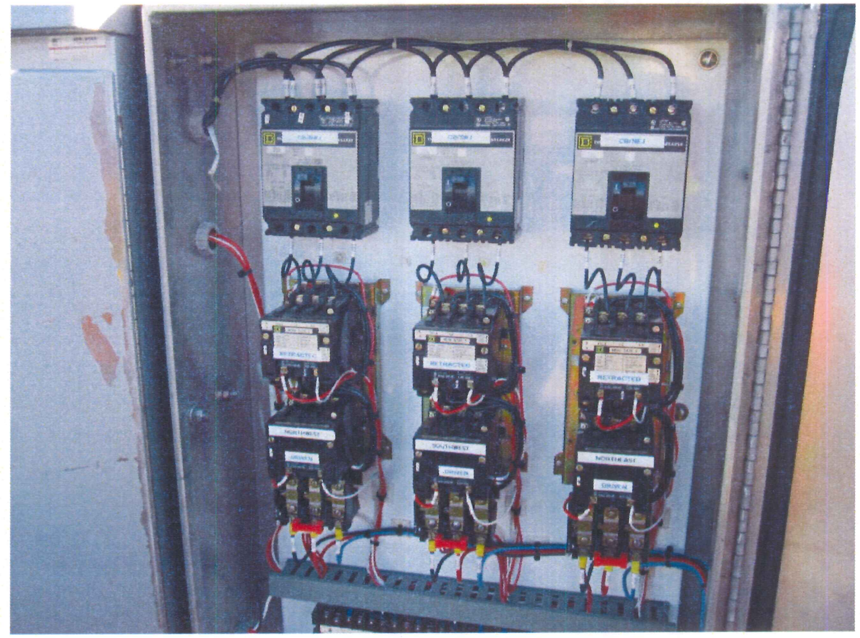

Photo E10: **Right Control Enclosure. Left enclosure is typical.**

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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

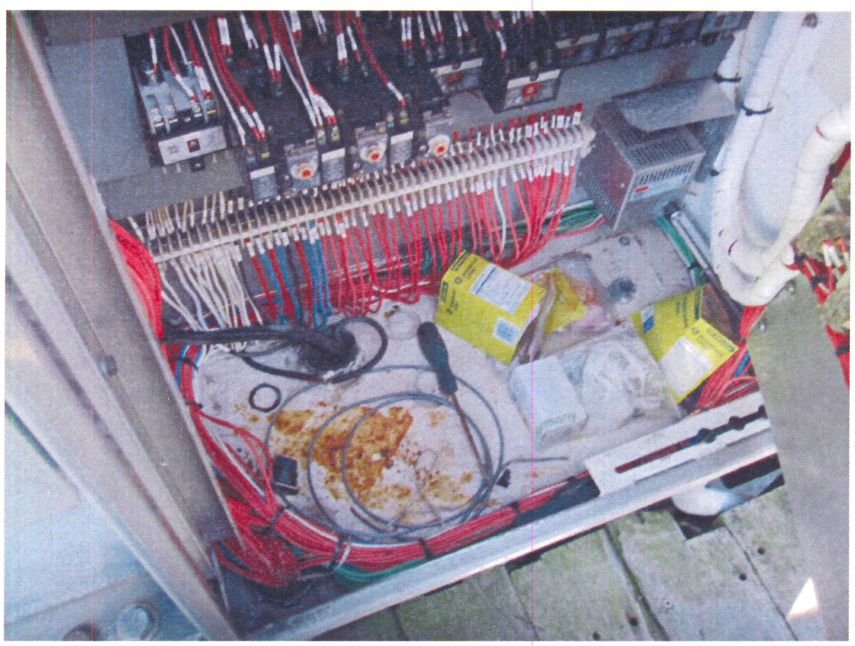

Photo E11: **Main Power and Control Enclosure. Note the corrosion within the enclosure and the combustible materials stored within.**

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

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Bridge No.	01349	**Inspected by 1:**	JSF
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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

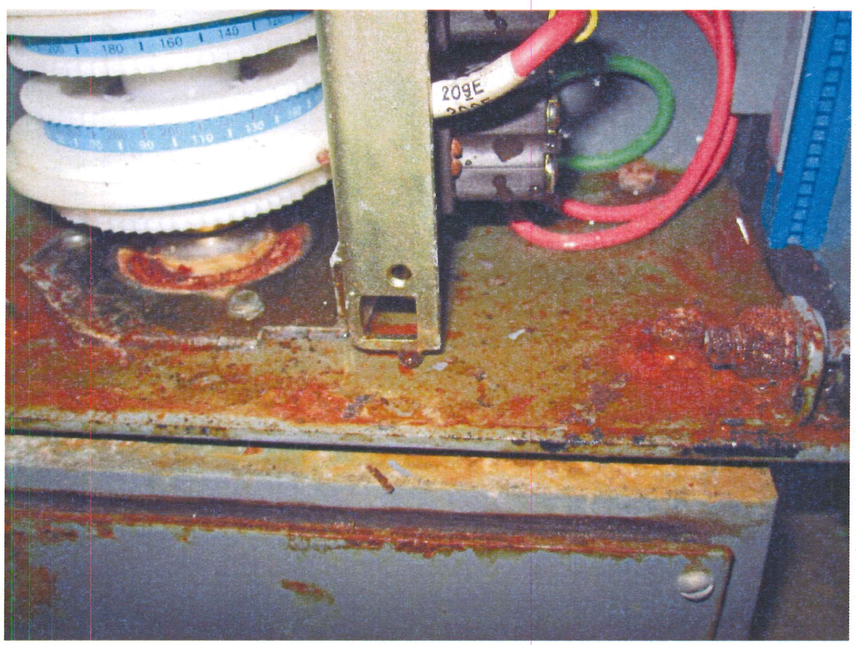

Photo E15: **Typical Jack Limit Switch Interior. Note the water intrusion and severe corrosion.**

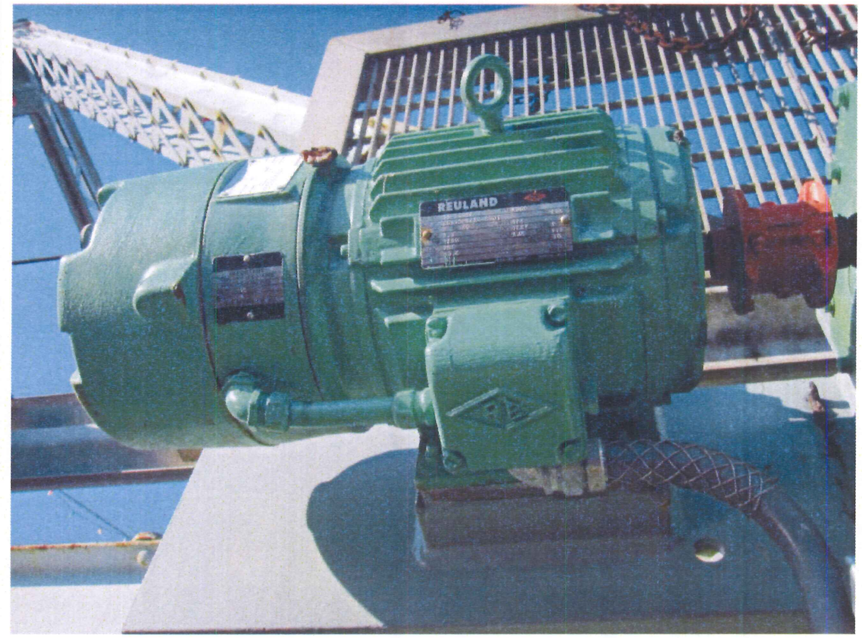

Photo E16: **Typical Newly Installed Jack Motor and Brake.**

Prepared by TranSystems

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

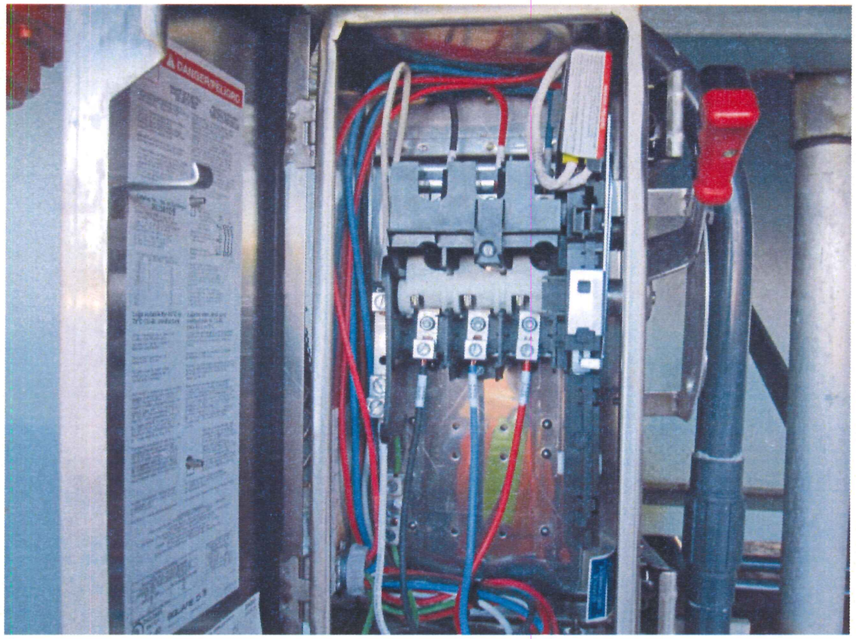

Photo E17: **Jack Motor Disconnect Switch. Note the color coding is inconsistent between the line and load sides. This is typical in several locations.**

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

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
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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.**

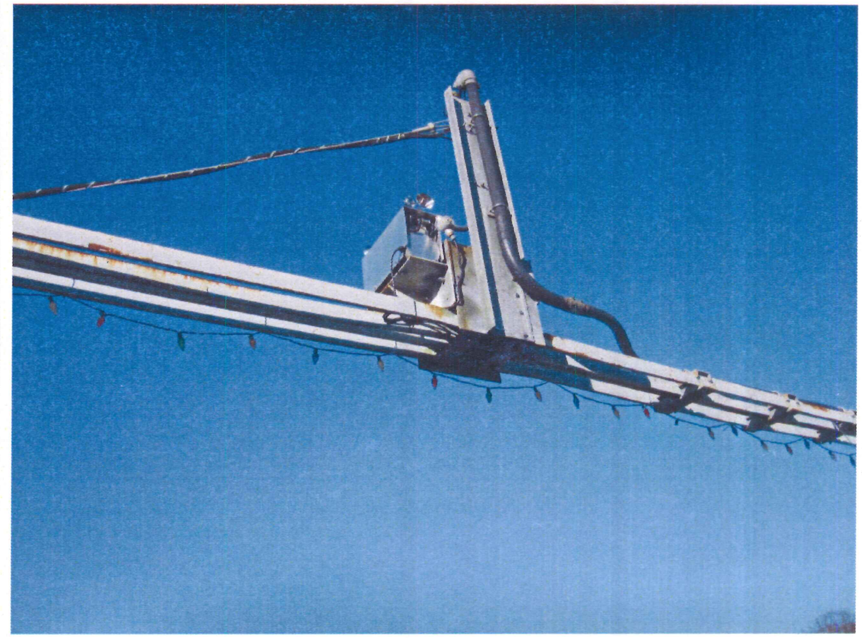

Photo E20: **Navigation Air Horn.**

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.**

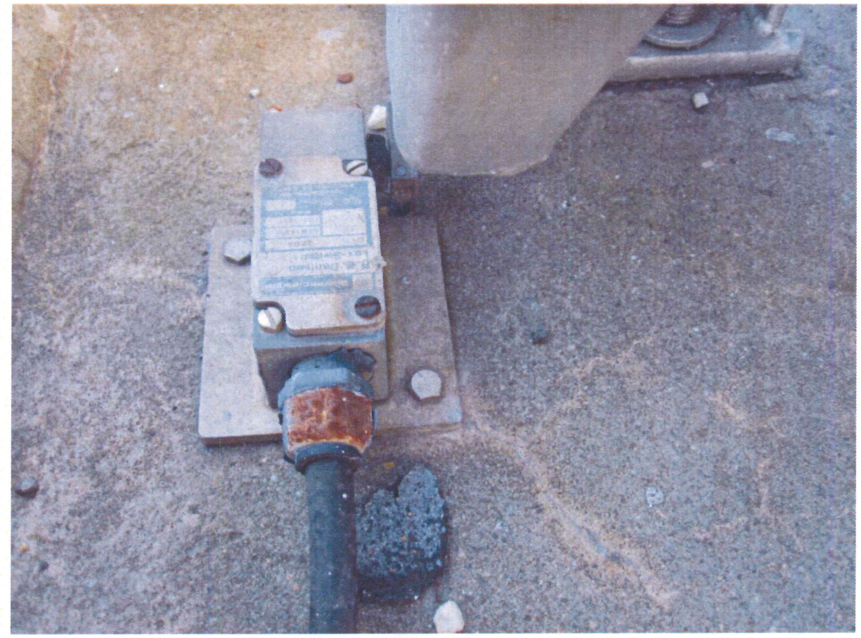

Photo E22: **Typical Barrier Gate Limit Switch.**

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

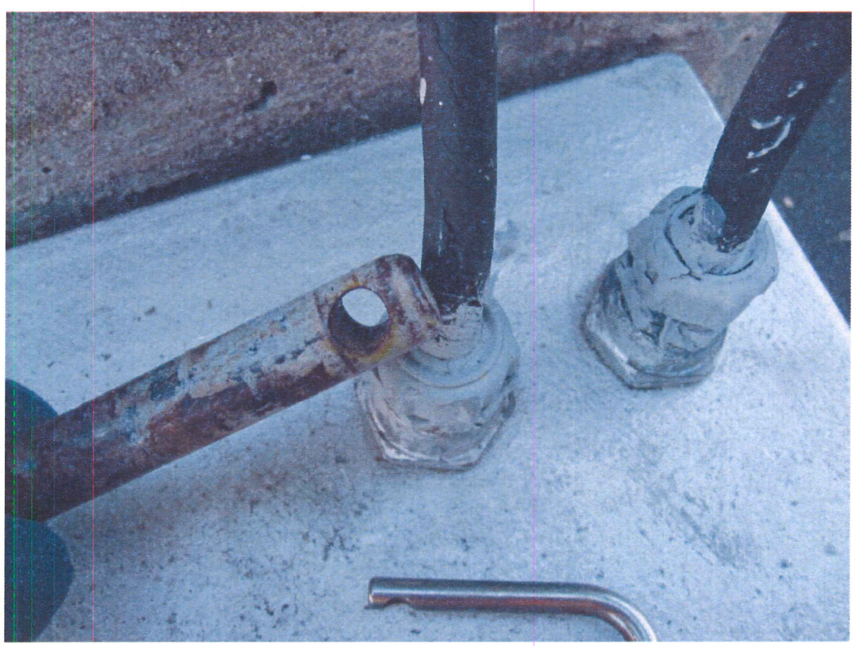

Photo E23: **West Barrier Gate. The SO cable covering is deteriorating.**

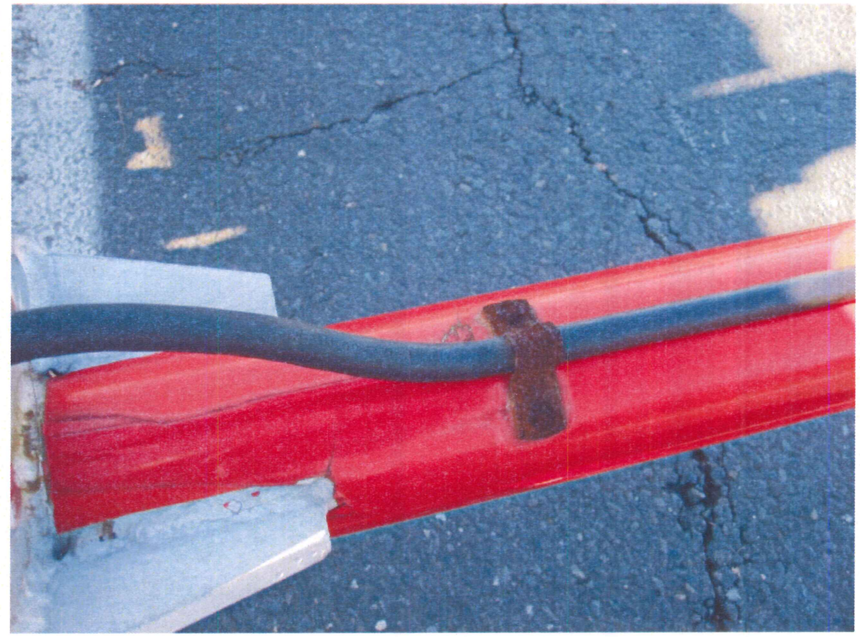

Photo E24: **Typical Barrier Gate. Note the corrosion on the SO cable clamp.**

Prepared by TranSystems

Bridge No.	01349	**Inspected by 1:**	JSF
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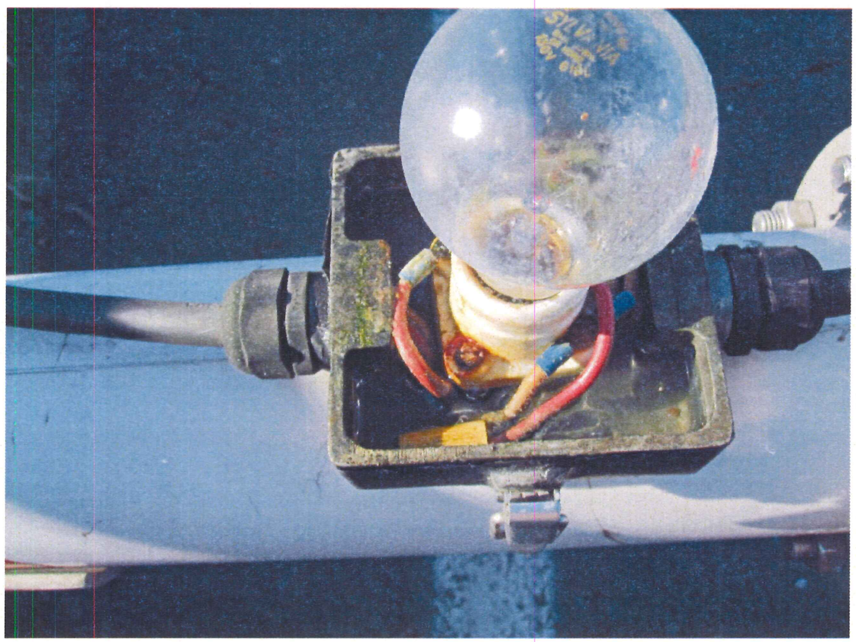

Photo E25: **East Barrier Gate, Innermost Warning Lamp. Note the corrosion on the socket base and the standing water within the warning light enclosure.**

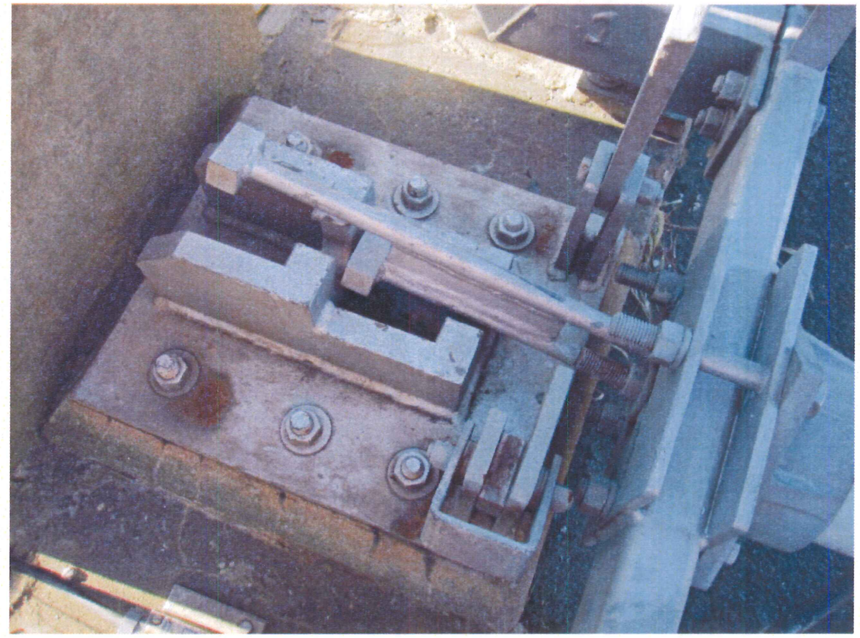

Photo E26: **Typical Barrier Gate. Note the gate latching mechanisms do not properly latch into their receiver.**

Bridge No.	01349	**Inspected by 1:**	JSF
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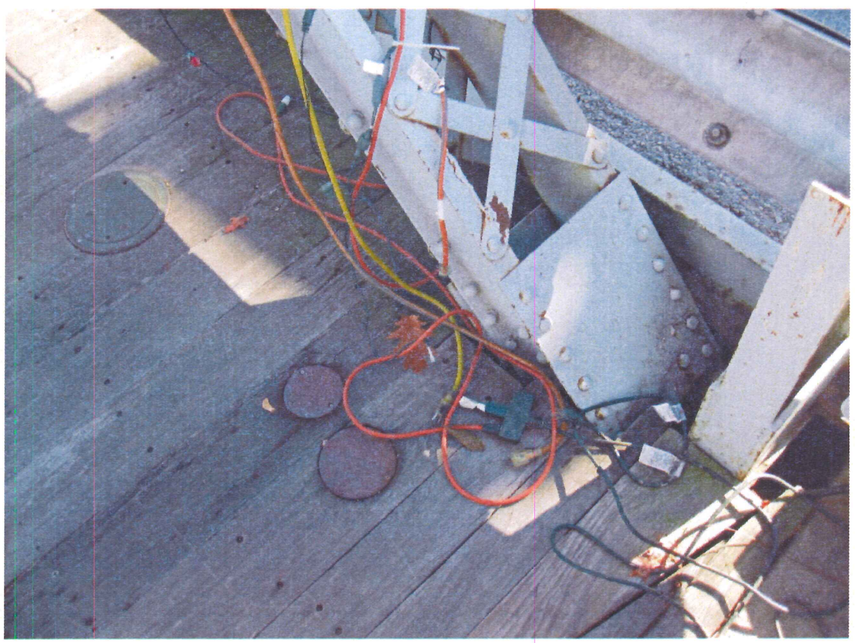

Photo E27: **Cables for holiday decorations are not weatherproof and are considered inappropriate for this application.**

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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.

8 EXCELLENT: Performs intended function with very high degree of reliability and effectiveness.

7 GOOD: Performs with high degree of reliability and/or effectiveness.

6 FAIR: Performs with little reduction in reliability and/or effectiveness.

5 ADEQUATE: Performs with moderate reduction in reliability and/or effectiveness.

4 MARGINAL: Performance marginal: corrective action required within one year.

3 POOR: Performance poor and/or unreliable: corrective actions 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.

NA Not Applicable.

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
(0764) 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 0765
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). (0766)

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). (0767) 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 (0759)

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.

<u>Traffic Signals</u> 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

<u>Traffic Gates</u> - 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. NO CHG
- 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

FLANDERS GROUP Engineering. Electrical & Mechanical Movable Bridge Specialists	Project 1349			Page
	Project #			Sheet
	Designer NCS	Date 11/14/14	Checker	Date

TABLES:

N. CTR JACK
P 60 66 71
D 70 61 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 75 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	210/120	59.98

Project 1349			Page
Project #			Sheet
Designer NGS	Date 11/18	Checker	Date

Electrical & Mechanical Movable Bridge Specialists

GATES

WEST BG

LITES & LS GOOD JB ON REAR (0722)

SO CABLE CRACKED FOR LITES (0723)

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

WIRENUTS TYP @ ALL LITES (0725)

TYP CORROSION @ CONDUIT CLAMPS (0726)

SCHEMATIC (0727)

GATE WAS NOT FULLY DROPPED INTO RECEIVER INITIALLY

ADD LS ?

NO GONG

REAR RECIEVER NOT CATCHED (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 JBS (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

9 ARM LITES

W. CONTROL CABINET (0759)

BAD GASKET (0760)

TYP CORROSION (0761)

Project			Page
Project #			Sheet
Designer	Date	Checker	Date

SPAN MTR

NAMEPLATE (0789)

2x0156 MTR/BRK & HEATERS/LS (0792)

RGLS OK, CLEAN

PRETTY TOUGH TO GET TO. ZERO NEC CLEARANCES

CTRL BOX

CORRODED INSIDE (MATERIALS (0797)

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 (0802)

CONDUIT

ALL PVC COATED RGS & RGS

CAST AL J BOXES W/ GASKET @ ALL LOC.

BRAIDED COPPER FLEX CONDUITS @ FENDER LEVEL (0823)

LS'ES

FC LS (0846)

SAFETY PIN @ W END (0848)

W. BG LS (0858) CORROSION

Project		Page
Project #		Sheet
Designer	Date	Checker / Date

Electrical & Mechanical Movable Bridge Specialists

JACKS

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 @ 0156 (0818)
MTR N/P (0820)
BRK N/P 0821)

NE JACK

TYP PROX SWITCHES (0824)
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	K. Ko
	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

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

01/29/2015

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

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

RED FLAG

Bridge Number: 01349

Inspected By: J. Karalbas & R. Snelgrove

Sufficiency Rating: 58.36

Previous Inspection Date: 11/9/2012

BS&E Received

Copies Made

Data Entry By: K. V.

Data Entry Date: 2/4/15

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 24	19 52	12/7/2012	12/29/2014
Special:					

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 — 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

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

Inspected By: J. KARALERAS & 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 (A)
66) Inventory Rating	59.2		

CONDITION

		Rating	By
58) Deck	6		
59) Superstructure	~~5~~ 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: [signature]

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: [signature] #23005 Date 01/29/2015

[signature] 2/4/2015

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' 45"	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, 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	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

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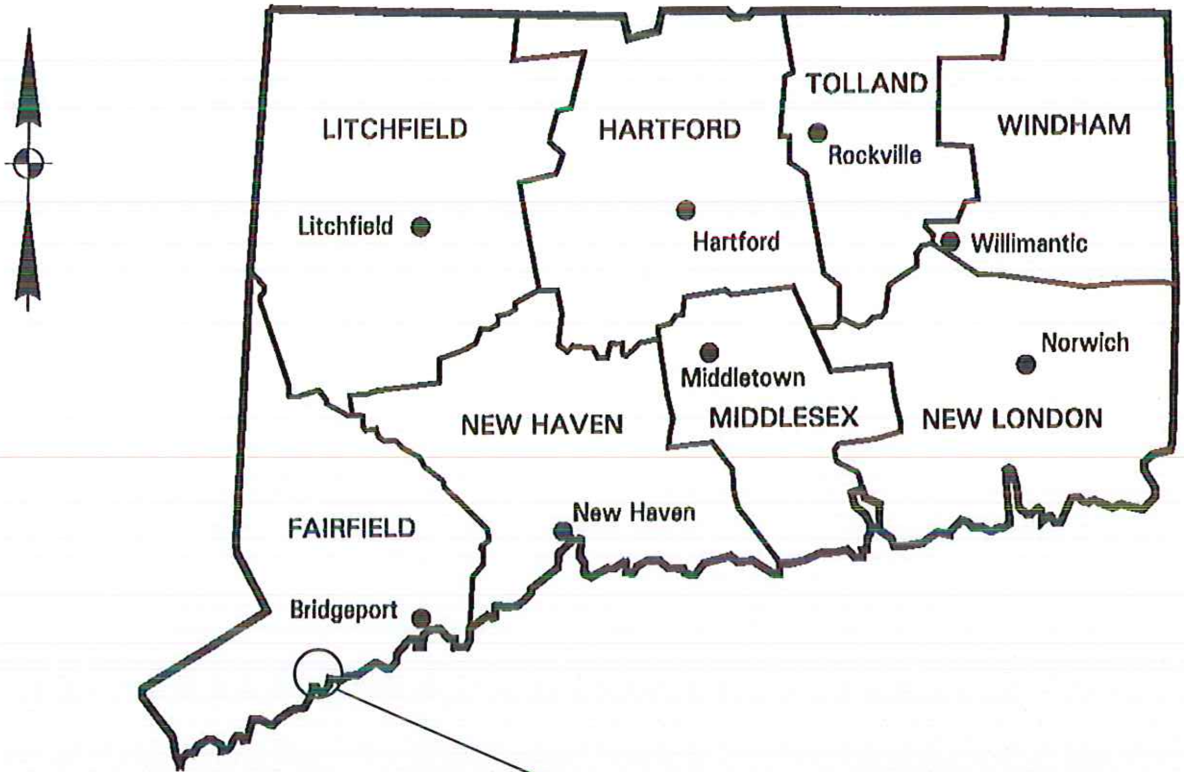
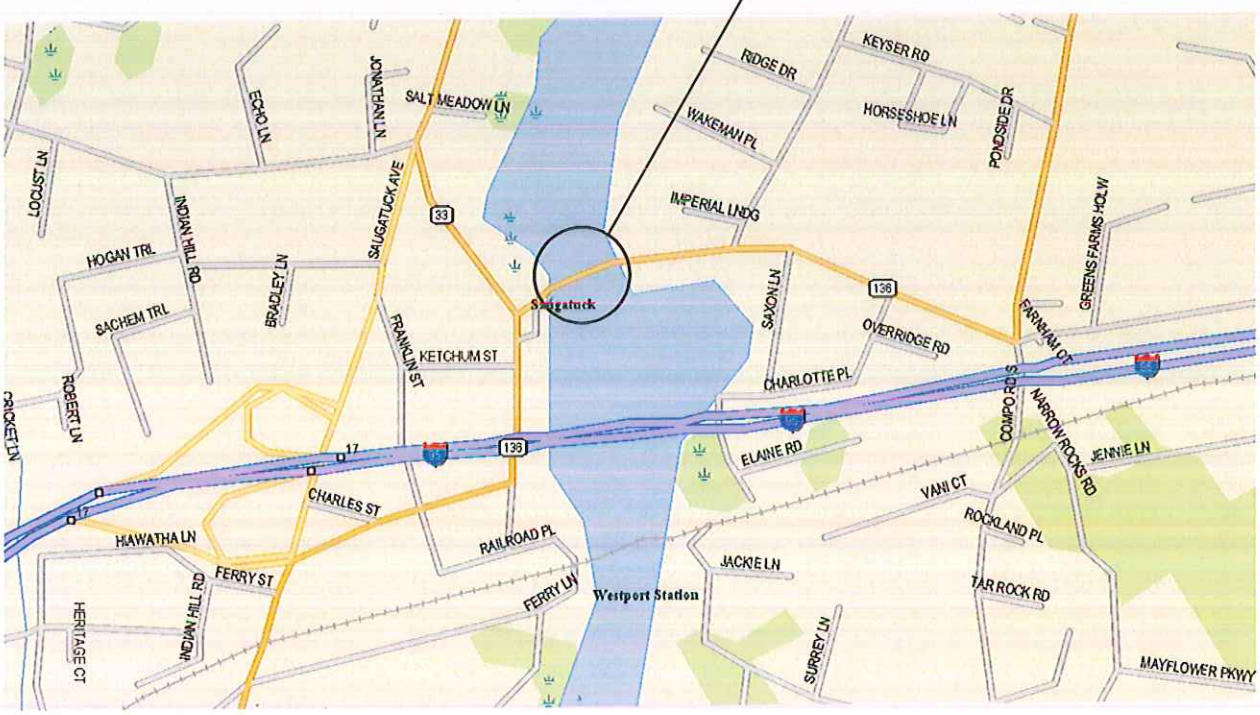


BRIDGE # 01349
WESTPORT

Vicinity Map

BRIDGE # 01349



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

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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 Nouzain 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**	**Town:**	Westport
Inspection Date:	**12/29/2014**	**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 to

Connecticut Department of Transportation

UNDERWATER INSPECTION

BRI-58 Form

Bridge No:	01349	Town:	Westport
		Route Carried:	136
Inspection Date:	12/29/2014	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 x 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:

ITEM	RATING	REMARKS
	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	**Town:**	Westport
Inspection Date:	12/29/2014	**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: Eta R Nagini for J. Figueroa **Date:** 1/23/15

D.O.T. reviewed by: [signature] **Date:** 2/4/2015

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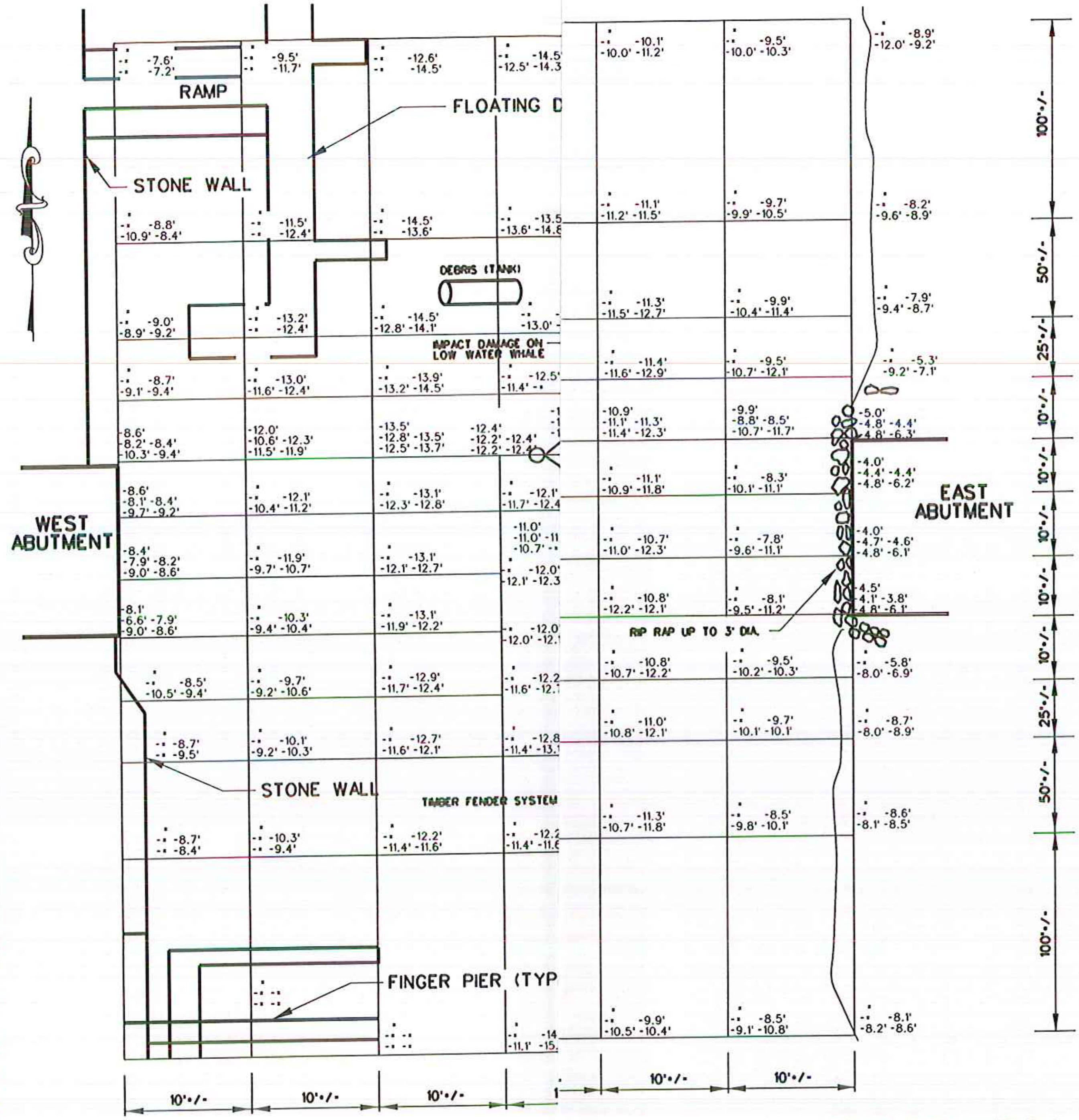


LEGEND FOR SYMBOLS

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.

CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER

WESTPORT — CONNECTICUT

PLAN

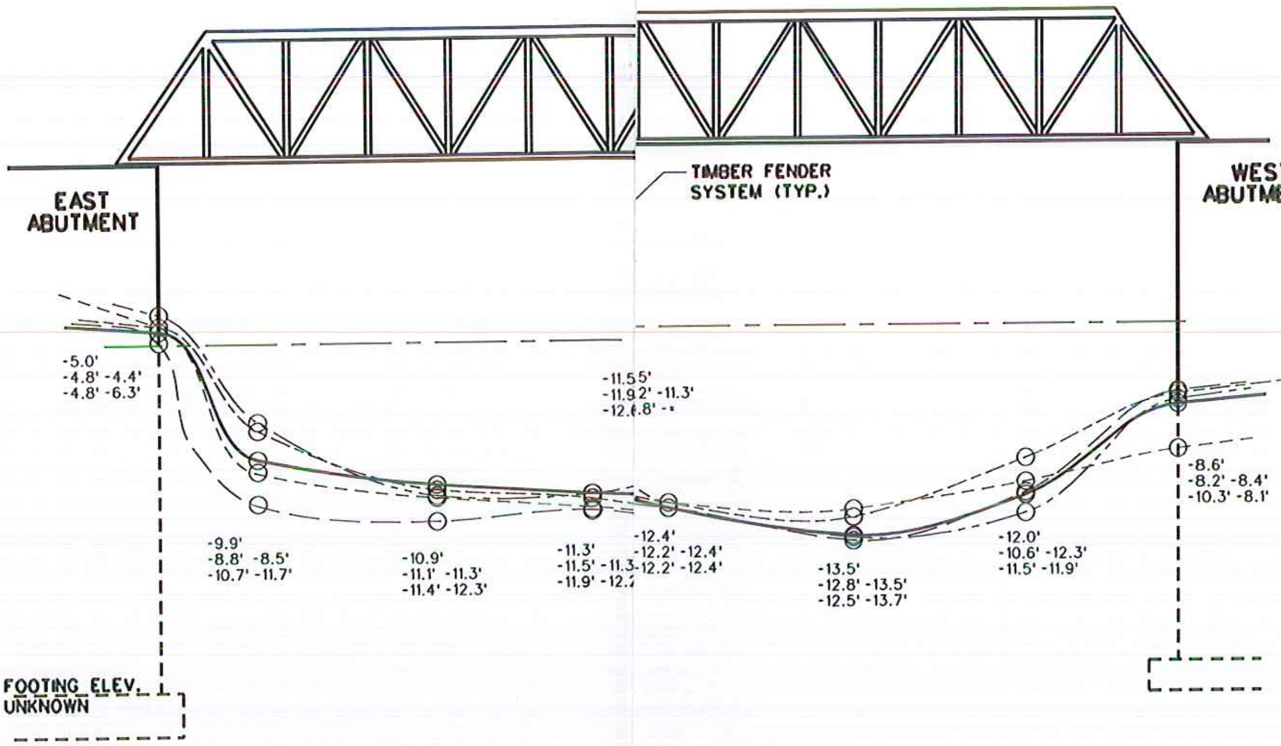
INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349A

LEGEND FOR 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

12/41



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.

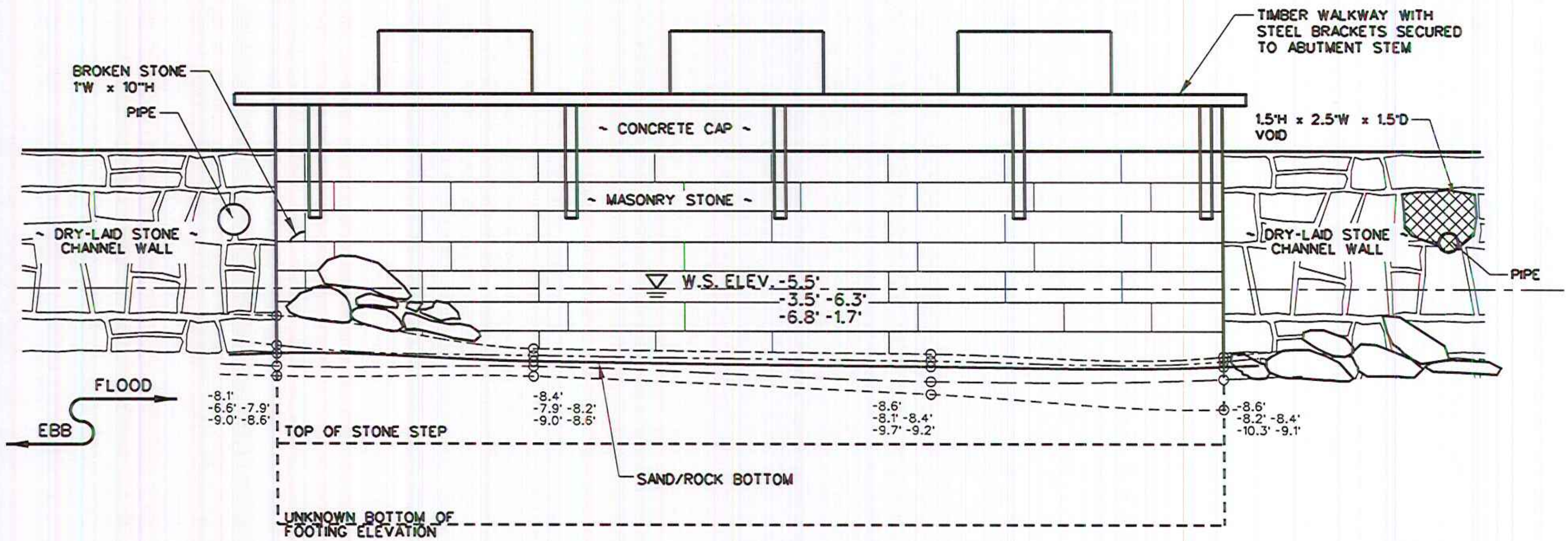
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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

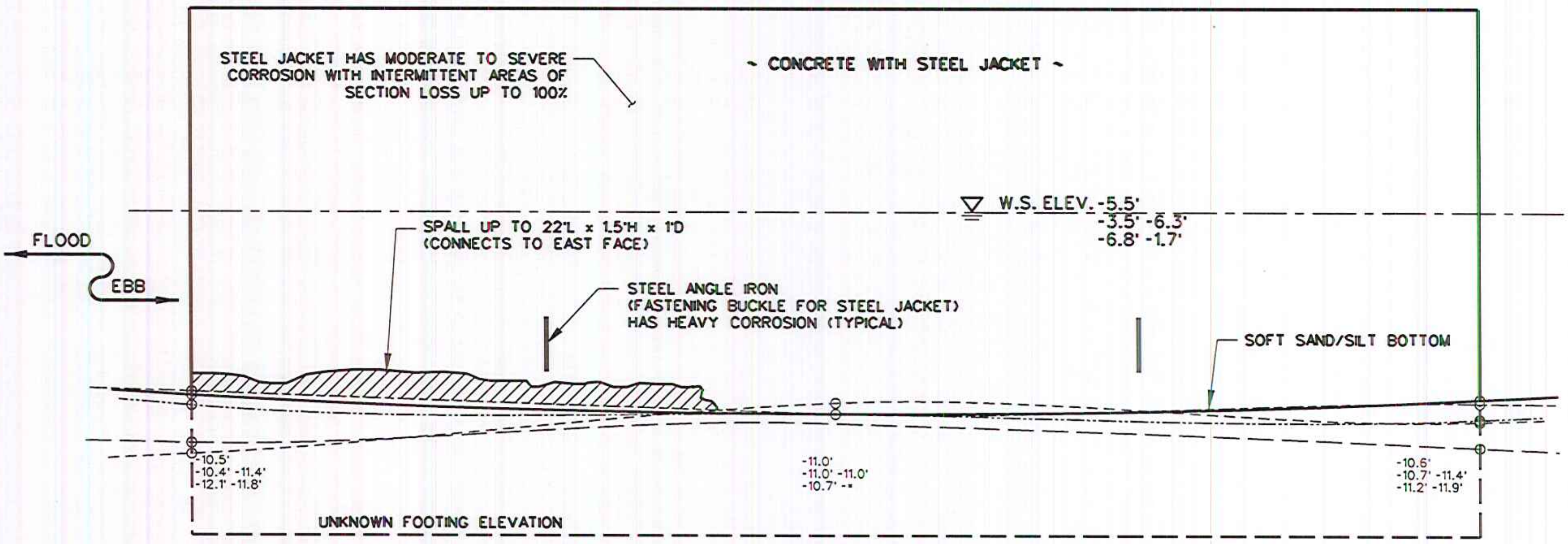
COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

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



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

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CONNECTICUT DEPARTMENT OF TRANSPORTATION

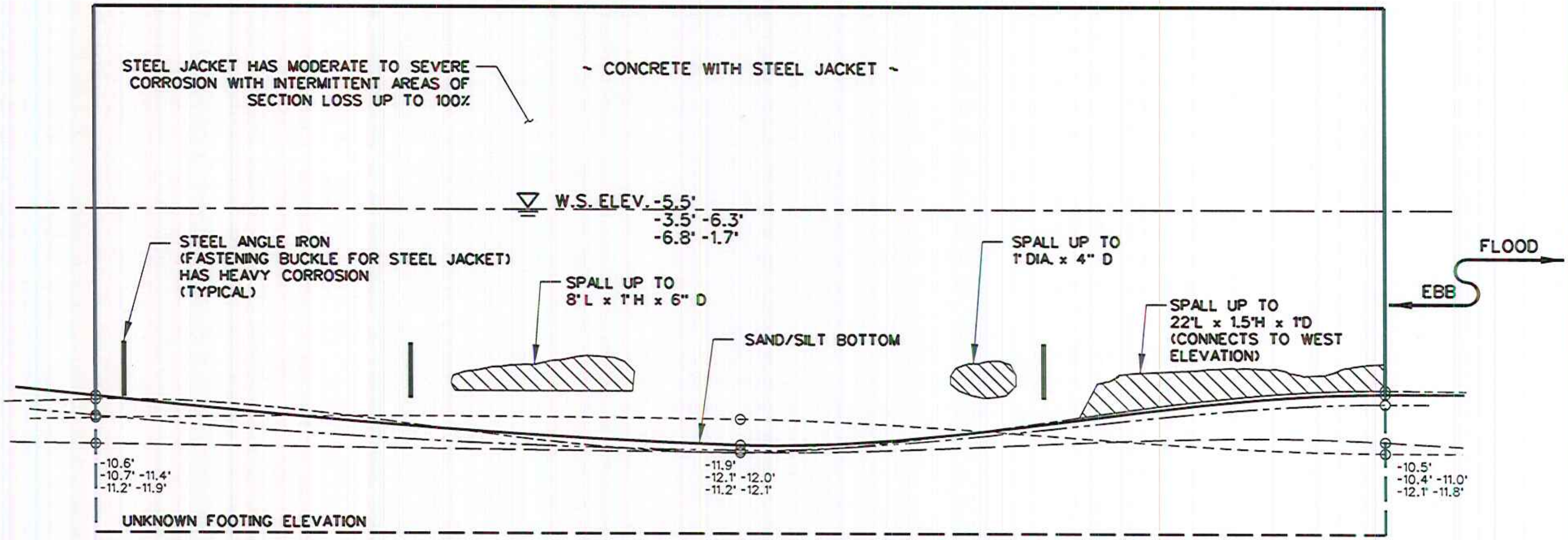
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER

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. 01349D

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.
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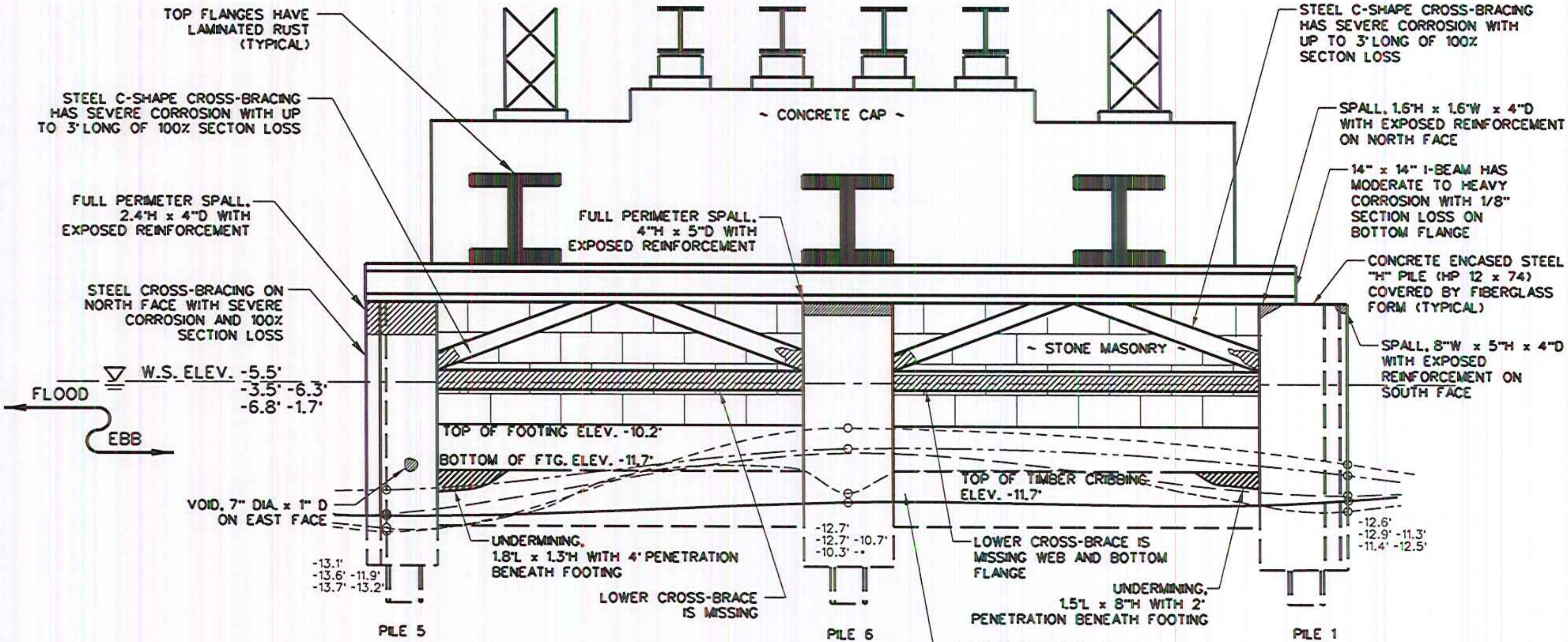
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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

15/41



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.
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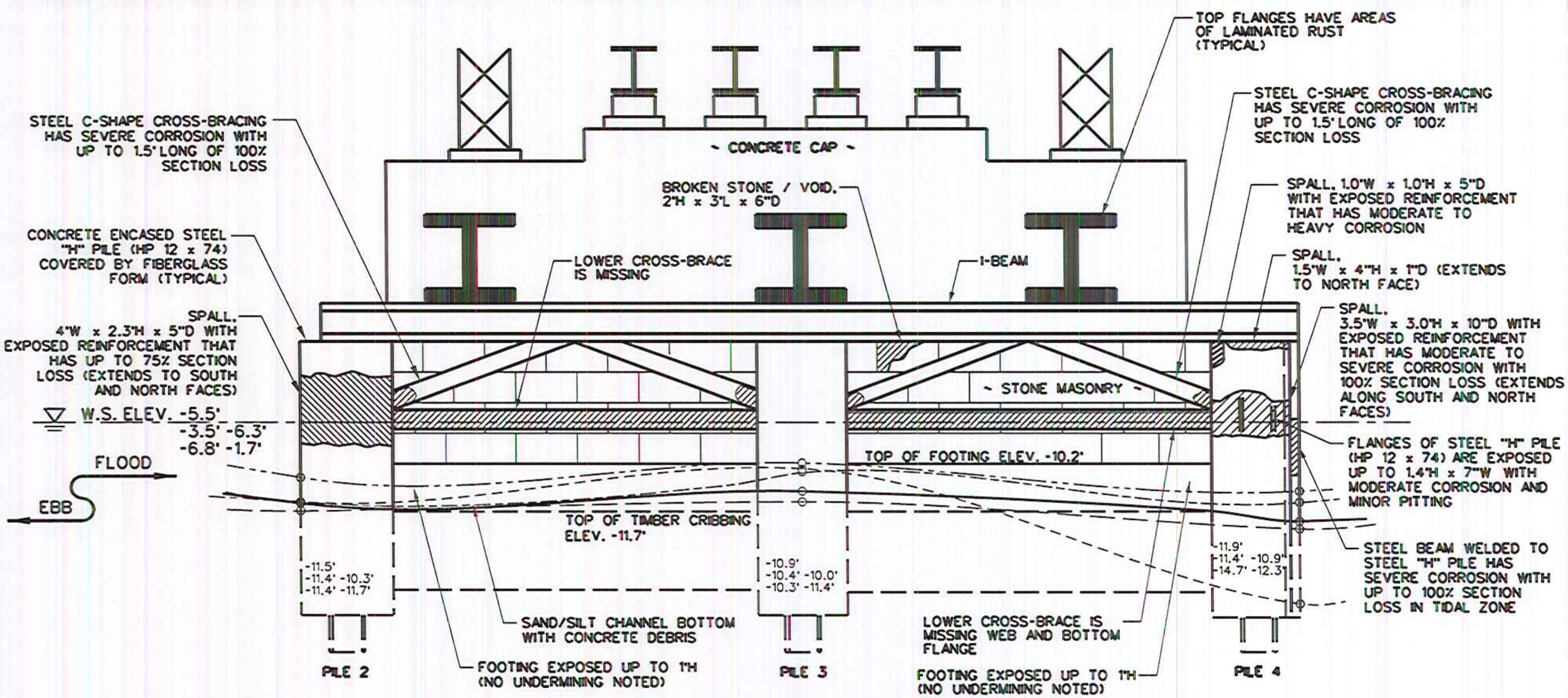
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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



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 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.
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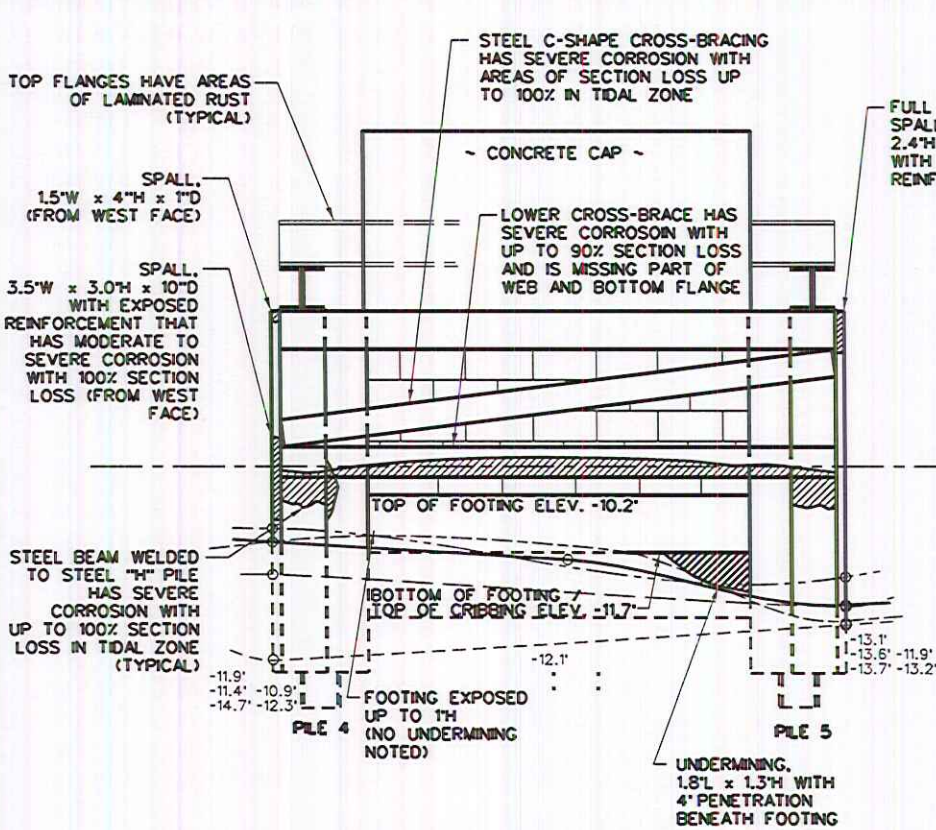
CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER

WESTPORT | CONNECTICUT

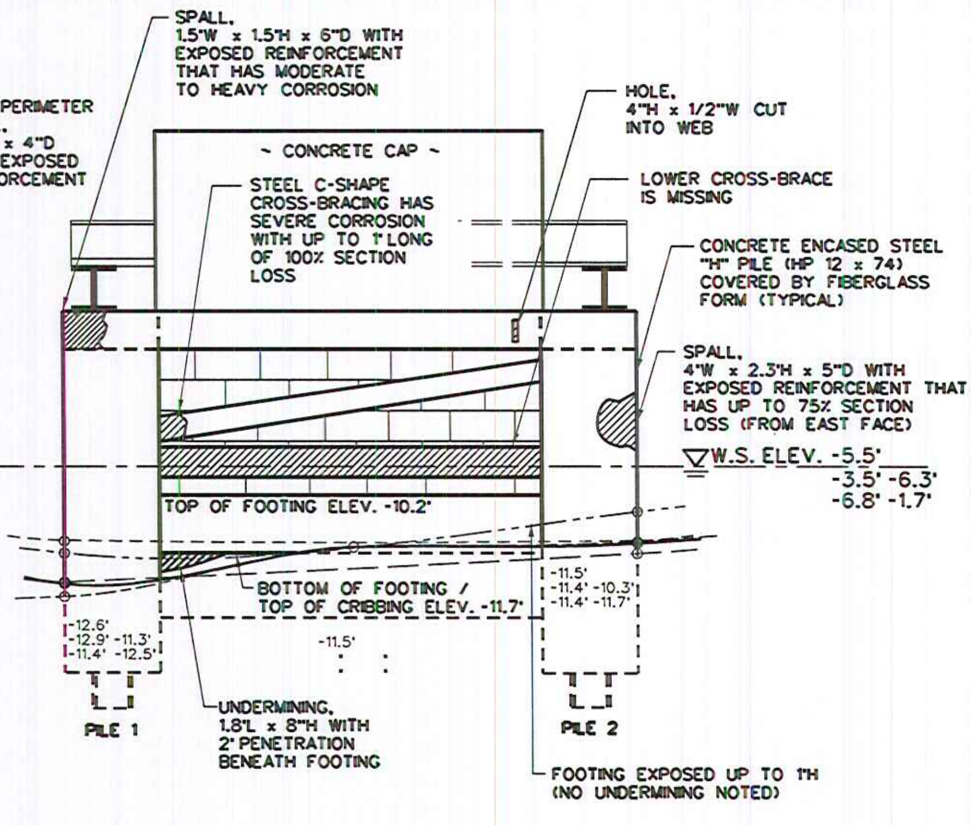
PIER 2 (EAST ELEVATION)

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349G



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

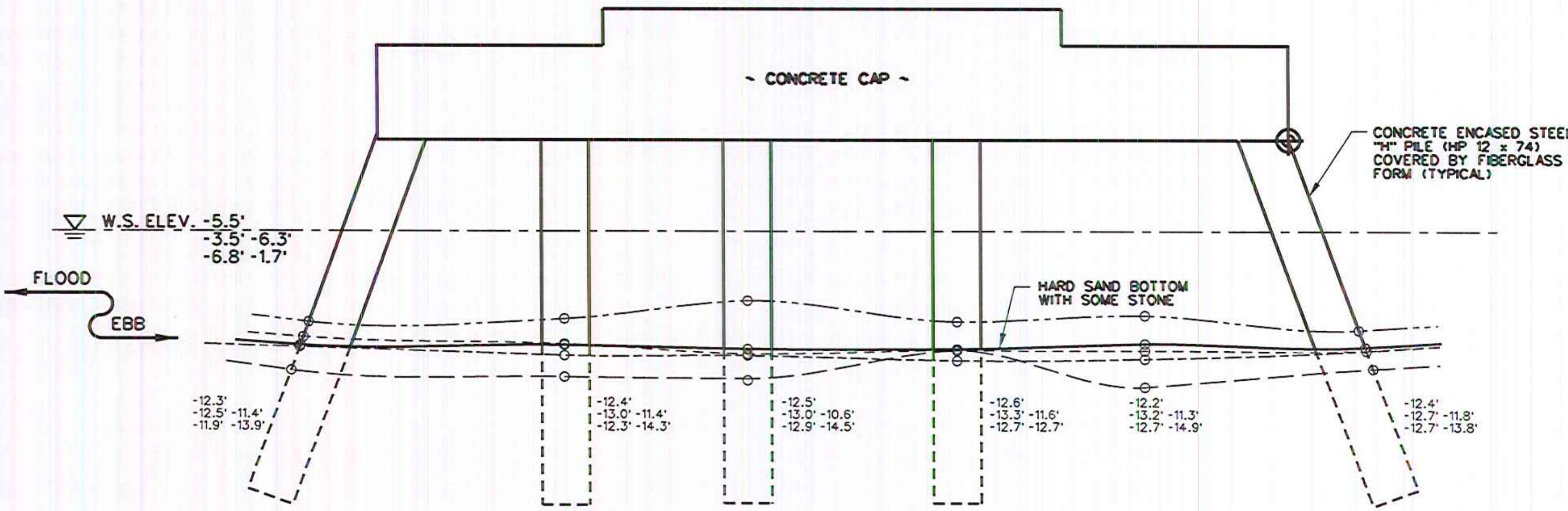
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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



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

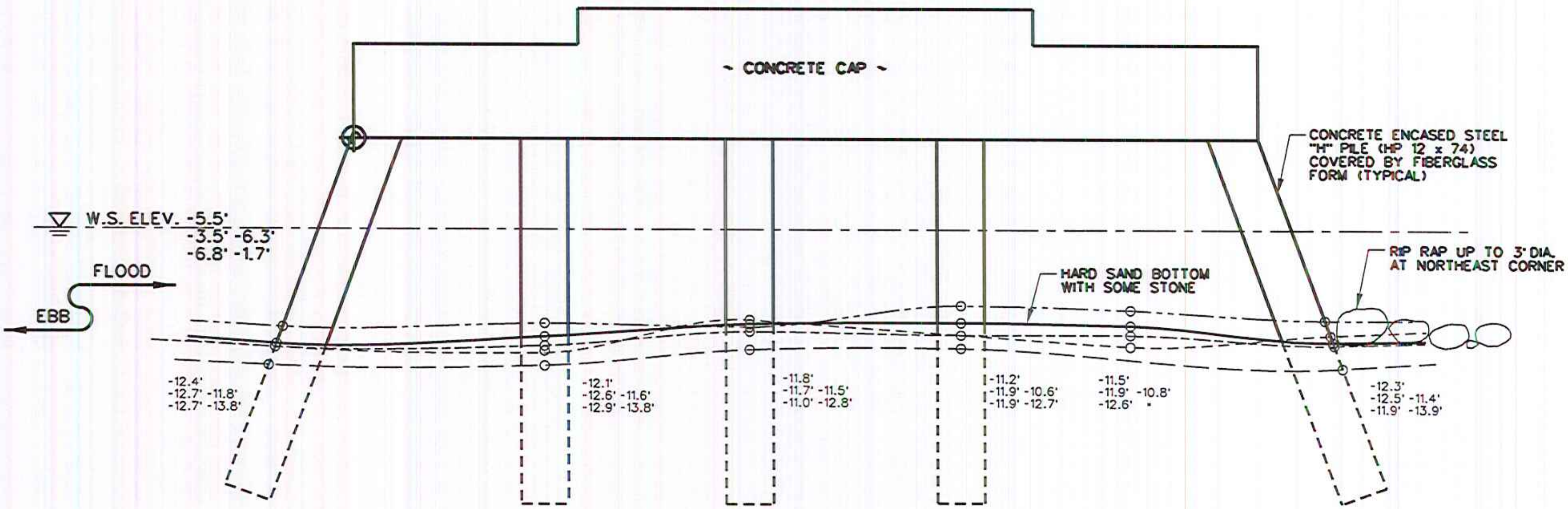
COLLINS ENGINEERS INC.
101 HAMMER MILL ROAD
ROCKY HILL, CT 06067
Phone: (860) 571-0384
Fax: (860) 571-0385

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. 01349I



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

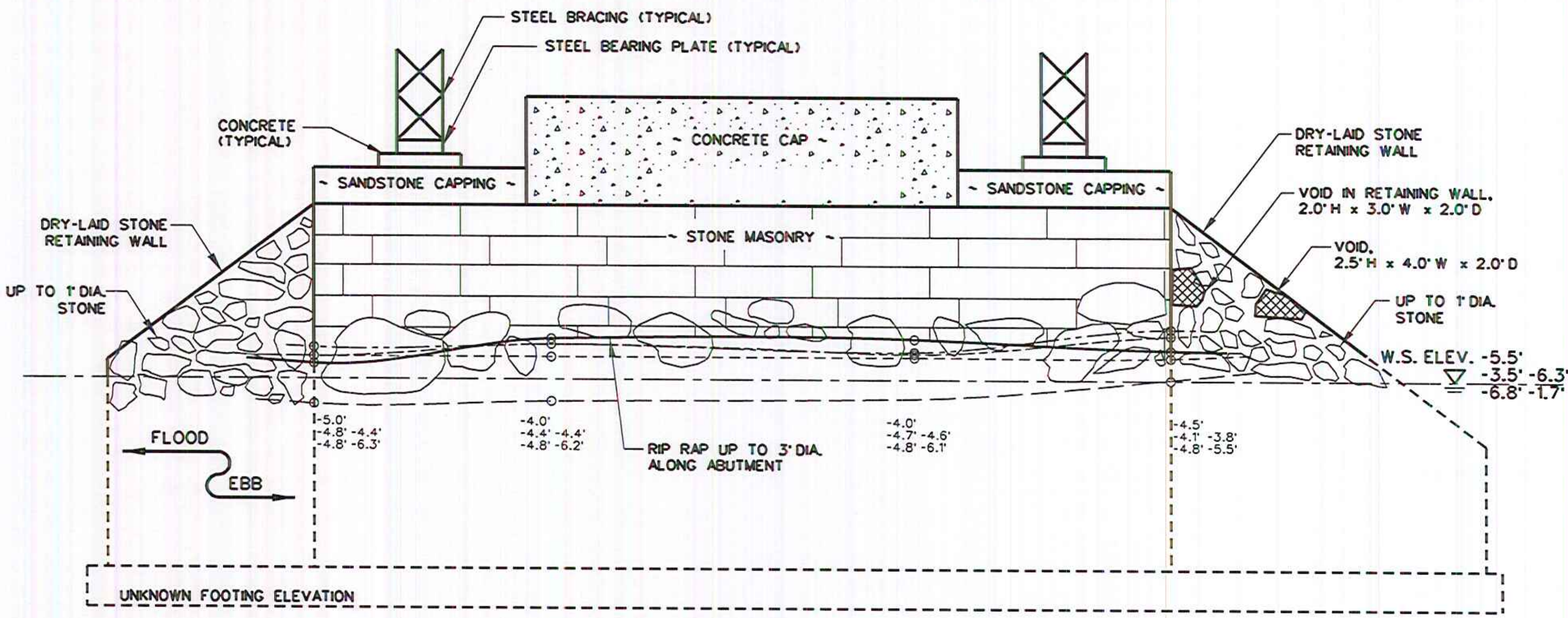
BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER
WESTPORT CONNECTICUT

PIER 3 (EAST ELEVATION)

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349J

20/41

21/41



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.
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CONNECTICUT DEPARTMENT OF TRANSPORTATION

BRIDGE NO. 01349
ROUTE 136 OVER SAUGATUCK RIVER

WESTPORT CONNECTICUT

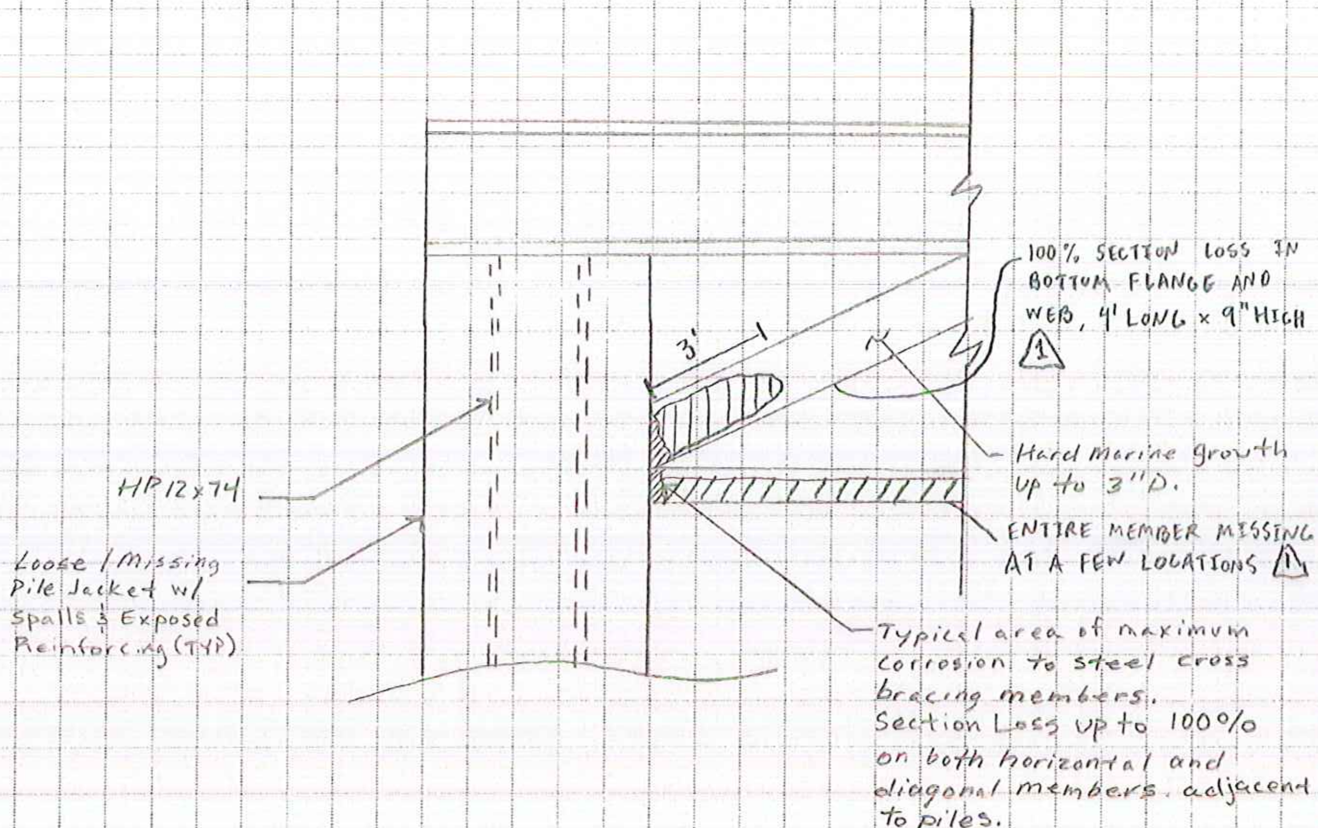
EAST ABUTMENT

INSPECTED BY: JK, JF, RS REVISED BY: ERN	SCALE: AS SHOWN	DATE OF INSPECTION 12/29/2014	DRAWING NO. 01349K

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

△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	CHANNELLOOKING 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 (EBB).


01349 - 01.JPG


01349 - 02.JPG


01349 - 03.JPG


01349 - 04.JPG


01349 - 05.JPG


01349 - 06.JPG


01349 - 07.JPG


01349 - 08.JPG

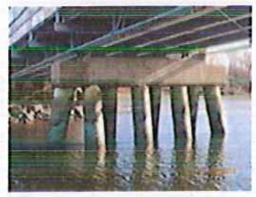

01349 - 09.JPG


01349 - 10.JPG


01349 - 11.JPG


01349 - 12.JPG


01349 - 13.JPG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01349 - 15.JPG


01349 - 16.JPG


01349 - 17.JPG


01349 - 18.JPG


01349 - 19.JPG


01349 - 20.JPG

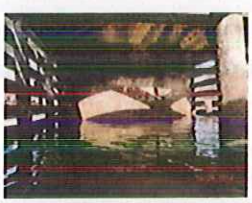

01349 - 21.JPG


01349 - 22.JPG


01349 - 23.JPG


01349 - 24.JPG


01349 - 25.JPG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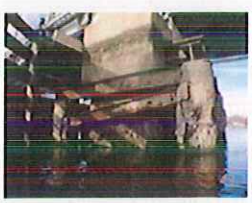
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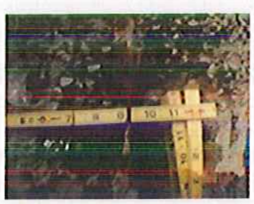
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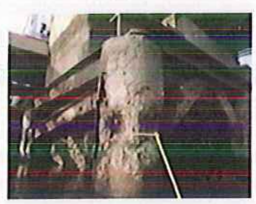
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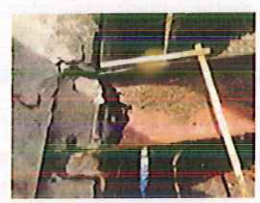
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01349 - 31.JPG


01349 - 32.JPG


01349 - 33.JPG


01349 - 34.JPG

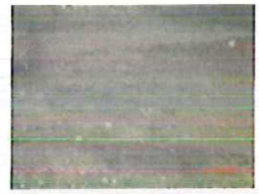

01349 - 35.JPG


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.

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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)

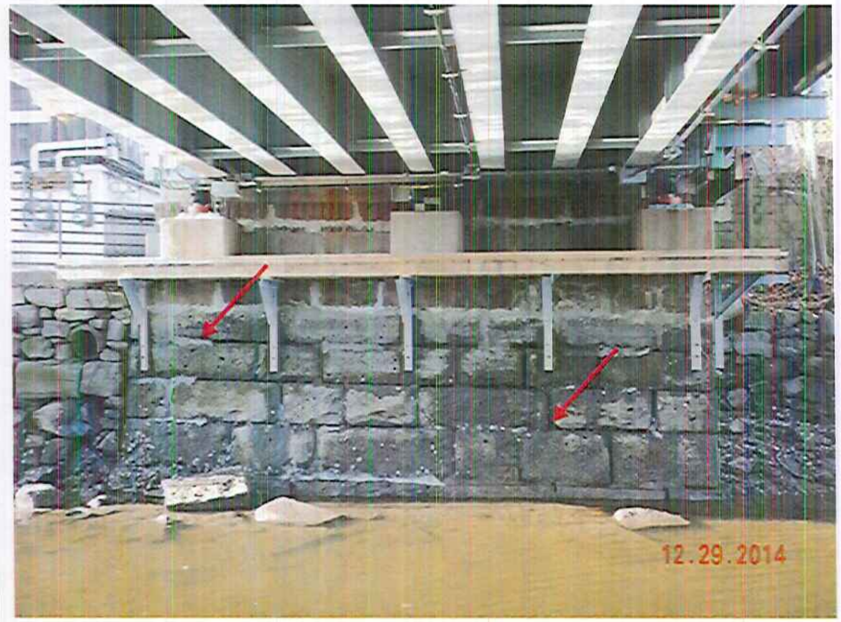

Photo # 6: West Abutment Elevation, Looking West

Note: Timber walkway anchored to abutment stem. Deteriorated / missing mortar and failing grout repair/ epoxy coating.

Prepared by:
COLLINS ENGINEERS INC.

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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

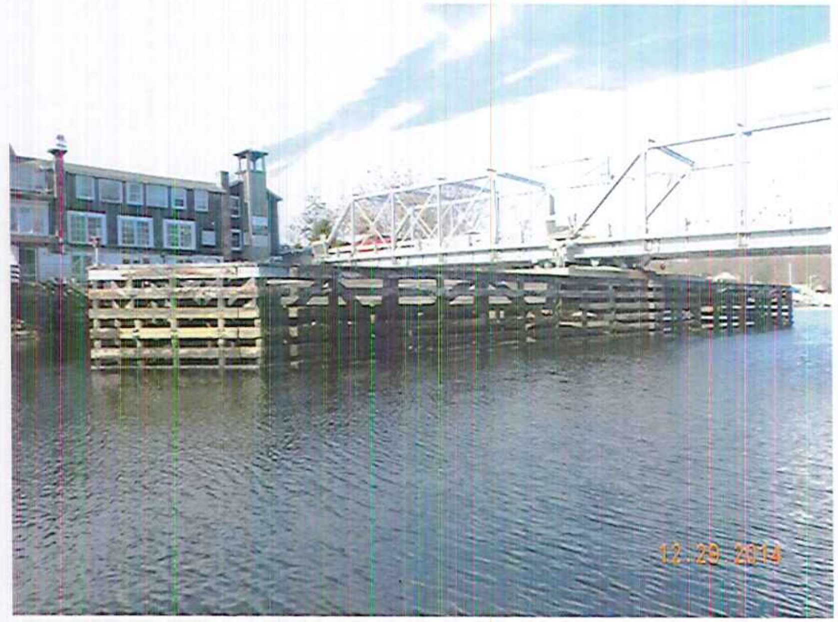

Photo # 10: Pier 1 East Elevation and Fender System, Looking Northwest

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:
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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

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.

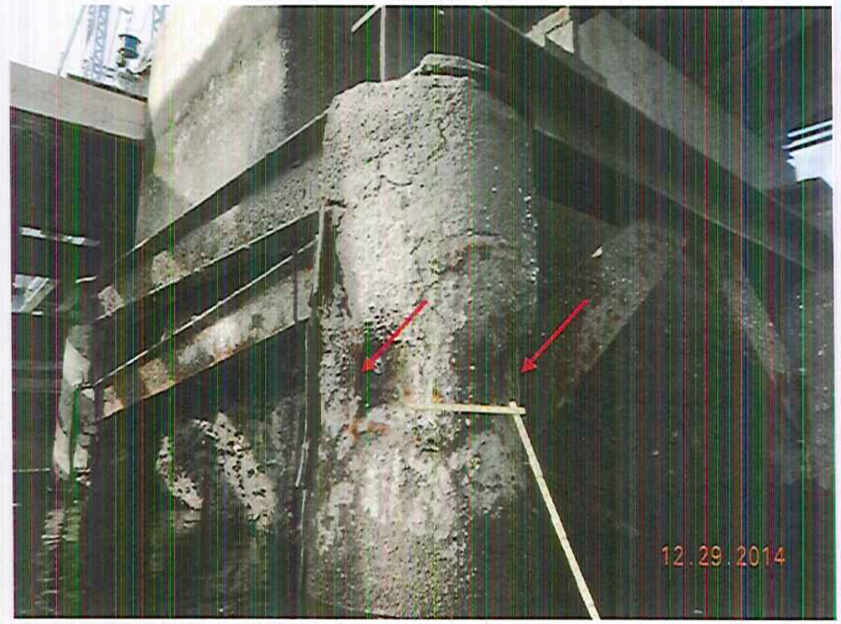

Photo # 18: Pier 2, Pile 2 at Southeast Corner of Pier

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.

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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.

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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 1100
Time Out of Water: 2:30 PM 230
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 ✓
Remarks: ~~CONN DOT representative Ron Jantzen made a site visit.~~
Boat Ramp located Elaine Rd

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CONNECTICUT - DOT
BRIDGE SAFETY & EVALUATION

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: Clay Carlson [signature] **Date:** 1/3/13
[illegible] 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%~~ 50% 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). 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 IN 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. Masonry pier w/ timber cribbing. Encased in concrete w/ Steel shell @ 1951-1952
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'~~ 22 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).
FOOTING	N	Not visible. pier noted as 5d'
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

Add note OK

PDT 4/23/13

original Masonry Pier is undermined however a retrofit repair has been added with steel piles. Encasement are in rough shape but steel is good.

5/28

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*
		jacket.
PILES ADT 4/23/13 5✓ For Pile Condition; For Bracing – Rating = "2"	4	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). up to 35L; see notes; not found
STEM RDT 4/23/13	5✓	Stone masonry section exhibits mortar loss up to 25% with up to 2.5' penetration into the joints.
FOOTING ADT 4/23/13 4✓	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 4.5	5	Mudline elevations primarily exhibit aggradation up to 2.0' since the 2010 inspection. (Sheets 12, 13 & 14) Addnote:
SETTLEMENT	7✓	→ SW corner undermining (30"L x 5"H x 4"dp) - exposed timber
General remarks:		cribbing w/ splitting + marine borers. NW corner undermined (22"L x 16"H x 25"dp)
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	(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:

ADT 4/23/13	5✓	undermining at Pier 2
CHANNEL SCOUR 5✓ Isolated minor undermine @ P2	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	7 6	Minor scattered debris. throughout channel including old pier and tank.
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	

6/28

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*
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: [signature] Date: 1/4/13

Inspected by: Clay Carlson [signature] Date: 1/4/13

D.O.T. reviewed by: Ronald [signature] Date: 4/23/2013

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JAN 08 2013
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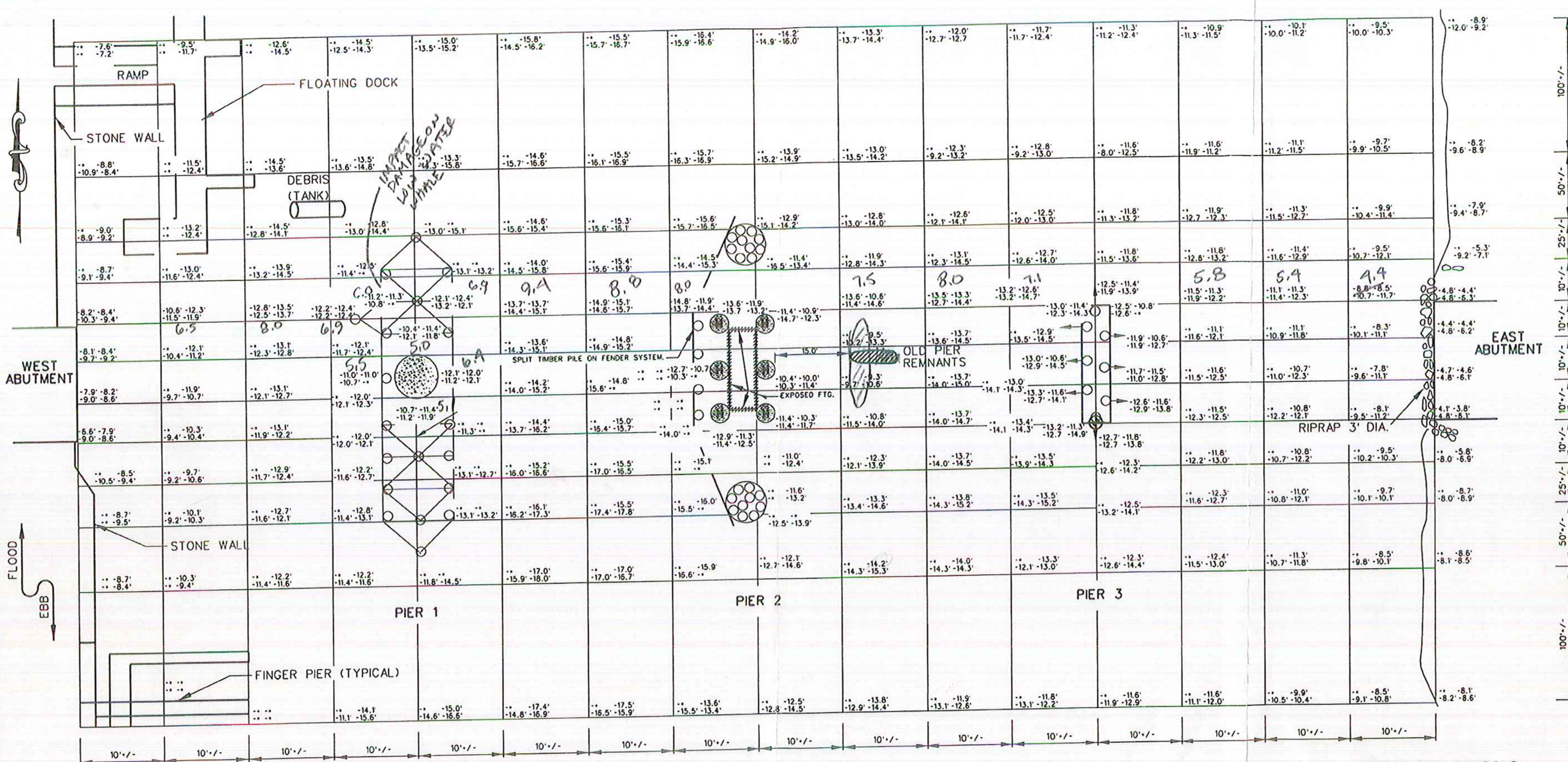
BRIDGE SAFETY & EVALUATION



PLAN
N.T.S.

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

LEGEND FOR SYMBOLS

⊕ DATUM ELEV. 0.0 TAKEN FROM BOTTOM OF CONCRETE CAP ON SOUTH END OF PIER 3.

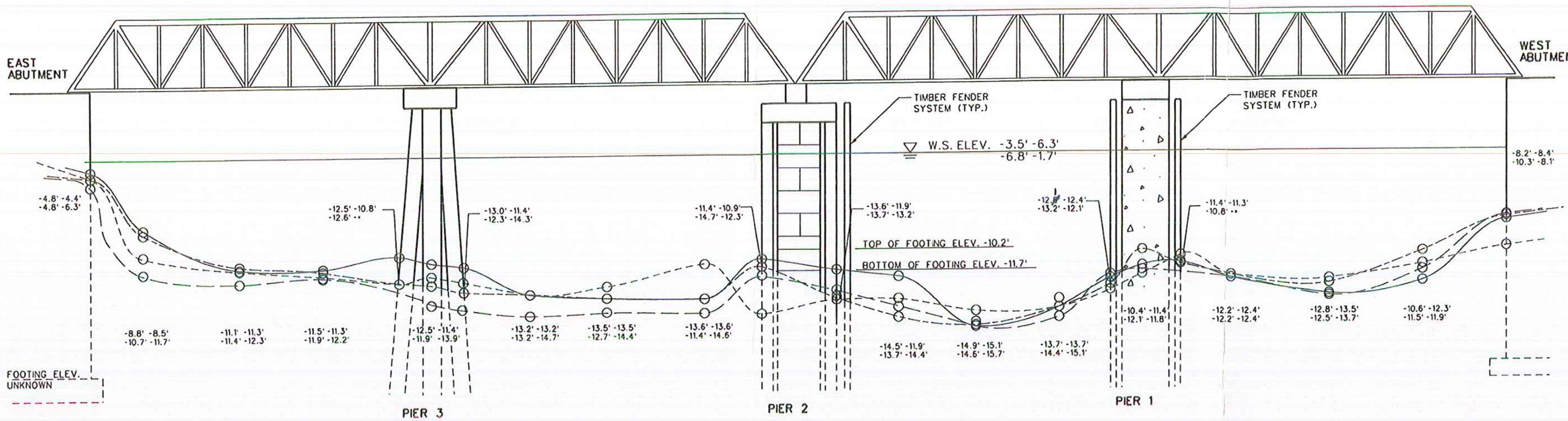
▽ W.S. ELEV. -3.5' ~~-6.3'~~ 6.0 – 5.0 LATE
-6.8' -1.7' EARLY
SEE ELEV SHEETS

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

* INDICATES NO INFORMATION

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'

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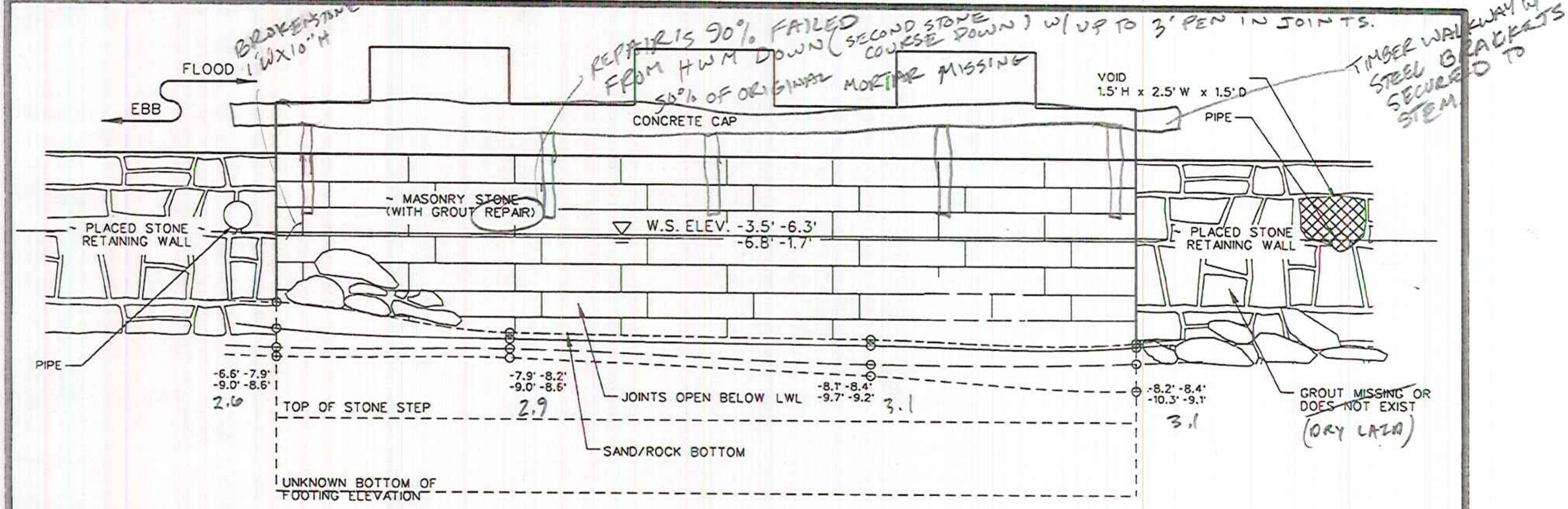
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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'~~ 5.5
-6.8' -1.7'

· INDICATES NO INFORMATION

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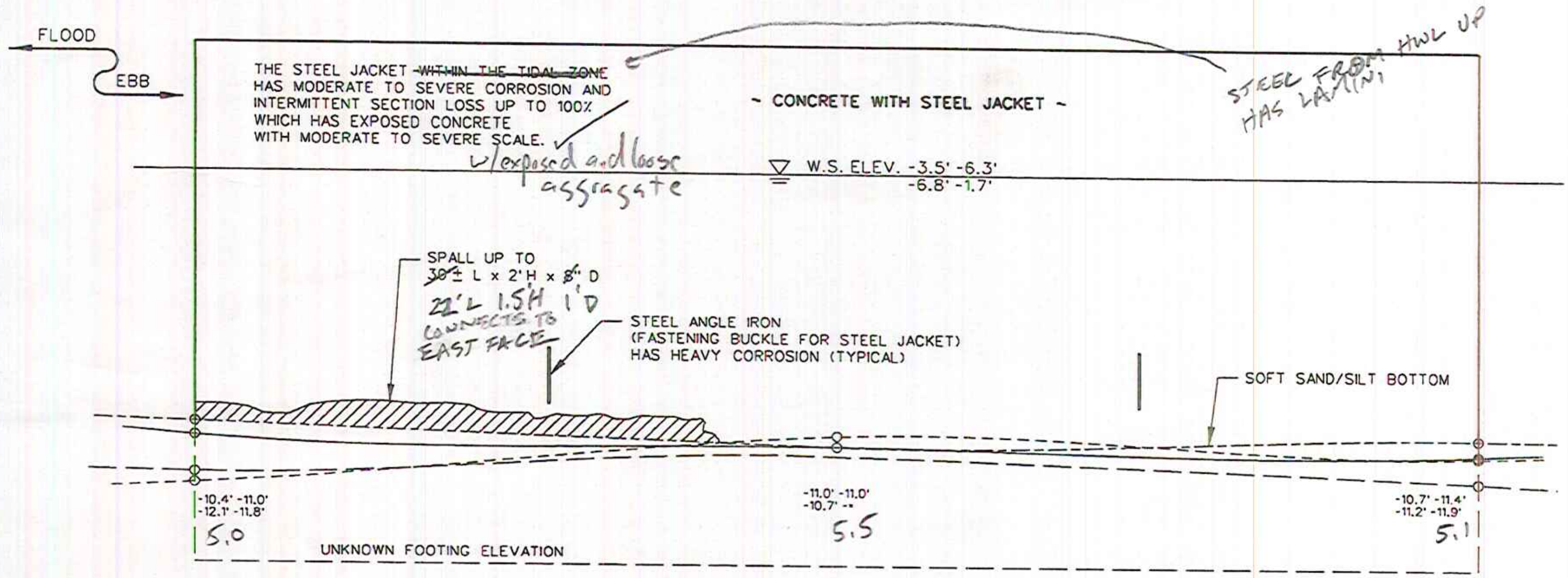
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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

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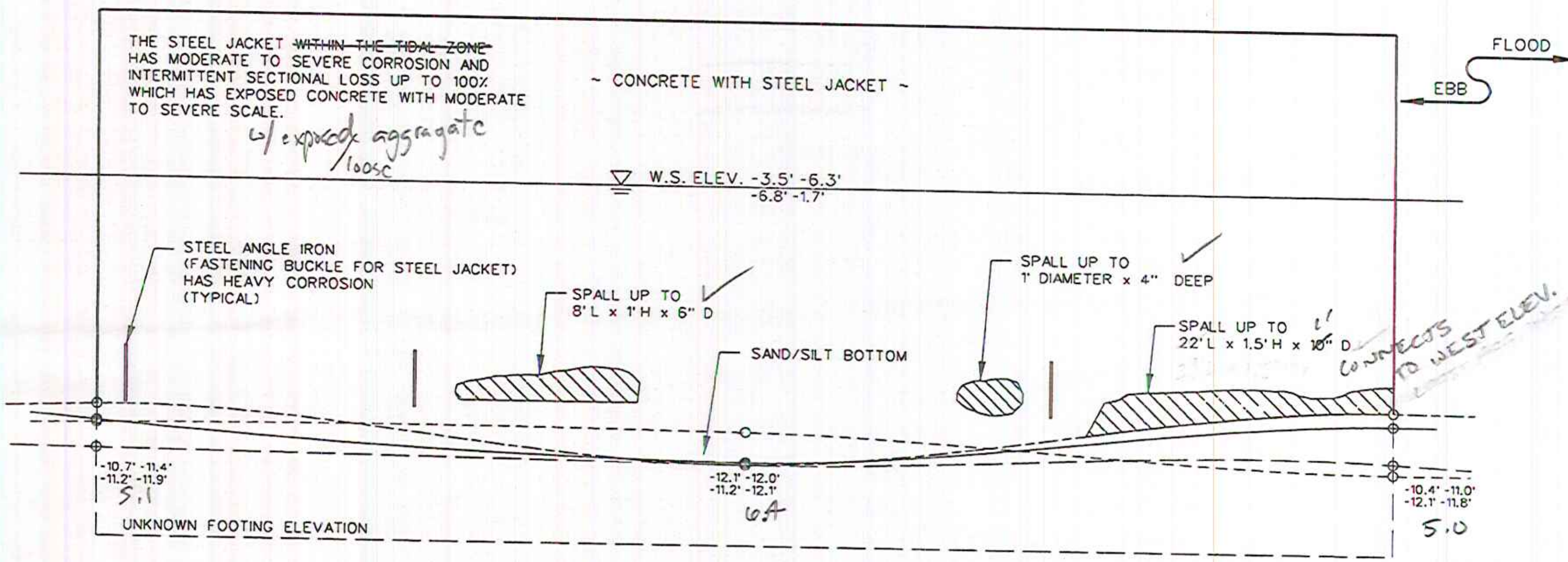
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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

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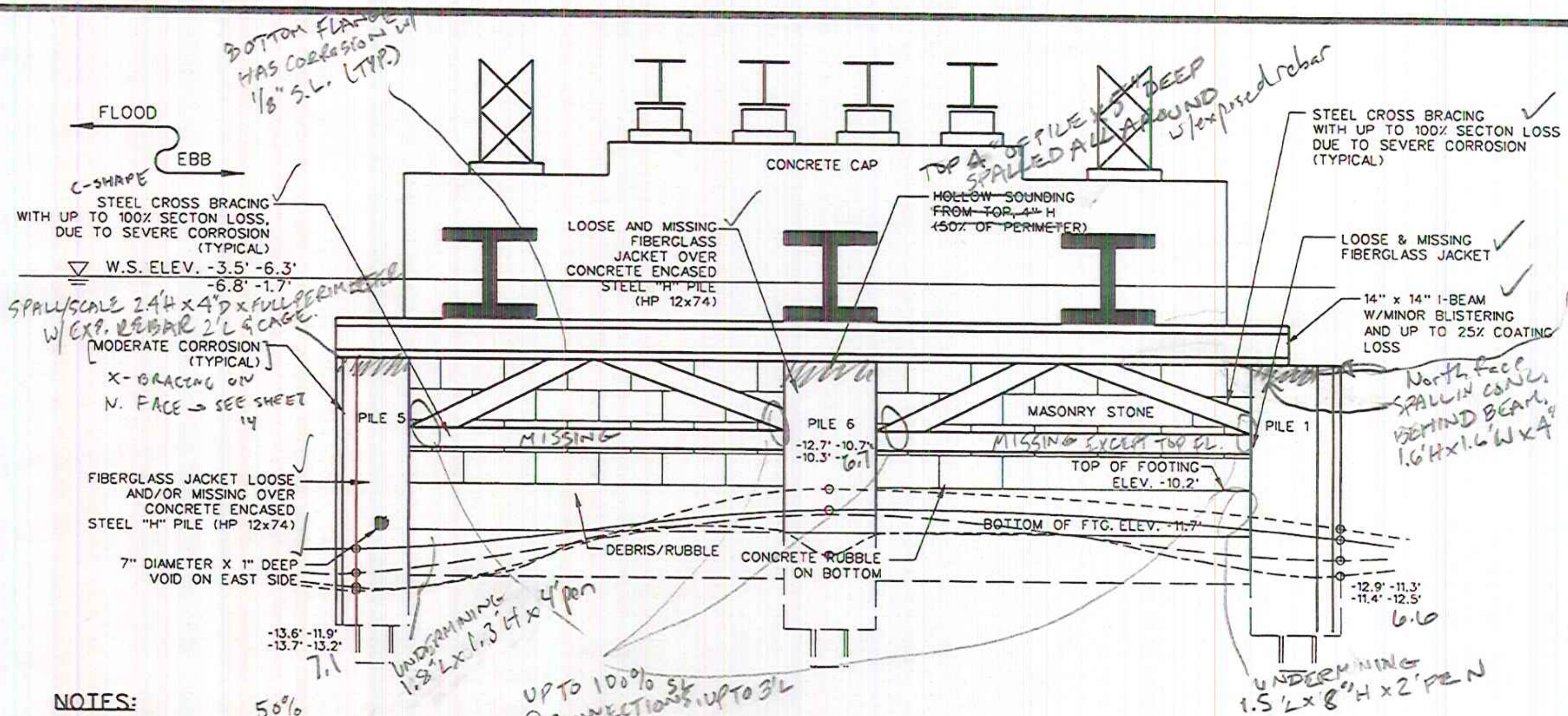
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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

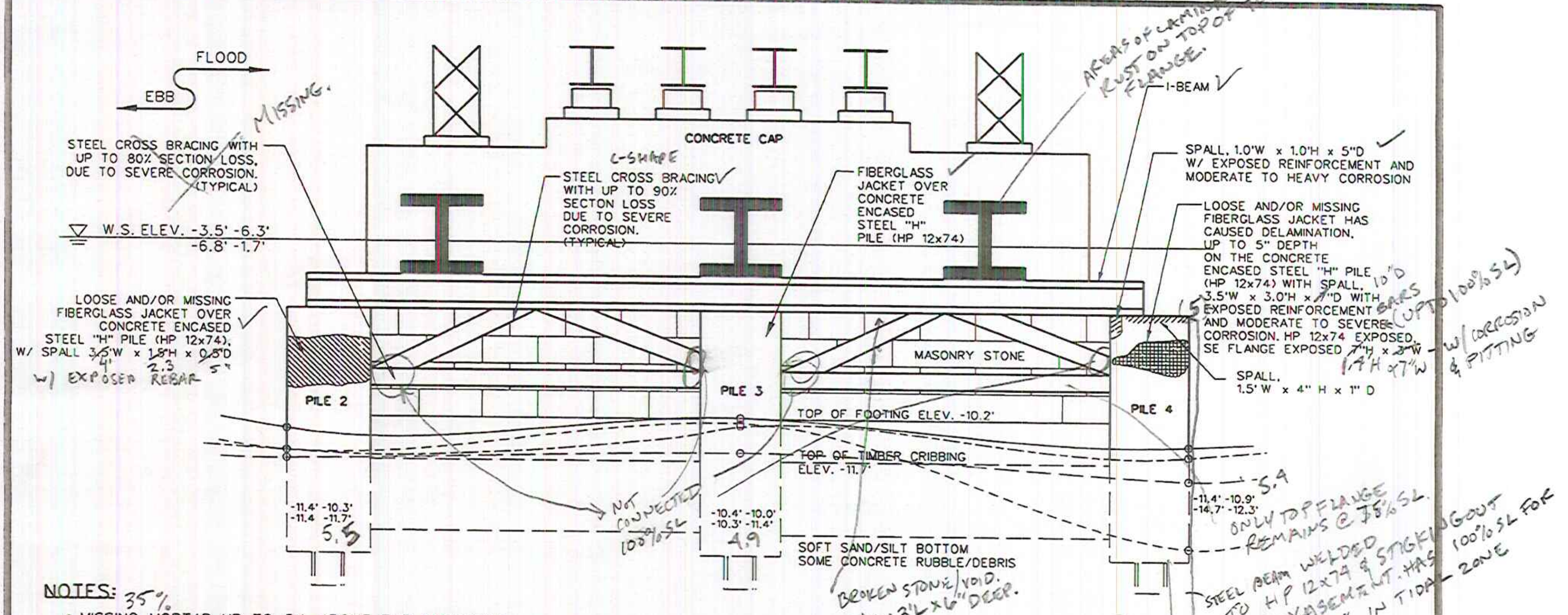
A.DiCesare Associates, P.C.
690 Clinton Ave, Bridgeport, CT 06604
Phone: 203-696-0444, Fax: 203-696-1094
Email: dicesare@adicesarepc.com

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



PIER 2 (EAST ELEVATION)

N.T.S.

TYP. (ADD TO ALL PIER 2 SHEETS) ENCASEMENTS HAVE SCALE w/ EXP. AGG. UP TO 1/2" DEEP.

NOTES: 35%

- 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.

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

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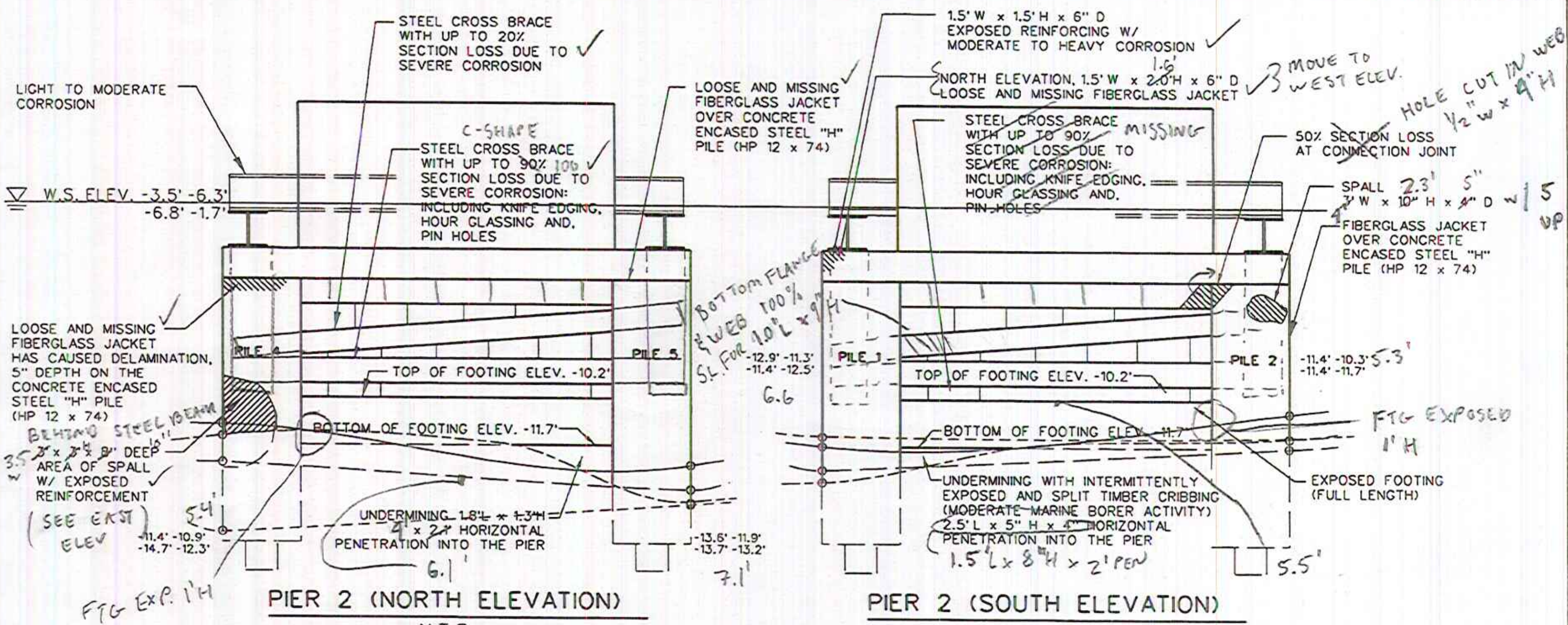
CONNECTICUT DEPARTMENT OF TRANSPORTATION

WESTPORT — BRIDGE NO. 01349 — ROUTE 136 OVER SAUGATUCK RIVER — 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%~~ 30% WITH 2.5' HORIZONTAL PENETRATION INTO THE PIER, BETWEEN THE STONEWORK.

TOP OF FOOTING @ 4' @ 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

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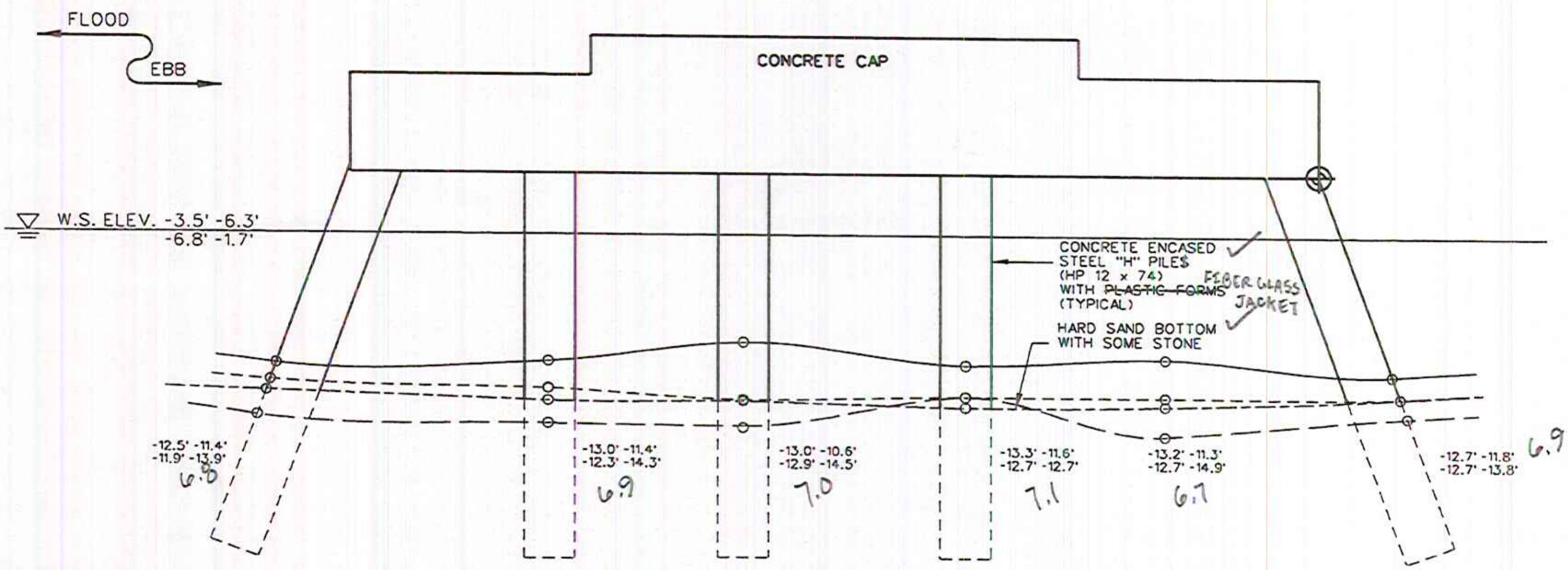
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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' ~~-6.5'~~ 5.5
-6.8' -1.7'

· INDICATES NO INFORMATION

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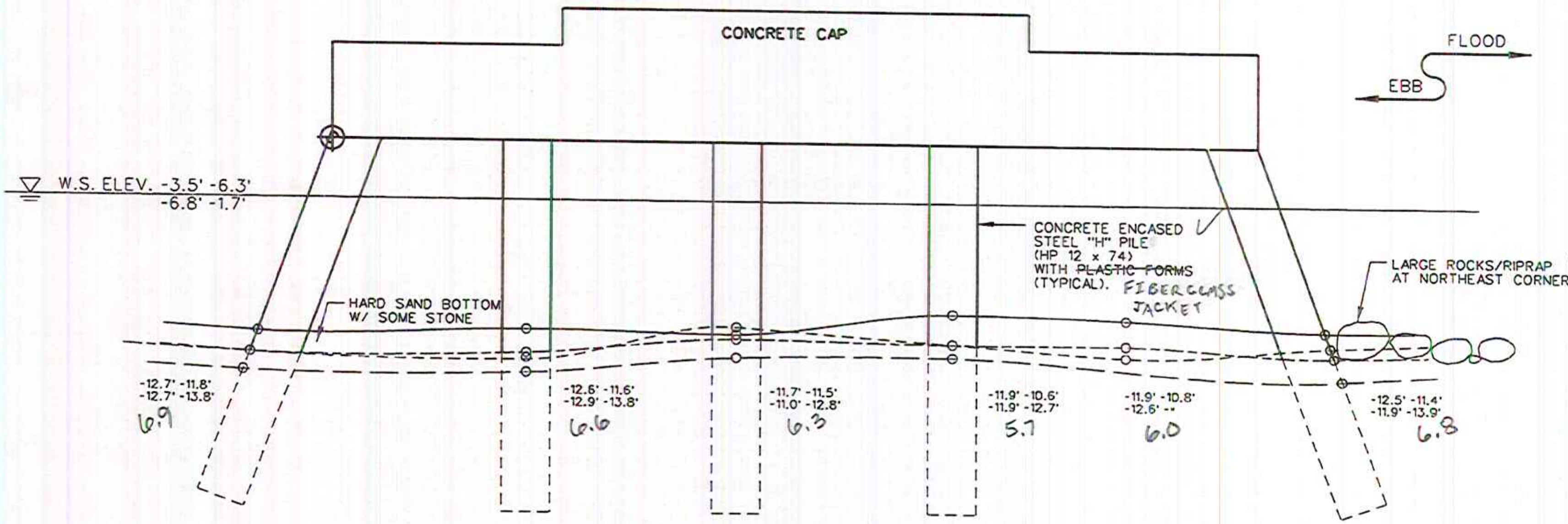
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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



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'~~ 5.5
-6.8' -1.7'

* INDICATES NO INFORMATION

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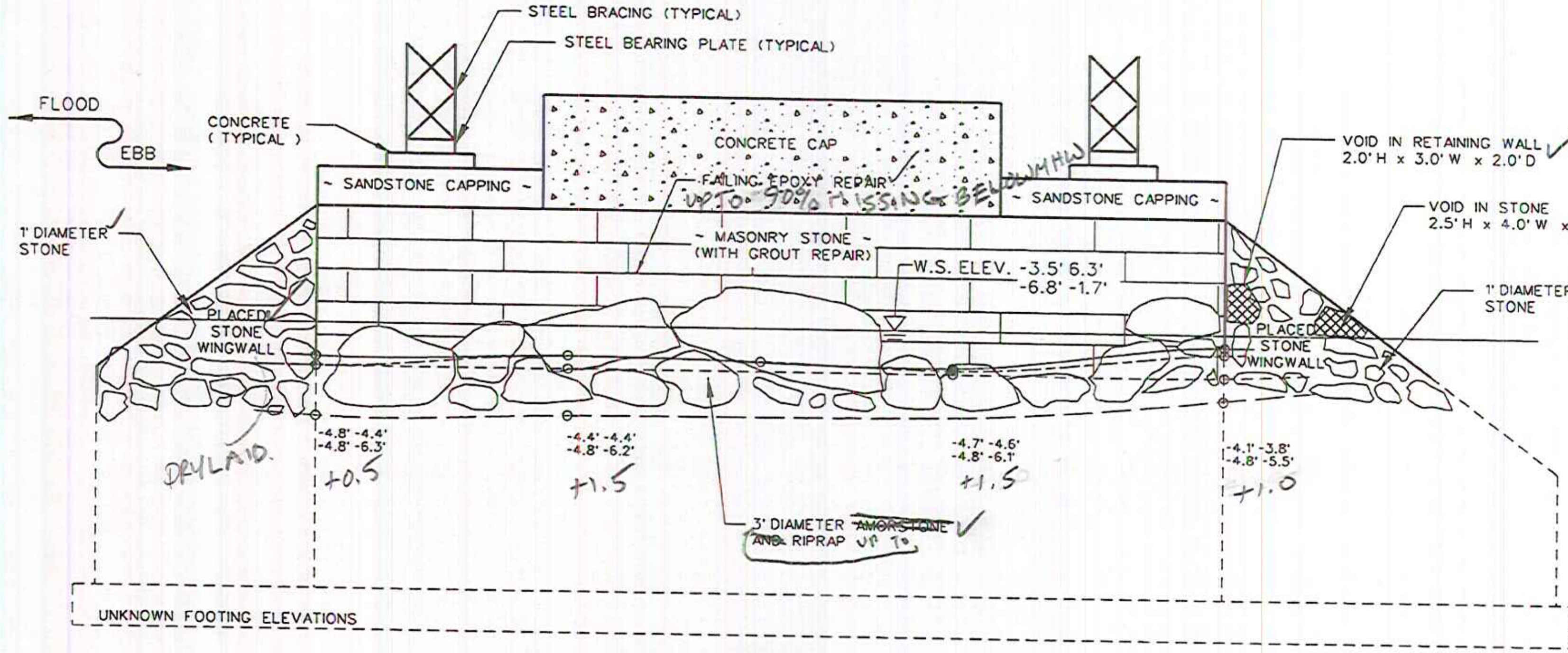
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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. UPTO 90% BELOW MHW.
- RIPRAP UP TO 3.0' DIAMETER ~~WAS PLACED TO PREVENT SCOUR.~~ along abutment [REMOVE SINCE 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

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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

Revised 12/07/12
By: Bill McLachlan

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

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

Condition Remains 2014

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. 9.~~
2. ~~The ends of the north bridge rail are touching at Pier 2.~~
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~~ ~~52~~ 22' feet long by 2 feet high. ~~See Photo No. 24.~~

Please direct persons under your jurisdiction to:

Repair required 2014

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~~. 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.~~

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~~ encasements of pier 2. The spalls are now up to 7" deep, and steel H-pile flange exposed.
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.