Tighe&Bond

South Benson Pump Station Study – Final Report

Project No. 15-0439-08
South Benson Pump Station &
Drainage Improvement Study

Fairfield, Connecticut

Prepared For:

Town of Fairfield

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Section 1
Introduction and Site Conditions

1.1 Project Description

Tighe & Bond, Inc. has been retained by the Town of Fairfield to provide consulting engineering services for the South Benson Storm Water Pump Station and Drainage Improvement Study. The study area is roughly bounded by South Benson Road to the north, Penfield Road to the south, Fairfield Beach Road to the east and Old Post Road to the west.

The purpose of the project is to analyze the current condition of the storm drainage within the study area and to investigate the potential to locate a storm water pump station within the approximately 0.3 square mile area. The South Benson Storm Water Pump Station Study is needed to improve the resiliency of the flood prone Fairfield Beach areas.

During major coastal storm surge events such as Superstorm Sandy, floodwaters overtop the coastal barrier beaches and become trapped behind the higher ground. The existing system that drains to South Benson Marina does not have sufficient capacity to evacuate major flooding events and is limited by tidal conditions.

1.2 Project Location

The Town of Fairfield, CT is located in southwestern Connecticut on Long Island Sound. Fairfield is bounded by Easton to the North, Bridgeport to the East, and Westport to the West. The town has a population of approximately 61,000 and contains 5 miles of shoreline.

The study area is located in the Fairfield Beach neighborhood of Fairfield. The area has a high concentration of luxury and high-value homes as well as Fairfield Town Hall and Roger Sherman Elementary School.

This study area includes approximately 175 acres and is located primarily in a Residential “A” Zone, single family dwelling with a minimum lot size of 9,375 SF, with a portion of the study area (Town Hall and surrounding area) located within a Residential “R-3” Zone, single family dwelling with a minimum lot size of 20,000 SF, per the Town of Fairfield Zoning Map Dated January 30, 2018.

1.3 Existing Flooding Problems

The study area experiences frequent flooding issues, with some areas flooding to depths of approximately 6” several times per year. When the area receives over an inch of rain in a short time span, flooding occurs on Penfield Road, Fairfield Beach Road, Rhoda Avenue, Norcliff Lane, and Edward Street based on discussions with the Fairfield Engineering Department.

In addition to rainfall event flooding, the area experiences storm surge flooding in major coastal storm events. During major coastal storm events such as that experienced with Superstorm Sandy, floodwaters overtop the coastal barrier beaches to the south and become trapped behind the higher ground. The study area consists of low lying

properties and roadways that effectively serve as a detention basin following coastal storm events. The existing system that drains to South Benson Marina does not have sufficient capacity to evacuate major flooding events, and it is limited by tidal conditions.

Section 2
Storm Drainage System Analysis

2.1 Design Criteria

After gathering and reviewing information provided by the Town of Fairfield and completing a field survey of missing/conflicting results, a model of the existing storm drainage system was created. We have utilized Town LiDAR and GIS mapping information to create a base map of the study area.

2.1.1 Modeling Program

A hydraulic analysis was performed for the existing drainage system using Autodesk Storm and Sanitary Analysis 2015. Existing watersheds were delineated utilizing the existing topography, and the most upstream point of the storm sewer main within the respective watershed was used as the inlet for that watershed, which is a conservative approach. Analysis down to the catch basin level was not performed, as the goal of the study was to determine the capacity of the existing storm mains. All areas and portions of the main that contribute to the system were evaluated. A total of 32 watersheds were included in the existing conditions analysis.

A runoff coefficient was calculated for a typical watershed utilizing runoff coefficients of 0.90 for impervious cover and 0.30 for landscaped and lawn cover. The average weighted runoff coefficient was calculated at 0.58. It was assumed, based on the existing coverage and Zoning, that the remainder of the watersheds would have the same approximate ratio of impervious cover to lawn cover. As such, a runoff coefficient of 0.58 was applied to all watersheds to calculate peak runoff rates. The time of concentration was calculated for each watershed and entered into a hydraulic model to determine the capacity of the existing pipes.

In the hydraulic analysis, a ponded area was applied to each manhole to represent actual local flooding conditions. The ponding area values were calculated using the existing grading information and manhole rim elevations. It was assumed that the maximum ponded elevation was approximately 1 foot above the manhole rim elevation. Ponding exceeding that level would likely overflow to the next structure downstream.

2.1.2 Design Storm

After reviewing the Connecticut Department of Transportation Drainage Manual and consulting with engineers from the Town of Fairfield, it was determined that the 25-Year design storm would be utilized for the analysis and design of the piped storm system. Utilizing a design storm in excess of the 25-Year design storm would result in a piped network oversized for the majority of storm events. The 25-Year design storm exceeds the CTDOT's requirement of a 10-Year design storm for piped drainage networks.

2.1.3 Tailwater Surface Elevation

The outlet of the drainage system at South Benson Marina is tidally influenced. Based on info from NOAA Tide Station 8467150 in Bridgeport, CT, Mean High Water (MHW) in Fairfield occurs at El. 3.2 NAVD 88, and Mean Low Water occurs at El. -3.6 NAVD 88. The Coastal Jurisdiction Line (CJL) established by the Connecticut Department of Energy and Environmental Protection (CTDEEP) for Fairfield is at El. 5.20 NAVD 88. In order to model a "worst case" scenario where an extreme rainfall event coincides with a high

tide, the culvert tailwater elevation was set at MHW, El. 3.2 NAVD 88, for the hydraulic analysis in accordance with the guidance provided in the CTDOT Drainage Manual, Section 8.3.6, for tidally influenced culverts.

2.1.4 Rainfall Data

Rainfall data was collected and compared from two different sources, Northeast Regional Climate Center's (NERCC) Extreme Precipitation in New York & New England and National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Point Precipitation Frequency Estimates: CT. The values were compared in an attempt to develop an accurate model of the existing/proposed storm system using the most conservative estimate of precipitation values. Precipitation values from the two models were compared for the design storm (25-year) for 60 minutes, for the development of an Intensity-Duration-Frequency (IDF) curve to be used in the model.

The NERCC model is a web-based platform, created by Cornell University, that allows users access to sound data estimates for extreme rainfall amounts across New York and New England. It includes estimates of rainfall for various durations (from 5 minutes to 60 days) and recurrence intervals (1 year to 1,000 years) with a confidence interval of 90%. The data has been reviewed by the US Natural Resource Conservation Service (NRCS) and is screened monthly by NOAA.

The NOAA model is an online interface, that allows users access to sound data estimates for extreme rainfall amounts across New York and New England. It includes estimates of extreme rainfall for various durations (from 5 minutes to 10 days) and recurrence intervals (1 year to 500 years) with a confidence interval of 90%. The data has been collected in accordance with the National Weather Service.

After comparing both, the NERCC model was determined to be more conservative than the NOAA model and therefore the data from the NERCC model was utilized for the creation of the storm system model for the existing and proposed drainage analysis. The data from both models is located in Appendix B.

2.1.5 Method of Hydraulic Analysis

The following storm drainage design criteria were used for all pipe systems:

1. Design storm rainfall data from Northeast Regional Climate Center's Extreme Precipitation in New York and New England.

2. Piped storm drainage system and the outlets are designed for a 25-Year storm event.

3. The pump station design flow was based on a 25-Year storm event.

4. Minimum time of concentration = 5 minutes.

5. For rational peak flow calculations, runoff coefficients were as follows:

    a. Impervious (Pavement/Roof) areas = 0.90

    b. Landscaped/Lawns = 0.30

6. Minimum diameter pipes, excluding roof leaders, underdrains and foundation drains = 12 inches

7. Watershed areas delineated using polylines in AutoCAD Civil 3D 2015.

8. Comparative hydrology analyzed using AutoCAD Civil 3D 2015 Storm and Sanitary Analysis by Autodesk software.

9. Storm drainage system analyzed using AutoCAD Civil 3D 2015 Storm and Sanitary Analysis by Autodesk software.

Runoff computations, storm sewer calculations, and existing and proposed conditions are included in Appendix B through Appendix E for review.

2.2 Existing Conditions Evaluation

The existing South Benson storm drainage system is comprised of a series of storm mains of varying sizes (12", 15", 18", 24", and 36") that convey flow captured via manholes and catch basin inlets to a 36" main located under South Benson Road. The South Benson Road main discharges north to a marsh adjacent to Ash Creek. This marsh discharges to Long Island Sound through a 48" culvert that is protected by a self-regulating tide gate. The study area has a relatively flat topography throughout and surface runoff is collected by numerous catch basins that are connected to a system of storm mains.

There is an additional marsh area northwest of Fern Street and between Fairfield Town Hall and Roger Sherman Elementary School. The marsh receives runoff via a storm main from Old Post Road and Fairfield Town Hall as well as surrounding surface runoff. The runoff is collected in the marsh and outflows to a 15" culvert that conveys the runoff southeast to the existing storm water system in Fern Street.

There is a low point in the storm main at manhole #42 located on Carlynn Drive between Edward Street and Rhoda Avenue. The low point is a result of the removal of a previously existing outfall to Long Island Sound at Fairfield Beach Road. The outfall has since been removed, however, it does not appear that the drainage system was reconfigured. The low point still remains and collects runoff from the drainage systems in Carlynn Drive, Edward Street, Eunice Avenue, Fairfield Beach Road, Norcliff Lane, Puritan Road, Rhoda Avenue, and a portion of Birch Road. The low point collects runoff until the water level reaches an elevation high enough to overflow to the northeast to the Beach Road system, before ultimately discharging to the outfall near South Benson Road. This condition was confirmed through a field survey that showed many of the storm mains near manhole #42 were submerged even during dry periods.

The hydraulic analysis showed that the existing storm drainage system does not have sufficient capacity and lacks the functionality to convey the 25-Year storm event. The analysis revealed that all pipes within the system do not have sufficient capacity to convey the design storm and are surcharged in a 25-year storm event. Of the 93 manholes evaluated, 52 of them experienced surface ponding.

A breakdown of existing watershed areas is included in Appendix C and an existing watershed map and storm sewer calculations are included in Appendix D of this report. A

spreadsheet identifying the existing ponding areas on the site is also included in Appendix D.

The Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRM) #09001C0438G and #09001C0419G for Fairfield County, effective July 8, 2013 show the project site within the 100-year floodplain, as shown in Figure 4 in Appendix A.

Section 3
Proposed Drainage Improvements

Tighe & Bond developed and evaluated drainage system improvements to reduce flooding within the South Benson study area. Two general improvement strategies were evaluated: a gravity upgrade and a pump station upgrade.

The gravity upgrade consists of upgrading the existing storm mains to larger diameter pipes and relaying stretches of the existing mains in order to create positive slope. The pump station upgrade consists of the evaluation of a pump station to discharge large coastal storm surge events and standard storm events by increasing the slopes of the existing storm system before discharging to a wet well at the proposed pump station location.

3.1 Gravity Upgrade Alternative

In order to convey the design storm and reduce flooding, significant improvements are required in the form of upgrades to the size of the existing mains as well as relaying of pipes to create positive slope and prevent ponding within the system.

The gravity upgrade requires an increase in nearly all main sizes, the addition of a new 48" main to divert flows around the low point in the Carlynn Drive system, and the relaying of two large stretches of storm main. The high tailwater elevation at the system outlet and extremely flat slopes of the existing storm main require pipe sizes to be increased significantly in order to eliminate surface flooding in a 25-year storm.

3.1.1 Pipe Diameter Increases

As shown in Figure C-102, the majority of the mains would need to be increased significantly in size. The main to the outfall will need to be increased from 36" to 60" to accommodate the design storm. Many of the existing slopes will remain the same. The proposed gravity upgrade includes upsizing the storm system mains as detailed below:

300 linear feet of 15"
1,320 linear feet of 18"
4,845 linear feet of 24"
1,250 linear feet of 30"
5,359 linear feet of 36"
1,760 linear feet of 48"
3,885 linear feet of 60"

3.1.2 New Storm Mains

A 48" main (approximately 585 linear feet) would be installed from the manhole at the intersection of Puritan Road and Rhoda Avenue to the proposed 60" main at the intersection of Beach Road and Puritan Road. This proposed addition will convey flows from the Puritan Road Storm System and portions of the storm systems in Rhoda Avenue, Norcliff Lane, and Birch Road to the existing outfall, and divert flows away from the existing low point in Carlynn Drive.

3.1.3 Relaying of Pipes

In order to eliminate low points within the storm system, several stretches of main would have to be relayed to create positive slope to the outfall and to prevent standing water in the system. There is one existing low point within the system in Carlynn Drive between Edward Street and Rhoda Avenue. There is also a high point that diverts flows located on Fern Street southeast of Roger Sherman Elementary School.

The low point on Carlynn Drive can be eliminated by raising pipes and changing the direction of pitch from the manhole at the intersection of Edward Street and Penfield Road to the manhole at the intersection of Carlynn Drive and Beach Road. The main will need to be increased from an 18" and in some spots 12" to a combination of 30" and 36". The slope required to meet the invert at the manhole at the end of Carlynn Drive has to be very shallow, approximately 0.1%. The pipe connection from Norcliff Lane will be removed to reduce inflows to the Carlynn Drive portion of the system. The connection running from Puritan Road to Norcliff Lane will be relayed and the new main will convey the flows towards Puritan Road and subsequently to the proposed 48" main.

The high point on Fern Street will be remedied by relaying pipes along Fern Street, Birch Road, and Quincy Street. The main will require a very flat slope in order to meet the invert at Beach Road, approximately 0.02-0.04%.

The extent of pipe to be relayed is as follows:

- 1,030 linear feet on Fern Street
- 1,650 linear feet on Edward Street and Carlynn Drive

3.1.4 Gravity Upgrade Results

The results to the gravity upgrade analysis for the proposed stormwater system are included in Appendix E. The results show that with the proposed upgrades, all ponding elevations will be controlled and reduced to less than 6" above the rim elevations at all but one manhole, which was considered to be an acceptable level of flooding. The results also show that despite the upgrades in pipe size, nearly all pipes within the system will remain surcharged due to the tailwater elevation and relatively flat slopes of the existing stormwater system. The existing outfall invert limits the potential to increase slopes within the system in a gravity system scenario.

Thus, even with a substantial investment in the storm drainage infrastructure, existing flooding cannot be totally eliminated through increasing pipe capacity. The tailwater conditions at high tide limit the capacity of the outfall pipe to discharge major storm events and create flood conditions in the upstream areas. In addition, in a major coastal storm surge event similar to Superstorm Sandy, trapped flood waters will not be able to discharge by gravity due to the high tailwater elevation, leaving the South Benson area flooded for a substantial timeframe until tide levels recede.

3.2 Pump Station Upgrade Alternative

The second alternative evaluated included the construction of a new stormwater pump station near South Benson Road. The subsequent phase of the overall study involves the evaluation of a pump station to discharge large coastal storm surge events. The intent of this second alternative is that the same pump station could be utilized to discharge flows during standard storm events as well. Construction of a pump station would allow the slopes of the existing storm system to be increased, which increases the flow capacity of the system and dramatically reduces flooding. The pipes within the study area were

reevaluated using a consistent slope routed to the wet well at the proposed pump station location. The existing pipes within the system were evaluated with the revised slopes to determine if any pipes under the proposed conditions would be surcharged.

3.2.1 Proposed System Improvements

The proposed pipe slope was increased to 0.5% over the entirety of the storm system under this alternative. As with the gravity upgrade, several stretches of pipe will have to be relayed to achieve positive pitch towards the proposed pump station and eliminate low points in the existing system.

The majority of the existing pipe diameters were found to provide sufficient capacities when the slopes were revised to 0.5%. However, there are a few segments that require an increase in size to convey the 25-Year storm. The proposed pump station alternative includes replacing significant portions of the existing storm system as follows:

375 linear feet of 15”
1,150 linear feet of 18”
6,085 linear feet of 24”
2,605 linear feet of 30”
1,890 linear feet of 36”
1,130 linear feet of 42”
975 linear feet of 48”
1,770 linear feet of 54”

3.2.2 Pump Station Location

The proposed pump station location is shown on Figure C-103. The pump station is proposed to be located at the parking lot for Jennings Beach near manhole 81. For purposes of the initial drainage study, Manhole 81 was considered to be the pump station location due to the proximity to the outfall and open space/availability. The optimal location of the pump station will be determined in the subsequent phase of this study.

3.2.3 Pump Station Invert

In order to accommodate the proposed 0.5% slope in the storm mains, the invert at manhole 81 (the proposed pump station location) needs to be lowered significantly. The existing invert is approximately -3.53. The proposed invert at the pump station wet well is approximately elevation -20, with finished grade at approximately elevation 3.96.

The invert at the proposed pump station was calculated by utilizing the invert of the furthest manhole (manhole 01 with an invert of 9.27), the length of the main from that manhole to the proposed pump station (5,824 ft), and a 0.5% slope applied. A 1% slope was evaluated as well, however the invert at the pump station under this condition would be approximately elevation -40, which was considered unfeasible for wet well construction.

3.2.4 Pump Station Upgrade Results

The results to the pump station upgrade for the proposed stormwater system are included in Appendix F. The results show that with the proposed upgrades, all proposed mains within the system will have adequate capacity to convey flows from a 25-year storm event without surcharging the mains.

3.2.5 Contributing Drainage System Design

Following the initial analysis of the pump station upgrade alternative, Tighe & Bond developed plans advancing the design of the major contributing storm mains in the South Benson area to a 50% Design level. The following roadways and storm mains were included in this effort:

Roadway	Length
Beach Road	1,750 LF
Carlynn Drive	950 LF
Colonial Drive	700 LF
Edward Street	700 LF
Fairfield Beach Road	1,850 LF
Fern Street	950 LF
Penfield Road	2,000 LF
Pilgrim Lane	650 LF
Quincy Street	1,200 LF
Rhoda Avenue	800 LF

A detailed field survey of these roadways within the study area was performed. Tighe & Bond then reviewed the existing catch basin locations within each of the major watersheds delineated in the initial phase of the South Benson Pump Station Study and prepared a proposed conditions design.

The design included a review of the survey mapping to determine if large inlets (Type I or Type II) doubles could be installed to improve interception capacity. We also assessed the impact of the additional inlets on the performance of the drainage system.

Preliminary drainage design plans were prepared showing new structures, pipes, pipe size and materials. Plan and profile sheets were prepared depicting the proposed improvements. Please see Appendix H for the 50% Design Plans for the contributing storm drainage network.

Section 4
Summary of Drainage Proposals

After completion of a drainage evaluation for the South Benson Storm Water Pump Station and Drainage Improvement Study, Tighe & Bond created two alternative solutions to improve flood resiliency in the study area.

4.1 Gravity Upgrade

- Approximately 18,720 linear feet of storm main would be upgraded to a larger diameter
- Some pockets of flooding remain (less than 6" of ponding)
- Most pipe segments remain surcharged
- Relaying total of 2,680 linear feet of storm main (no increase in diameter)
    - 1,030 linear feet on Fern Street
    - 1,650 linear feet on Edward Street and Carlynn Drive
- Addition of approximately 585 linear feet of 48" storm main on Puritan Road

4.2 Pump Station Upgrade

- The storm main slope will be increased to 0.5%
- Approximately 15,975 linear feet of storm main will be replaced
- Pump station will be located at the Jennings Beach parking lot
- All storm mains have 25-year storm capacity (not surcharged)
- Relaying total of 2,680 linear feet of storm main
    - 1,030 linear feet on Fern Street
    - 1,650 linear feet on Edward Street and Carlynn Drive

4.3 Opinion of Probable Construction Cost

Tighe & Bond has prepared an Opinion of Probable Construction Cost (OPC) for each proposed improvement. The approximate costs are listed below. A detailed breakdown of costs can be found in Appendix G.

Proposed Improvement	Cost
Gravity Upgrade	$10,300,000
Pump Station Upgrade	$8,960,000*

**Note: The Pump Station Upgrade cost only includes pipe costs and does not include construction of the pump station as the size and cost of the proposed pump station is included in the subsequent phase of the study.*

Section 5
Proposed Pump Station Improvements

The proposed South Benson Pump Station structure will be located within the Town of Fairfield, Connecticut. The proposed pump station's contributing drainage area is roughly bounded by South Benson Road to the north, Penfield Road to the south, Fairfield Beach Road to the east and Old Post Road to the west. The contributing drainage area is approximately 169 Acres.

During the initial phase of the study, Tighe & Bond analyzed the capacity of the existing storm drainage system in the study area and calculated peak stormwater runoff rates for various storm intensities. As a result of the storm drainage study, the 25-Year storm peak runoff rate was calculated at 124 Cubic Feet per Second (CFS). This peak flow rate is greater than the flow rate required to evacuate two feet of coastal flooding over the contributing area within 24 hours. Based on discussions with Town of Fairfield staff, a peak pumping rate of 124 CFS was utilized as the basis of design for the Preliminary Design documents.

The flows utilized in the Preliminary Design of the South Benson Pump Station assume that the storm sewer mains within the contributing watershed will be replaced to increase pipe slopes to a minimum of 0.5% to increase capacity. The replacement of the storm mains results in an influent invert of -20.0 at the proposed pump station location.

During major coastal storm surge events such as that experienced with Superstorm Sandy, floodwaters overtop the coastal barrier beaches and become trapped behind the higher ground. The existing system that drains to South Benson Marina does not have sufficient capacity to evacuate major flooding events, and it is limited by tidal conditions. As opposed to a gravity system, construction of a pump station will allow flood waters to be discharged when the system outlet is submerged, as was the case during Superstorm Sandy.

The proposed pump station includes a cast-in place concrete wet well and an above grade building to house new storm water screening and pumping equipment and associated controls. The pump station and pumps will be designed to transfer storm water from a rainfall event up to the 25-Year storm from the contributing area, which results in a peak pumping capacity of 124 Cubic Feet per Second (CFS), or 80 Million Gallons per Day (MGD). The pump station has also been sized to evacuate approximately two feet of coastal flooding over the contributing area within 24 hours.

The following narrative and attached drawings describe the proposed preliminary pump station design approach.

5.1 Pump Station Components and Narrative

The proposed South Benson Pump Station will consist of the following components:

- Storm water wet well sized to handle storm water flows up to the 25-Year storm (124 CFS or 80 MGD)

- Main flow storm water pumps (two online), sized to handle lower flows up to 1-Year and part of 2-Year storm
- Major flow storm water pumps (four online, sized to handle flows up to the 25-Year storm
- Pump station controls (control & power panels)
- Pump station backup generator (Outdoor diesel generator in enclosure with 72 hour fuel tank), to provide backup power, with flood protection to 3' above 100-Year flood
- Pump station piping, valves and gauges

Operational Narrative:

Storm water will enter the pump station structure through the re-routed storm sewer main by gravity and will be discharged into the influent wet well chamber. Flow will pass through two mechanically-cleaned bar screens that will remove solids greater than 1" in diameter. The flow will then pass to the end of the influent wet well chamber to the two Main Pumps (submersible non-clog centrifugal pumps), which will be used to pump the entering flows up to an effluent chamber at a higher elevation such that it can flow through a 54" diameter effluent gravity storm sewer to a new outfall located at the inlet to Ash Creek.

Under flow conditions that exceed the capabilities of the Main Pumps, the water level in the primary wet well will rise until it overtops the transition wall to the Major Pump (secondary) wet well. The secondary wet well will fill while the Main Pumps continue to attempt to handle the flow in the primary wet well. When the water level in the secondary wet well reaches sufficient height, the Main Pumps will be shut off, and the Major Pumps will be activated in a sequenced fashion to pump down the wet well. The Major Pumps (submersible axial mixed flow centrifugal pumps), will be used to pump the entering flows up to an effluent chamber at a higher elevation such that it can flow through the 54" diameter effluent gravity storm sewer to the new outfall. The Major Pumps will operate until the water level in the secondary wet well reaches the minimum operating level and then they will shut off and the Main Pumps will resume operation to pump the water from the influent wet well.

The storm water pumps will operate when the water level in the wet well reaches specific preset elevations. The storm water pumps will be controlled through dedicated control panels located within the pump station building, above the 100-Year storm elevation of El. 11.0 NAVD 88. We have assumed that under standard operating conditions, electrical power will be provided to the pump station from the existing electrical grid in the project area that is owned and maintained by United Illuminating. In the event of a power outage, power will be provided by a diesel-fueled generator located outside the building in a sound proof and weather tight enclosure. The generator will have a fuel supply capable of 72 hours of continuous operation.

5.2 Pump Station Structure

The proposed pump station structure consists of a cast-in-place concrete wetwell structure that will receive influent stormwater and direct it to the Main (Primary) and Major

(Secondary) Pumps. The pumps and screening will be housed in the wet well structures. The wet well has been designed with a 4-foot thick mat foundation to resist the effects of buoyancy. The Preliminary Design drawings assume that groundwater will be at or near Elevation 0.0 based on the pump station's proximity to Long Island Sound. The proposed bottom of foundation elevation is El. -24.0.

The above-grade structure consists of a concrete and block structure with a brick façade. Concrete walls will extend up to El. 14.0 to provide three feet of freeboard above the Base Flood Elevation of El. 11.0. The concrete walls will provide flood protection for the pump controls and electrical components. Alternative façade materials, such as wood shingles or clapboard siding, could be investigated if the Town feels these materials would be more appropriate to match the character of the surrounding neighborhood.

The above-ground building currently only encloses the area required for pump station controls, electrical equipment and access to mechanical equipment such as bar screens. In previous meetings, the Town of Fairfield had mentioned the possibility of installing restrooms as part of the pump station building for use by the public. While restrooms are not shown in the Preliminary Design documents, an area with a footprint of approximately 24' x 24' has been allocated on the ground floor for potential use as public restrooms. If the Town wishes to include public restrooms, they can be added in the subsequent design phase.

A flat roof is shown on the building in the Preliminary Design documents, as a flat roof is generally the least costly roof structure option and facilitates access to roof hatches for maintenance and removal of equipment within the pump station. Stairs are shown on drawing M-101 for access to the roof hatches along with a safety railing for fall protection. Based on preliminary discussions with the Town, a Mansard-type roof detail was added at the perimeter of the pump station to more closely resemble the architectural features of the surrounding residential area.

The location assumed in the Preliminary Design drawings is shown on the attached Figure 1, Proposed Pump Station Location Map, and Figure 2, FIRM Map. Several location options were investigated as part of the study. The proposed pump station location is at the southwest corner of the Jennings Beach parking lot as shown on Sheet C-101. This location was selected as it has the least visual impact on surrounding neighborhoods and does not impact coastal resources area. The proposed site is within a paved portion of the existing parking lot.

5.3 Pump Station Equipment Description

5.3.1 Pumps

Main Pumps:

- Submersible Non-Clog Centrifugal Pumps (Semi-Open Impellar)
- 60 Horsepower (HP) Pumps with Variable Frequency Drives (VFD's)
- Pumping Capacity:

  One (1) Pump Operating: 3,172 to 4,100 gpm @ 40 ft TDH

Two (2) Pumps Operating: 6,344 to 8,200 gpm @ 40 ft TDH

Major Pumps:

- Submersible Axial Mixed Flow Centrifugal Pumps
- 200 HP Pumps with VFD's
- Pumping Capacity:

  One (1) Pump Operating: 14,750 gpm @ 25 ft TDH

  Two (2) Pumps Operating: 29,500 gpm @ 25 ft TDH

  Three (3) Pumps Operating: 44,250 gpm @ 25 ft TDH

  Four (4) Pumps Operating: 59,000 gpm @ 25 ft TDH

References/Guidelines: American National Standard for Pump Intake Design, Hydraulic Institute

5.3.2 Mechanical Bar Screens

Design Criteria:

- 1-inch Bar Spacing (prevents items from passing which are greater than 1")
- Screen's bar rack section to 23.5-feet prior to switch to plate
- Screenings discharged at four feet above the pump station finished floor elevation
- Screen inclined 80 degrees from horizontal
- Allows for passage of peak 25-Year flows with one screen out of service (100% redundancy)
- Screen head loss less than 0.75-feet with one screen 100% blind & the other 30% blind at 25-Year storm flows
- Hydraulicly capable of supporting forces of flow when 100% blinded
- Large storms will trigger automatic and continuous operation until flow stops
- Smaller storms will trigger screen operation via level, or will trigger single cycle upon pump shut-off
- Screening removal shall be allowable by manual trigger by the operator

5.3.3 Emergency Generator

Due to the critical nature of the proposed pump station, an emergency generator is recommended to power the pumps in the event of a power outage. The Preliminary Design plans include an outdoor generator on a concrete pad adjacent to the pump station building. Similar to the design of the pump station building itself, the walls surrounding the generator will be concrete up to three feet above the 100-Year flood elevation, with block and brick above that height to provide a visual barrier from the surrounding neighborhood.

The project includes construction of a 28'-8" x 9'-7" generator pad and installation of a 1,000 kW diesel generator in a 27'-8" x 8'-7" sound proof and weather tight enclosure with an associated fuel oil tank. A sub base fuel oil tank will be installed underneath the generator, within the weatherproof enclosure. The tank will have a double wall construction with a UL 142 certification and will be sized to provide a minimum of 72 hours of continuous operation. A rupture/containment basin with a capacity of 110% of the full capacity of the tank is also provided. A leak detection system is provided within the containment basin that will alarm at the generator as well as at the Building Management System (BMS). The BMS will be monitored 24 hours a day, 7 days a week. Groundwater quality will be protected through the use of the double wall fuel oil tank and leak detection system.

The feasibility of natural gas generators was also investigated as part of the Preliminary Design phase. Natural gas generators do not have the motor starting capacity of diesel generators, and thus a larger capacity natural gas generator would be required. In order to provide sufficient motor starting capacity for the proposed pumps, two 750 kW natural gas generators would be required. Based on budget pricing from the generator manufacturer, the required natural gas generators would be more than double the price of a 1,000 kW diesel generator and would also require nearly double the footprint. Should the Town wish to pursue natural gas generators in lieu of diesel despite these disadvantages, natural gas generators can be investigated further in a subsequent design phase.

Please see Appendix I for the South Benson Pump Station Conceptual Design plans.

5.3.4 Opinion of Probable Construction Cost

A concept-level Opinion of Probable Construction Cost (OPCC) was prepared (in 2018 U.S. Dollars) to help allow an informed decision to be made based on funding limitations/other constraints. (See detailed summary in Appendix J). The estimate should be considered Conceptual and a detailed OPCC should be prepared for the as part of final design. Based on the Conceptual plans, the OPCC for the South Benson Pump Station is approximately $14,300,000.

The OPCC's was prepared based on Conceptual plans and without the benefit of final plans and specifications. Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing. The estimates of probable construction costs are made on the basis of the Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this estimate of the Probable Construction Cost. A 20% contingency has been included in the OPCC's due to the Conceptual Level of the design.

Section 6
Geotechnical Evaluation

6.1 Site Conditions

Existing – The proposed pump station is located near the south corner of the paved parking lot for Jennings Beach, off South Benson Road. Existing site grade ranges from approximately elevation 6 to 7 feet.

Proposed – The proposed pump station has two levels and a footprint of 46 feet by 49 feet. The lower level encompasses the entire footprint and includes a primary wet well with a finished floor elevation of -21.5 feet, and a secondary wet well with a finished floor elevation of -16 feet. A 48-inch diameter influent pipe enters the wet well near the north corner of the pump station at invert elevation -20.5 feet. A 54-inch diameter effluent pipe exits near the east corner of the pump station at invert elevation -1 feet. The upper level has a finished floor elevation of 6 feet and is enclosed, except for a 26-foot by 25.3-foot area in the southern corner of the pump station that will be an exposed concrete slab. As currently planned, the pump station will be supported by a 4-foot thick reinforced concrete mat foundation bearing at elevation -25.5 feet.

An adjoining generator area with a footprint of 21.6 feet by 46 feet is planned off the northeast side of the pump station. As currently planned, the generator and associated equipment will be supported by a 4-foot thick reinforced concrete mat foundation bearing at elevation 1-foot.

The proposed site grade adjacent to the pump station and generator area is elevation 5 feet.

6.2 Subsurface Conditions

The generalized subsurface conditions described in the text below summarize trends observed in the explorations. The boundaries between soil strata are approximate, and are based on interpretations of widely spaced explorations and samples. Actual conditions could be more variable.

Test Borings – Two geotechnical test borings (B-1 and B-2) were drilled by General Borings, Inc. of Prospect, CT on August 9, 2017. Test borings were advanced with 2.25-inch inner diameter hollow-stem augers to a depth of 15 feet below the existing ground surface, and with 4-inch inner diameter flush joint casing and drive and wash methods below that to a depth of 47 feet at B-1 and 62 feet at B-2. Split-spoon sampling and Standard Penetration Tests (SPTs) were conducted at maximum 5 foot intervals. The test borings were terminated in native soils.

Borings were backfilled upon completion with cuttings. Approximate boring locations are shown on Figure 1, of Appendix K. Test boring logs are included in Appendix L.

Laboratory Testing – Laboratory tests were performed to aid in soil classifications, evaluate liquefaction potential, and evaluate soil re-use potential. Five mechanical Particle Size Analysis tests (ASTM D422), two of which included hydrometer analysis, were performed on samples taken during the explorations. Laboratory test results are included in Appendix M.

Summary of Subsurface Conditions – In general, subsurface conditions observed in the explorations consisted of approximately 2 inches of asphalt pavement overlying sands which extended to the termination depth of the borings. An approximate 5-foot thick layer of silt was encountered in boring B-2 from depths of approximately 44 to 49 feet below the existing ground surface. Table 1 below presents the general stratigraphy encountered during the subsurface exploration program in descending depth from below the surficial pavement.

Table 1
Description of Subsurface Conditions Encountered

Strata (In Descending Depth)	General Description
SAND	Medium dense, black to brown, fine to medium SAND with up to 10% Gravel and 10% Silt (encountered in B-1 only); varying to very loose to dense, brown to grey, fine SAND with up to 50% Silt
SILT	Dense, grey SILT with up to 20% fine Sand (encountered in B-2 only)

Groundwater was encountered approximately 10 feet below the existing ground surface corresponding to approximately elevation -3 feet. Water levels were taken during or immediately after drilling and may not reflect stabilized conditions. The approximate mean high water (MHW) level recorded at nearby tide stations 8467150 in Bridgeport and 8467726 in Southport Harbor is elevation 3.2 feet. Water levels can fluctuate with tides, season, precipitation, and nearby construction or other below grade activities, such as excavation, dewatering, wells, infiltration basins, etc.

6.3 Geotechnical Evaluation and Recommendations

The analyses and recommendations submitted in this evaluation are based upon the data obtained from the relatively widely spaced subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If significant variations from these descriptions appear during construction, it will be necessary to re-evaluate these recommendations.

Geotechnical Design Recommendations

Pump Station Foundation Design – It is recommended that the pump station mat foundation bear on a 12-inch thick Crushed Stone base course. This will help reduce the potential for subgrade disturbance during construction and provide a firm and stable base for structure support. Based on the mat foundation bearing elevation of -25.5 feet, and 12 inches of Crushed Stone below the mat, the excavation for the pump station is anticipated to extend approximately 33 to 34 feet below the existing ground surface. The anticipated excavation depth is approximately 24 feet below the groundwater level observed in the borings, and 30 feet below the approximate MHW level. A temporary excavation support system and construction dewatering will be required, and are discussed in following sections of this memorandum.

In general, the native sands and silts are considered capable of supporting a mat foundation for the proposed pump station. A net allowable bearing pressure of 4.5 kips per square foot (ksf) is recommended for a mat foundation bearing on 12 inches of a compacted Crushed Stone base course placed over a proof compacted native sand subgrade. At the recommended bearing pressure, total settlement is anticipated to be 1 inch, and differential settlement is anticipated to be less than ½ inch. Most settlement will occur during construction as dead load is applied.

Generator Area Foundation Design – It is anticipated that the excavation support system for the pump station will likely be installed within the footprint of the generator area. Based on this, it is anticipated that that the mat foundation for the generator area may bear on native sands outside the limits of the excavation support system, and on compacted Granular Fill placed as backfill inside the limits of the excavation support system. It is recommended that the mat foundation for the generator area also bear on a 12-inch thick Crushed Stone base course to help reduce the potential for subgrade disturbance during construction, provide a firm and stable base for structure support, and aid in construction dewatering should it be necessary.

In general, the native sands and compacted Granular Fill are considered capable of supporting a mat foundation for the proposed generator area. A net allowable bearing pressure of 4.5 kips per square foot (ksf) is recommended for a mat foundation bearing on 12 inches of a compacted Crushed Stone base course placed over a proof compacted native sand subgrade. At the recommended bearing pressure, total settlement is anticipated to be 1 inch, and differential settlement is anticipated to be less than ½ inch. Most settlement will occur during construction as dead load is applied.

General Foundation Design - An increase of one third in the recommended net allowable bearing pressure is permitted when using alternate load combinations, as presented in Section 1605.3.2 of the Connecticut State Building Code, that include wind or earthquake loads. Per the Connecticut State Building Code, foundations should bear a minimum of 3.5 feet below adjacent ground surface exposed to freezing temperatures for frost protection.

A coefficient of friction equal to 0.35 ($\delta = 19$ degrees) should be used for concrete on native soils, 0.50 ($\delta = 27$ degrees) should be used for concrete on placed and compacted Gravel Borrow or Crushed Stone.

Subgrades and required fill to achieve proposed grade should be prepared, placed, and compacted as recommended later in this memorandum.

Foundation and Underslab Drainage – The proposed lowest pump station floor level is approximately 19 feet below the groundwater level observed in the borings, and approximately 25 feet below MHW. A foundation drainage blanket and permanent pumped dewatering system could be used to maintain groundwater levels below the bottom of the mat foundation and eliminate the need to design the pump station to resist hydrostatic pressures, but this is not considered reliable or cost effective. Therefore, it is recommended that the pump station be designed to resist hydrostatic uplift pressures and waterproofing be provided.

The finished floor level in the generator area is anticipated to be elevation 5 feet, approximately 8 feet above the groundwater level observed in the borings, and approximately 2 feet above MHW. It is recommended that the generator mat foundation

be waterproofed for flood conditions and be designed to resist hydrostatic uplift pressures.

The designers should evaluate uplift potential of the pump station and generator area during flood conditions. A minimum factor of safety of 1.2 for uplift is recommended.

Retaining Wall Design – Below grade portions of the proposed pump station foundation walls will have unbalanced soil pressures acting on them. Therefore, it is recommended that braced foundation walls be designed for the following lateral loads:

- Static: 59 psf/ft as an equivalent fluid pressure
- Surcharge: 0.47 times the vertical surcharge load uniformly distributed over the height of the wall. The minimum vertical surcharge should be equivalent to an H-20 vehicular load, if vehicles (including construction equipment) will be allowed above the wall within a distance of the 1.5 times the wall height. Vertical surcharge loading from the generator area mat foundation should be also be accounted for.

These design values were calculated using Rankine Theory with a soil unit weight of 125 pounds per cubic foot (pcf) and a friction angle of 32 degrees, assuming the use of compacted Granular Fill as backfill. The design values above do not include hydrostatic loads.

Where the calculated lateral earth pressure is less than 200 pounds per square foot (psf), it should be increased to 200 psf to account for compaction induced stresses.

Modulus of Subgrade Reaction - The recommended modulus of subgrade reaction, k_1, is 100 lbs per cubic inch. This value was determined based upon the available SPT data collected during the subsurface exploration program, and is not based upon a plate load test, or other type of direct test.

Seismic Design - Based on data from the borings, the site is assigned to Site Class E, according to the State of Connecticut Building Code. The design spectral response accelerations at short periods (S_{DS}) and at 1-second period (S_{D1}) are 0.358 and 0.152, respectively. These values were calculated based on the spectral response accelerations listed in Appendix N of the 2016 Connecticut State Building Code for the Town of Fairfield, and the appropriate magnification factors for Site Class E. The structural engineer should determine the Seismic Design Category based upon the assumed seismic use group.

Based on the SPT N-values and observed groundwater levels, the site soils are not considered susceptible to liquefaction.

6.4 Geotechnical Construction Recommendations

This section provides comments related to foundation construction, earthwork, and other geotechnical aspects of the project that will aid those responsible for preparing construction specifications.

Excavation and Fill – Conventional heavy construction equipment should be suitable for excavation in existing soil materials. Excavation should conform to OSHA excavation regulations contained in 29 CFR Part 1926, latest edition. Due to the depth of

excavation, groundwater levels, and site constraints, a sloped open cut excavation is not considered feasible for the pump station, and temporary excavation support and construction dewatering systems will be required. It is anticipated that the excavation support system will likely consist of steel sheet piling with internal bracing or anchored with tiebacks. Depending on the installed depth, the temporary excavation support system could potentially act as a groundwater seepage cutoff to help with construction dewatering. Temporary excavation support and dewatering systems would require Contractor design submittals stamped by a Professional Engineer licensed in the State of Connecticut. It is recommended that a performance-based specification be developed for the Contractor to use for the design of a temporary excavation support system.

Subgrades should be excavated in such a way to minimize disturbance, such as using a smooth faced bucket. Compacted Crushed Stone wrapped in a non-woven geotextile separation fabric should be used for the base course below the mat foundations. Other fill needed below the Crushed Stone base course, if any, should consist of compacted Granular Fill or Gravel Borrow. Table 2 presents the required gradations for imported materials.

Table 2
Gradation Requirements for Borrow Materials

Sieve Size	Percent Finer by Weight		
	Granular Fill	**Gravel Borrow**	**1-1/2" Crushed Stone**
2/3rd lift thickness	100		
2 inch	--	100	100
1½ inch	--	--	95-100
1 inch	--	--	35-70
¾ inch	--	--	0-25
½ inch	--	50-85	--
No. 4	--	40-75	--
No. 10	30-95	--	--
No. 40	10-70	--	--
No. 50	--	8-28	--
No. 200	0-15	0-10	--

All backfill should be placed in 12-inch maximum lifts and should be compacted to at least 95 percent of the maximum dry density as determined by the Modified Proctor laboratory test (ASTM D1557). Thinner lifts may be needed depending on the material

placed and the type of compactor used. Crushed Stone should be placed in loose lift thicknesses of less than 12 inches and be compacted with heavy compaction equipment to achieve an unyielding subgrade.

Dewatering – Groundwater will likely be encountered during foundation excavation for the pump station, and could be encountered during foundation excavation for the generator area. Dewatering can likely be accomplished by pumping from properly filtered sumps if groundwater is within a foot or two above the bottom of excavation; excavation to greater depths below groundwater will likely require the use of well points or similar methods. As discussed above, installation of a temporary excavation support system could help with construction dewatering by acting as a seepage cutoff. Regardless of the method used the groundwater level should be temporarily lowered at least two feet below excavations to limit potential "boils", loss of fines, or softening of the ground, and dewatering should be discharged according to federal, state, and local regulations. Surface water entering the construction area should be diverted away from excavations.

Bearing Surface Preparation – Excavated subgrades should be proof compacted with either 10 passes of a 10-ton vibratory drum roller for open excavations or 6 passes of a large, reversible, walk behind vibratory compactor capable of exerting a minimum force of 2,000 lbs in trench or pit excavations. Any subgrades that are soft or yielding under proof compaction efforts should be removed below the footprint of the structures as well as in the foundation bearing zones, which is defined by a 1H:1V plane extending downward and outward from one foot beyond the edge of foundation, and replaced with appropriate materials as described in the excavation and fill section above. If proof compaction will prove detrimental to the surface due to the presence of groundwater, static rolling may be allowed at the discretion of the Engineer.

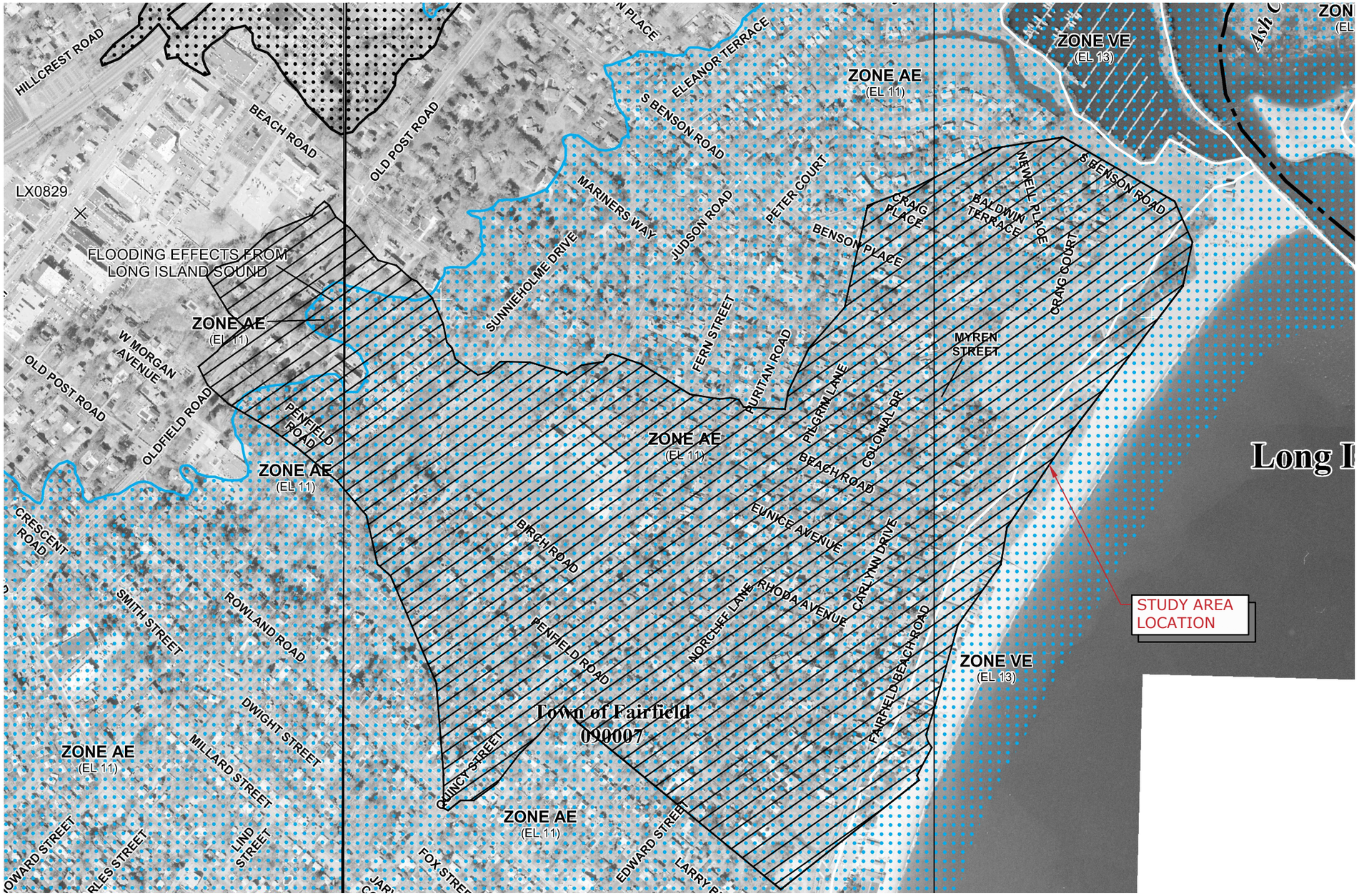
Time between final excavation and placement of the crushed stone base coarse should be minimized to limit disturbance and groundwater induced softening of the subgrade. Soil bearing surfaces should be protected against freezing and the elements before and after concrete placement. If construction is performed during freezing weather, the foundation and foundation walls should be backfilled as soon as possible after they are constructed. Alternatively, insulating blankets or other means may be used for protection against freezing.

Reuse of Existing Soils – Existing subsurface materials may be re-used as Granular Fill, regardless of its gradation, provided it is environmentally appropriate, free of organics, debris, stones greater than two thirds the lift thickness in diameter, or other unsuitable material, and they are placed to the required degree of compaction.

Existing site soils may not be re-used as Gravel Borrow or Crushed Stone unless it meets the gradation requirements presented above, which is unlikely. It was not within Tighe & Bond's scope of work to evaluate the potential for soil contamination regarding the suitability for reuse or for off-site disposal purposes.

Tighe&Bond

APPENDIX A



NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0419G

FIRM

FLOOD INSURANCE RATE MAP

FAIRFIELD COUNTY, CONNECTICUT (ALL JURISDICTIONS)

PANEL 419 OF 626

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FAIRFIELD, TOWN OF	090007	0419	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 09001C0419G

MAP REVISED JULY 8, 2013

Federal Emergency Management Agency

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0438G

FIRM

FLOOD INSURANCE RATE MAP

FAIRFIELD COUNTY, CONNECTICUT (ALL JURISDICTIONS)

PANEL 438 OF 626

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BRIDGEPORT, CITY OF	090002	0438	G
FAIRFIELD, TOWN OF	090007	0438	G

-NOTE-

THIS MAP INCLUDES BOUNDARIES OF THE COASTAL BARRIER RESOURCES SYSTEM ESTABLISHED UNDER THE COASTAL BARRIER RESOURCES ACT OF 1982 AND/OR SUBSEQUENT ENABLING LEGISLATION.

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 09001C0438G

MAP REVISED JULY 8, 2013

Federal Emergency Management Agency

SCALE IN FEET

0 500' 1000'

GRAPHIC SCALE

SOUTH BENSON PUMP STATION AND DRAINAGE IMPROVEMENT STUDY
FAIRFIELD, CONNECTICUT

FIRM MAP

DATE: 9-1-2016

SCALE: 1" = 500'

Tighe&Bond
www.tighebond.com

SOUTH BENSON ROAD PUMP STATION
FAIRFIELD, CONNECTICUT

STUDY AREA LIMITS

DATE: NOVEMBER 11, 2016
SCALE: 1" = 500'
FIGURE 1

Tighe&Bond

11/07/2016

Nov 07, 2016-3:32pm Plotted By: PAReady
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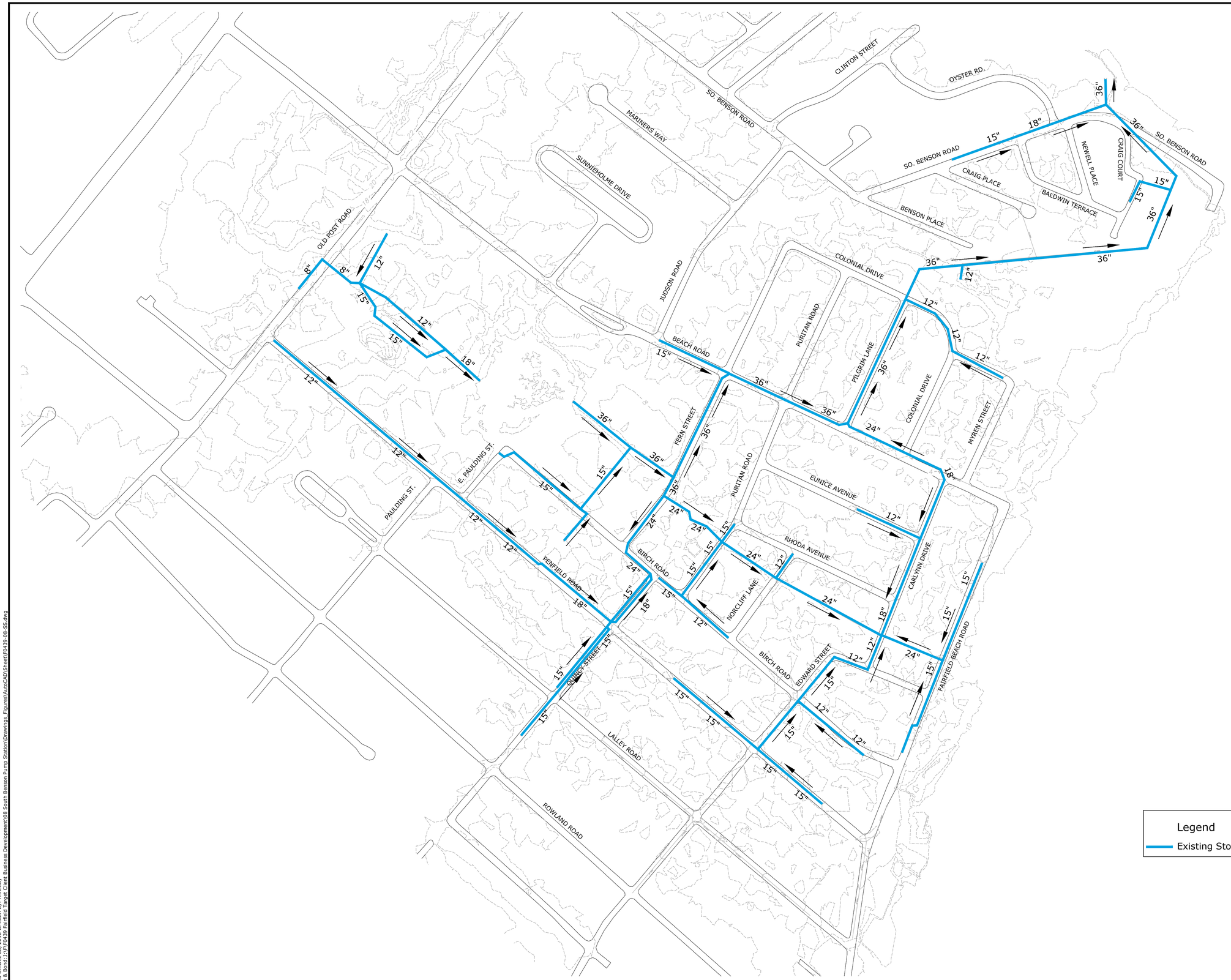

Tighe&Bond
www.tighebond.com
1000 Bridgeport Avenue
Suite 320
Shelton, CT 06484
(203) 712-1100

Drainage Evaluation

South Benson Pump Station

Town Of Fairfield

Fairfield, CT

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

PROJECT NO:	F0439-08
DATE:	11/11/2016
FILE:	F0439-08-SS.dwg
DRAWN BY:	MDS
CHECKED:	JAR
APPROVED:	DCH

EXISTING STORM

SCALE: 1" = 200'

C-100

Last Saved: 12/7/2016
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1000 Bridgeport Avenue
Suite 320
Shelton, CT 06484
(203) 712-1100

Drainage Evaluation

South Benson Pump Station

Town Of Fairfield

Fairfield, CT

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DATE:	11/11/2016
FILE:	F0439-08-WM.dwg
DRAWN BY:	MDS
CHECKED:	JAR
APPROVED:	DCH

WATERSHED MAP

SCALE: 1" = 200'

C-101

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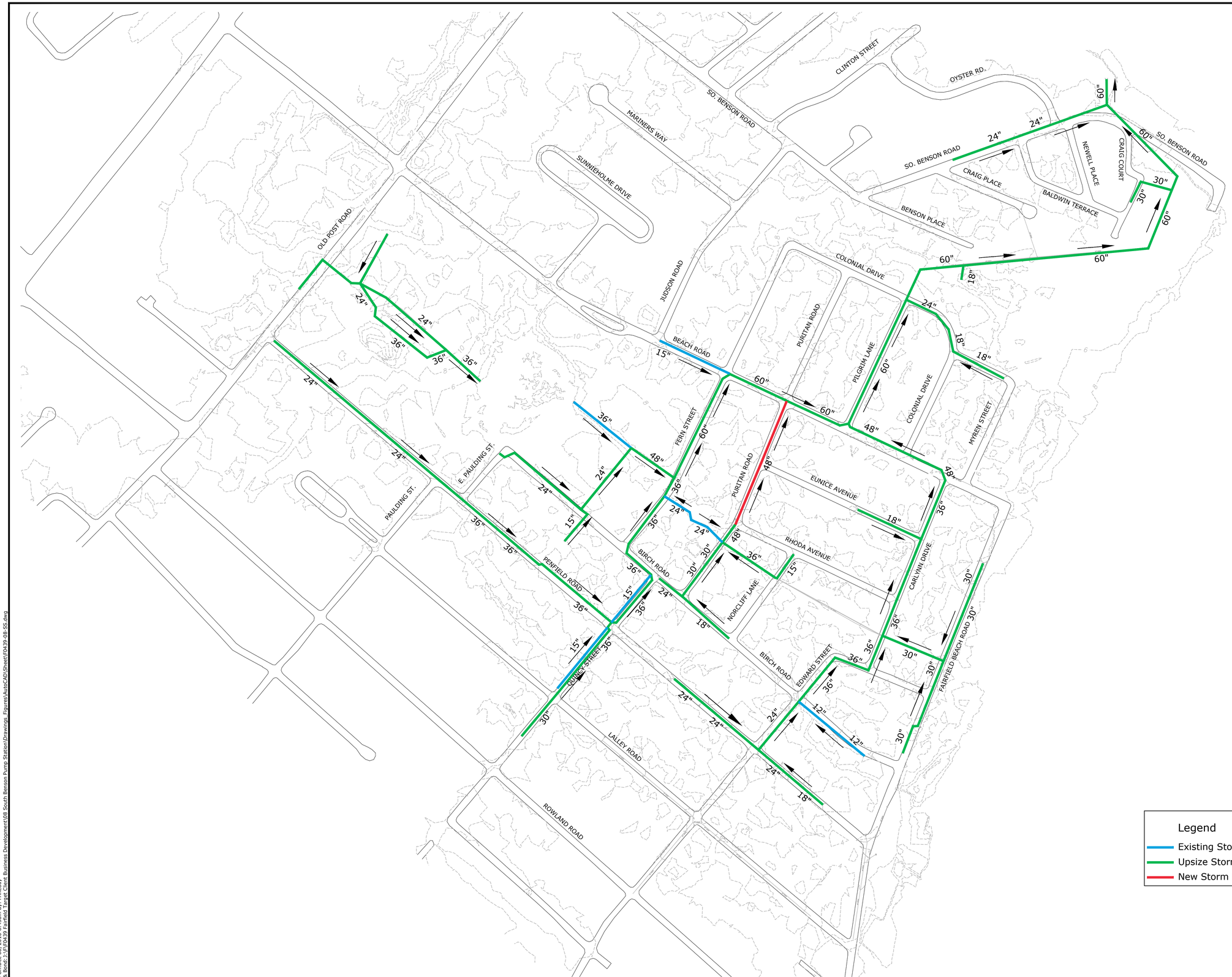

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Drainage Evaluation

South Benson Pump Station

Town Of Fairfield

Fairfield, CT

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MARK	DATE	DESCRIPTION

PROJECT NO:	F0439-08
DATE:	11/11/2016
FILE:	F0439-08-SS.dwg
DRAWN BY:	MDS
CHECKED:	JAR
APPROVED:	DCH

PROPOSED GRAVITY UPGRADE

SCALE: 1" = 200'

C-102

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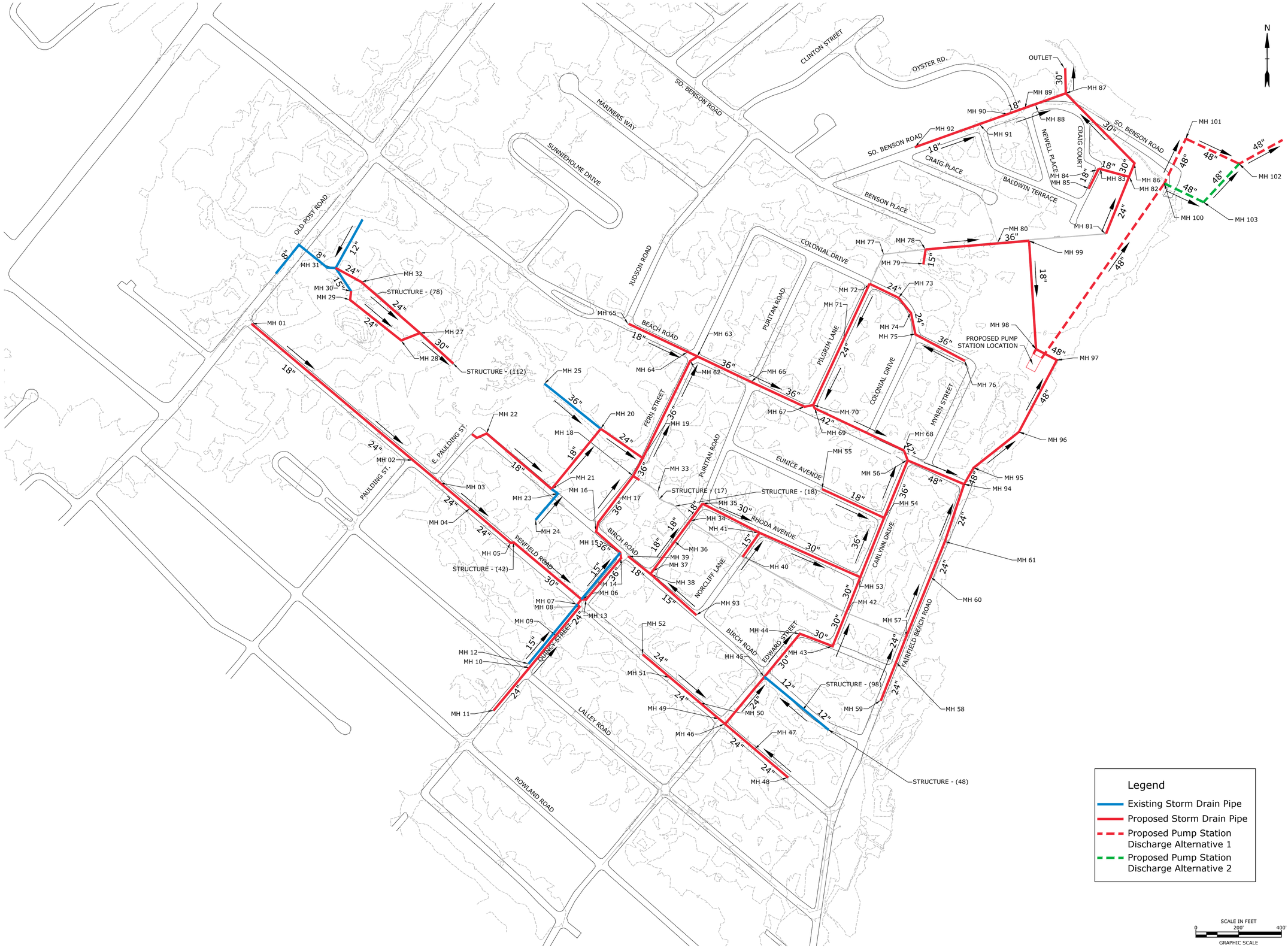

SCALE IN FEET
0 200' 400'
GRAPHIC SCALE

N

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CONCEPTUAL DRAWINGS

NOT FOR CONSTRUCTION

South Benson Pump Station

Town Of Fairfield

Fairfield, CT

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
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IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

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DATE:	03/01/2017
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DRAWN BY:	
CHECKED:	
APPROVED:	DCH

PROPOSED PUMP STATION UPGRADE

SCALE: 1" = 200'

C-103

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Tighe&Bond

APPENDIX B

Point precipitation frequency estimates (inches)
NOAA Atlas 14 Volume 10 Version 2
Data type: Precipitation depth
Time series type: Partial duration
Project area: Northeastern States
Location name: Fairfield, Connecticut, US*
Station Name: None
Latitude: 41.1390°
Longitude: -73.2430°
Elevation: 5 ft*
* source: Google Maps

PRECIPITATION FREQUENCY ESTIMATES

by duration	1	2	5	10	25	50	100	200	500
5-min:	0.35	0.42	0.53	0.62	0.74	0.84	0.93	1.05	1.2
10-min:	0.5	0.59	0.75	0.88	1.05	1.19	1.32	1.48	1.7
15-min:	0.59	0.7	0.88	1.03	1.24	1.4	1.55	1.75	2
30-min:	0.82	0.98	1.23	1.44	1.72	1.95	2.17	2.43	2.77
60-min:	1.05	1.25	1.57	1.84	2.21	2.5	2.78	3.11	3.54
2-hr:	1.36	1.63	2.08	2.44	2.95	3.33	3.72	4.21	4.84
3-hr:	1.57	1.89	2.41	2.85	3.44	3.9	4.36	4.95	5.73
6-hr:	1.98	2.39	3.06	3.62	4.38	4.97	5.56	6.35	7.39
12-hr:	2.44	2.95	3.78	4.47	5.42	6.16	6.89	7.89	9.21
24-hr:	2.84	3.47	4.5	5.35	6.52	7.43	8.33	9.63	11.35
2-day:	3.15	3.92	5.17	6.21	7.65	8.75	9.85	11.55	13.79
3-day:	3.4	4.24	5.62	6.76	8.33	9.54	10.75	12.64	15.13
4-day:	3.65	4.53	5.98	7.18	8.83	10.11	11.38	13.36	15.98
7-day:	4.36	5.31	6.87	8.16	9.94	11.31	12.68	14.73	17.44
10-day:	5.04	6.04	7.67	9.02	10.87	12.3	13.73	15.77	18.45
20-day:	7.12	8.21	10	11.49	13.54	15.11	16.69	18.61	21.15
30-day:	8.83	10	11.91	13.5	15.69	17.37	19.05	20.89	23.32
45-day:	10.97	12.22	14.27	15.97	18.31	20.11	21.91	23.68	26.01
60-day:	12.75	14.07	16.22	18.01	20.47	22.37	24.27	26	28.28

Date/time (GMT): Thu Sep 1 15:00:41 2016
pyRunTime: 0.0938258171082

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	Connecticut
Location	
Longitude	73.243 degrees West
Latitude	41.139 degrees North
Elevation	0 feet
Date/Time	Thu, 01 Sep 2016 10:56:49 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.33	0.51	0.63	0.83	1.04	1.29	**1yr**	0.89	1.22	1.49	1.84	2.27	2.80	3.14	**1yr**	2.48	3.02	3.43	4.17	4.83	**1yr**
2yr	0.40	0.61	0.76	1.01	1.27	1.58	**2yr**	1.09	1.48	1.82	2.26	2.78	3.43	3.78	**2yr**	3.03	3.63	4.19	5.00	5.63	**2yr**
5yr	0.47	0.73	0.91	1.22	1.56	1.98	**5yr**	1.35	1.85	2.28	2.83	3.49	4.28	4.80	**5yr**	3.79	4.61	5.38	6.29	7.04	**5yr**
10yr	0.52	0.82	1.04	1.41	1.83	2.34	**10yr**	1.58	2.19	2.71	3.36	4.14	5.07	5.74	**10yr**	4.49	5.52	6.50	7.48	8.34	**10yr**
25yr	0.61	0.96	1.23	1.70	2.26	2.92	**25yr**	1.95	2.74	3.39	4.23	5.21	6.34	7.30	**25yr**	5.61	7.02	8.36	9.40	10.44	**25yr**
50yr	0.69	1.10	1.41	1.98	2.66	3.45	**50yr**	2.29	3.25	4.02	5.02	6.17	7.51	8.75	**50yr**	6.65	8.41	10.13	11.19	12.37	**50yr**
100yr	0.77	1.25	1.62	2.29	3.13	4.08	**100yr**	2.70	3.85	4.78	5.97	7.33	8.91	10.49	**100yr**	7.88	10.09	12.27	13.32	14.68	**100yr**
200yr	0.88	1.43	1.86	2.66	3.68	4.84	**200yr**	3.17	4.57	5.67	7.09	8.71	10.56	12.59	**200yr**	9.35	12.10	14.87	15.87	17.41	**200yr**
500yr	1.05	1.72	2.25	3.26	4.57	6.06	**500yr**	3.95	5.72	7.12	8.91	10.94	13.24	16.02	**500yr**	11.71	15.40	19.20	19.99	21.84	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.41	0.50	0.67	0.82	1.05	**1yr**	0.71	1.03	1.33	1.67	2.06	2.45	2.81	**1yr**	2.17	2.70	3.00	3.76	4.29	**1yr**
2yr	0.38	0.59	0.73	0.98	1.21	1.47	**2yr**	1.05	1.44	1.69	2.18	2.74	3.34	3.67	**2yr**	2.96	3.53	4.06	4.85	5.48	**2yr**
5yr	0.43	0.67	0.83	1.13	1.44	1.75	**5yr**	1.25	1.71	2.00	2.59	3.25	4.02	4.47	**5yr**	3.56	4.30	4.96	5.80	6.49	**5yr**
10yr	0.47	0.73	0.90	1.26	1.62	2.00	**10yr**	1.40	1.95	2.26	2.95	3.70	4.61	5.19	**10yr**	4.08	4.99	5.74	6.60	7.35	**10yr**
25yr	0.53	0.81	1.00	1.43	1.89	2.36	**25yr**	1.63	2.31	2.66	3.49	4.41	5.50	6.36	**25yr**	4.87	6.12	7.02	7.83	8.57	**25yr**
50yr	0.58	0.88	1.09	1.57	2.12	2.68	**50yr**	1.83	2.62	3.02	3.97	5.03	6.30	7.44	**50yr**	5.57	7.15	8.20	8.92	9.59	**50yr**
100yr	0.63	0.95	1.19	1.73	2.37	3.03	**100yr**	2.04	2.96	3.41	4.53	5.75	7.22	8.70	**100yr**	6.39	8.37	9.61	10.16	10.78	**100yr**
200yr	0.69	1.04	1.32	1.91	2.66	3.43	**200yr**	2.29	3.35	3.85	5.15	6.58	8.28	10.21	**200yr**	7.33	9.82	11.32	11.57	12.09	**200yr**
500yr	0.78	1.16	1.49	2.16	3.07	4.02	**500yr**	2.65	3.93	4.50	6.13	7.87	9.99	12.66	**500yr**	8.84	12.17	14.15	13.74	14.11	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.36	0.56	0.68	0.92	1.13	1.37	**1yr**	0.98	1.34	1.59	2.04	2.51	3.07	3.41	**1yr**	2.72	3.28	3.76	4.53	5.15	**1yr**
2yr	0.42	0.65	0.80	1.08	1.33	1.58	**2yr**	1.15	1.54	1.81	2.33	2.91	3.58	3.92	**2yr**	3.17	3.77	4.36	5.22	5.89	**2yr**
5yr	0.51	0.79	0.98	1.34	1.70	2.06	**5yr**	1.47	2.02	2.37	3.03	3.74	4.55	5.18	**5yr**	4.03	4.98	5.81	6.74	7.59	**5yr**
10yr	0.61	0.93	1.16	1.62	2.09	2.52	**10yr**	1.80	2.47	2.92	3.70	4.53	5.51	6.40	**10yr**	4.88	6.15	7.24	8.26	9.29	**10yr**
25yr	0.78	1.18	1.47	2.10	2.76	3.32	**25yr**	2.38	3.24	3.86	4.84	5.84	7.10	8.45	**25yr**	6.29	8.13	9.68	10.83	12.14	**25yr**
50yr	0.93	1.42	1.77	2.54	3.42	4.08	**50yr**	2.95	3.99	4.78	5.93	7.10	8.61	10.41	**50yr**	7.62	10.01	12.04	13.28	14.86	**50yr**
100yr	1.13	1.70	2.13	3.08	4.23	5.02	**100yr**	3.65	4.90	5.91	7.28	8.63	10.43	12.81	**100yr**	9.23	12.32	14.96	16.28	18.19	**100yr**
200yr	1.37	2.06	2.60	3.77	5.26	6.18	**200yr**	4.54	6.05	7.30	8.92	10.50	12.62	15.78	**200yr**	11.17	15.17	18.59	19.99	22.31	**200yr**
500yr	1.77	2.63	3.39	4.92	7.00	8.19	**500yr**	6.04	8.00	9.70	11.69	13.58	16.25	20.71	**500yr**	14.38	19.91	24.79	26.23	29.20	**500yr**

Tighe&Bond

APPENDIX C

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 01**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.960	0.90	0.8638
Roofs	2.300	0.90	2.0701
Landscaped and Lawns	3.700	0.30	1.1099
	6.960		4.044

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	228	0.022	26.2

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.01	2.03	387	3.2

Total Tc = 29.3 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 02**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.804	0.90	0.7236
Roofs	1.927	0.90	1.7342
Landscaped and Lawns	3.099	0.30	0.9298
	5.830		3.388

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	300	0.025	31.0

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	unpaved	0.006	1.25	65	0.9

Total Tc = 31.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 03**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.702	0.90	0.6321
Roofs	1.683	0.90	1.5149
Landscaped and Lawns	2.707	0.30	0.8122
	5.093		2.959

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	300	0.025	31.0

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	unpaved	0.026	2.60	136	0.9

Total Tc = 31.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 04**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.686	0.90	0.6175
Roofs	1.644	0.90	1.4799
Landscaped and Lawns	2.645	0.30	0.7935
	4.975		2.891

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	143	0.01	24.7

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**

Total Tc = 24.7 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 05**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	1.942	0.90	1.7480
Roofs	4.655	0.90	4.1894
Landscaped and Lawns	7.487	0.30	2.2462
	14.084		8.184

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	170	0.038	16.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	unpaved	0.011	1.69	177	1.7

Total Tc = 18.4 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 06**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.921	0.90	0.8287
Roofs	2.207	0.90	1.9862
Landscaped and Lawns	3.550	0.30	1.0649
	6.678		3.880

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	291	0.01	43.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**

Total Tc = 43.6 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 07**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.501	0.90	0.4511
Roofs	1.201	0.90	1.0812
Landscaped and Lawns	1.932	0.30	0.5797
	3.635		2.112

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	248	0.004	55.3

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	unpaved				

Total Tc = 55.3 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 08**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.335	0.90	0.3011
Roofs	0.802	0.90	0.7215
Landscaped and Lawns	1.290	0.30	0.3869
	2.426		1.409

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	300	0.013	40.2

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.007	1.70	30	0.3

Total Tc = 40.5 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 09**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	1.076	0.90	0.9685
Roofs	2.579	0.90	2.3212
Landscaped and Lawns	4.148	0.30	1.2445
	7.804		4.534

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	278	0.004	60.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.003	1.11	174	2.6

Total Tc = 63.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 10**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	1.014	0.90	0.9123
Roofs	2.429	0.90	2.1865
Landscaped and Lawns	3.908	0.30	1.1723
	7.351		4.271

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	300	0.011	43.0

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	unpaved	0.005	1.14	192	2.8

Total Tc = 45.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **South Benson Road Pump Station**
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Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 11**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.249	0.90	0.2245
Roofs	0.598	0.90	0.5380
Landscaped and Lawns	0.962	0.30	0.2885
	1.809		1.051

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	85	0.029	10.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.003	1.11	63	0.9

Total Tc = 11.6 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 12**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.411	0.90	0.3695
Roofs	0.984	0.90	0.8855
Landscaped and Lawns	1.583	0.30	0.4748
	2.977		1.730

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	158	0.003	43.3

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.003	1.11	34	0.5

Total Tc = 43.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 13**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.867	0.90	0.7807
Roofs	2.079	0.90	1.8710
Landscaped and Lawns	3.344	0.30	1.0032
	6.290		3.655

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	240	0.017	30.2

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**

Total Tc = 30.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 14**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.788	0.90	0.7090
Roofs	1.888	0.90	1.6993
Landscaped and Lawns	3.037	0.30	0.9111
	5.713		3.319

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	240	0.01	37.4

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.004	1.29	83	1.1

Total Tc = 38.4 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
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Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 15**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.753	0.90	0.6781
Roofs	1.806	0.90	1.6253
Landscaped and Lawns	2.905	0.30	0.8714
	5.464		3.175

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	300	0.009	46.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.003	1.11	37	0.6

Total Tc = 47.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 16**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.821	0.90	0.7390
Roofs	1.968	0.90	1.7710
Landscaped and Lawns	3.165	0.30	0.9496
	5.954		3.460

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	247	0.016	31.7

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**

Total Tc = 31.7 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 17**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.893	0.90	0.8039
Roofs	2.141	0.90	1.9268
Landscaped and Lawns	3.444	0.30	1.0331
	6.478		3.764

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	Surface "n"	Flow Length (ft.)	Slope (ft/ft)	Time (min.)
Segment A - B	0.24	300	0.01	44.7

Shallow Concentrated Flow					
Segment		Slope (ft/ft)	V (ft/s)	Length (ft)	Time (min.)
Segment B - C	paved	0.018	2.73	72	0.4

Total Tc = 45.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 18**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.677	0.90	0.6092
Roofs	1.622	0.90	1.4600
Landscaped and Lawns	2.609	0.30	0.7828
	4.908		2.852

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	Surface "n"	Flow Length (ft.)	Slope (ft/ft)	Time (min.)
Segment A - B	0.24	143	0.057	12.3

Shallow Concentrated Flow					
Segment		Slope (ft/ft)	V (ft/s)	Length (ft)	Time (min.)
Segment B - C	paved	0.018	2.73	94	0.6

Total Tc = 12.9 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 19**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.352	0.90	0.3166
Roofs	0.843	0.90	0.7588
Landscaped and Lawns	1.356	0.30	0.4068
	2.551		1.482

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	300	0.009	46.6

Shallow Concentrated Flow				
Segment	**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**

Total Tc = 46.6 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 20**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.255	0.90	0.2292
Roofs	0.610	0.90	0.5494
Landscaped and Lawns	0.982	0.30	0.2945
	1.847		1.073

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	157	0.006	32.6

Shallow Concentrated Flow				
Segment	**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**

Total Tc = 32.6 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Tighe&Bond
Consulting Engineers
Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 21**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.926	0.90	0.8335
Roofs	2.220	0.90	1.9977
Landscaped and Lawns	3.570	0.30	1.0711
	6.716		3.902

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	250	0.112	14.7

Shallow Concentrated Flow				
Segment	**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**

Total Tc = 14.7 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 22**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.655	0.90	0.5896
Roofs	1.570	0.90	1.4132
Landscaped and Lawns	2.526	0.30	0.7577
	4.751		2.760

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	254	0.009	40.8

Shallow Concentrated Flow				
Segment	**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**

Total Tc = 40.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 23**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.351	0.90	0.3158
Roofs	0.841	0.90	0.7568
Landscaped and Lawns	1.353	0.30	0.4058
	2.544		1.478

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	216	0.005	45.3

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.002	0.91	128	2.3

Total Tc = 47.7 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 24**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	1.171	0.90	1.0543
Roofs	2.808	0.90	2.5269
Landscaped and Lawns	4.516	0.30	1.3548
	8.495		4.936

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	300	0.008	48.8

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.003	1.11	113	1.7

Total Tc = 50.5 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 25**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.604	0.90	0.5437
Roofs	1.448	0.90	1.3030
Landscaped and Lawns	2.329	0.30	0.6986
	4.381		2.545

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	Surface "n"	Flow Length (ft.)	Slope (ft/ft)	Time (min.)
Segment A - B	0.24	223	0.005	46.5

Shallow Concentrated Flow					
Segment		Slope (ft/ft)	V (ft/s)	Length (ft)	Time (min.)

Total Tc = 46.5 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 26**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	1.026	0.90	0.9231
Roofs	2.458	0.90	2.2124
Landscaped and Lawns	3.954	0.30	1.1862
	7.438		4.322

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	Surface "n"	Flow Length (ft.)	Slope (ft/ft)	Time (min.)
Segment A - B	0.24	300	0.009	46.6

Shallow Concentrated Flow					
Segment		Slope (ft/ft)	V (ft/s)	Length (ft)	Time (min.)
Segment B - C	paved	0.008	1.82	158	1.4

Total Tc = 48.0 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 27**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.837	0.90	0.7535
Roofs	2.007	0.90	1.8060
Landscaped and Lawns	3.228	0.30	0.9683
	6.072		3.528

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	248	0.01	38.3

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.006	1.57	336	3.6
Segment C - D	unpaved	0.038	3.15	53	0.3

Total Tc = 42.2 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 28**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.735	0.90	0.6618
Roofs	1.762	0.90	1.5862
Landscaped and Lawns	2.835	0.30	0.8505
	5.333		3.099

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	150	0.007	29.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.006	1.57	50	0.5

Total Tc = 30.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Consulting Engineers
Environmental Specialists

Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 29**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.805	0.90	0.7242
Roofs	1.929	0.90	1.7357
Landscaped and Lawns	3.102	0.30	0.9306
	5.835		3.390

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	112	0.027	13.6

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.005	1.44	298	3.5

Total Tc = 17.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 30**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	1.071	0.90	0.9639
Roofs	2.567	0.90	2.3101
Landscaped and Lawns	4.129	0.30	1.2386
	7.766		4.513

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	170	0.006	34.8

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.002	0.91	141	2.6

Total Tc = 37.4 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

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Project Name: **South Benson Road Pump Station**
Project Number: **F 0439-08**
Project Location: **Fairfield, CT**
Description: **Existing C & TC Calculations**
Prepared By: **PAR** Date: **August 22, 2016**

Designation: **WS 31**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.775	0.90	0.6977
Roofs	1.858	0.90	1.6720
Landscaped and Lawns	2.988	0.30	0.8965
	5.621		3.266

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	135	0.022	17.2

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**
Segment B - C	paved	0.005	1.44	311	3.6

Total Tc = 20.8 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

Designation: **WS 32**
Location:

Cover Type	Area, ac	Coef.	A x C
Pavement	0.241	0.90	0.2171
Roofs	0.578	0.90	0.5204
Landscaped and Lawns	0.930	0.30	0.2790
	1.750		1.017

Weighted C: 0.58

Time of Concentration

(computed in accordance with ConnDOT Drainage Manual, Sec. 6C)

Overland				
Segment	**Surface "n"**	**Flow Length (ft.)**	**Slope (ft/ft)**	**Time (min.)**
Segment A - B	0.24	88	0.011	16.1

Shallow Concentrated Flow					
Segment		**Slope (ft/ft)**	**V (ft/s)**	**Length (ft)**	**Time (min.)**

Total Tc = 16.1 Min.

Note: Overland time of concentration computed using "Kinematic Wave" equation
Gutter and pipe time of concentration computed using Manning's equation

APPENDIX D

Project Description

File Name	Existing Storm Sewer 10-4-16.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	User-Defined
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	YES

Analysis Options

Start Analysis On	Sep 16, 2016	00:00:00
End Analysis On	Sep 17, 2016	00:00:00
Start Reporting On	Sep 16, 2016	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	32
Nodes	99
Junctions	97
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	1
Links	100
Channels	0
Pipes	100
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	25 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	WS-01	6.96	0.5800	1.68	0.98	6.79	13.90	0 00:29:18
2	WS-02	5.83	0.5800	1.74	1.01	5.89	11.11	0 00:31:48
3	WS-03	5.09	0.5800	1.74	1.01	5.15	9.70	0 00:31:48
4	WS-04	4.98	0.5800	1.55	0.90	4.47	10.88	0 00:24:42
5	WS-05	14.08	0.5800	1.35	0.78	11.01	36.04	0 00:18:24
6	WS-06	6.68	0.5800	1.99	1.15	7.69	10.57	0 00:43:36
7	WS-07	3.64	0.5800	2.19	1.27	4.61	5.00	0 00:55:18
8	WS-08	2.43	0.5800	1.92	1.12	2.70	4.01	0 00:40:30
9	WS-09	7.80	0.5800	2.31	1.34	10.44	9.92	0 01:03:12
10	WS-10	7.35	0.5800	2.02	1.17	8.63	11.30	0 00:45:48
11	WS-11	1.81	0.5800	1.05	0.61	1.10	5.67	0 00:11:36
12	WS-12	2.98	0.5800	1.99	1.15	3.43	4.70	0 00:43:48
13	WS-13	6.29	0.5800	1.70	0.99	6.21	12.36	0 00:30:12
14	WS-14	5.71	0.5800	1.88	1.09	6.22	9.74	0 00:38:24
15	WS-15	5.46	0.5800	2.05	1.19	6.49	8.26	0 00:47:06
16	WS-16	5.95	0.5800	1.74	1.01	6.00	11.37	0 00:31:42
17	WS-17	6.48	0.5800	2.01	1.17	7.56	10.05	0 00:45:06
18	WS-18	4.91	0.5800	1.11	0.65	3.17	14.79	0 00:12:54
19	WS-19	2.55	0.5800	2.04	1.18	3.02	3.88	0 00:46:36
20	WS-20	1.85	0.5800	1.76	1.02	1.89	3.47	0 00:32:36
21	WS-21	6.72	0.5800	1.21	0.70	4.72	19.31	0 00:14:42
22	WS-22	4.75	0.5800	1.93	1.12	5.32	7.82	0 00:40:48
23	WS-23	2.54	0.5800	2.06	1.19	3.03	3.82	0 00:47:42
24	WS-24	8.50	0.5800	2.11	1.22	10.37	12.33	0 00:50:30
25	WS-25	4.38	0.5800	2.04	1.18	5.17	6.67	0 00:46:30
26	WS-26	7.44	0.5800	2.06	1.20	8.90	11.12	0 00:48:00
27	WS-27	6.07	0.5800	1.95	1.13	6.88	9.79	0 00:42:12
28	WS-28	5.33	0.5800	1.71	0.99	5.28	10.50	0 00:30:06
29	WS-29	5.84	0.5800	1.31	0.76	4.44	15.53	0 00:17:06
30	WS-30	7.77	0.5800	1.86	1.08	8.37	13.45	0 00:37:24
31	WS-31	5.62	0.5800	1.44	0.83	4.68	13.48	0 00:20:48
32	WS-32	1.75	0.5800	1.28	0.74	1.30	4.81	0 00:16:06

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	MH 01	Junction	9.27	13.67	9.27	13.67	9170.00	11.09	14.96	1.29	0.00	0 00:32	3.32	126.00
2	MH 02	Junction	1.17	6.08	1.17	6.08	28220.00	13.55	6.60	0.52	0.00	0 00:24	4.05	217.00
3	MH 03	Junction	0.67	5.17	0.67	5.17	27800.00	4.42	5.44	0.27	0.00	0 00:43	2.07	267.00
4	MH 04	Junction	0.07	4.71	0.07	4.71	27800.00	4.03	4.72	0.01	0.00	0 00:43	0.09	49.00
5	MH 05	Junction	-0.25	4.48	-0.25	4.48	27800.00	11.92	4.36	0.00	0.12	0 00:00	0.00	0.00
6	MH 06	Junction	-0.90	3.62	-0.90	3.62	1710.00	6.78	4.79	1.17	0.00	0 00:14	0.64	308.00
7	MH 07	Junction	-0.25	3.80	-0.25	3.80	1710.00	5.49	4.91	1.11	0.00	0 00:14	0.55	161.00
8	MH 08	Junction	0.07	4.17	0.07	4.17	1710.00	6.47	5.10	0.93	0.00	0 00:13	0.47	149.00
9	MH 09	Junction	0.41	4.77	0.41	4.77	1710.00	5.56	6.39	1.62	0.00	0 00:12	0.81	136.00
10	MH 10	Junction	0.83	5.17	0.83	5.17	1710.00	6.58	7.90	2.73	0.00	0 00:12	1.38	142.00
11	MH 11	Junction	2.28	5.97	2.28	5.97	1710.00	9.91	10.24	4.27	0.00	0 01:03	2.10	131.00
12	MH 12	Junction	2.07	5.17	2.07	5.17	1710.00	2.98	5.18	0.01	0.00	0 00:15	0.01	1.00
13	MH 13	Junction	-0.92	3.87	-0.92	3.87	1710.00	5.57	4.80	0.93	0.00	0 00:16	0.47	157.00
14	MH 14	Junction	-1.15	5.37	-1.15	5.37	1710.00	4.81	4.85	0.00	0.52	0 00:00	0.00	0.00
15	MH 15	Junction	-1.17	5.77	-1.17	5.77	1710.00	10.16	4.86	0.00	0.91	0 00:00	0.00	0.00
16	MH 16	Junction	-1.17	5.17	-1.17	5.17	14960.00	6.53	4.87	0.00	0.30	0 00:00	0.00	0.00
17	MH 17	Junction	-1.17	4.87	-1.17	4.87	14960.00	11.29	4.88	0.01	0.00	0 00:46	0.03	11.00
18	MH 18	Junction	-0.96	4.84	-0.96	4.84	14960.00	38.03	4.84	0.00	0.00	0 00:12	0.06	1.00
19	MH 19	Junction	-0.83	4.62	-0.83	4.62	14960.00	51.98	4.65	0.03	0.00	0 00:13	0.11	2.00
20	MH 20	Junction	-0.56	7.84	-0.56	7.84	1000.00	48.39	7.84	0.00	0.00	0 00:12	0.08	0.00
21	MH 21	Junction	-0.33	4.25	-0.33	4.25	39580.00	4.59	3.88	0.00	0.37	0 00:00	0.00	0.00
22	MH 22	Junction	0.75	3.59	0.75	3.59	39580.00	5.00	3.90	0.31	0.00	0 00:55	3.54	629.00
23	MH 23	Junction	-0.30	4.25	-0.30	4.25	39580.00	3.24	3.88	0.00	0.37	0 00:00	0.00	0.00
24	MH 24	Junction	0.46	3.10	0.46	3.10	39580.00	3.42	3.84	0.74	0.00	0 01:03	8.14	1427.00
25	MH 27	Junction	2.16	10.47	2.16	10.47	7970.00	7.55	6.44	0.00	4.03	0 00:00	0.00	0.00
26	MH 28	Junction	2.44	10.17	2.44	10.17	7970.00	5.12	7.20	0.00	2.97	0 00:00	0.00	0.00
27	MH 29	Junction	3.42	9.07	3.42	9.07	7970.00	5.15	9.07	0.00	0.00	0 00:51	0.00	7.00
28	MH 30	Junction	3.55	8.47	3.55	8.47	7970.00	12.28	9.56	1.09	0.00	0 00:32	2.42	83.00
29	MH 31	Junction	3.93	8.47	3.93	8.47	7970.00	13.88	9.62	1.15	0.00	0 00:29	2.55	87.00
30	MH 32	Junction	3.35	7.76	3.35	7.76	7970.00	3.90	8.20	0.44	0.00	0 00:44	0.98	96.00
31	MH 33	Junction	-0.76	4.81	-0.76	4.81	37670.00	15.13	4.81	0.00	0.00	0 00:13	0.00	0.00
32	MH 34	Junction	-0.92	4.50	-0.92	4.50	37670.00	14.97	4.66	0.16	0.00	0 00:45	1.66	115.00
33	MH 35	Junction	-1.26	4.48	-1.26	4.48	37670.00	12.34	4.82	0.34	0.00	0 00:30	3.56	172.00
34	MH 36	Junction	-0.39	4.47	-0.39	4.47	37670.00	3.61	4.77	0.30	0.00	0 00:56	3.13	194.00
35	MH 37	Junction	1.35	5.27	1.35	5.27	34215.00	3.30	5.27	0.00	0.00	0 00:11	0.00	0.00
36	MH 38	Junction	1.97	5.47	1.97	5.47	34215.00	4.16	5.47	0.00	0.00	0 00:11	0.00	0.00
37	MH 39	Junction	2.11	5.37	2.11	5.37	34215.00	9.73	5.67	0.30	0.00	0 00:38	2.79	118.00
38	MH 40	Junction	-1.22	4.08	-1.22	4.08	22120.00	13.85	4.73	0.65	0.00	0 00:14	4.01	235.00
39	MH 41	Junction	0.20	3.70	0.20	3.70	22120.00	5.59	4.53	0.83	0.00	0 00:32	5.09	441.00
40	MH 42	Junction	-4.52	4.88	-4.52	4.88	40220.00	14.64	4.88	0.00	0.00	0 01:15	0.01	25.00
41	MH 43	Junction	-1.15	4.75	-1.15	4.75	38800.00	3.66	4.75	0.00	0.00	0 00:07	0.00	1.00
42	MH 44	Junction	-0.40	4.35	-0.40	4.35	38800.00	3.51	4.77	0.42	0.00	0 01:07	4.49	700.00
43	MH 45	Junction	0.12	4.07	0.12	4.07	38800.00	12.45	4.90	0.83	0.00	0 00:45	9.02	854.00
44	MH 46	Junction	1.02	5.22	1.02	5.22	47550.00	3.68	5.22	0.00	0.00	0 00:10	0.00	0.00
45	MH 47	Junction	1.48	4.98	1.48	4.98	47550.00	3.54	5.07	0.09	0.00	0 01:09	1.18	292.00
46	MH 48	Junction	1.81	4.73	1.81	4.73	47550.00	11.35	5.09	0.36	0.00	0 00:31	4.97	580.00
47	MH 49	Junction	1.36	5.20	1.36	5.20	13830.00	3.66	5.20	0.00	0.00	0 00:10	0.00	0.00
48	MH 50	Junction	1.47	6.81	1.47	6.81	13830.00	5.21	6.81	0.00	0.00	0 00:10	0.00	0.00
49	MH 51	Junction	1.65	5.20	1.65	5.20	13830.00	4.82	5.53	0.33	0.00	0 00:59	1.28	187.00
50	MH 52	Junction	1.82	5.20	1.82	5.20	13830.00	8.25	5.96	0.76	0.00	0 00:47	2.89	212.00
51	MH 53	Junction	-3.20	5.30	-3.20	5.30	40220.00	12.77	5.30	0.00	0.00	0 00:00	0.00	0.00
52	MH 54	Junction	-2.22	5.38	-2.22	5.38	40220.00	19.24	5.47	0.09	0.00	0 00:14	1.01	22.00
53	MH 55	Junction	0.09	4.49	0.09	4.49	60950.00	4.97	4.77	0.28	0.00	0 00:47	4.70	298.00
54	MH 56	Junction	-0.58	5.07	-0.58	5.07	40220.00	12.32	5.19	0.12	0.00	0 00:32	1.43	80.00
55	MH 57	Junction	-0.30	5.87	-0.30	5.87	48370.00	8.18	5.12	0.00	0.75	0 00:00	0.00	0.00
56	MH 58	Junction	0.00	4.87	0.00	4.87	12650.00	6.67	4.97	0.10	0.00	0 00:24	0.34	93.00
57	MH 59	Junction	0.69	4.57	0.69	4.57	12650.00	14.74	5.13	0.56	0.00	0 00:13	1.96	156.00
58	MH 60	Junction	-0.05	6.07	-0.05	6.07	48370.00	3.61	5.83	0.00	0.24	0 00:00	0.00	0.00
59	MH 61	Junction	0.05	6.27	0.05	6.27	48370.00	7.81	6.39	0.12	0.00	0 00:41	1.66	84.00
60	MH 62	Junction	-1.46	7.07	-1.46	7.07	25650.00	48.48	7.07	0.00	0.00	0 00:00	0.00	0.00
61	MH 63	Junction	-1.49	7.07	-1.49	7.07	25650.00	36.91	7.07	0.00	0.00	0 00:11	0.02	0.00
62	MH 64	Junction	1.05	7.27	1.05	7.27	15070.00	6.31	7.01	0.00	0.26	0 00:00	0.00	0.00
63	MH 65	Junction	2.29	8.37	2.29	8.37	15071.00	5.64	8.37	0.00	0.00	0 00:11	0.00	0.00
64	MH 66	Junction	-1.74	5.67	-1.74	5.67	25650.00	31.54	5.66	0.00	0.01	0 00:00	0.00	0.00
65	MH 67	Junction	-2.00	4.72	-2.00	4.72	25650.00	30.81	4.72	0.00	0.00	0 00:10	0.02	1.00
66	MH 68	Junction	-0.61	4.77	-0.61	4.77	47180.00	11.81	4.81	0.04	0.00	0 00:10	0.56	67.00
67	MH 69	Junction	-1.95	4.67	-1.95	4.67	47180.00	23.56	4.67	0.00	0.00	0 00:10	0.01	1.00
68	MH 70	Junction	-1.97	4.67	-1.97	4.67	47180.00	37.19	4.67	0.00	0.00	0 00:11	0.02	1.00
69	MH 71	Junction	-2.56	4.50	-2.56	4.50	52480.00	33.09	4.50	0.00	0.00	0 00:11	0.01	1.00
70	MH 72	Junction	-2.85	4.40	-2.85	4.40	52480.00	36.07	4.40	0.00	0.00	0 00:10	0.00	0.00
71	MH 73	Junction	-1.00	4.40	-1.00	4.40	44550.00	3.90	4.42	0.02	0.00	0 00:47	0.23	82.00
72	MH 74	Junction	0.13	4.50	0.13	4.50	44550.00	2.38	4.53	0.03	0.00	0 01:18	0.36	224.00
73	MH 75	Junction	1.44	4.63	1.44	4.63	44550.00	2.36	4.78	0.15	0.00	0 01:13	1.85	324.00
74	MH 76	Junction	2.31	5.27	2.31	5.27	44550.00	11.11	5.75	0.48	0.00	0 00:48	5.86	267.00
75	MH 77	Junction	-3.00	4.29	-3.00	4.29	43370.00	33.03	4.31	0.02	0.00	0 00:44	0.26	31.00
76	MH 78	Junction	-3.00	4.00	-3.00	4.00	43370.00	36.67	4.25	0.25	0.00	0 00:14	2.99	95.00
77	MH 79	Junction	-0.03	3.70	-0.03	3.70	43370.00	11.48	4.33	0.63	0.00	0 00:42	7.49	321.00
78	MH 80	Junction	-3.00	3.60	-3.00	3.60	1000.00	38.22	4.21	0.61	0.00	0 00:12	0.50	232.00
79	MH 81	Junction	-3.29	3.96	-3.29	3.96	35430.00	40.49	4.06	0.10	0.00	0 00:18	1.03	50.00
80	MH 82	Junction	-3.48	4.37	-3.48	4.37	35430.00	46.62	4.37	0.00	0.00	0 00:02	0.02	0.00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
81	MH 83	Junction	-1.41	4.47	-1.41	4.47	35430.00	6.90	4.12	0.00	0.35	0 00:00	0.00	0.00
82	MH 84	Junction	-1.28	4.67	-1.28	4.67	35430.00	6.03	4.20	0.00	0.47	0 00:00	0.00	0.00
83	MH 85	Junction	-0.51	4.07	-0.51	4.07	35430.00	13.44	4.39	0.32	0.00	0 00:21	3.13	110.00
84	MH 86	Junction	-3.54	5.50	-3.54	5.50	35430.00	53.41	4.29	0.00	1.21	0 00:00	0.00	0.00
85	MH 87	Junction	-4.06	7.14	-4.06	7.14	1000.00	92.95	5.40	0.00	1.74	0 00:00	0.00	0.00
86	MH 88	Junction	-0.09	6.07	-0.09	6.07	29080.00	7.68	3.98	0.00	2.09	0 00:00	0.00	0.00
87	MH 89	Junction	2.01	5.87	2.01	5.87	29080.00	5.69	4.25	0.00	1.62	0 00:00	0.00	0.00
88	MH 90	Junction	2.17	5.87	2.17	5.87	29080.00	5.67	4.61	0.00	1.26	0 00:00	0.00	0.00
89	MH 91	Junction	2.46	6.30	2.46	6.30	29080.00	5.67	5.12	0.00	1.18	0 00:00	0.00	0.00
90	MH 92	Junction	3.51	7.17	3.51	7.17	29080.00	13.43	7.53	0.36	0.00	0 00:37	2.89	84.00
91	MH 93	Junction	2.69	5.39	2.69	5.39	34215.00	1.90	5.39	0.00	0.00	0 00:12	0.00	0.00
92	Structure - (17)	Junction	-0.91	5.57	-0.91	5.57	0.00	15.07	4.74	0.00	0.83	0 00:00	0.00	0.00
93	Structure - (18)	Junction	-1.07	6.69	-1.07	6.69	0.00	14.99	4.64	0.00	2.06	0 00:00	0.00	0.00
94	Structure - (42)	Junction	-0.53	3.49	-0.53	2.21	0.00	17.52	3.49	0.00	0.00	0 00:44	39.23	590.00
95	Structure - (48)	Junction	1.07	5.67	1.07	5.67	0.00	2.70	5.67	0.00	0.00	0 00:10	0.01	0.00
96	Structure - (78)	Junction	3.08	7.76	3.08	7.76	0.00	2.96	7.65	0.00	0.11	0 00:00	0.00	0.00
97	Structure - (98)	Junction	0.77	5.17	0.77	5.17	0.00	2.74	5.17	0.00	0.00	0 00:10	0.00	0.00
98	Out-1Pipe - (97)	Outfall	-4.28					92.95	3.20					
99	Pond	Storage Node	2.00	4.00	2.97		288963.00	57.02	3.97				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	Link-05	Pipe	MH 93	MH 38	286.60	2.69	1.97	0.2500	12.000	0.0120	1.90	1.93	0.98	3.23	1.00	1.00	436.00	SURCHARGED
2	Pipe - (01)	Pipe	MH 80	MH 81	505.29	-3.00	-3.00	0.0000	36.000	0.0120	36.64	1.02	36.05	6.24	3.00	1.00	1435.00	SURCHARGED
3	Pipe - (02)	Pipe	MH 78	MH 80	337.96	-3.00	-3.00	0.0000	36.000	0.0120	35.31	1.24	28.41	5.65	3.00	1.00	1434.00	SURCHARGED
4	Pipe - (03)	Pipe	MH 77	MH 78	196.13	-3.00	-3.00	0.0000	36.000	0.0120	33.03	1.63	20.24	5.03	3.00	1.00	1433.00	SURCHARGED
5	Pipe - (04)	Pipe	MH 72	MH 77	152.89	-2.85	-3.00	0.1000	36.000	0.0120	35.05	22.63	1.55	5.61	3.00	1.00	1432.00	SURCHARGED
6	Pipe - (05)	Pipe	MH 71	MH 72	286.81	-2.56	-2.85	0.1000	36.000	0.0120	32.01	22.98	1.39	5.49	3.00	1.00	1432.00	SURCHARGED
7	Pipe - (06)	Pipe	MH 70	MH 71	336.69	-1.97	-2.56	0.1800	36.000	0.0120	29.71	30.25	0.98	5.50	3.00	1.00	1429.00	SURCHARGED
8	Pipe - (07)	Pipe	MH 67	MH 70	42.09	-2.00	-1.97	-0.0700	36.000	0.0120	30.81	19.29	1.60	4.37	3.00	1.00	1429.00	SURCHARGED
9	Pipe - (08)	Pipe	MH 66	MH 67	274.49	-1.74	-2.00	0.0900	36.000	0.0120	30.37	22.24	1.37	4.30	3.00	1.00	1429.00	SURCHARGED
10	Pipe - (09)	Pipe	MH 63	MH 66	278.67	-1.49	-1.74	0.0900	36.000	0.0120	31.58	21.64	1.46	4.58	3.00	1.00	1429.00	SURCHARGED
11	Pipe - (10)	Pipe	MH 62	MH 63	38.64	-1.46	-1.49	0.0800	36.000	0.0120	37.71	20.13	1.87	5.54	3.00	1.00	1428.00	SURCHARGED
12	Pipe - (100)	Pipe	MH 90	MH 89	80.00	2.17	2.01	0.2000	18.000	0.0120	5.69	5.09	1.12	3.22	1.50	1.00	88.00	SURCHARGED
13	Pipe - (101)	Pipe	MH 89	MH 88	52.00	2.01	1.91	0.1900	18.000	0.0120	5.70	4.99	1.14	3.23	1.50	1.00	89.00	SURCHARGED
14	Pipe - (101) (1)	Pipe	MH 88	MH 87	150.01	-0.09	-0.39	0.2000	18.000	0.0120	7.68	5.09	1.51	6.32	1.50	1.00	1439.00	SURCHARGED
15	Pipe - (102)	Pipe	MH 35	MH 34	99.30	-1.26	-1.30	0.0400	15.000	0.0120	5.28	4.09	1.29	4.31	1.25	1.00	1431.00	SURCHARGED
16	Pipe - (11)	Pipe	MH 19	MH 62	504.30	-0.83	-1.46	0.1200	36.000	0.0120	29.07	25.54	1.14	4.32	3.00	1.00	1428.00	SURCHARGED
17	Pipe - (12)	Pipe	MH 18	MH 19	94.26	-0.96	-0.78	-0.1900	36.000	0.0120	20.17	31.58	0.64	3.00	3.00	1.00	1428.00	SURCHARGED
18	Pipe - (13)	Pipe	MH 33	MH 18	137.02	-0.76	-0.84	0.0600	24.000	0.0120	15.17	5.92	2.56	5.03	2.00	1.00	1428.00	SURCHARGED
19	Pipe - (16)	Pipe	MH 33	Structure - (17)	36.57	-0.84	-0.91	0.2000	24.000	0.0120	15.13	15.80	0.96	4.82	2.00	1.00	1430.00	SURCHARGED
20	Pipe - (17)	Pipe	Structure - (17)	Structure - (18)	80.80	-0.91	-1.07	0.2000	24.000	0.0120	15.07	10.84	1.39	4.80	2.00	1.00	1430.00	SURCHARGED
21	Pipe - (18)	Pipe	Structure - (18)	MH 34	97.75	-1.07	-1.30	0.2400	24.000	0.0120	14.99	9.60	1.56	4.77	2.00	1.00	1430.00	SURCHARGED
22	Pipe - (19)	Pipe	MH 34	MH 40	295.51	-0.92	-1.40	0.1600	24.000	0.0120	10.36	7.81	1.33	3.46	2.00	1.00	1430.00	SURCHARGED
23	Pipe - (20)	Pipe	MH 40	MH 42	549.97	-1.22	-4.72	0.6400	24.000	0.0120	11.66	18.98	0.61	3.71	2.00	1.00	1431.00	SURCHARGED
24	Pipe - (22)	Pipe	MH 57	MH 42	303.15	-0.30	-4.77	1.4700	24.000	0.0120	6.71	28.92	0.23	4.94	2.00	1.00	1431.00	SURCHARGED
25	Pipe - (23)	Pipe	MH 60	MH 57	302.70	-0.05	-0.64	0.1900	15.000	0.0120	3.53	2.01	1.75	2.87	1.25	1.00	1431.00	SURCHARGED
26	Pipe - (24)	Pipe	MH 61	MH 60	177.87	0.05	-0.03	0.0400	15.000	0.0120	3.61	1.48	2.43	2.94	1.25	1.00	1431.00	SURCHARGED
27	Pipe - (25)	Pipe	MH 69	MH 70	15.86	-1.95	-1.97	0.1300	24.000	0.0120	11.95	8.70	1.37	4.07	2.00	1.00	1431.00	SURCHARGED
28	Pipe - (26)	Pipe	MH 68	MH 69	459.16	-0.61	-1.95	0.2900	24.000	0.0120	11.61	13.24	0.88	4.21	2.00	1.00	1430.00	SURCHARGED
29	Pipe - (27)	Pipe	MH 56	MH 68	48.09	-0.58	-0.61	0.0600	18.000	0.0120	11.81	2.84	4.16	6.68	1.50	1.00	1430.00	SURCHARGED
30	Pipe - (28)	Pipe	MH 64	MH 63	50.10	1.05	0.87	0.3600	15.000	0.0120	6.75	4.19	1.61	5.50	1.25	1.00	1428.00	SURCHARGED
31	Pipe - (29)	Pipe	MH 65	MH 64	306.12	2.29	1.05	0.4100	15.000	0.0120	6.31	4.45	1.42	5.14	1.25	1.00	479.00	SURCHARGED
32	Pipe - (30)	Pipe	MH 41	MH 40	135.00	0.20	-1.02	0.9000	12.000	0.0120	2.13	3.67	0.58	3.39	1.00	1.00	1430.00	SURCHARGED
33	Pipe - (31)	Pipe	MH 42	MH 53	178.00	-4.52	-3.20	-0.7400	18.000	0.0120	6.35	9.80	0.65	4.85	1.50	1.00	1433.00	SURCHARGED
34	Pipe - (32)	Pipe	MH 53	MH 54	298.77	-3.20	-2.22	-0.3300	18.000	0.0120	8.68	6.52	1.33	5.40	1.50	1.00	1433.00	SURCHARGED
35	Pipe - (33)	Pipe	MH 54	MH 56	291.18	-2.22	-0.78	-0.4900	18.000	0.0120	9.33	8.54	1.09	5.28	1.50	1.00	1432.00	SURCHARGED
36	Pipe - (34)	Pipe	MH 55	MH 54	320.64	0.09	-2.17	0.7000	12.000	0.0120	1.98	3.24	0.61	2.53	1.00	1.00	1432.00	SURCHARGED
37	Pipe - (35)	Pipe	MH 17	MH 18	272.42	-1.17	-0.86	-0.1100	24.000	0.0120	8.52	8.27	1.03	2.71	2.00	1.00	1428.00	SURCHARGED
38	Pipe - (36)	Pipe	MH 16	MH 17	43.34	-1.17	-1.17	0.0000	24.000	0.0120	6.53	1.18	5.55	2.08	2.00	1.00	1429.00	SURCHARGED
39	Pipe - (37)	Pipe	MH 15	MH 16	148.56	-1.17	-1.17	0.0000	24.000	0.0120	5.96	0.64	9.37	2.53	2.00	1.00	1428.00	SURCHARGED
40	Pipe - (38)	Pipe	MH 14	MH 15	25.86	-1.15	-1.17	0.0800	18.000	0.0120	4.89	3.16	1.54	2.76	1.50	1.00	1429.00	SURCHARGED
41	Pipe - (39)	Pipe	MH 13	MH 14	253.94	-0.92	-1.15	0.0900	18.000	0.0120	4.81	3.42	1.40	2.72	1.50	1.00	1429.00	SURCHARGED
42	Pipe - (40)	Pipe	MH 06	MH 13	21.90	-0.90	-0.92	0.0900	18.000	0.0120	5.57	3.44	1.62	3.16	1.50	1.00	1429.00	SURCHARGED
43	Pipe - (41)	Pipe	Structure - (42)	MH 06	412.92	-0.53	-0.90	0.0900	18.000	0.0120	5.95	3.41	1.75	3.36	1.50	1.00	1429.00	SURCHARGED
44	Pipe - (42)	Pipe	MH 05	Structure - (42)	14.42	-0.25	-0.53	1.9400	18.000	0.0120	11.93	15.86	0.75	6.75	1.50	1.00	1430.00	SURCHARGED
45	Pipe - (43)	Pipe	MH 43	MH 42	168.25	-1.15	-3.72	1.5300	12.000	0.0120	2.53	4.77	0.53	4.18	1.00	1.00	1433.00	SURCHARGED
46	Pipe - (44)	Pipe	MH 44	MH 43	163.19	-0.40	-1.15	0.4600	12.000	0.0120	1.97	2.62	0.75	3.33	1.00	1.00	1432.00	SURCHARGED
47	Pipe - (45)	Pipe	MH 45	MH 44	261.00	0.12	-0.40	0.2000	15.000	0.0120	2.53	3.12	0.81	2.81	1.25	1.00	1431.00	SURCHARGED
48	Pipe - (46)	Pipe	Structure - (98)	MH 45	237.10	0.77	0.07	0.2900	12.000	0.0120	2.74	2.01	1.36	3.50	1.00	1.00	1430.00	SURCHARGED
49	Pipe - (47)	Pipe	Structure - (48)	Structure - (98)	151.07	1.07	0.77	0.2000	12.000	0.0120	2.70	1.73	1.56	3.92	1.00	1.00	1429.00	SURCHARGED
50	Pipe - (48)	Pipe	MH 46	MH 45	286.84	1.02	0.12	0.3100	15.000	0.0120	2.89	3.92	0.74	2.60	1.25	1.00	1430.00	SURCHARGED
51	Pipe - (49)	Pipe	MH 49	MH 46	35.50	1.36	1.32	0.1000	15.000	0.0120	3.66	2.20	1.67	2.98	1.25	1.00	1430.00	SURCHARGED
52	Pipe - (50)	Pipe	MH 50	MH 49	118.10	1.47	1.36	0.1000	15.000	0.0120	3.67	2.18	1.68	3.01	1.25	1.00	1430.00	SURCHARGED
53	Pipe - (51)	Pipe	MH 51	MH 50	181.37	1.65	1.47	0.1000	15.000	0.0120	3.00	2.20	1.36	2.55	1.25	1.00	1429.00	SURCHARGED
54	Pipe - (52)	Pipe	MH 52	MH 51	167.64	1.82	1.65	0.1000	15.000	0.0120	3.52	2.23	1.58	2.87	1.25	1.00	1429.00	SURCHARGED
55	Pipe - (53)	Pipe	MH 47	MH 46	182.12	1.48	1.32	0.0900	15.000	0.0120	3.51	2.07	1.69	2.86	1.25	1.00	1430.00	SURCHARGED
56	Pipe - (54)	Pipe	MH 48	MH 47	204.00	1.81	1.48	0.1600	15.000	0.0120	3.54	2.81	1.26	3.08	1.25	1.00	1430.00	SURCHARGED
57	Pipe - (55)	Pipe	MH 04	MH 05	248.29	0.07	-0.25	0.1300	12.000	0.0120	3.45	1.39	2.49	4.64	1.00	1.00	1432.00	SURCHARGED
58	Pipe - (56)	Pipe	MH 03	MH 04	184.06	0.67	0.17	0.2700	12.000	0.0120	4.03	2.01	2.00	5.31	1.00	1.00	1433.00	SURCHARGED

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
59	Pipe - (57)	Pipe	MH 02	MH 03	165.25	1.17	0.77	0.2400	12.000	0.0120	4.42	1.90	2.33	5.77	1.00	1.00	1433.00	SURCHARGED
60	Pipe - (58)	Pipe	MH 01	MH 02	984.92	9.27	1.27	0.8100	12.000	0.0150	2.81	2.78	1.01	3.58	1.00	1.00	126.00	SURCHARGED
61	Pipe - (59)	Pipe	MH 36	MH 34	120.11	-0.39	-1.30	0.7600	15.000	0.0120	3.33	4.65	0.72	2.72	1.25	1.00	1430.00	SURCHARGED
62	Pipe - (60)	Pipe	MH 37	MH 36	173.86	1.35	-0.03	0.7900	15.000	0.0120	3.30	6.23	0.53	4.11	1.25	1.00	1430.00	SURCHARGED
63	Pipe - (61)	Pipe	MH 38	MH 37	16.35	1.97	1.97	0.0000	15.000	0.0120	3.30	0.55	6.03	2.96	1.25	1.00	1037.00	SURCHARGED
64	Pipe - (62)	Pipe	MH 39	MH 38	132.67	2.11	1.97	0.1100	15.000	0.0120	3.69	2.27	1.63	3.01	1.25	1.00	833.00	SURCHARGED
65	Pipe - (63)	Pipe	MH 73	MH 72	146.77	-1.00	-2.85	1.2600	12.000	0.0120	2.39	4.33	0.55	4.64	1.00	1.00	1432.00	SURCHARGED
66	Pipe - (64)	Pipe	MH 74	MH 73	89.97	0.13	-1.00	1.2600	12.000	0.0120	2.33	4.33	0.54	4.42	1.00	1.00	1432.00	SURCHARGED
67	Pipe - (65)	Pipe	MH 75	MH 74	101.97	1.44	0.13	1.2800	12.000	0.0120	2.36	4.37	0.54	4.48	1.00	1.00	1430.00	SURCHARGED
68	Pipe - (66)	Pipe	MH 76	MH 75	261.50	2.31	1.44	0.3300	12.000	0.0120	2.36	2.23	1.06	3.65	1.00	1.00	746.00	SURCHARGED
69	Pipe - (67)	Pipe	MH 20	MH 19	239.12	-0.56	-0.78	0.0900	36.000	0.0120	36.64	21.92	1.67	5.43	3.00	1.00	1427.00	SURCHARGED
70	Pipe - (68)	Pipe	MH 21	MH 20	363.04	-0.33	-0.53	0.0600	15.000	0.0120	4.59	1.64	2.79	3.74	1.25	1.00	1430.00	SURCHARGED
71	Pipe - (70)	Pipe	MH 24	MH 23	161.08	0.46	-0.30	0.4700	15.000	0.0120	3.42	4.81	0.71	3.02	1.25	1.00	1427.00	SURCHARGED
72	Pipe - (71)	Pipe	MH 22	MH 21	399.15	0.75	-0.33	0.2700	15.000	0.0120	3.30	3.64	0.91	2.76	1.25	1.00	1427.00	SURCHARGED
73	Pipe - (72)	Pipe	Pond	MH 20	575.54	2.00	-0.56	0.4400	36.000	0.0120	16.71	48.19	0.35	6.63	2.48	0.83	0.00	Calculated
74	Pipe - (73)	Pipe	MH 27	Pond	380.87	2.16	2.00	0.0400	18.000	0.0150	7.54	1.87	4.04	4.57	1.50	1.00	403.00	SURCHARGED
75	Pipe - (74)	Pipe	Structure - (78)	MH 27	269.44	3.08	2.32	0.2800	12.000	0.0120	2.95	2.05	1.44	3.76	1.00	1.00	101.00	SURCHARGED
76	Pipe - (75)	Pipe	MH 32	Structure - (78)	94.59	3.35	3.08	0.2900	12.000	0.0120	2.96	2.06	1.43	3.77	1.00	1.00	100.00	SURCHARGED
77	Pipe - (76)	Pipe	MH 31	MH 32	124.07	4.10	3.35	0.6000	12.000	0.0120	3.90	3.00	1.30	4.96	1.00	1.00	97.00	SURCHARGED
78	Pipe - (77)	Pipe	MH 28	MH 27	94.57	2.44	2.16	0.3000	15.000	0.0120	5.12	3.81	1.34	4.17	1.25	1.00	414.00	SURCHARGED
79	Pipe - (78)	Pipe	MH 29	MH 28	304.30	3.42	2.44	0.3200	15.000	0.0120	5.12	3.97	1.29	4.18	1.25	1.00	98.00	SURCHARGED
80	Pipe - (79)	Pipe	MH 30	MH 29	40.33	3.55	3.42	0.3200	15.000	0.0120	5.15	3.97	1.30	4.20	1.25	1.00	98.00	SURCHARGED
81	Pipe - (80)	Pipe	MH 31	MH 30	120.05	3.93	3.55	0.3200	15.000	0.0120	4.00	3.94	1.02	3.26	1.25	1.00	97.00	SURCHARGED
82	Pipe - (81)	Pipe	MH 58	MH 57	127.69	0.00	-0.28	0.2200	15.000	0.0120	6.67	3.28	2.04	5.64	1.25	1.00	1432.00	SURCHARGED
83	Pipe - (82)	Pipe	MH 59	MH 58	192.09	0.69	0.03	0.3400	15.000	0.0120	6.67	4.10	1.63	5.44	1.25	1.00	1436.00	SURCHARGED
84	Pipe - (83)	Pipe	MH 07	MH 06	29.02	-0.25	-0.90	2.2400	15.000	0.0120	5.59	10.47	0.53	4.55	1.25	1.00	1429.00	SURCHARGED
85	Pipe - (84)	Pipe	MH 08	MH 07	15.04	0.07	-0.25	2.1300	15.000	0.0120	5.49	10.21	0.54	4.47	1.25	1.00	1428.00	SURCHARGED
86	Pipe - (85)	Pipe	MH 09	MH 08	173.04	0.41	0.07	0.2000	15.000	0.0120	5.41	3.10	1.74	4.41	1.25	1.00	1428.00	SURCHARGED
87	Pipe - (86)	Pipe	MH 10	MH 09	194.92	0.83	0.41	0.2200	15.000	0.0120	5.56	3.25	1.71	4.53	1.25	1.00	1428.00	SURCHARGED
88	Pipe - (87)	Pipe	MH 11	MH 10	260.28	2.28	1.77	0.2000	15.000	0.0120	6.58	3.10	2.12	5.36	1.25	1.00	467.00	SURCHARGED
89	Pipe - (88)	Pipe	MH 12	MH 15	672.90	2.07	-1.17	0.4800	15.000	0.0120	2.98	4.86	0.61	2.89	1.25	1.00	850.00	SURCHARGED
90	Pipe - (89)	Pipe	MH 79	MH 78	67.89	-0.03	-1.53	2.2100	12.000	0.0120	2.65	5.74	0.46	5.24	1.00	1.00	1433.00	SURCHARGED
91	Pipe - (90)	Pipe	MH 23	MH 21	36.08	-0.30	-0.33	0.0800	15.000	0.0120	3.24	2.02	1.61	2.64	1.25	1.00	1430.00	SURCHARGED
92	Pipe - (91)	Pipe	MH 85	MH 84	96.00	-0.51	-1.28	0.8000	15.000	0.0120	3.96	6.27	0.63	3.61	1.25	1.00	1437.00	SURCHARGED
93	Pipe - (92)	Pipe	MH 84	MH 83	16.00	-1.28	-1.41	0.8100	15.000	0.0120	4.00	6.31	0.63	3.45	1.25	1.00	1437.00	SURCHARGED
94	Pipe - (93)	Pipe	MH 83	MH 82	140.00	-1.41	-2.53	0.8000	15.000	0.0120	5.23	6.26	0.84	5.37	1.25	1.00	1437.00	SURCHARGED
95	Pipe - (94)	Pipe	MH 81	MH 82	288.06	-3.29	-3.48	0.0700	36.000	0.0120	38.01	18.56	2.05	7.13	3.00	1.00	1437.00	SURCHARGED
96	Pipe - (95)	Pipe	MH 82	MH 86	69.10	-3.48	-3.54	0.0900	36.000	0.0120	46.60	21.29	2.19	9.04	3.00	1.00	1438.00	SURCHARGED
97	Pipe - (96)	Pipe	MH 86	MH 87	456.41	-3.54	-3.96	0.0900	36.000	0.0120	52.92	21.92	2.41	7.56	3.00	1.00	1438.00	SURCHARGED
98	Pipe - (97)	Pipe	MH 87	Out-1Pipe - (97)	115.05	-4.06	-4.28	0.1900	36.000	0.0120	92.95	31.60	2.94	13.17	3.00	1.00	1439.00	SURCHARGED
99	Pipe - (98)	Pipe	MH 92	MH 91	320.00	3.51	2.71	0.2500	15.000	0.0120	5.67	3.50	1.62	4.62	1.25	1.00	87.00	SURCHARGED
100	Pipe - (99)	Pipe	MH 91	MH 90	144.00	2.46	2.17	0.2000	18.000	0.0120	5.67	5.11	1.11	3.21	1.50	1.00	87.00	SURCHARGED

Existing 25 Year Pipe Capacities

SN	From (Inlet) Node	To (Outlet) Node	Length (ft)	Average Slope (%)	Pipe Diameter or Height (inches)	Peak Flow (cfs)	Design Flow Capacity (cfs)	Meets Capacity (Y/N)
60	MH 01	MH 02	984.92	0.8100	12.000	2.81	2.78	N
59	MH 02	MH 03	165.25	0.2400	12.000	4.42	1.90	N
58	MH 03	MH 04	184.06	0.2700	12.000	4.03	2.01	N
57	MH 04	MH 05	248.29	0.1300	12.000	3.45	1.39	N
44	MH 05	Structure - (42)	14.42	1.9400	18.000	11.92	15.86	Y
42	MH 06	MH 13	21.90	0.0900	18.000	5.39	3.44	N
84	MH 07	MH 06	29.02	2.2400	15.000	5.60	10.47	Y
85	MH 08	MH 07	15.04	2.1300	15.000	5.51	10.21	Y
86	MH 09	MH 08	173.04	0.2000	15.000	5.42	3.10	N
87	MH 10	MH 09	194.92	0.2200	15.000	5.56	3.25	N
88	MH 11	MH 10	260.28	0.2000	15.000	6.58	3.10	N
89	MH 12	MH 15	672.90	0.4800	15.000	2.86	4.86	Y
41	MH 13	MH 14	253.94	0.0900	18.000	4.57	3.42	N
40	MH 14	MH 15	25.86	0.0800	18.000	4.62	3.16	N
39	MH 15	MH 16	148.56	0.0000	24.000	5.77	0.64	N
38	MH 16	MH 17	43.34	0.0000	24.000	6.65	1.18	N
37	MH 17	MH 18	272.42	-0.1100	24.000	8.58	8.27	N
17	MH 18	MH 19	94.26	-0.1900	36.000	15.59	31.58	Y
16	MH 19	MH 62	504.30	0.1200	36.000	28.64	25.54	N
69	MH 20	MH 19	239.12	0.0900	36.000	35.25	21.92	N
70	MH 21	MH 20	363.04	0.0600	15.000	4.56	1.64	N
72	MH 22	MH 21	399.15	0.2700	15.000	2.84	3.64	Y
91	MH 23	MH 21	36.08	0.0800	15.000	3.89	2.02	N
71	MH 24	MH 23	161.08	0.4700	15.000	3.89	4.81	Y
74	MH 27	Pond	380.87	0.0400	18.000	7.55	1.87	N
78	MH 28	MH 27	94.57	0.3000	15.000	5.12	3.81	N
79	MH 29	MH 28	304.30	0.3200	15.000	5.12	3.97	N
80	MH 30	MH 29	40.33	0.3200	15.000	5.15	3.97	N
77	MH 31	MH 32	124.07	0.6000	12.000	3.90	3.00	N
81	MH 31	MH 30	120.05	0.3200	15.000	4.00	3.94	N
76	MH 32	Structure - (78)	94.59	0.2900	12.000	2.96	2.06	N
18	MH 33	MH 18	137.02	0.0600	24.000	15.15	5.92	N
19	MH 33	Structure - (17)	36.57	0.2000	24.000	15.03	15.80	Y
22	MH 34	MH 40	295.51	0.1600	24.000	9.68	7.81	N
15	MH 35	MH 34	99.30	0.0400	15.000	4.93	4.09	N
61	MH 36	MH 34	120.11	0.7600	15.000	3.34	4.65	Y
62	MH 37	MH 36	173.86	0.7900	15.000	3.30	6.23	Y
63	MH 38	MH 37	16.35	0.0000	15.000	3.30	0.55	N
64	MH 39	MH 38	132.67	0.1100	15.000	3.31	2.27	N
23	MH 40	MH 42	549.97	0.6400	24.000	11.77	18.98	Y
32	MH 41	MH 40	135.00	0.9000	12.000	2.12	3.67	Y

Existing 25 Year Pipe Capacities

SN	From (Inlet) Node	To (Outlet) Node	Length (ft)	Average Slope (%)	Pipe Diameter or Height (inches)	Peak Flow (cfs)	Design Flow Capacity (cfs)	Meets Capacity (Y/N)
33	MH 42	MH 53	178.00	-0.7400	18.000	6.35	9.80	Y
45	MH 43	MH 42	168.25	1.5300	12.000	2.53	4.77	Y
46	MH 44	MH 43	163.19	0.4600	12.000	2.13	2.62	Y
47	MH 45	MH 44	261.00	0.2000	15.000	2.53	3.12	Y
50	MH 46	MH 45	286.84	0.3100	15.000	2.89	3.92	Y
55	MH 47	MH 46	182.12	0.0900	15.000	3.47	2.07	N
56	MH 48	MH 47	204.00	0.1600	15.000	3.54	2.81	N
51	MH 49	MH 46	35.50	0.1000	15.000	3.73	2.20	N
52	MH 50	MH 49	118.10	0.1000	15.000	3.61	2.18	N
53	MH 51	MH 50	181.37	0.1000	15.000	3.21	2.20	N
54	MH 52	MH 51	167.64	0.1000	15.000	3.52	2.23	N
34	MH 53	MH 54	298.77	-0.3300	18.000	8.68	6.52	N
35	MH 54	MH 56	291.18	-0.4900	18.000	9.31	8.54	N
36	MH 55	MH 54	320.64	0.7000	12.000	2.68	3.24	Y
29	MH 56	MH 68	48.09	0.0600	18.000	11.81	2.84	N
24	MH 57	MH 42	303.15	1.4700	24.000	6.71	28.92	Y
82	MH 58	MH 57	127.69	0.2200	15.000	6.67	3.28	N
83	MH 59	MH 58	192.09	0.3400	15.000	6.67	4.10	N
25	MH 60	MH 57	302.70	0.1900	15.000	3.53	2.01	N
26	MH 61	MH 60	177.87	0.0400	15.000	3.61	1.48	N
11	MH 62	MH 63	38.64	0.0800	36.000	37.53	20.13	N
10	MH 63	MH 66	278.67	0.0900	36.000	33.80	21.64	N
30	MH 64	MH 63	50.10	0.3600	15.000	6.12	4.19	N
31	MH 65	MH 64	306.12	0.4100	15.000	5.72	4.45	N
9	MH 66	MH 67	274.49	0.0900	36.000	31.83	22.24	N
8	MH 67	MH 70	42.09	-0.0700	36.000	31.49	19.29	N
28	MH 68	MH 69	459.16	0.2900	24.000	9.92	13.24	Y
27	MH 69	MH 70	15.86	0.1300	24.000	11.37	8.70	N
7	MH 70	MH 71	336.69	0.1800	36.000	29.66	30.25	Y
6	MH 71	MH 72	286.81	0.1000	36.000	32.01	22.98	N
5	MH 72	MH 77	152.89	0.1000	36.000	35.05	22.63	N
65	MH 73	MH 72	146.77	1.2600	12.000	2.39	4.33	Y
66	MH 74	MH 73	89.97	1.2600	12.000	2.31	4.33	Y
67	MH 75	MH 74	101.97	1.2800	12.000	2.17	4.37	Y
68	MH 76	MH 75	261.50	0.3300	12.000	2.28	2.23	N
4	MH 77	MH 78	196.13	0.0000	36.000	33.03	1.63	N
3	MH 78	MH 80	337.96	0.0000	36.000	35.31	1.24	N
90	MH 79	MH 78	67.89	2.2100	12.000	3.26	5.74	Y
2	MH 80	MH 81	505.29	0.0000	36.000	36.64	1.02	N
95	MH 81	MH 82	288.06	0.0700	36.000	38.01	18.56	N
96	MH 82	MH 86	69.10	0.0900	36.000	46.60	21.29	N

Existing 25 Year Pipe Capacities

SN	From (Inlet) Node	To (Outlet) Node	Length (ft)	Average Slope (%)	Pipe Diameter or Height (inches)	Peak Flow (cfs)	Design Flow Capacity (cfs)	Meets Capacity (Y/N)
94	MH 83	MH 82	140.00	0.8000	15.000	5.23	6.26	Y
93	MH 84	MH 83	16.00	0.8100	15.000	4.00	6.31	Y
92	MH 85	MH 84	96.00	0.8000	15.000	3.96	6.27	Y
97	MH 86	MH 87	456.41	0.0900	36.000	52.92	21.92	N
98	MH 87	Out-1Pipe - (97)	115.05	0.1900	36.000	92.95	31.60	N
14	MH 88	MH 87	150.01	0.2000	18.000	7.68	5.09	N
13	MH 89	MH 88	52.00	0.1900	18.000	5.71	4.99	N
12	MH 90	MH 89	80.00	0.2000	18.000	5.69	5.09	N
100	MH 91	MH 90	144.00	0.2000	18.000	5.67	5.11	N
99	MH 92	MH 91	320.00	0.2500	15.000	5.67	3.50	N
1	MH 93	MH 38	286.60	0.2500	12.000	1.69	1.93	Y
73	Pond	MH 20	575.54	0.4400	36.000	16.24	48.19	Y
20	Structure - (17)	Structure - (18)	80.80	0.2000	24.000	14.90	10.84	N
21	Structure - (18)	MH 34	97.75	0.2400	24.000	14.77	9.60	N
43	Structure - (42)	MH 06	412.92	0.0900	18.000	5.93	3.41	N
49	Structure - (48)	Structure - (98)	151.07	0.2000	12.000	2.70	1.73	N
75	Structure - (78)	MH 27	269.44	0.2800	12.000	2.95	2.05	N
48	Structure - (98)	MH 45	237.10	0.2900	12.000	3.02	2.01	N

ting 25 Year Ponding Elevations

Element ID	Outlet ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ponded Area (ft^2)	Pipe Diameter (in)	Average Pipe Slope (%)	Peak Inflow (cfs)	Maximum HGL Elevation Attained (ft)	Max Surcharge Depth (ft)	Existing 25 Year Surcharge
MH 01	MH 02	9.27	13.67	9170	12.0	0.81	11.09	14.96	1.29	1.27
MH 02	MH 03	1.17	6.08	28220	12.0	0.24	13.54	6.60	0.52	0.44
MH 03	MH 04	0.67	5.17	27800	12.0	0.27	4.42	5.44	0.27	0.80
MH 04	MH 05	0.07	4.71	27800	12.0	0.13	4.03	4.72	0.01	0.30
MH 05	Structure - (42)	-0.25	4.48	27800	18.0	1.94	11.93	4.36	-0.12	0.25
MH 06	MH 13	-0.90	3.62	1710	18.0	0.09	6.83	4.79	1.17	0.84
MH 07	MH 06	-0.25	3.80	1710	15.0	2.24	5.51	4.91	1.11	-1.33
MH 08	MH 07	0.07	4.17	1710	15.0	2.13	6.46	5.10	0.93	-1.48
MH 09	MH 08	0.41	4.77	1710	15.0	0.20	5.56	6.39	1.62	2.11
MH 10	MH 09	0.83	5.17	1710	15.0	0.22	6.58	7.90	2.73	2.03
MH 11	MH 10	2.28	5.97	1710	15.0	0.20	9.92	10.24	4.27	4.47
MH 12	MH 15	2.07	5.17	1710	15.0	0.48	2.86	5.18	0.01	0.01
MH 13	MH 14	-0.92	3.87	1710	18.0	0.09	5.39	4.80	0.93	0.83
MH 14	MH 15	-1.15	5.37	1710	18.0	0.08	4.57	4.85	-0.52	-0.72
MH 15	MH 16	-1.17	5.77	1710	24.0	0.00	10.09	4.86	-0.91	-0.62
MH 16	MH 17	-1.17	5.17	14960	24.0	0.00	6.65	4.87	-0.30	-0.97
MH 17	MH 18	-1.17	4.87	14960	24.0	-0.11	11.30	4.88	0.01	-1.18
MH 18	MH 19	-0.96	4.84	14960	36.0	-0.19	32.15	4.84	0.00	0.00
MH 19	MH 62	-0.83	4.62	14960	36.0	0.12	49.19	4.65	0.03	0.01
MH 20	MH 19	-0.56	7.84	1000	36.0	0.09	46.87	7.84	0.00	0.00
MH 21	MH 20	-0.33	4.25	39580	15.0	0.06	4.56	3.88	-0.37	0.07
MH 22	MH 21	0.75	3.59	39580	15.0	0.27	5.00	3.90	0.31	0.00
MH 23	MH 21	-0.30	4.25	39580	15.0	0.08	3.89	3.88	-0.37	0.05
MH 24	MH 23	0.46	3.10	39580	15.0	0.47	3.89	3.84	0.74	0.05
MH 27	Pond	2.16	10.47	7970	18.0	0.04	7.55	6.44	-4.03	-3.55
MH 28	MH 27	2.44	10.17	7970	15.0	0.30	5.12	7.20	-2.97	-2.20
MH 29	MH 28	3.42	9.07	7970	15.0	0.32	5.15	9.07	0.00	-1.51
MH 30	MH 29	3.55	8.47	7970	15.0	0.32	12.28	9.56	1.09	0.22
MH 31	MH 32	3.93	8.47	7970	15.0	0.32	13.87	9.62	1.15	2.01
MH 32	Structure - (78)	3.35	7.76	7970	12.0	0.29	3.90	8.20	0.44	0.33
MH 33	MH 18	-0.76	4.81	37670	24.0	0.06	15.03	4.81	0.00	0.02
MH 34	MH 40	-0.92	4.50	37670	24.0	0.16	14.70	4.66	0.16	0.26
MH 35	MH 34	-1.26	4.48	37670	15.0	0.04	12.33	4.82	0.34	0.37
MH 36	MH 34	-0.39	4.47	37670	15.0	0.76	3.61	4.77	0.30	0.39
MH 37	MH 36	1.35	5.27	34215	15.0	0.79	3.62	5.27	0.00	-0.76
MH 38	MH 37	1.97	5.47	34215	15.0	0.00	4.14	5.47	0.00	-0.55
MH 39	MH 38	2.11	5.37	34215	15.0	0.11	9.72	5.67	0.30	0.14
MH 40	MH 42	-1.22	4.08	22120	24.0	0.64	13.85	4.73	0.65	0.37
MH 41	MH 40	0.20	3.70	22120	12.0	0.90	5.58	4.53	0.83	0.57
MH 42	MH 53	-4.52	4.88	40220	18.0	-0.74	14.64	4.88	0.00	-0.67
MH 43	MH 42	-1.15	4.75	38800	12.0	1.53	3.66	4.75	0.00	-1.73
MH 44	MH 43	-0.40	4.35	38800	12.0	0.46	3.51	4.77	0.42	-1.42
MH 45	MH 44	0.12	4.07	38800	15.0	0.20	12.46	4.90	0.83	0.57
MH 46	MH 45	1.02	5.22	47550	15.0	0.31	3.81	5.22	0.00	0.44
MH 47	MH 46	1.48	4.98	47550	15.0	0.09	3.54	5.07	0.09	0.35
MH 48	MH 47	1.81	4.73	47550	15.0	0.16	11.34	5.09	0.36	0.35
MH 49	MH 46	1.36	5.20	13830	15.0	0.10	3.73	5.20	0.00	0.30
MH 50	MH 49	1.47	6.81	13830	15.0	0.10	5.14	6.81	0.00	0.00
MH 51	MH 50	1.65	5.20	13830	15.0	0.10	5.03	5.53	0.33	0.00
MH 52	MH 51	1.82	5.20	13830	15.0	0.10	8.26	5.96	0.76	0.58
MH 53	MH 54	-3.20	5.30	40220	18.0	-0.33	12.77	5.30	0.00	0.00
MH 54	MH 56	-2.22	5.38	40220	18.0	-0.49	19.22	5.47	0.09	0.04
MH 55	MH 54	0.09	4.49	60950	12.0	0.70	4.97	4.77	0.28	0.26
MH 56	MH 68	-0.58	5.07	40220	18.0	0.06	12.32	5.19	0.12	0.01
MH 57	MH 42	-0.30	5.87	48370	24.0	1.47	8.18	5.12	-0.75	-0.07
MH 58	MH 57	0.00	4.87	12650	15.0	0.22	6.67	4.97	0.10	-0.51
MH 59	MH 58	0.69	4.57	12650	15.0	0.34	14.74	5.13	0.56	0.68
MH 60	MH 57	-0.05	6.07	48370	15.0	0.19	3.61	5.83	-0.24	-0.31
MH 61	MH 60	0.05	6.27	48370	15.0	0.04	7.80	6.39	0.12	0.12
MH 62	MH 63	-1.46	7.07	25650	36.0	0.08	47.26	7.07	0.00	-2.00
MH 63	MH 66	-1.49	7.07	25650	36.0	0.09	39.06	7.07	0.00	-0.46
MH 64	MH 63	1.05	7.27	15070	15.0	0.36	5.72	7.01	-0.26	-1.92
MH 65	MH 64	2.29	8.37	15071	15.0	0.41	5.66	8.37	0.00	-0.01
MH 66	MH 67	-1.74	5.67	25650	36.0	0.09	32.96	5.66	-0.01	-0.65
MH 67	MH 70	-2.00	4.72	25650	36.0	-0.07	31.49	4.72	0.00	-0.51
MH 68	MH 69	-0.61	4.77	47180	24.0	0.29	11.81	4.81	0.04	0.06
MH 69	MH 70	-1.95	4.67	47180	24.0	0.13	20.67	4.67	0.00	0.00
MH 70	MH 71	-1.97	4.67	47180	36.0	0.18	37.13	4.67	0.00	-0.13
MH 71	MH 72	-2.56	4.50	52480	36.0	0.10	33.09	4.50	0.00	-1.78
MH 72	MH 77	-2.85	4.40	52480	36.0	0.10	36.07	4.40	0.00	0.00

MH 73	MH 72	-1.00	4.40	44550	12.0	1.26	3.90	4.42	0.02	0.00
MH 74	MH 73	0.13	4.50	44550	12.0	1.26	2.38	4.53	0.03	-0.99
MH 75	MH 74	1.44	4.63	44550	12.0	1.28	2.28	4.78	0.15	-1.35
MH 76	MH 75	2.31	5.27	44550	12.0	0.33	11.12	5.75	0.48	0.43
MH 77	MH 78	-3.00	4.29	43370	36.0	0.00	33.03	4.31	0.02	0.00
MH 78	MH 80	-3.00	4.00	43370	36.0	0.00	36.67	4.25	0.25	-0.86
MH 79	MH 78	-0.03	3.70	43370	12.0	2.21	12.04	4.33	0.63	0.60
MH 80	MH 81	-3.00	3.60	1000	36.0	0.00	38.22	4.21	0.61	-1.98
MH 81	MH 82	-3.29	3.96	35430	36.0	0.07	40.49	4.06	0.10	-1.77
MH 82	MH 86	-3.48	4.37	35430	36.0	0.09	46.62	4.37	0.00	-1.65
MH 83	MH 82	-1.41	4.47	35430	15.0	0.80	6.90	4.12	-0.35	-0.12
MH 84	MH 83	-1.28	4.67	35430	15.0	0.81	6.03	4.20	-0.47	-1.00
MH 85	MH 84	-0.51	4.07	35430	15.0	0.80	13.43	4.39	0.32	0.10
MH 86	MH 87	-3.54	5.50	35430	36.0	0.09	53.41	4.29	-1.21	-2.02
MH 87	Out-1Pipe - (97)	-4.06	7.14	1000	36.0	0.19	92.95	5.40	-1.74	-6.48
MH 88	MH 87	-0.09	6.07	29080	18.0	0.20	7.68	3.98	-2.09	-4.62
MH 89	MH 88	2.01	5.87	29080	18.0	0.19	5.69	4.25	-1.62	-2.61
MH 90	MH 89	2.17	5.87	29080	18.0	0.20	5.67	4.61	-1.26	-2.01
MH 91	MH 90	2.46	6.30	29080	18.0	0.20	5.67	5.12	-1.18	-1.60
MH 92	MH 91	3.51	7.17	29080	15.0	0.25	13.43	7.53	0.36	0.33
MH 93	MH 38	2.69	5.39	34215	12.0	0.25	1.69	5.39	0.00	
Structure - (17)	Structure - (18)	-0.91	5.57	0	24.0	0.20	14.90	4.74	-0.83	-1.46
Structure - (18)	MH 34	-1.07	6.69	0	24.0	0.24	14.77	4.64	-2.05	-2.51
Structure - (42)	MH 27	-0.53	3.49	0	18.0	0.09	17.51	3.49	0.00	0.00
Structure - (48)	Structure - (98)	1.07	5.67	0	12.0	0.20	2.70	5.67	0.00	0.00
Structure - (78)	MH 30	3.08	7.76	0	12.0	0.28	2.96	7.65	-0.11	0.00
Structure - (98)	MH 45	0.77	5.17	0	12.0	0.29	3.02	5.17	0.00	0.00

Tighe&Bond

APPENDIX E

Project Description

File Name	Proposed Storm Sewer - Gravity Upgrade.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	User-Defined
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	YES

Analysis Options

Start Analysis On	Sep 16, 2016	00:00:00
End Analysis On	Sep 17, 2016	00:00:00
Start Reporting On	Sep 16, 2016	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	32
Nodes	100
Junctions	98
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	1
Links	101
Channels	0
Pipes	101
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	25 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	WS-01	6.96	0.5800	1.68	0.98	6.79	13.90	0 00:29:18
2	WS-02	5.83	0.5800	1.74	1.01	5.89	11.11	0 00:31:48
3	WS-03	5.09	0.5800	1.74	1.01	5.15	9.70	0 00:31:48
4	WS-04	4.98	0.5800	1.55	0.90	4.47	10.88	0 00:24:42
5	WS-05	14.08	0.5800	1.35	0.78	11.01	36.04	0 00:18:24
6	WS-06	6.68	0.5800	1.99	1.15	7.69	10.57	0 00:43:36
7	WS-07	3.64	0.5800	2.19	1.27	4.61	5.00	0 00:55:18
8	WS-08	2.43	0.5800	1.92	1.12	2.70	4.01	0 00:40:30
9	WS-09	7.80	0.5800	2.31	1.34	10.44	9.92	0 01:03:12
10	WS-10	7.35	0.5800	2.02	1.17	8.63	11.30	0 00:45:48
11	WS-11	1.81	0.5800	1.05	0.61	1.10	5.67	0 00:11:36
12	WS-12	2.98	0.5800	1.99	1.15	3.43	4.70	0 00:43:48
13	WS-13	6.29	0.5800	1.70	0.99	6.21	12.36	0 00:30:12
14	WS-14	5.71	0.5800	1.88	1.09	6.22	9.74	0 00:38:24
15	WS-15	5.46	0.5800	2.05	1.19	6.49	8.26	0 00:47:06
16	WS-16	5.95	0.5800	1.74	1.01	6.00	11.37	0 00:31:42
17	WS-17	6.48	0.5800	2.01	1.17	7.56	10.05	0 00:45:06
18	WS-18	4.91	0.5800	1.11	0.65	3.17	14.79	0 00:12:54
19	WS-19	2.55	0.5800	2.04	1.18	3.02	3.88	0 00:46:36
20	WS-20	1.85	0.5800	1.76	1.02	1.89	3.47	0 00:32:36
21	WS-21	6.72	0.5800	1.21	0.70	4.72	19.31	0 00:14:42
22	WS-22	4.75	0.5800	1.93	1.12	5.32	7.82	0 00:40:48
23	WS-23	2.54	0.5800	2.06	1.19	3.03	3.82	0 00:47:42
24	WS-24	8.50	0.5800	2.11	1.22	10.37	12.33	0 00:50:30
25	WS-25	4.38	0.5800	2.04	1.18	5.17	6.67	0 00:46:30
26	WS-26	7.44	0.5800	2.06	1.20	8.90	11.12	0 00:48:00
27	WS-27	6.07	0.5800	1.95	1.13	6.88	9.79	0 00:42:12
28	WS-28	5.33	0.5800	1.71	0.99	5.28	10.50	0 00:30:06
29	WS-29	5.84	0.5800	1.31	0.76	4.44	15.53	0 00:17:06
30	WS-30	7.77	0.5800	1.86	1.08	8.37	13.45	0 00:37:24
31	WS-31	5.62	0.5800	1.44	0.83	4.68	13.48	0 00:20:48
32	WS-32	1.75	0.5800	1.28	0.74	1.30	4.81	0 00:16:06

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-04	Junction	-1.45	5.00	-1.45	5.00	0.00	25.18	4.45	0.00	0.55	0 00:00	0.00	0.00
2	MH 01	Junction	9.27	13.67	9.27	13.67	9170.00	11.11	10.26	0.00	3.41	0 00:00	0.00	0.00
3	MH 02	Junction	1.17	6.08	1.17	6.08	28220.00	19.16	6.08	0.00	0.00	0 00:21	0.03	2.00
4	MH 03	Junction	0.67	5.17	0.67	5.17	27800.00	21.12	5.17	0.00	0.00	0 00:20	0.07	1.00
5	MH 04	Junction	0.07	4.71	0.07	4.71	27800.00	23.45	4.71	0.00	0.00	0 00:20	0.03	1.00
6	MH 05	Junction	-0.25	4.48	-0.25	4.48	27800.00	30.33	4.24	0.00	0.24	0 00:00	0.00	0.00
7	MH 06	Junction	-0.90	3.62	-0.90	3.62	1710.00	24.33	3.97	0.35	0.00	0 00:24	0.35	71.00
8	MH 07	Junction	-0.25	3.80	-0.25	3.80	1710.00	22.51	4.06	0.26	0.00	0 00:23	0.27	53.00
9	MH 08	Junction	0.07	4.17	0.07	4.17	1710.00	21.67	4.20	0.03	0.00	0 00:23	0.02	1.00
10	MH 09	Junction	0.41	4.77	0.41	4.77	1710.00	20.59	4.68	0.00	0.09	0 00:00	0.00	0.00
11	MH 10	Junction	0.83	5.17	0.83	5.17	1710.00	19.90	5.17	0.00	0.00	0 00:00	0.00	0.00
12	MH 11	Junction	2.28	5.97	2.28	5.97	1710.00	15.51	5.03	0.00	0.94	0 00:00	0.00	0.00
13	MH 12	Junction	2.07	5.17	2.07	5.17	1710.00	2.48	5.18	0.01	0.00	0 00:22	0.01	1.00
14	MH 13	Junction	-0.92	3.87	-0.92	3.87	1710.00	22.45	4.02	0.15	0.00	0 00:25	0.12	37.00
15	MH 14	Junction	-1.15	5.37	-1.15	5.37	1710.00	22.57	4.07	0.00	1.30	0 00:00	0.00	0.00
16	MH 15	Junction	-1.17	5.77	-1.17	5.77	1710.00	23.93	4.09	0.00	1.68	0 00:00	0.00	0.00
17	MH 16	Junction	-1.20	5.17	-1.20	5.17	14960.00	24.04	4.10	0.00	1.07	0 00:00	0.00	0.00
18	MH 17	Junction	-1.21	4.87	-1.21	4.87	14960.00	24.16	4.26	0.00	0.61	0 00:00	0.00	0.00
19	MH 18	Junction	-1.28	4.84	-1.28	4.84	14960.00	19.30	4.50	0.00	0.34	0 00:00	0.00	0.00
20	MH 19	Junction	-1.32	4.62	-1.32	4.62	14960.00	47.70	4.65	0.03	0.00	0 00:19	0.14	1.00
21	MH 20	Junction	-0.56	7.84	-0.56	7.84	1000.00	23.52	5.17	0.00	2.67	0 00:00	0.00	0.00
22	MH 21	Junction	-0.33	4.25	-0.33	4.25	39580.00	8.68	3.94	0.00	0.31	0 00:00	0.00	0.00
23	MH 22	Junction	0.75	3.59	0.75	3.59	39580.00	7.83	3.98	0.39	0.00	0 00:20	4.46	166.00
24	MH 23	Junction	-0.30	4.25	-0.30	4.25	39580.00	3.84	3.85	0.00	0.40	0 00:00	0.00	0.00
25	MH 24	Junction	0.46	3.10	0.46	3.10	39580.00	3.70	3.59	0.49	0.00	0 00:20	5.50	1422.00
26	MH 27	Junction	2.16	10.47	2.16	10.47	7970.00	21.96	4.85	0.00	5.62	0 00:00	0.00	0.00
27	MH 28	Junction	2.44	10.17	2.44	10.17	7970.00	13.79	4.95	0.00	5.22	0 00:00	0.00	0.00
28	MH 29	Junction	3.42	9.07	3.42	9.07	7970.00	14.06	5.12	0.00	3.95	0 00:00	0.00	0.00
29	MH 30	Junction	3.55	8.47	3.55	8.47	7970.00	14.06	5.63	0.00	2.84	0 00:00	0.00	0.00
30	MH 31	Junction	3.93	8.47	3.93	8.47	7970.00	13.89	5.69	0.00	2.78	0 00:00	0.00	0.00
31	MH 32	Junction	3.35	7.76	3.35	7.76	7970.00	8.88	5.48	0.00	2.28	0 00:00	0.00	0.00
32	MH 33	Junction	-0.76	4.81	-0.76	4.81	37670.00	9.57	4.48	0.00	0.33	0 00:00	0.00	0.00
33	MH 34	Junction	-1.10	4.50	-1.10	4.50	37670.00	21.77	4.36	0.00	0.14	0 00:00	0.00	0.00
34	MH 35	Junction	-1.19	4.48	-1.19	4.48	37670.00	26.06	4.39	0.00	0.09	0 00:00	0.00	0.00
35	MH 36	Junction	0.23	4.47	0.23	4.47	37670.00	9.95	4.48	0.01	0.00	0 00:20	0.11	3.00
36	MH 37	Junction	1.97	5.27	1.97	5.27	34215.00	9.74	5.17	0.00	0.10	0 00:00	0.00	0.00
37	MH 38	Junction	1.97	5.47	1.97	5.47	34215.00	9.75	5.07	0.00	0.40	0 00:00	0.00	0.00
38	MH 39	Junction	2.11	5.37	2.11	5.37	34215.00	9.74	5.37	0.00	0.00	0 00:19	0.01	0.00
39	MH 40	Junction	-0.92	4.08	-0.92	4.08	22120.00	12.82	4.24	0.16	0.00	0 00:21	0.96	51.00
40	MH 41	Junction	0.20	3.70	0.20	3.70	22120.00	6.10	4.19	0.49	0.00	0 00:32	2.98	122.00
41	MH 42	Junction	-0.72	4.88	-0.72	4.88	40220.00	27.23	4.64	0.00	0.24	0 00:00	0.00	0.00
42	MH 43	Junction	-0.56	4.75	-0.56	4.75	38800.00	18.25	4.68	0.00	0.07	0 00:00	0.00	0.00
43	MH 44	Junction	-0.40	4.35	-0.40	4.35	38800.00	17.65	4.72	0.37	0.00	0 00:15	4.02	106.00
44	MH 45	Junction	0.00	4.07	0.00	4.07	38800.00	22.74	4.79	0.72	0.00	0 00:20	7.75	141.00
45	MH 46	Junction	1.02	5.22	1.02	5.22	47550.00	15.61	5.02	0.00	0.20	0 00:00	0.00	0.00
46	MH 47	Junction	1.48	4.98	1.48	4.98	47550.00	7.36	4.99	0.01	0.00	0 00:16	0.12	34.00
47	MH 48	Junction	1.81	4.73	1.81	4.73	47550.00	11.36	5.01	0.28	0.00	0 00:31	3.71	135.00
48	MH 49	Junction	1.36	5.20	1.36	5.20	13830.00	10.37	5.10	0.00	0.10	0 00:00	0.00	0.00
49	MH 50	Junction	1.47	6.81	1.47	6.81	13830.00	13.29	5.17	0.00	1.64	0 00:00	0.00	0.00
50	MH 51	Junction	1.65	5.20	1.65	5.20	13830.00	12.28	5.26	0.06	0.00	0 00:16	0.23	41.00
51	MH 52	Junction	1.82	5.20	1.82	5.20	13830.00	9.89	5.39	0.19	0.00	0 00:17	0.80	64.00
52	MH 53	Junction	-0.90	5.30	-0.90	5.30	40220.00	18.00	4.58	0.00	0.72	0 00:00	0.00	0.00
53	MH 54	Junction	-1.19	5.38	-1.19	5.38	40220.00	23.86	4.88	0.00	0.50	0 00:00	0.00	0.00
54	MH 55	Junction	0.09	4.49	0.09	4.49	60950.00	7.06	4.55	0.06	0.00	0 01:43	1.18	85.00
55	MH 56	Junction	-1.48	5.07	-1.48	5.07	40220.00	27.86	4.49	0.00	0.58	0 00:00	0.00	0.00
56	MH 57	Junction	-0.30	5.87	-0.30	5.87	48370.00	13.74	5.11	0.00	0.76	0 00:00	0.00	0.00
57	MH 58	Junction	0.00	4.87	0.00	4.87	12650.00	14.49	4.87	0.00	0.00	0 00:16	0.00	0.00
58	MH 59	Junction	0.69	4.57	0.69	4.57	12650.00	14.79	4.67	0.10	0.00	0 00:15	0.55	61.00
59	MH 60	Junction	-0.05	6.07	-0.05	6.07	48370.00	7.82	6.07	0.00	0.00	0 00:14	0.00	0.00
60	MH 61	Junction	0.05	6.27	0.05	6.27	48370.00	9.74	6.27	0.00	0.00	0 00:16	0.01	1.00
61	MH 62	Junction	-1.46	7.07	-1.46	7.07	25650.00	55.09	4.67	0.00	2.40	0 00:00	0.00	0.00
62	MH 63	Junction	-1.49	7.07	-1.49	7.07	25650.00	63.55	4.65	0.00	2.42	0 00:00	0.00	0.00
63	MH 64	Junction	1.05	7.27	1.05	7.27	15070.00	5.66	5.70	0.00	1.57	0 00:00	0.00	0.00
64	MH 65	Junction	2.29	8.37	2.29	8.37	15071.00	5.66	8.37	0.00	0.00	0 00:19	0.00	0.00
65	MH 66	Junction	-1.74	5.67	-1.74	5.67	25650.00	73.61	4.52	0.00	1.15	0 00:00	0.00	0.00
66	MH 67	Junction	-2.00	4.72	-2.00	4.72	25650.00	75.25	4.42	0.00	0.30	0 00:00	0.00	0.00
67	MH 68	Junction	-1.52	4.77	-1.52	4.77	47180.00	27.72	4.40	0.00	0.37	0 00:00	0.00	0.00
68	MH 69	Junction	-1.95	4.67	-1.95	4.67	47180.00	29.71	4.39	0.00	0.28	0 00:00	0.00	0.00
69	MH 70	Junction	-1.97	4.67	-1.97	4.67	47180.00	78.20	4.38	0.00	0.29	0 00:00	0.00	0.00
70	MH 71	Junction	-2.56	4.50	-2.56	4.50	52480.00	67.85	4.22	0.00	0.28	0 00:00	0.00	0.00
71	MH 72	Junction	-2.85	4.40	-2.85	4.40	52480.00	72.43	4.13	0.00	0.27	0 00:00	0.00	0.00
72	MH 73	Junction	-1.00	4.40	-1.00	4.40	44550.00	9.23	4.24	0.00	0.16	0 00:00	0.00	0.00
73	MH 74	Junction	0.13	4.50	0.13	4.50	44550.00	6.25	4.32	0.00	0.18	0 00:00	0.00	0.00
74	MH 75	Junction	1.44	4.63	1.44	4.63	44550.00	6.27	4.63	0.00	0.00	0 00:50	0.02	24.00
75	MH 76	Junction	2.31	5.27	2.31	5.27	44550.00	11.11	5.45	0.18	0.00	0 00:48	2.27	82.00
76	MH 77	Junction	-2.94	4.29	-2.94	4.29	43370.00	77.47	4.08	0.00	0.21	0 00:00	0.00	0.00
77	MH 78	Junction	-3.05	4.00	-3.05	4.00	43370.00	88.12	4.00	0.00	0.00	0 00:20	0.00	0.00
78	MH 79	Junction	-0.50	3.70	-0.50	3.70	43370.00	10.27	4.09	0.39	0.00	0 00:27	4.71	107.00
79	MH 80	Junction	-3.24	3.60	-3.24	3.60	1000.00	100.34	3.98	0.38	0.00	0 00:20	0.33	62.00
80	MH 81	Junction	-3.53	3.96	-3.53	3.96	35430.00	112.40	3.84	0.00	0.12	0 00:00	0.00	0.00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
81	MH 82	Junction	-3.69	4.37	-3.69	4.37	35430.00	148.22	3.73	0.00	0.64	0 00:00	0.00	0.00
82	MH 83	Junction	-1.41	4.47	-1.41	4.47	35430.00	21.99	3.90	0.00	0.57	0 00:00	0.00	0.00
83	MH 84	Junction	-1.28	4.67	-1.28	4.67	35430.00	19.80	3.97	0.00	0.70	0 00:00	0.00	0.00
84	MH 85	Junction	-0.51	4.07	-0.51	4.07	35430.00	13.46	4.08	0.01	0.00	0 00:04	0.13	10.00
85	MH 86	Junction	-3.73	5.50	-3.73	5.50	35430.00	150.98	3.65	0.00	1.85	0 00:00	0.00	0.00
86	MH 87	Junction	-4.06	7.14	-4.06	7.14	1000.00	225.58	5.51	0.00	1.63	0 00:00	0.00	0.00
87	MH 88	Junction	-0.09	6.07	-0.09	6.07	29080.00	16.25	4.10	0.00	1.97	0 00:00	0.00	0.00
88	MH 89	Junction	2.01	5.87	2.01	5.87	29080.00	13.46	4.57	0.00	1.30	0 00:00	0.00	0.00
89	MH 90	Junction	2.17	5.87	2.17	5.87	29080.00	13.45	5.11	0.00	0.76	0 00:00	0.00	0.00
90	MH 91	Junction	2.46	6.30	2.46	6.30	29080.00	13.45	5.81	0.00	0.49	0 00:00	0.00	0.00
91	MH 92	Junction	3.51	7.17	3.51	7.17	29080.00	13.44	7.08	0.00	0.09	0 00:00	0.00	0.00
92	MH 93	Junction	2.69	5.39	2.69	5.39	34215.00	5.89	5.39	0.00	0.00	0 00:20	0.03	1.00
93	Structure - (17)	Junction	-0.91	5.57	-0.91	5.57	0.00	9.36	4.44	0.00	1.13	0 00:00	0.00	0.00
94	Structure - (18)	Junction	-1.07	6.69	-1.07	6.69	0.00	9.59	4.41	0.00	2.29	0 00:00	0.00	0.00
95	Structure - (42)	Junction	-0.53	3.49	-0.53	2.21	0.00	45.54	3.49	0.00	0.00	0 00:25	41.22	142.00
96	Structure - (48)	Junction	1.07	5.67	1.07	5.67	0.00	2.23	5.67	0.00	0.00	0 00:15	0.00	0.00
97	Structure - (78)	Junction	3.08	7.76	3.08	7.76	0.00	8.68	5.26	0.00	2.50	0 00:00	0.00	0.00
98	Structure - (98)	Junction	0.77	5.17	0.77	5.17	0.00	2.51	5.17	0.00	0.00	0 00:15	0.00	0.00
99	Out-1Pipe - (97)	Outfall	-4.28					225.58	3.20					
100	Pond	Storage Node	2.00	4.00	2.97		288963.00	59.78	3.75				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	Link-05	Pipe	MH 93	MH 38	286.60	2.69	1.97	0.2500	18.000	0.0120	5.89	5.70	1.03	3.39	1.50	1.00	58.00	SURCHARGED
2	Link-06	Pipe	MH 35	Jun-04	291.18	-1.19	-1.45	0.0900	48.000	0.0120	19.75	46.50	0.42	2.49	4.00	1.00	1423.00	SURCHARGED
3	Link-07	Pipe	Jun-04	MH 66	291.18	-1.45	-1.74	0.1000	48.000	0.0120	25.18	49.11	0.51	2.59	4.00	1.00	1423.00	SURCHARGED
4	Pipe - (01)	Pipe	MH 80	MH 81	505.29	-3.24	-3.53	0.0600	60.000	0.0120	98.71	67.59	1.46	6.07	5.00	1.00	1432.00	SURCHARGED
5	Pipe - (02)	Pipe	MH 78	MH 80	337.96	-3.05	-3.24	0.0600	60.000	0.0120	88.12	66.90	1.32	5.64	5.00	1.00	1431.00	SURCHARGED
6	Pipe - (03)	Pipe	MH 77	MH 78	196.13	-2.94	-3.05	0.0600	60.000	0.0120	77.47	66.82	1.16	5.76	5.00	1.00	1429.00	SURCHARGED
7	Pipe - (04)	Pipe	MH 72	MH 77	152.89	-2.85	-2.94	0.0600	60.000	0.0120	72.43	68.46	1.06	6.23	5.00	1.00	1427.00	SURCHARGED
8	Pipe - (05)	Pipe	MH 71	MH 72	286.81	-2.56	-2.85	0.1000	60.000	0.0120	66.42	89.72	0.74	4.98	5.00	1.00	1425.00	SURCHARGED
9	Pipe - (06)	Pipe	MH 70	MH 71	336.69	-1.97	-2.56	0.1800	60.000	0.0120	64.21	118.11	0.54	4.72	5.00	1.00	1422.00	SURCHARGED
10	Pipe - (07)	Pipe	MH 67	MH 70	42.09	-2.00	-1.97	-0.0700	60.000	0.0120	75.25	75.33	1.00	4.55	5.00	1.00	1422.00	SURCHARGED
11	Pipe - (08)	Pipe	MH 66	MH 67	274.49	-1.74	-2.00	0.0900	60.000	0.0120	71.86	86.84	0.83	4.13	5.00	1.00	222.00	SURCHARGED
12	Pipe - (09)	Pipe	MH 63	MH 66	278.67	-1.49	-1.74	0.0900	60.000	0.0120	61.18	84.51	0.72	3.23	5.00	1.00	128.00	SURCHARGED
13	Pipe - (10)	Pipe	MH 62	MH 63	38.64	-1.46	-1.49	0.0800	60.000	0.0120	55.09	78.62	0.70	3.03	5.00	1.00	121.00	SURCHARGED
14	Pipe - (100)	Pipe	MH 90	MH 89	80.00	2.17	2.01	0.2000	24.000	0.0120	13.46	10.96	1.23	4.28	2.00	1.00	18.00	SURCHARGED
15	Pipe - (101)	Pipe	MH 89	MH 88	52.00	2.01	1.91	0.1900	24.000	0.0120	13.46	10.75	1.25	4.28	2.00	1.00	10.00	SURCHARGED
16	Pipe - (101) (1)	Pipe	MH 88	MH 87	150.01	-0.09	-0.39	0.2000	24.000	0.0120	16.25	10.96	1.48	6.73	2.00	1.00	1439.00	SURCHARGED
17	Pipe - (102)	Pipe	MH 34	MH 35	99.30	-1.10	-1.19	0.0900	48.000	0.0120	17.27	46.85	0.37	2.81	4.00	1.00	1422.00	SURCHARGED
18	Pipe - (11)	Pipe	MH 19	MH 62	504.30	-1.32	-1.46	0.0300	60.000	0.0120	44.98	47.01	0.96	2.29	5.00	1.00	86.00	SURCHARGED
19	Pipe - (12)	Pipe	MH 18	MH 19	94.26	-1.28	-1.32	0.0400	36.000	0.0120	17.29	14.88	1.16	2.74	3.00	1.00	1423.00	SURCHARGED
20	Pipe - (13)	Pipe	MH 33	MH 18	137.02	-0.76	-0.84	0.0600	24.000	0.0120	9.74	5.92	1.65	3.10	2.00	1.00	1425.00	SURCHARGED
21	Pipe - (16)	Pipe	MH 33	Structure - (17)	36.57	-0.84	-0.91	0.2000	24.000	0.0120	9.57	15.80	0.61	3.04	2.00	1.00	1425.00	SURCHARGED
22	Pipe - (17)	Pipe	Structure - (17)	Structure - (18)	80.80	-0.91	-1.07	0.2000	24.000	0.0120	9.36	10.84	0.86	2.98	2.00	1.00	1425.00	SURCHARGED
23	Pipe - (18)	Pipe	Structure - (18)	MH 34	97.75	-1.07	-1.10	0.0300	24.000	0.0120	9.59	4.29	2.23	3.05	2.00	1.00	1425.00	SURCHARGED
24	Pipe - (19)	Pipe	MH 40	MH 34	295.51	-0.92	-1.10	0.0600	36.000	0.0120	11.09	17.83	0.62	1.57	3.00	1.00	1424.00	SURCHARGED
25	Pipe - (22)	Pipe	MH 57	MH 42	303.15	-0.30	-0.72	0.1400	30.000	0.0120	13.26	16.54	0.80	3.60	2.50	1.00	1426.00	SURCHARGED
26	Pipe - (23)	Pipe	MH 60	MH 57	302.70	-0.05	-0.30	0.0800	30.000	0.0120	7.83	12.77	0.61	1.59	2.50	1.00	1425.00	SURCHARGED
27	Pipe - (24)	Pipe	MH 61	MH 60	177.87	0.05	-0.05	0.0600	30.000	0.0120	7.82	10.54	0.74	2.04	2.50	1.00	1425.00	SURCHARGED
28	Pipe - (25)	Pipe	MH 69	MH 70	15.86	-1.95	-1.97	0.1300	48.000	0.0120	27.68	55.26	0.50	3.88	4.00	1.00	1425.00	SURCHARGED
29	Pipe - (26)	Pipe	MH 68	MH 69	459.16	-1.52	-1.95	0.0900	48.000	0.0120	27.72	47.62	0.58	2.97	4.00	1.00	1425.00	SURCHARGED
30	Pipe - (27)	Pipe	MH 56	MH 68	48.09	-1.48	-1.52	0.0800	36.000	0.0120	27.72	20.84	1.33	3.92	3.00	1.00	1427.00	SURCHARGED
31	Pipe - (28)	Pipe	MH 64	MH 63	50.10	1.05	0.87	0.3600	15.000	0.0120	5.66	4.19	1.35	4.93	1.25	1.00	1423.00	SURCHARGED
32	Pipe - (29)	Pipe	MH 65	MH 64	306.12	2.29	1.05	0.4100	15.000	0.0120	5.66	4.45	1.27	4.61	1.25	1.00	128.00	SURCHARGED
33	Pipe - (30)	Pipe	MH 41	MH 40	135.00	0.20	-0.92	0.8300	15.000	0.0120	3.23	6.37	0.51	2.63	1.25	1.00	1425.00	SURCHARGED
34	Pipe - (31)	Pipe	MH 42	MH 53	178.00	-0.72	-0.90	0.1000	36.000	0.0120	18.00	22.98	0.78	2.55	3.00	1.00	1425.00	SURCHARGED
35	Pipe - (32)	Pipe	MH 53	MH 54	298.77	-0.90	-1.19	0.1000	36.000	0.0120	17.92	22.51	0.80	2.54	3.00	1.00	1426.00	SURCHARGED
36	Pipe - (33)	Pipe	MH 54	MH 56	291.18	-1.19	-1.48	0.1000	36.000	0.0120	23.76	22.80	1.04	3.36	3.00	1.00	1427.00	SURCHARGED
37	Pipe - (34)	Pipe	MH 55	MH 54	320.64	0.09	-1.19	0.4000	18.000	0.0120	7.06	7.19	0.98	4.00	1.50	1.00	1427.00	SURCHARGED
38	Pipe - (35)	Pipe	MH 17	MH 18	272.42	-1.21	-1.28	0.0300	36.000	0.0120	19.20	11.58	1.66	2.72	3.00	1.00	1423.00	SURCHARGED
39	Pipe - (36)	Pipe	MH 16	MH 17	43.34	-1.20	-1.21	0.0200	36.000	0.0120	24.04	10.98	2.19	3.40	3.00	1.00	1423.00	SURCHARGED
40	Pipe - (37)	Pipe	MH 15	MH 16	148.56	-1.17	-1.20	0.0200	36.000	0.0120	23.93	10.27	2.33	3.39	3.00	1.00	1422.00	SURCHARGED
41	Pipe - (38)	Pipe	MH 14	MH 15	25.86	-1.15	-1.17	0.0800	36.000	0.0120	22.57	20.09	1.12	3.19	3.00	1.00	1422.00	SURCHARGED
42	Pipe - (39)	Pipe	MH 13	MH 14	253.94	-0.92	-1.15	0.0900	36.000	0.0120	22.45	21.75	1.03	3.18	3.00	1.00	1421.00	SURCHARGED
43	Pipe - (40)	Pipe	MH 06	MH 13	21.90	-0.90	-0.92	0.0900	36.000	0.0120	22.36	21.84	1.02	3.16	3.00	1.00	1421.00	SURCHARGED
44	Pipe - (41)	Pipe	Structure - (42)	MH 06	412.92	-0.53	-0.90	0.0900	36.000	0.0120	19.74	21.63	0.91	2.79	3.00	1.00	1420.00	SURCHARGED
45	Pipe - (42)	Pipe	MH 05	Structure - (42)	14.42	-0.25	-0.53	1.9400	36.000	0.0120	30.36	100.69	0.30	4.29	3.00	1.00	1420.00	SURCHARGED
46	Pipe - (43)	Pipe	MH 43	MH 42	168.25	-0.56	-0.72	0.1000	36.000	0.0120	18.31	22.28	0.82	2.59	3.00	1.00	1425.00	SURCHARGED
47	Pipe - (44)	Pipe	MH 44	MH 43	163.19	-0.40	-0.56	0.1000	36.000	0.0120	18.25	22.63	0.81	2.58	3.00	1.00	1425.00	SURCHARGED
48	Pipe - (45)	Pipe	MH 45	MH 44	261.00	0.00	-0.40	0.1500	36.000	0.0120	13.08	28.29	0.46	2.52	3.00	1.00	1425.00	SURCHARGED
49	Pipe - (46)	Pipe	Structure - (98)	MH 45	237.10	0.77	0.07	0.2900	12.000	0.0120	2.51	2.09	1.20	3.20	1.00	1.00	1425.00	SURCHARGED
50	Pipe - (47)	Pipe	Structure - (48)	Structure - (98)	151.07	1.07	0.77	0.2000	12.000	0.0120	2.23	1.73	1.29	3.26	1.00	1.00	1425.00	SURCHARGED
51	Pipe - (48)	Pipe	MH 46	MH 45	286.84	1.02	0.00	0.3600	24.000	0.0120	11.62	14.61	0.80	3.70	2.00	1.00	1424.00	SURCHARGED
52	Pipe - (49)	Pipe	MH 49	MH 46	35.50	1.36	1.32	0.1000	24.000	0.0120	10.37	7.70	1.35	3.32	2.00	1.00	149.00	SURCHARGED
53	Pipe - (50)	Pipe	MH 50	MH 49	118.10	1.47	1.36	0.1000	24.000	0.0120	10.78	7.65	1.41	3.76	2.00	1.00	144.00	SURCHARGED
54	Pipe - (51)	Pipe	MH 51	MH 50	181.37	1.65	1.47	0.1000	24.000	0.0120	9.65	7.72	1.25	3.32	2.00	1.00	143.00	SURCHARGED
55	Pipe - (52)	Pipe	MH 52	MH 51	167.64	1.82	1.65	0.1000	24.000	0.0120	6.96	7.80	0.89	2.45	2.00	1.00	142.00	SURCHARGED
56	Pipe - (53)	Pipe	MH 47	MH 46	182.12	1.48	1.32	0.0900	24.000	0.0120	5.35	7.26	0.74	3.18	2.00	1.00	147.00	SURCHARGED
57	Pipe - (54)	Pipe	MH 48	MH 47	204.00	1.81	1.48	0.1600	18.000	0.0120	5.73	4.58	1.25	3.26	1.50	1.00	175.00	SURCHARGED
58	Pipe - (55)	Pipe	MH 04	MH 05	248.29	0.07	-0.25	0.1300	36.000	0.0120	25.06	25.94	0.97	3.55	3.00	1.00	1420.00	SURCHARGED

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
59	Pipe - (56)	Pipe	MH 03	MH 04	184.06	0.67	0.17	0.2700	36.000	0.0120	23.45	37.66	0.62	3.49	3.00	1.00	30.00	SURCHARGED
60	Pipe - (57)	Pipe	MH 02	MH 03	165.25	1.17	0.77	0.2400	24.000	0.0120	21.12	12.06	1.75	6.72	2.00	1.00	1420.00	SURCHARGED
61	Pipe - (58)	Pipe	MH 01	MH 02	984.92	9.27	1.27	0.8100	24.000	0.0120	10.91	22.09	0.49	4.33	1.50	0.75	0.00	Calculated
62	Pipe - (59)	Pipe	MH 36	MH 34	120.11	0.23	-1.10	1.1100	30.000	0.0120	13.59	46.76	0.29	2.77	2.50	1.00	1423.00	SURCHARGED
63	Pipe - (60)	Pipe	MH 37	MH 36	173.86	1.97	0.23	1.0000	30.000	0.0120	9.94	44.45	0.22	5.07	2.50	1.00	2.00	SURCHARGED
64	Pipe - (61)	Pipe	MH 38	MH 37	16.35	1.97	1.97	0.0000	24.000	0.0120	9.74	1.92	5.08	4.40	2.00	1.00	59.00	SURCHARGED
65	Pipe - (62)	Pipe	MH 39	MH 38	132.67	2.11	1.97	0.1100	24.000	0.0120	9.75	7.96	1.22	3.10	2.00	1.00	59.00	SURCHARGED
66	Pipe - (63)	Pipe	MH 73	MH 72	146.77	-1.00	-2.85	1.2600	24.000	0.0120	7.84	27.51	0.28	3.38	2.00	1.00	1431.00	SURCHARGED
67	Pipe - (64)	Pipe	MH 74	MH 73	89.97	0.13	-1.00	1.2600	24.000	0.0120	6.24	27.51	0.23	4.15	2.00	1.00	1427.00	SURCHARGED
68	Pipe - (65)	Pipe	MH 75	MH 74	101.97	1.44	0.13	1.2800	18.000	0.0120	6.25	12.88	0.48	4.79	1.50	1.00	1425.00	SURCHARGED
69	Pipe - (66)	Pipe	MH 76	MH 75	261.50	2.31	1.44	0.3300	18.000	0.0120	6.27	6.56	0.95	3.91	1.50	1.00	89.00	SURCHARGED
70	Pipe - (67)	Pipe	MH 20	MH 19	239.12	-0.56	-0.78	0.0900	48.000	0.0120	23.41	47.20	0.50	3.61	4.00	1.00	146.00	SURCHARGED
71	Pipe - (68)	Pipe	MH 21	MH 20	363.04	-0.33	-0.53	0.0600	24.000	0.0120	8.68	5.75	1.51	2.76	2.00	1.00	1422.00	SURCHARGED
72	Pipe - (70)	Pipe	MH 24	MH 23	161.08	0.46	-0.30	0.4700	15.000	0.0120	3.70	4.81	0.77	3.02	1.25	1.00	1422.00	SURCHARGED
73	Pipe - (71)	Pipe	MH 22	MH 21	399.15	0.75	-0.33	0.2700	24.000	0.0120	6.14	12.75	0.48	2.09	2.00	1.00	1419.00	SURCHARGED
74	Pipe - (72)	Pipe	Pond	MH 20	575.54	2.00	-0.56	0.4400	36.000	0.0120	15.28	48.19	0.32	6.69	2.38	0.79	0.00	Calculated
75	Pipe - (73)	Pipe	MH 27	Pond	380.87	2.16	2.00	0.0400	36.000	0.0150	21.88	11.85	1.85	4.26	2.05	0.68	0.00	> CAPACITY
76	Pipe - (74)	Pipe	Structure - (78)	MH 27	269.44	3.08	2.32	0.2800	24.000	0.0120	8.68	13.02	0.67	2.76	2.00	1.00	8.00	SURCHARGED
77	Pipe - (75)	Pipe	MH 32	Structure - (78)	94.59	3.35	3.08	0.2900	24.000	0.0120	8.68	13.09	0.66	3.12	2.00	1.00	6.00	SURCHARGED
78	Pipe - (76)	Pipe	MH 31	MH 32	124.07	4.10	3.35	0.6000	24.000	0.0120	8.88	19.05	0.47	3.65	1.79	0.90	0.00	Calculated
79	Pipe - (77)	Pipe	MH 28	MH 27	94.57	2.44	2.16	0.3000	36.000	0.0120	13.75	39.32	0.35	2.11	2.60	0.87	0.00	Calculated
80	Pipe - (78)	Pipe	MH 29	MH 28	304.30	3.42	2.44	0.3200	36.000	0.0120	13.79	41.01	0.34	3.03	2.11	0.70	0.00	Calculated
81	Pipe - (79)	Pipe	MH 30	MH 29	40.33	3.55	3.42	0.3200	24.000	0.0120	14.06	13.91	1.01	4.86	1.85	0.93	0.00	> CAPACITY
82	Pipe - (80)	Pipe	MH 31	MH 30	120.05	3.93	3.55	0.3200	24.000	0.0120	4.94	13.79	0.36	2.01	1.88	0.94	0.00	Calculated
83	Pipe - (81)	Pipe	MH 58	MH 57	127.69	0.00	-0.30	0.2300	30.000	0.0120	13.74	21.54	0.64	4.05	2.50	1.00	1425.00	SURCHARGED
84	Pipe - (82)	Pipe	MH 59	MH 58	192.09	0.69	0.00	0.3600	30.000	0.0120	14.49	26.63	0.54	3.94	2.50	1.00	1425.00	SURCHARGED
85	Pipe - (83)	Pipe	MH 07	MH 06	29.02	-0.25	-0.90	2.2400	36.000	0.0120	22.51	108.14	0.21	3.20	3.00	1.00	1420.00	SURCHARGED
86	Pipe - (84)	Pipe	MH 08	MH 07	15.04	0.07	-0.25	2.1300	36.000	0.0120	21.67	105.40	0.21	4.12	3.00	1.00	1419.00	SURCHARGED
87	Pipe - (85)	Pipe	MH 09	MH 08	173.04	0.41	0.07	0.2000	36.000	0.0120	20.59	32.03	0.64	3.05	3.00	1.00	146.00	SURCHARGED
88	Pipe - (86)	Pipe	MH 10	MH 09	194.92	0.83	0.41	0.2200	36.000	0.0120	16.67	33.54	0.50	2.58	3.00	1.00	56.00	SURCHARGED
89	Pipe - (87)	Pipe	MH 11	MH 10	260.28	2.28	1.77	0.2000	36.000	0.0120	12.09	31.98	0.38	2.94	2.66	0.89	0.00	Calculated
90	Pipe - (88)	Pipe	MH 12	MH 15	672.90	2.07	-1.17	0.4800	15.000	0.0120	2.48	4.86	0.51	2.39	1.25	1.00	169.00	SURCHARGED
91	Pipe - (89)	Pipe	MH 79	MH 78	67.89	-0.50	-1.50	1.4700	18.000	0.0120	6.32	13.81	0.46	4.21	1.50	1.00	1433.00	SURCHARGED
92	Pipe - (90)	Pipe	MH 23	MH 21	36.08	-0.30	-0.33	0.0800	18.000	0.0120	3.84	3.28	1.17	2.17	1.50	1.00	1423.00	SURCHARGED
93	Pipe - (91)	Pipe	MH 85	MH 84	96.00	-0.51	-1.28	0.8000	30.000	0.0120	12.83	39.80	0.32	3.66	2.50	1.00	1436.00	SURCHARGED
94	Pipe - (92)	Pipe	MH 84	MH 83	16.00	-1.28	-1.41	0.8100	30.000	0.0120	17.78	40.05	0.44	4.62	2.50	1.00	1436.00	SURCHARGED
95	Pipe - (93)	Pipe	MH 83	MH 82	140.00	-1.41	-2.53	0.8000	30.000	0.0120	21.99	39.74	0.55	5.25	2.50	1.00	1436.00	SURCHARGED
96	Pipe - (94)	Pipe	MH 81	MH 82	288.06	-3.53	-3.69	0.0600	60.000	0.0120	109.89	66.50	1.65	7.15	5.00	1.00	1435.00	SURCHARGED
97	Pipe - (95)	Pipe	MH 82	MH 86	69.10	-3.69	-3.73	0.0600	60.000	0.0120	148.22	67.88	2.18	8.52	5.00	1.00	1436.00	SURCHARGED
98	Pipe - (96)	Pipe	MH 86	MH 87	456.41	-3.73	-4.06	0.0700	60.000	0.0120	150.48	75.87	1.98	8.11	5.00	1.00	1438.00	SURCHARGED
99	Pipe - (97)	Pipe	MH 87	Out-1Pipe - (97)	115.05	-4.06	-4.28	0.1900	60.000	0.0120	225.58	123.38	1.83	11.76	5.00	1.00	1439.00	SURCHARGED
100	Pipe - (98)	Pipe	MH 92	MH 91	320.00	3.51	2.71	0.2500	24.000	0.0120	13.45	12.25	1.10	4.28	2.00	1.00	16.00	SURCHARGED
101	Pipe - (99)	Pipe	MH 91	MH 90	144.00	2.46	2.17	0.2000	24.000	0.0120	13.45	11.00	1.22	4.28	2.00	1.00	23.00	SURCHARGED

Proposed Gravity Upgrade 25 Year Ponding Elevations

SN	Element ID	Outlet ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ponded Area (ft^2)	Pipe Diameter (in)	Average Pipe Slope (%)	Peak Inflow (cfs)	Maximum HGL Elevation Attained (ft)	Proposed Max Surcharge Depth (ft)	Existing Max Surcharge Depth (ft)
1	Proposed MH	MH 66	-1.45	5.00	0	48.0	0.10	25.18	4.45	-0.55	
2	MH 01	MH 02	9.27	13.67	9170	24.0	0.81	11.11	10.26	-3.41	1.29
3	MH 02	MH 03	1.17	6.08	28220	24.0	0.24	19.16	6.08	0.00	0.52
4	MH 03	MH 04	0.67	5.17	27800	36.0	0.27	21.12	5.17	0.00	0.27
5	MH 04	MH 05	0.07	4.71	27800	36.0	0.13	23.45	4.71	0.00	0.01
6	MH 05	Structure - (42)	-0.25	4.48	27800	36.0	1.94	30.33	4.24	-0.24	-0.11
7	MH 06	MH 13	-0.90	3.62	1710	36.0	0.09	24.33	3.97	0.35	1.17
8	MH 07	MH 06	-0.25	3.80	1710	36.0	2.24	22.51	4.06	0.26	1.10
9	MH 08	MH 07	0.07	4.17	1710	36.0	2.13	21.67	4.20	0.03	0.92
10	MH 09	MH 08	0.41	4.77	1710	36.0	0.20	20.59	4.68	-0.09	1.61
11	MH 10	MH 09	0.83	5.17	1710	36.0	0.22	19.90	5.17	0.00	2.73
12	MH 11	MH 10	2.28	5.97	1710	36.0	0.20	15.51	5.03	-0.94	4.27
13	MH 12	MH 15	2.07	5.17	1710	15.0	0.48	2.48	5.18	0.01	0.01
14	MH 13	MH 14	-0.92	3.87	1710	36.0	0.09	22.45	4.02	0.15	0.93
15	MH 14	MH 15	-1.15	5.37	1710	36.0	0.08	22.57	4.07	-1.30	-0.53
16	MH 15	MH 16	-1.17	5.77	1710	36.0	0.02	23.93	4.09	-1.68	-0.91
17	MH 16	MH 17	-1.20	5.17	14960	36.0	0.02	24.04	4.10	-1.07	-0.30
18	MH 17	MH 18	-1.21	4.87	14960	36.0	0.03	24.16	4.26	-0.61	0.01
19	MH 18	MH 19	-1.28	4.84	14960	36.0	0.04	19.30	4.50	-0.34	-0.17
20	MH 19	MH 62	-1.32	4.62	14960	60.0	0.03	47.70	4.65	0.03	0.02
21	MH 20	MH 19	-0.56	7.84	1000	48.0	0.09	23.52	5.17	-2.67	0.00
22	MH 21	MH 20	-0.33	4.25	39580	30.0	0.06	8.68	3.94	-0.31	-0.53
23	MH 22	MH 21	0.75	3.59	39580	24.0	0.27	7.83	3.98	0.39	0.23
24	MH 23	MH 21	-0.30	4.25	39580	15.0	0.08	3.84	3.85	-0.40	-0.53
25	MH 24	MH 23	0.46	3.10	39580	18.0	0.47	3.70	3.59	0.49	1.23
26	MH 27	Pond	2.16	10.47	7970	36.0	0.04	21.96	4.85	-5.62	-4.03
27	MH 28	MH 27	2.44	10.17	7970	36.0	0.30	13.79	4.95	-5.22	-2.97
28	MH 29	MH 28	3.42	9.07	7970	36.0	0.32	14.06	5.12	-3.95	0.00
29	MH 30	MH 29	3.55	8.47	7970	24.0	0.32	14.06	5.63	-2.84	1.09
30	MH 31	MH 32	3.93	8.47	7970	24.0	0.60	13.89	5.69	-2.78	1.15
31	MH 32	Structure - (78)	3.35	7.76	7970	24.0	0.29	8.88	5.48	-2.28	0.44
32	MH 33	MH 18	-0.76	4.81	37670	24.0	0.06	9.57	4.48	-0.33	-0.08
33	MH 34	MH 35	-1.10	4.50	37670	48.0	0.09	21.77	4.36	-0.14	0.15
34	MH 35	Proposed MH	-1.19	4.48	37670	48.0	0.09	26.06	4.39	-0.09	0.34
35	MH 36	MH 34	0.23	4.47	37670	30.0	1.11	9.95	4.48	0.01	0.30
36	MH 37	MH 36	1.97	5.27	34215	30.0	1.00	9.74	5.17	-0.10	-0.11
37	MH 38	MH 37	1.97	5.47	34215	24.0	0.00	9.75	5.07	-0.40	-0.19
38	MH 39	MH 38	2.11	5.37	34215	24.0	0.11	9.74	5.37	0.00	0.30
39	MH 40	MH 34	-0.92	4.08	22120	36.0	0.06	12.82	4.24	0.16	0.64
40	MH 41	MH 40	0.20	3.70	22120	18.0	0.83	6.10	4.19	0.49	0.83
41	MH 42	MH 53	-0.72	4.88	40220	36.0	0.10	27.23	4.64	-0.24	0.00
42	MH 43	MH 42	-0.56	4.75	38800	36.0	0.10	18.25	4.68	-0.07	0.00
43	MH 44	MH 43	-0.40	4.35	38800	30.0	0.10	17.65	4.72	0.37	0.42
44	MH 45	MH 44	0.00	4.07	38800	30.0	0.20	22.74	4.79	0.72	0.83
45	MH 46	MH 45	1.02	5.22	47550	30.0	0.31	15.61	5.02	-0.20	-0.11
46	MH 47	MH 46	1.48	4.98	47550	24.0	0.09	7.36	4.99	0.01	0.09

Proposed Gravity Upgrade 25 Year Ponding Elevations

SN	Element ID	Outlet ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ponded Area (ft^2)	Pipe Diameter (in)	Average Pipe Slope (%)	Peak Inflow (cfs)	Maximum HGL Elevation Attained (ft)	Proposed Max Surcharge Depth (ft)	Existing Max Surcharge Depth (ft)
47	MH 48	MH 47	1.81	4.73	47550	18.0	0.16	11.36	5.01	0.28	0.36
48	MH 49	MH 46	1.36	5.20	13830	24.0	0.10	10.37	5.10	-0.10	0.00
49	MH 50	MH 49	1.47	6.81	13830	24.0	0.10	13.29	5.17	-1.64	0.00
50	MH 51	MH 50	1.65	5.20	13830	24.0	0.10	12.28	5.26	0.06	0.33
51	MH 52	MH 51	1.82	5.20	13830	24.0	0.10	9.89	5.39	0.19	0.76
52	MH 53	MH 54	-0.90	5.30	40220	36.0	0.10	18.00	4.58	-0.72	0.00
53	MH 54	MH 56	-1.19	5.38	40220	36.0	0.10	23.86	4.88	-0.50	0.09
54	MH 55	MH 54	0.09	4.49	60950	18.0	0.40	7.06	4.55	0.06	0.28
55	MH 56	MH 68	-1.48	5.07	40220	36.0	0.08	27.86	4.49	-0.58	0.12
56	MH 57	MH 42	-0.30	5.87	48370	30.0	0.14	13.74	5.11	-0.76	-0.75
57	MH 58	MH 57	0.00	4.87	12650	30.0	0.23	14.49	4.87	0.00	0.10
58	MH 59	MH 58	0.69	4.57	12650	30.0	0.36	14.79	4.67	0.10	0.56
59	MH 60	MH 57	-0.05	6.07	48370	30.0	0.08	7.82	6.07	0.00	-0.24
60	MH 61	MH 60	0.05	6.27	48370	30.0	0.06	9.74	6.27	0.00	0.12
61	MH 62	MH 63	-1.46	7.07	25650	60.0	0.08	55.09	4.67	-2.40	-0.99
62	MH 63	MH 66	-1.49	7.07	25650	60.0	0.09	63.55	4.65	-2.42	0.00
63	MH 64	MH 63	1.05	7.27	15070	15.0	0.36	5.66	5.70	-1.57	-0.08
64	MH 65	MH 64	2.29	8.37	15071	15.0	0.41	5.66	8.37	0.00	0.00
65	MH 66	MH 67	-1.74	5.67	25650	60.0	0.09	73.61	4.52	-1.15	0.00
66	MH 67	MH 70	-2.00	4.72	25650	60.0	-0.07	75.25	4.42	-0.30	0.00
67	MH 68	MH 69	-1.52	4.77	47180	48.0	0.09	27.72	4.40	-0.37	0.04
68	MH 69	MH 70	-1.95	4.67	47180	48.0	0.13	29.71	4.39	-0.28	0.00
69	MH 70	MH 71	-1.97	4.67	47180	60.0	0.18	78.20	4.38	-0.29	0.00
70	MH 71	MH 72	-2.56	4.50	52480	60.0	0.10	67.85	4.22	-0.28	0.00
71	MH 72	MH 77	-2.85	4.40	52480	60.0	0.06	72.43	4.13	-0.27	0.00
72	MH 73	MH 72	-1.00	4.40	44550	24.0	1.26	9.23	4.24	-0.16	0.02
73	MH 74	MH 73	0.13	4.50	44550	24.0	1.26	6.25	4.32	-0.18	0.02
74	MH 75	MH 74	1.44	4.63	44550	18.0	1.28	6.27	4.63	0.00	0.15
75	MH 76	MH 75	2.31	5.27	44550	18.0	0.33	11.11	5.45	0.18	0.48
76	MH 77	MH 78	-2.94	4.29	43370	60.0	0.06	77.47	4.08	-0.21	0.01
77	MH 78	MH 80	-3.05	4.00	43370	60.0	0.06	88.12	4.00	0.00	0.23
78	MH 79	MH 78	-0.50	3.70	43370	12.0	2.21	10.27	4.09	0.39	0.70
79	MH 80	MH 81	-3.24	3.60	1000	60.0	0.06	100.34	3.98	0.38	0.59
80	MH 81	MH 82	-3.53	3.96	35430	60.0	0.06	112.40	3.84	-0.12	0.10
81	MH 82	MH 86	-3.69	4.37	35430	60.0	0.06	148.22	3.73	-0.64	0.00
82	MH 83	MH 82	-1.41	4.47	35430	30.0	0.80	21.99	3.90	-0.57	-0.35
83	MH 84	MH 83	-1.28	4.67	35430	30.0	0.81	19.80	3.97	-0.70	-0.47
84	MH 85	MH 84	-0.51	4.07	35430	30.0	0.80	13.46	4.08	0.01	0.32
85	MH 86	MH 87	-3.73	5.50	35430	60.0	0.07	150.98	3.65	-1.85	-1.21
86	MH 87	Out-1Pipe - (97)	-4.06	7.14	1000	60.0	0.19	225.58	5.51	-1.63	-1.74
87	MH 88	MH 87	-0.09	6.07	29080	24.0	0.20	16.25	4.10	-1.97	-2.10
88	MH 89	MH 88	2.01	5.87	29080	24.0	0.19	13.46	4.57	-1.30	-1.62
89	MH 90	MH 89	2.17	5.87	29080	24.0	0.20	13.45	5.11	-0.76	-1.26
90	MH 91	MH 90	2.46	6.30	29080	24.0	0.20	13.45	5.81	-0.49	-1.18
91	MH 92	MH 91	3.51	7.17	29080	24.0	0.25	13.44	7.08	-0.09	0.36
92	MH 93	MH 38	2.69	5.39	34215	18.0	0.25	5.89	5.39	0.00	0.00

Proposed Gravity Upgrade 25 Year Ponding Elevations

SN	Element ID	Outlet ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ponded Area (ft^2)	Pipe Diameter (in)	Average Pipe Slope (%)	Peak Inflow (cfs)	Maximum HGL Elevation Attained (ft)	Proposed Max Surcharge Depth (ft)	Existing Max Surcharge Depth (ft)
93	Structure - (17)	Structure - (18)	-0.91	5.57	0	24.0	0.20	9.36	4.44	-1.13	-0.88
94	Structure - (18)	MH 34	-1.07	6.69	0	24.0	0.03	9.59	4.41	-2.28	-2.08
95	Structure - (42)	MH 06	-0.53	3.49	0	36.0	0.09	45.54	3.49	0.00	0.00
96	Structure - (48)	Structure - (98)	1.07	5.67	0	12.0	0.20	2.23	5.67	0.00	0.00
97	Structure - (78)	MH 27	3.08	7.76	0	24.0	0.28	8.68	5.26	-2.50	-0.11
98	Structure - (98)	MH 45	0.77	5.17	0	12.0	0.29	2.51	5.17	0.00	0.00

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APPENDIX F

Proposed Pump Station 25 Year Pipe Capacities

From (Inlet) Node	To (Outlet) Node	Length (ft)	Average Slope (%)	Pipe Diameter or Height (in)	Peak Flow (cfs)	Design Flow Capacity (cfs)	Meets Capacity (Y/N)
MH 01	MH 02	984.92	0.7300	18.000	9.67	9.75	Y
MH 02	MH 03	165.25	0.5100	24.000	17.43	17.55	Y
MH 03	MH 04	184.06	0.5100	24.000	17.42	17.55	Y
MH 04	MH 05	248.29	0.5100	24.000	17.40	17.55	Y
MH 05	Structure - (42)	14.42	0.2800	30.000	23.35	23.58	Y
MH 06	MH 13	21.90	0.5000	36.000	29.97	51.23	Y
MH 07	MH 06	29.02	0.5000	36.000	11.47	51.23	Y
MH 08	MH 07	15.04	0.5000	36.000	10.77	51.23	Y
MH 09	MH 08	173.04	0.6000	24.000	10.39	19.03	Y
MH 10	MH 09	194.92	0.6000	24.000	10.24	19.03	Y
MH 11	MH 10	260.28	0.4100	24.000	9.92	15.73	Y
MH 12	MH 15	672.90	0.4800	15.000	1.26	4.86	Y
MH 13	MH 14	253.94	0.3200	36.000	29.51	40.98	Y
MH 14	MH 15	25.86	0.4000	36.000	29.12	45.82	Y
MH 15	MH 16	148.56	0.4000	36.000	28.12	45.82	Y
MH 16	MH 17	43.34	0.4000	36.000	27.68	45.82	Y
MH 17	MH 18	272.42	0.4000	36.000	34.70	45.82	Y
MH 18	MH 19	94.26	0.4000	36.000	33.61	45.82	Y
MH 19	MH 62	504.30	0.4500	36.000	39.12	48.60	Y
MH 20	MH 19	239.12	0.6000	24.000	14.06	19.03	Y
MH 21	MH 20	363.04	0.5000	18.000	7.06	8.07	Y
MH 22	MH 21	399.15	0.5000	18.000	6.23	8.07	Y
MH 23	MH 21	36.08	1.9400	18.000	2.42	15.89	Y
MH 24	MH 23	161.08	0.4700	15.000	2.40	4.81	Y
MH 27	Pond	210.45	0.3000	30.000	22.13	24.40	Y
MH 28	MH 27	94.57	0.3900	24.000	12.41	15.35	Y
MH 29	MH 28	304.30	0.3000	24.000	12.46	13.46	Y
MH 30	MH 29	40.33	0.3000	24.000	12.56	13.46	Y
MH 31	MH 32	124.07	1.0000	18.000	10.39	11.41	Y
MH 31	MH 30	120.05	0.3200	15.000	3.49	3.97	Y
MH 32	Structure - (78)	94.59	0.5000	24.000	10.21	17.38	Y
MH 33	MH 18	137.02	0.0600	24.000	1.83	6.02	Y
MH 34	MH 35	99.30	0.7000	18.000	8.94	9.55	Y
MH 35	MH 41	298.63	0.4500	30.000	19.28	29.89	Y
MH 36	MH 34	120.11	0.7000	18.000	8.94	9.55	Y
MH 37	MH 36	173.86	0.8000	18.000	8.94	10.21	Y
MH 38	MH 37	16.35	0.7000	18.000	8.95	9.55	Y
MH 39	MH 38	132.67	1.0000	18.000	9.55	11.41	Y
MH 40	MH 41	135.00	1.0000	15.000	4.06	7.02	Y
MH 41	MH 53	513.33	0.5000	30.000	25.78	31.51	Y
MH 42	MH 53	178.00	0.7000	30.000	23.11	37.28	Y

MH 43	MH 42	168.25	0.7000	30.000	23.09	37.28	Y
MH 44	MH 43	163.19	0.7000	30.000	23.16	37.28	Y
MH 45	MH 44	261.00	0.7000	30.000	23.30	37.28	Y
MH 46	MH 45	286.84	0.7000	24.000	16.42	20.56	Y
MH 47	MH 46	182.12	0.7200	24.000	11.42	20.85	Y
MH 48	MH 47	204.00	0.7000	24.000	11.33	20.56	Y
MH 49	MH 46	35.50	0.7000	24.000	12.25	20.56	Y
MH 50	MH 49	118.10	0.7000	24.000	12.25	20.56	Y
MH 51	MH 50	181.37	0.7000	24.000	12.26	20.56	Y
MH 52	MH 51	167.64	0.7000	24.000	12.28	20.56	Y
MH 53	MH 54	298.77	0.4000	36.000	44.30	45.82	Y
MH 54	MH 56	291.18	0.6000	36.000	47.69	56.12	Y
MH 55	MH 54	320.64	1.5000	24.000	3.80	30.10	Y
MH 56	MH-94	285.46	0.5000	48.000	103.59	110.33	Y
MH 57	MH 60	302.70	1.0000	24.000	14.55	24.57	Y
MH 58	MH 57	127.69	1.0000	24.000	14.60	24.57	Y
MH 59	MH 58	192.09	0.8000	24.000	14.69	21.98	Y
MH 60	MH 61	177.87	1.0000	24.000	14.43	24.57	Y
MH 61	MH-94	282.24	1.0000	24.000	17.03	24.57	Y
MH 62	MH 63	38.64	0.5000	36.000	39.16	51.23	Y
MH 63	MH 66	278.67	0.5000	36.000	40.67	51.23	Y
MH 64	MH 63	50.10	0.3600	18.000	5.38	6.85	Y
MH 65	MH 64	306.12	0.4100	18.000	5.53	7.31	Y
MH 66	MH 67	274.49	0.5000	36.000	41.77	51.23	Y
MH 67	MH 70	42.09	0.5000	36.000	41.79	51.23	Y
MH 68	MH 56	48.09	0.5000	42.000	52.78	77.28	Y
MH 69	MH 68	459.16	0.5000	42.000	52.69	77.28	Y
MH 70	MH 69	15.86	0.5000	42.000	51.69	77.28	Y
MH 71	MH 70	336.69	0.6000	24.000	17.57	19.03	Y
MH 72	MH 71	286.81	0.5000	24.000	11.12	17.38	Y
MH 73	MH 72	146.77	0.5000	24.000	11.12	17.38	Y
MH 74	MH 73	89.97	0.5000	24.000	11.10	17.38	Y
MH 75	MH 74	101.97	0.5000	24.000	11.11	17.38	Y
MH 76	MH 75	261.50	0.5000	24.000	11.11	17.38	Y
MH 78	MH 80	337.96	0.1000	36.000	9.86	22.91	Y
MH 79	MH 78	67.89	2.2100	15.000	9.78	10.43	Y
MH 80	MH-99	146.37	0.1000	36.000	16.94	22.91	Y
MH 81	MH 82	288.06	0.4000	24.000	14.49	15.54	Y
MH 82	MH 86	69.10	0.3900	30.000	25.68	27.82	Y
MH 83	MH 82	140.00	0.8500	18.000	9.59	10.52	Y
MH 84	MH 83	16.00	0.8800	15.000	4.89	6.58	Y
MH 85	MH 84	96.00	0.6500	15.000	4.79	5.66	Y
MH 86	MH 87	456.41	0.4000	30.000	26.12	28.18	Y
MH 87	Out-1Pipe - (97)	115.05	1.7000	30.000	53.26	58.09	Y
MH 88	MH 87	150.01	0.7500	18.000	7.26	9.88	Y
MH 89	MH 88	52.00	0.7100	18.000	7.20	9.61	Y
MH 90	MH 89	80.00	0.5000	18.000	7.13	8.07	Y

MH 91	MH 90	144.00	0.5000	18.000	7.16	8.07	Y
MH 92	MH 91	320.00	0.4400	18.000	7.18	7.57	Y
MH 93	MH 38	286.60	0.7000	15.000	1.95	5.87	Y
MH-94	MH-95	89.01	0.6000	48.000	109.93	120.86	Y
MH-95	MH-96	269.24	0.6000	48.000	109.90	120.86	Y
MH-96	MH-97	379.26	0.6000	48.000	109.90	120.86	Y
MH-97	MH-98	110.00	0.9000	48.000	109.91	148.03	Y
MH-98	Pump-1	25.00	0.7000	48.000	124.78	130.55	Y
MH-99	MH-98	506.53	2.5000	18.000	16.92	18.04	Y
Pond	MH 20	336.43	0.3300	36.000	6.52	41.62	Y
Pump-2	MH-100	996.67	0.4000	54.000	129.86	135.10	Y
Structure - (42)	MH 06	412.92	0.2700	30.000	23.34	23.15	Y
Structure - (78)	MH 27	269.44	0.3000	24.000	9.89	13.46	Y

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

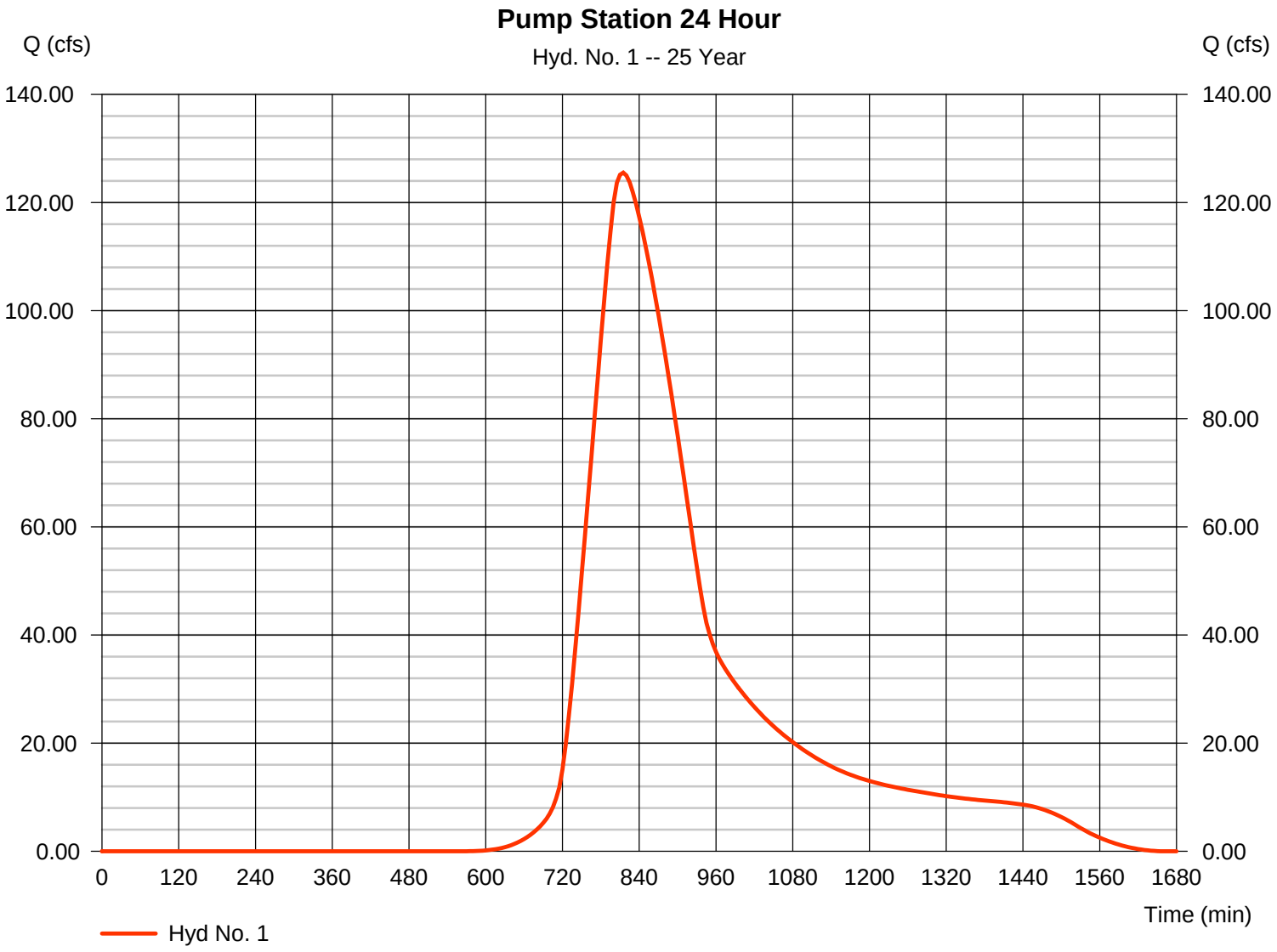
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	125.53	5	815	1,697,668	------	------	------	Pump Station 24 Hour
2	Rational	127.49	1	142	1,086,213	------	------	------	Prop Pump Station
3	SCS Runoff	59.86	2	272	790,118	------	------	------	Pump Station 6 Hour

Hydrograph Report

Hyd. No. 1

Pump Station 24 Hour

Hydrograph type	=	SCS Runoff	Peak discharge	=	125.53 cfs
Storm frequency	=	25 yrs	Time to peak	=	815 min
Time interval	=	5 min	Hyd. volume	=	1,697,668 cuft
Drainage area	=	168.908 ac	Curve number	=	67
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	142.00 min
Total precip.	=	6.34 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



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APPENDIX G

Tighe&Bond
Consulting Engineers
Environmental Specialists

Prep'd Date 12/20/2018 By PAR
Ch'kd Date 12/20/2018 By JAR
Town of Fairfield, CT
Funds
Town No.
Project No. F0439-8
Sheet No. 1 of 2

Opinion of Probable Cost for the Construction of

Project Description South Benson Pump Station
Fairfield, CT

Drainage Improvements

No.	Item	Unit	Quantity	Price	Amount
1	15" RCP	LF	1,556	$75.00	$116,700.00
2	18" RCP	LF	4,200	$105.00	$441,000.00
3	24" RCP	LF	6,500	$120.00	$780,000.00
4	30" RCP	LF	2,860	$150.00	$429,000.00
5	36" RCP	LF	3,453	$225.00	$776,925.00
6	42" RCP	LF	525	$300.00	$157,500.00
7	48" RCP	LF	1158	$450.00	$521,100.00
8	54" RCP	LF	0	$550.00	$0.00
9	60" RCP	LF	0	$650.00	$0.00
10	Permanent Patch at Trench	SY	22500	$65.00	$1,462,500.00
11	Full Width Mill & Overlay	SY	62320	$25.00	$1,558,000.00
12	Mobilization (7.5%)	LS	1		$468,204.38
13	Construction Staking (1%)	LS	1		$62,427.25
14	Maintenance & Protection of Traffic (5%)	LS	1		$312,136.25
	Subtotal				$7,085,492.88
	Design & Construction Admin./Observation (15%)				$1,062,823.93
	Contingency (10%)				$814,831.68
	TOTAL			SAY	$8,960,000.00

Tighe&Bond
Consulting Engineers
Environmental Specialists

Prep'd Date 12/20/2018 By PAR
Ch'kd Date 12/20/2018 By JAR
Town of Fairfield, CT
Funds
Town No.
Project No.
Sheet No. 2 of 2

Opinion of Probable Cost for the Construction of

Project Description South Benson Pump Station
Fairfield, CT

Gravity Upgrade

No.	Item	Unit	Quantity	Price	Amount
1	15" RCP	LF	300	$75.00	$22,500.00
2	18" RCP	LF	1,319	$105.00	$138,495.00
3	24" RCP	LF	4,845	$120.00	$581,400.00
4	30" RCP	LF	1,250	$150.00	$187,500.00
5	36" RCP	LF	5,359	$165.00	$884,235.00
6	42" RCP	LF	0	$205.00	$0.00
7	48" RCP	LF	1760	$300.00	$528,000.00
8	54" RCP	LF	0	$400.00	$0.00
9	60" RCP	LF	3885	$500.00	$1,942,500.00
10	Permanent Patch at Trench	SY	20800	$65.00	$1,352,000.00
11	Full Width Mill and Overlay	SY	61400	$25.00	$1,535,000.00
11	Mobilization (7.5%)	LS	1		$537,872.25
12	Construction Staking (1%)	LS	1		$71,716.30
13	Maintenance & Protection of Traffic (5%)	LS	1		$358,581.50
	Subtotal				$8,139,800.05
	Design & Construction Oversight (15%)				$1,220,970.01
	Contingency (10%)				$936,077.01
	TOTAL			SAY	$10,300,000.00

Tighe&Bond

APPENDIX H

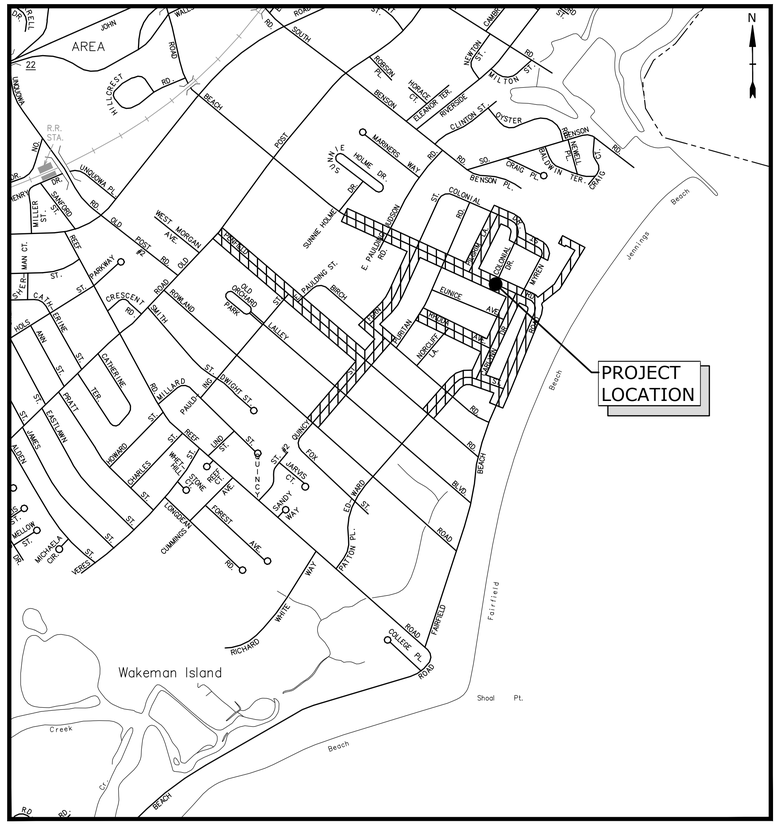
SOUTH BENSON PUMP STATION DRAINAGE IMPROVEMENTS

PROJECT NO: F0439-08

FAIRFIELD,CT

OCTOBER 1, 2018

LIST OF DRAWINGS	
SHEET NO.	SHEET TITLE
	COVER
C1.00	GENERAL NOTES, LEGEND AND STANDARD ABBREVIATIONS PLAN
C2.00	SHEET INDEX PLAN
C3.01	PLAN AND PROFILE PENFIELD ROAD STA: 0+00 TO 5+50
C3.02	PLAN AND PROFILE PENFIELD ROAD STA: 5+50 TO 11+00
C3.03	PLAN AND PROFILE PENFIELD ROAD STA: 11+00 TO 16+50
C3.04	PLAN AND PROFILE PENFIELD ROAD STA: 16+50 TO 21+25
C3.05	PLAN AND PROFILE QUINCY STREET STA: 0+00 TO 5+00
C3.06	PLAN AND PROFILE QUINCY STREET STA: 5+00 TO 9+69
C3.07	PLAN AND PROFILE BIRCH ROAD STA: 0+00 TO 2+72
C3.08	PLAN AND PROFILE FERN STREET STA: 0+00 TO 4+50
C3.09	PLAN AND PROFILE FERN STREET STA: 4+50 TO 9+33
C3.10	PLAN AND PROFILE BEACH ROAD STA: 0+00 TO 4+50
C3.11	PLAN AND PROFILE BEACH ROAD STA: 4+50 TO 9+00
C3.12	PLAN AND PROFILE BEACH ROAD STA: 9+00 TO 13+50
C3.13	PLAN AND PROFILE BEACH ROAD STA: 13+50 TO 18+35
C3.14	PLAN AND PROFILE PILGRIM LANE STA: 0+00 TO 4+00
C3.15	PLAN AND PROFILE PILGRIM LANE STA: 4+00 TO 6+70
C3.16	PLAN AND PROFILE COLONIAL DRIVE STA: 0+00 TO 3+50
C3.17	PLAN AND PROFILE MYREN STREET STA: 3+50 TO 6+79
C3.18	PLAN AND PROFILE CARLYNN DRIVE STA: 0+00 TO 5+00
C3.19	PLAN AND PROFILE CARLYNN DRIVE STA: 5+00 TO 9+50
C3.20	PLAN AND PROFILE EDWARD STREET STA: 0+00 TO 5+00
C3.21	PLAN AND PROFILE EDWARD STREET STA: 5+00 TO 7+82
C3.22	PLAN AND PROFILE RHODA AVENUE STA: 0+00 TO 5+00
C3.23	PLAN AND PROFILE RHODA AVENUE STA: 5+00 TO 8+27
C3.24	PLAN AND PROFILE FAIRFIELD BEACH ROAD STA: 0+00 TO 3+50
C3.25	PLAN AND PROFILE FAIRFIELD BEACH ROAD STA: 3+50 TO 7+50
C3.26	PLAN AND PROFILE FAIRFIELD BEACH ROAD STA: 7+50 TO 11+25
C3.27	PLAN AND PROFILE PARKING LOT STA: -0+25 TO 4+00
C3.28	PLAN AND PROFILE PARKING LOT STA: 4+00 TO 8+60
C4.10	SITE DETAILS-1
C4.20	SITE DETAILS-2
C4.30	SITE DETAILS-3
C4.40	SITE DETAILS-4
C4.50	SITE DETAILS-5
C4.60	SITE DETAILS-6
C4.70	SITE DETAILS-7
C4.80	SITE DETAILS-8
C4.90	SITE DETAILS-9



LOCATION MAP
SCALE: 1" = 750'

PREPARED BY:

Tighe&Bond
www.tighebond.com

JONATHAN A. RICHER, P.E.

DANA C. HUFF, P.E.

PREPARED FOR:

TOWN OF FAIRFIELD
MICHAEL C. TETREAU, FIRST SELECTMAN

DEPARTMENT OF PUBLIC WORKS
JOSEPH MICHELANGELO, P.E., DIRECTOR

PRELIMINARY SET
NOT FOR CONSTRUCTION

COMPLETE SET 40 SHEETS

Last Saved: 12/21/2018
Plotted On: Dec 21, 2018 - 1:26pm By: JAR
Tighe & Bond J:\F\F0439 Fairfield Target Client Business Development\08 South Benson Pump Station\Drawings_ Figures\AutoCAD\Drainage\Sheets\F0439-08-C000-COVR.dwg

GENERAL NOTES

1. ALL ELEVATIONS SHOWN ARE IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. ALL SURVEY INFORMATION IS BASED UPON PLANS PREPARED BY MARTIN SURVEYING ASSOCIATES, KENSINGTON, CONNECTICUT.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE POLICE AND FIRE DEPARTMENTS ON A DAILY BASIS, TO INFORM THEM OF CONSTRUCTION ACTIVITY ON THE PROJECT, INCLUDING CHANGES IN TRAFFIC PATTERNS.
4. SPECIAL ATTENTION OF THE CONTRACTOR IS CALLED TO THE METHOD OF BACKFILLING AND COMPACTION OF TRENCHES AS SET FORTH IN THE SPECIFICATIONS AND SHOWN ON THE PLANS.
5. ALL TRAFFIC CONTROL, INFORMATIONAL, DIRECTION, OR STREET NAME SIGNS REMOVED BY THE CONTRACTOR TO FACILITATE CONSTRUCTION, WILL BE REPLACED BY THE CONTRACTOR AS SOON AS PRACTICABLE AFTER PARTICULAR WORK HAS BEEN COMPLETED.
6. IT IS THE RESPONSIBILITY OF THE CONTRACTOR IN EVALUATING THESE PLANS TO MAKE EXAMINATIONS IN THE FIELD BY VARIOUS METHODS AND OBTAIN NECESSARY INFORMATION FROM AVAILABLE RECORDS, UTILITY COMPANIES, AND INDIVIDUALS AS TO THE LOCATION OF SUBSURFACE STRUCTURES.
7. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW ALL OF THE DRAWINGS AND SPECIFICATIONS ASSOCIATED WITH THIS PROJECT WORK SCOPE PRIOR TO THE INITIATION OF CONSTRUCTION. SHOULD THE CONTRACTOR FIND A CONFLICT WITH THE DOCUMENTS RELATIVE TO THE DRAWINGS, SPECIFICATIONS OR APPLICABLE CODES, IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE ENGINEER IN WRITING PRIOR TO THE START OF CONSTRUCTION. FAILURE BY THE CONTRACTOR TO NOTIFY THE ENGINEER SHALL CONSTITUTE ACCEPTANCE OF FULL RESPONSIBILITY BY THE CONTRACTOR TO COMPLETE THE SCOPE OF WORK AS DEFINED BY THE DRAWINGS AND IN FULL CONFORMANCE WITH ALL REGULATIONS AND CODES.
8. AT ALL LOCATIONS WHERE THE CONTRACTOR IS REQUIRED TO REMOVE EXISTING PAVEMENT AREAS (WHICH ARE NOT TO BE RECONSTRUCTED) FOR THE INSTALLATION OF THE PROPOSED UTILITIES, THE PAVEMENT SHALL BE REPAIRED AS SHOWN ON THE CONTRACT DRAWINGS AND REQUIRED BY THE TOWN OF FAIRFIELD.
9. AS CONSTRUCTION IS COMPLETED, THE CONTRACTOR SHALL REMOVE ALL EXCESS MATERIAL, DEBRIS, ETC. AND RESTORE OR REPLACE ANY DAMAGE TO STREETSCAPE AND LANDSCAPING OUTSIDE OF THE PROJECT AREA.
10. CONTRACTOR SHALL COORDINATE WITH APPROPRIATE UTILITY COMPANIES REGARDING ALL UTILITY BOXES, FRAMES, AND GRATES, ETC. AFFECTED BY THE CONSTRUCTION ACTIVITIES. ALL UTILITIY FACILITIES THAT ARE NOT IDENTIFIED AS BEING REMOVED SHALL BE RESET OR RECONSTRUCTED (AS REQUIRED) TO THE PROPER GRADE.
11. EXCAVATION OF ANY TYPE SHALL BE ACCOMPLISHED IN SUCH A MANNER THAT UNDERGROUND UTILITIES OR STRUCTURES NOT IDENTIFIED FOR REMOVAL ARE NOT DAMAGED. IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY FOR ANY DAMAGE INCURRED TO THESE FACILITIES DURING EXCAVATION OPERATIONS. ALL EXCAVATION SHALL BE IN CONFORMANCE WITH THE LATEST OSHA REQUIREMENTS.
12. ALL DRIVEWAYS, ROADS, STAIRS, AND SIDEWALKS DISTURBED BY THE CONSTRUCTION OUTSIDE THE PROJECT LIMIT LINE SHALL BE RETURNED TO THEIR ORIGINAL CONDITION OR BETTER AND SHALL BE GRADED TO MEET THE PROPOSED CONSTRUCTION AS DIRECTED BY THE ENGINEER AT NO ADDITIONAL COST.
13. THE CONTRACTOR SHALL SUFFICIENTLY COVER ALL DISTURBED AREAS AT THE END OF EACH WORK DAY TO AVOID ANY RISK OF INJURY TO PEDESTRIAN OR VEHICULAR TRAFFIC. THE CONTRACTOR SHALL INSTALL TEMPORARY SUPPORT SYSTEMS OVER TRENCH EXCAVATIONS THAT ARE TAMPER RESISTANT AND SAFE FOR VEHICULAR AND PEDESTRIAN TRAFFIC. THE CONTRACTOR SHALL INSTALL BARRICADES AND FENCES TO PROTECT AGAINST PEDESTRIAN ACCESS. THE CONTRACTOR SHALL OBTAIN APPROVAL OF THE TEMPORARY SAFETY MEASURES BY THE ENGINEER.
14. THE STANDARD SPECIFICATIONS SHALL FOLLOW THE TOWN OF FAIRFIELD STANDARD DETAILS AND REQUIREMENTS, AND THE THE STATE OF CONNECTICUT, DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS FOR ROADS, BRIDGES, AND INCIDENTAL CONSTRUCTION, FORM 817, 2016, INCLUDING ALL SUPPLEMENTS THERETO.
15. THE CONTRACTOR SHALL RECORD THE LOCATIONS OF ALL UNDERGROUND UTILITIES INSTALLED OR FOUND DURING CONSTRUCTION. THE UTILITIES SHALL BE MEASURED FROM PERMANENT SURFACE FEATURES AND COMPILED BY THE CONTRACTOR ON RECORD DRAWINGS.
16. THE CONTRACTOR SHALL NOTIFY THE RESIDENT ENGINEER SHOULD THERE BE ANY CONFLICTS BETWEEN EXISTING UTILITIES AND PROPOSED CONSTRUCTION.
17. ALL DIMENSIONS, ELEVATIONS, AND EXISTING CONDITIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER.
18. THE CONTRACTOR SHALL NOT INTERRUPT EXISTING UTILITIES SERVICING FACILITIES OCCUPIED AND USED BY PROPERTY OWNERS OR OTHERS DURING OCCUPIED HOURS EXCEPT WHEN SUCH INTERRUPTIONS HAVE BEEN AUTHORIZED IN WRITING BY THE TOWN. INTERRUPTIONS SHALL ONLY OCCUR AFTER ACCEPTABLE TEMPORARY SERVICE HAS BEEN PROVIDED.
19. THE CONTRACTOR SHALL RESTORE ANY DRAINAGE STRUCTURE, PIPE, UTILITY, PAVEMENT, CURBS, SIDEWALKS, PRIVATE WALKS, STEPS, OR LANDSCAPED AREAS DISTURBED OUTSIDE OF THE PROJECT LIMITS DURING CONSTRUCTION TO THEIR ORIGINAL CONDITION OR BETTER AS APPROVED BY THE ENGINEER, AT NO ADDITIONAL COST TO THE TOWN.
20. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS REQUIRED BY GOVERNMENT AGENCIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL OBTAIN ANY TOWN OF FAIRFIELD PERMITS FOR WORK WITHIN ROAD RIGHT OF WAY. THE CONTRACTOR SHALL POST ALL BONDS, PAY ALL FEES, PROVIDE PROOF OF INSURANCE, AND PROVIDE TRAFFIC PROTECTION NECESSARY FOR THIS WORK.
21. THE CONTRACTOR SHALL CONFIRM PROJECT LIMITS PRIOR TO COMMENCING CONSTRUCTION OPERATIONS.
22. COORDINATE INFORMATION AND DIMENSIONS ARE DEEMED TO BE RELIABLE, BUT NOT GUARANTEED. THE CONTRACTOR SHALL VERIFY COORDINATES AND DIMENSIONS PRIOR TO CONSTRUCTION.
23. ALL DISTURBED LAWN AREAS NOT OTHERWISE INDICATED IN THE CONTRACT DRAWINGS SHALL BE TOPSOILED AND SEEDED.
24. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL TREES, STUMPS, BRUSH, RUBBISH, EXISTING PAVEMENTS, SIDEWALKS, CURBING, BASES, SUBBASE, EARTH, ETC., AND ALL OTHER MATERIAL WITHIN THE LIMITS OF WORK, WHERE SPECIFIED AND SUITABLY GRADE AND COMPACT THE AREA TO THE LINES AND GRADES SHOWN ON THE CONTRACT DRAWINGS.
25. THE CONTRACTOR SHALL SWEEP AND USE OTHER METHODS AS NECESSARY TO KEEP ADJACENT STREETS AND PRIVATE PROPERTIES CLEAN OF MUD, DIRT, AND DEBRIS CAUSED BY PROJECT ACTIVITIES. SUCH SWEEPING OR OTHER METHODS SHALL BE COMPLETED ON A DAILY BASIS WHEN MUD, DIRT, OR DEBRIS HAS BEEN DEPOSITED ON A STREET.
26. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL HOUSES, DRIVEWAYS, ETC. DURING CONSTRUCTION ACTIVITIES AND PROVIDE AS NECESSARY PROCESSED GRAVEL, TEMPORARY PAVEMENT, RAMPS, WALKS, ETC. TO MAINTAIN ACCESSIBILITY. PROCESSED GRAVEL WILL ONLY BE USED WHERE APPROVED BY THE ENGINEER FOR A WEARING SURFACE. ALL TEMPORARY ACCESSIBLE ROUTES SHALL BE BITUMINOUS CONCRETE SURFACE OR BETTER. THE CONTRACTOR SHALL COORDINATE ACTIVITIES WITH INDIVIDUAL OWNERS SO AS TO PROVIDE THE LEAST DISTURBANCE POSSIBLE.
27. PRIOR TO CONSTRUCTION ACTIVITIES, ALL SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH AND IN THE LOCATIONS SHOWN IN THE CONTRACT DOCUMENTS OR AT THE DIRECTION OF THE ENGINEER.
28. ALL EXISTING PLANTS AND TREES NOT REQUIRING REMOVAL SHALL BE PROTECTED DURING CONSTRUCTION.
29. ANY TREE OR SHRUB TO BE REMOVED OR CUT SHALL BE POSTED WITH A SUITABLE NOTICE STATING THE INTENTION TO CUT OR REMOVE SUCH TREE OR SHRUB 30 DAYS PRIOR TO REMOVAL OR CUTTING, PER THE TOWN OF FAIRFIELD REQUIREMENTS. CONTRACTOR SHALL COORDINATE WITH THE TOWN TREE WARDEN.
30. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION AND RESTORATIONS OF ALL PROPERTY LINE MONUMENTATION. THE RESETTING OF PROPERTY LINE MONUMENTATION SHALL BE DONE BY A LAND SURVEYOR LICENSED IN THE STATE OF CONNECTICUT.
31. ALL MAIL BOXES REQUIRED TO BE REMOVED AND RESET OR REBUILT AS NOTED TO PERFORM THE WORK, SHALL BE PAID FOR UNDER CLEARING AND GRUBBING.

UTILITY NOTES

1. INFORMATION ON EXISTING UTILITIES HAS BEEN COMPILED FROM AVAILABLE INFORMATION INCLUDING UTILITY COMPANY AND MUNICIPAL RECORD MAPS AND FIELD SURVEY AND IS NOT GUARANTEED CORRECT OR COMPLETE. UTILITIES ARE SHOWN TO ALERT THE CONTRACTOR TO THEIR PRESENCE. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES INCLUDING SERVICES. CONTACT "CALL BEFORE YOU DIG" AT 1-800-922-4455 48 HOURS MINIMUM PRIOR TO BEGINNING CONSTRUCTION AND VERIFY ALL UNDERGROUND AND OVERHEAD UTILITY LOCATIONS. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY THE ELEVATION AND LOCATION OF ALL UTILITIES BY VARIOUS MEANS PRIOR TO BEGINNING ANY EXCAVATION.
2. PROPER COORDINATION WITH THE RESPECTIVE UTILITY COMPANY SHALL BE PERFORMED BY THE CONTRACTOR TO INSURE THAT ALL UTILITY COMPANIES, CTDOT, AND TOWN OF FAIRFIELD STANDARDS FOR MATERIALS AND CONSTRUCTION METHODS ARE MET, AND THAT UTILITY INSTALLATIONS OR RELOCATIONS CAN BE PERFORMED WITHOUT AFFECTING CONTRACTOR OPERATIONS OR THE PROJECT SCHEDULE.
3. ALL UTILITY CONSTRUCTION IS SUBJECT TO INSPECTION PRIOR TO APPROVAL FOR BACKFILL IN ACCORDANCE WITH THE APPROPRIATE UTILITY COMPANY AND/OR TOWN OF FAIRFIELD REQUIREMENTS.
4. ALL DISTURBANCE INCURRED TO TOWN, STATE OR PRIVATE PROPERTY DUE TO CONSTRUCTION SHALL BE RESTORED TO ITS PREVIOUS CONDITION OR BETTER, TO THE SATISFACTION OF THE TOWN OF FAIRFIELD OR ENGINEER.
5. THE CONTRACTOR SHALL ARRANGE FOR WORK TO BE PERFORMED BY UTILITY COMPANIES AND THE TOWN OF FAIRFIELD. THE CONTRACTOR SHALL COORDINATE THIS WORK AND SECURE ANY PERMITS AND PAY ANY UTILITY COMPANY OR TOWN FEES.
6. THE CONTRACTOR SHALL COORDINATE AND CONDUCT WORK, AS DETERMINED BY THE APPROPRIATE UTILITY, THE RESETTING OR ADJUSTING OF MANHOLES, HANDHOLES, CURB BOXES AND VALVE BOXES TO THE NEW SIDEWALK OR ROADWAY GRADE AND SUPPLY NEW EXTENSIONS AS REQUIRED.
7. ALL EXISTING PAVEMENT WHERE UTILITY PIPING OR CONDUIT IS BEING INSTALLED SHALL BE SAW CUT.
8. THE CONTRACTOR SHALL COMPACT THE PIPE BACKFILL IN ACCORDANCE WITH THE STANDARD DETAILS. TRENCH BOTTOM SHALL BE STABLE IN HIGH GROUNDWATER AREAS. A PIPE BEDDING FOUNDATION SHALL BE USED IN AREAS OF ROCK EXCAVATION.
9. UNDERGROUND UTILITY FACILITIES SHALL BE INSTALLED AT A MINIMUM VERTICAL DEPTH OF 36" FROM THE TOP OF THE STRUCTURE TO THE PAVEMENT OR GROUND SURFACE. 12" MINIMUM CLEARANCE BETWEEN WATER, GAS, ELECTRICAL AND TELEPHONE LINES AND STORM SEWERS SHALL BE PROVIDED. 6" MINIMUM CLEARANCE SHALL BE MAINTAINED BETWEEN STORM AND SANITARY SEWER WITH A CONCRETE ENCASEMENT. 12" MINIMUM VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN ALL FACILITIES. HORIZONTAL CLEARANCES BETWEEN PIPELINE AND STRUCTURE SHOULD PERMIT MAINTENANCE OF THE PIPELINE AND OTHER FACILITIES. IN ALL CASES, A MINIMUM HORIZONTAL CLEARANCE OF 18" SHALL BE MAINTAINED.
10. THE CONTRACTOR SHALL MAINTAIN ALL FLOWS AND UTILITY CONNECTIONS TO EXISTING BUILDINGS WITHOUT INTERRUPTION UNLESS/UNTIL AUTHORIZED TO DISCONNECT BY THE TOWN, OWNER, THE ENGINEER, UTILITY COMPANIES AND GOVERNING AUTHORITIES.
11. ANY EXISTING UNDERGROUND UTILITY EXPOSED DURING TRENCHING EXCAVATION SHALL BE ADEQUATELY SUPPORTED PER THE REQUIREMENT OF THE OWNER OF THAT UTILITY.
12. STORM, GAS, WATER, AND SANITARY SEWER SERVICE LATERALS SHOWN ON THE PLANS ARE APPROXIMATE AND HAVE BEEN COMPILED FROM AVAILABLE INFORMATION INCLUDING UTILITY COMPANY AND MUNICIPAL RECORD MAPS AND FIELD SURVEY AND IS NOT GUARANTEED CORRECT OR COMPLETE. ANY LATERALS DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED IN KIND AT THE CONTRACTORS EXPENSE, AS APPROVED BY THE ENGINEER. ONLY SOUTHERN CT GAS PERSONNEL WILL BE ALLOWED TO REPAIR AND/OR REPLACE GAS FACILITIES.
13. TEST PITS ARE TO BE COMPLETED BEFORE ANY OTHER WORK BEGINS, AS INDICATED ON THE ROADWAY PLANS, TO DETERMINE DEPTH AND LOCATIONS OF EXISTING UTILITIES. PRIOR TO INSTALLATION OF DRAINAGE OR ROADWAY EXCAVATION, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF ANY CONFLICTS BETWEEN EXISTING UTILITIES AND PROPOSED IMPROVEMENTS SO THAT AN APPROPRIATE MODIFICATION MAY BE MADE.
14. THE CONTRACTOR SHALL BE REQUIRED TO COORDINATE THEIR ACTIVITIES WITH AFFECTED UTILITIES.
15. THE CONTRACTOR SHALL NOTE THAT ANY NECESSARY UTILITY POLE SUPPORT IS NOT REIMBURSABLE BY THE STATE AND OR TOWN.
16. THE CONTRACTOR SHALL RESET ALL GAS AND WATER VALVES AND APPURTENANCES AS NECESSARY TO MEET FINAL GRADES. THE SOUTHERN CT GAS INSPECTOR WILL PROVIDE VALVE BOXES/EXTENSIONS/RISERS.
17. THE CONTRACTOR SHALL NOTIFY SOUTHERN CT GAS (1-800-513-8898) IMMEDIATELY FOR ANY ODOR OF GAS OR CONTACT BY EQUIPMENT WITH GAS FACILITIES.
18. CONTRACTOR SHALL MAINTAIN ALL GAS VALVES/BOXES THROUGHOUT CONSTRUCTION.
19. ANY PROTECTIVE PLATES INSTALLED OVER GAS FACILITIES CAN BE RESET BY THE CONTRACTOR AT THEIR EXPENSE. A SOUTHERN CT GAS REPRESENTATIVE MUST BE PRESENT DURING THIS PROCESS.
20. TAMPING AND VIBRATORY ROLLER USE SHALL BE PROHIBITED WITHIN 12" OF ANY STEEL FACILITY AND 24" FROM ANY PLASTIC GAS FACILITY.
21. THE CONTRACTOR IS PROHIBITED FROM OPERATING ANY GAS VALVES.
22. THE CONTRACTOR SHALL NOT BE ALLOWED TO BLAST ROCK USING EXPLOSIVES UNLESS FIRST OBTAINING APPROVAL FROM THE TOWN, STATE AND SOUTHER CT GAS REPRESENTATIVE.

STANDARD ABBREVIATIONS

@	AT
&	AND
ABDN('D)	ABANDON(ED)
AC	ACRE
AOBE	AS ORDERED BY THE ENGINEER
BSMT	BASEMENT
BCLC	BITUMINOUS CONCRETE LIP CURBING
BOW	BACK OF WALK
BL	BASELINE
BW	BOTTOM OF WALL
BIT	BITUMINOUS
BC	BOTTOM OF CURB
BLDG	BUILDING
BOT	BOTTOM
CATV	CABLE TELEVISION
CIP	CAST IRON PIPE
CB	CATCH BASIN
CL	CENTERLINE
CLF	CHAIN LINK FENCE
CTDEEP	CONNECTICUT DEPT. OF ENERGY & ENV. PROTECTION
CTDOT	CONNECTICUT DEPT. OF TRANSPORTATION
CONC	CONCRETE
CO	CLEAN-OUT
CPP	CORRUGATED POLYETHYLENE PIPE
CY	CUBIC YARDS
DIP	DUCTILE IRON PIPE
DWG	DRAWING
E	EAST/ELECTRIC
EOP	EDGE OF PAVEMENT
ELEC	ELECTRIC
EL/ELEV	ELEVATION
EMH	ELECTRIC MANHOLE
EX/EXIST	EXISTING
EG	EXISTING GRADE
G	GAS
HC	HANDICAP
HYD	HYDRANT
IN	INCHES
INC	INCORPORATED
INV	INVERT
L	LENGTH OF CURVE
LT	LEFT
LOC	LOCATION
LP	LIGHT POLE
MAX	MAXIMUM
MIN	MINIMUM
MH	MANHOLE
MISC	MISCELLANEOUS
MON	MONUMENT
NIC	NOT IN CONTRACT
N	NORTH
NTS	NOT TO SCALE
N/A	NOT APPLICABLE
N/F	NOW OR FORMERLY
OH	OVERHEAD
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PCPP	PERFORATED CORRUGATED POLYETHYLENE
PED	PEDESTRIAN
PI	POINT OF INTERSECTION
PT	POINT OF TANGENCY
PRC	POINT OF REVERSE CURVATURE
PS	PARKING SPACES
PVC	POLYVINYL CHLORIDE
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
REV	REVISION
ROW	RIGHT OF WAY
RT	RIGHT
SAN	SANITARY
SCH	SCHEDULE
SDMH	STORM DRAIN MANHOLE
SF	SQUARE FEET
S	SOUTH
SSMH	SANITARY SEWER MANHOLE
STA	STATION
STD	STANDARD
STRM	STORM
T	TANGENT LENGTH/TEL-DATA
TEL	TEL-DATA
TF	TOP OF FRAME
TYP	TYPICAL
TC	TOP OF CURB
TW	TOP OF WALL
W	WEST/WATER
WG/WV	WATER GATE/VALVE

LEGEND

DESCRIPTION	EXISTING	PROPOSED
TAKING LINE		
PROPERTY LINE/ RIGHT OF WAY LINE		
CONTRACT LIMIT LINE		
LIMIT OF PROPOSED CUT		C
LIMIT OF PROPOSED FILL		F
MINOR CONTOUR		
MAJOR CONTOUR	00	100
SPOT ELEVATION	00.0	× 100
EDGE OF PAVEMENT		
CURB		
LIMIT OF WETLANDS		
SANITARY SEWER		SS
STORM DRAIN		
STONE WALL		
WIRE FENCE	X X X	
METAL FENCE	M M M	
SPLIT RAIL/PICKET FENCE		
STOCKADE FENCE		
CHAIN LINK FENCE		
UNDERGROUND ELECTRIC (PRIMARY)	UGE-P	E
UNDERGROUND ELECTRIC (SECONDARY)	UGE-S	E
GAS SERVICE	G	G
WATER SERVICE	W	PW
POLE AND GUY		
ELECTRIC MANHOLE	E	E
TREE	40"M 16"C	
HEDGE		
TELEPHONE MANHOLE	T	T
CATCH BASIN		
STORM DRAIN MANHOLE		
SANITARY SEWER MANHOLE	SSMH	S
HYDRANT		
WATER GATE	WG	WG
GAS GATE	GG	GG
MONITORING WELL		
WATER METER	M.W. WM	WM
LIGHT		
HANDHOLE		
SIGN		
HANDICAP RAMP		
DRILL HOLE		
IRON PIPE OR PIN		

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Preliminary

Town of Fairfield

South Benson Drainage Improvements

Fairfield, Connecticut

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

PROJECT NO:	F0439-08
DATE:	05/2/2018
FILE:	F0439-08-C100-GN.dwg
DRAWN BY:	WGK
CHECKED:	JAR
APPROVED:	DCH

GENERAL NOTES, LEGEND AND STANDARD ABBREVIATIONS PLAN

SCALE:

C1.00

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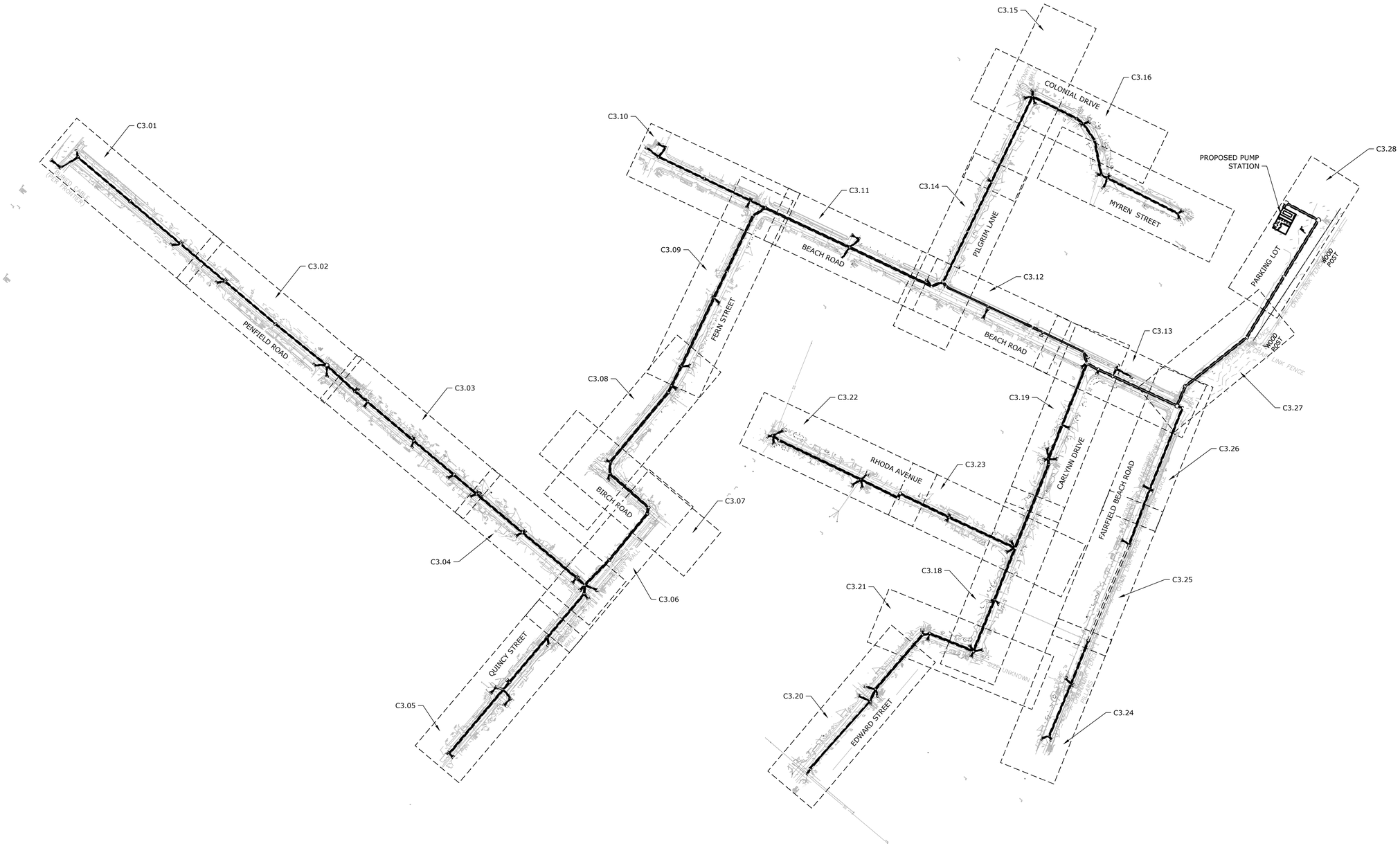

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SHEET INDEX PLAN

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C2.00

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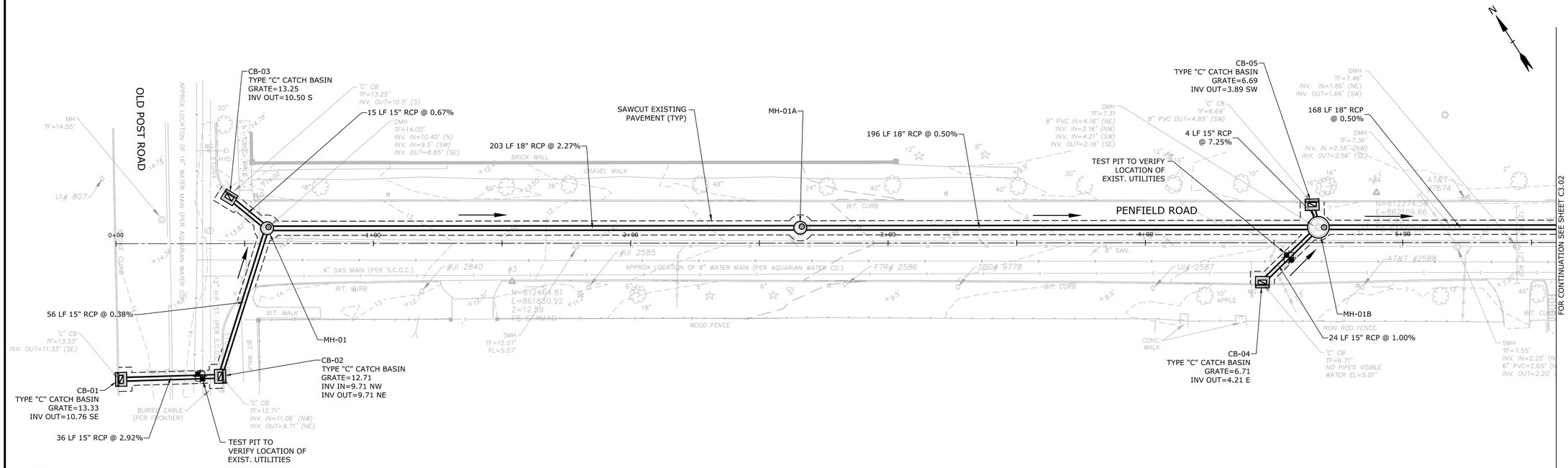
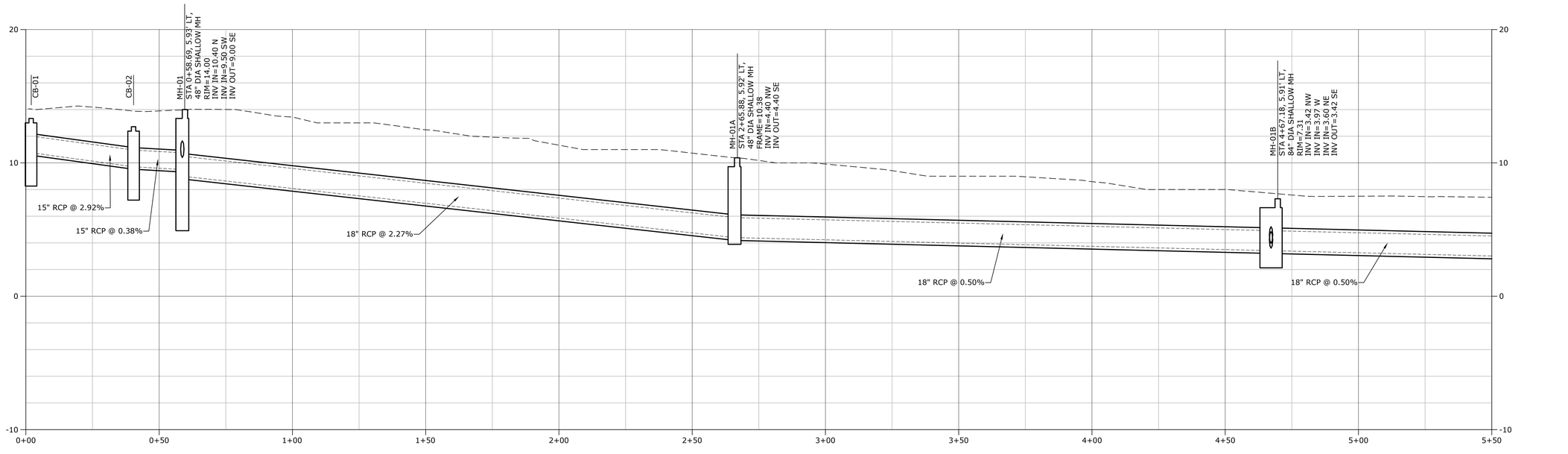


NOTES:

1. REMOVE AND DISPOSE OF EXISTING DRAINAGE STRUCTURES AND PIPE WHERE NEW STRUCTURES AND PIPE ARE LOCATED OVER EXISTING ALIGNMENT.
2. PROVIDE 2" FULL WIDTH MILL AND OVERLAY AFTER COMPLETION OF DRAINAGE IMPROVEMENTS.
3. PROVIDE FULL DEPTH PAVEMENT PATCH AT DRAINAGE IMPROVEMENTS. SEE DETAIL.

PLAN - PENFIELD ROAD - STA: 0+00 TO 5+50
SCALE: 1" = 20'



PROFILE - PENFIELD ROAD - STA: 0+00 TO 5+50
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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PLAN AND PROFILE
PENFIELD ROAD
STA: 0+00 TO 5+50

SCALE: AS NOTED

C3.01

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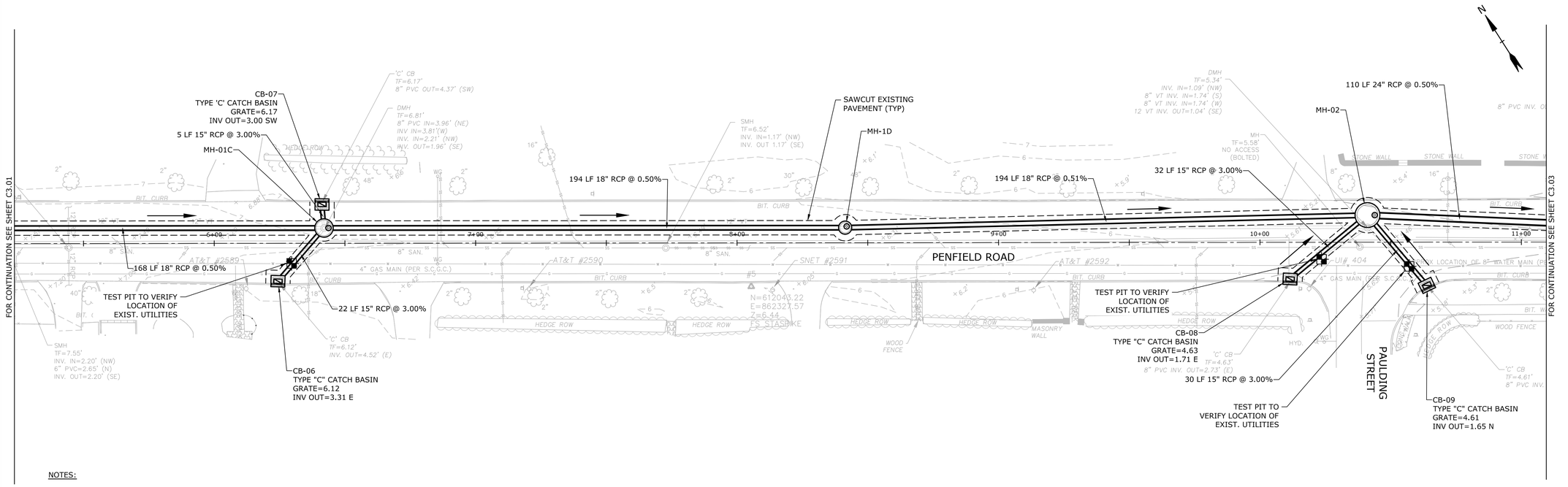

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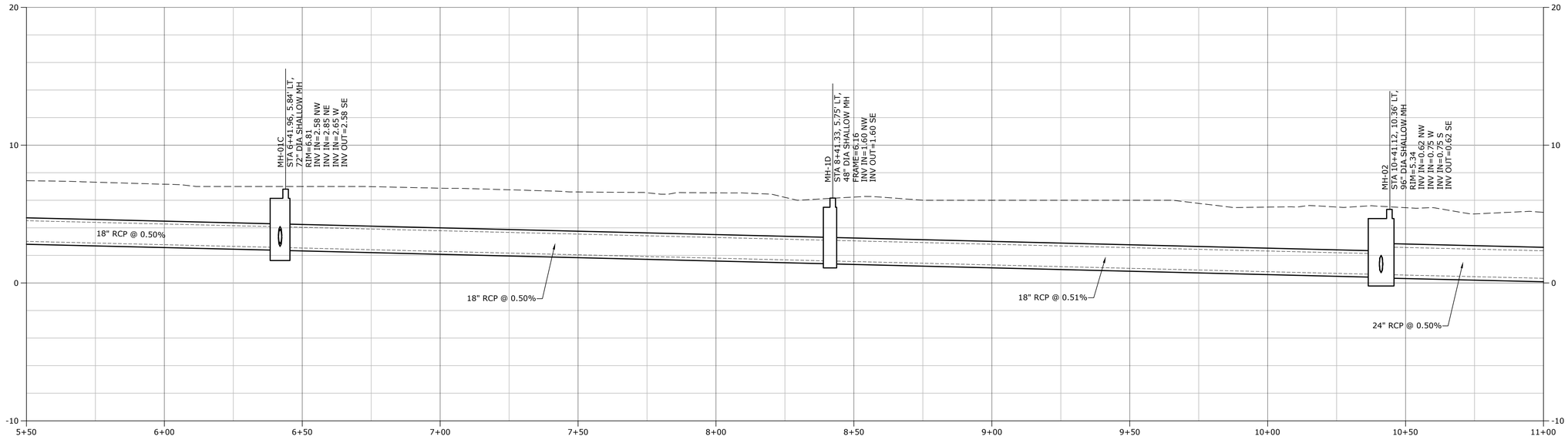
3. PROVIDE FULL DEPTH PAVEMENT PATCH AT DRAINAGE IMPROVEMENTS. SEE DETAIL.

PLAN - PENFIELD ROAD - STA: 5+50 TO 11+00
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - PENFIELD ROAD - STA: 5+50 TO 11+00
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
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PLAN AND PROFILE
PENFIELD ROAD
STA: 5+50 TO 11+00

SCALE: AS NOTED

C3.02

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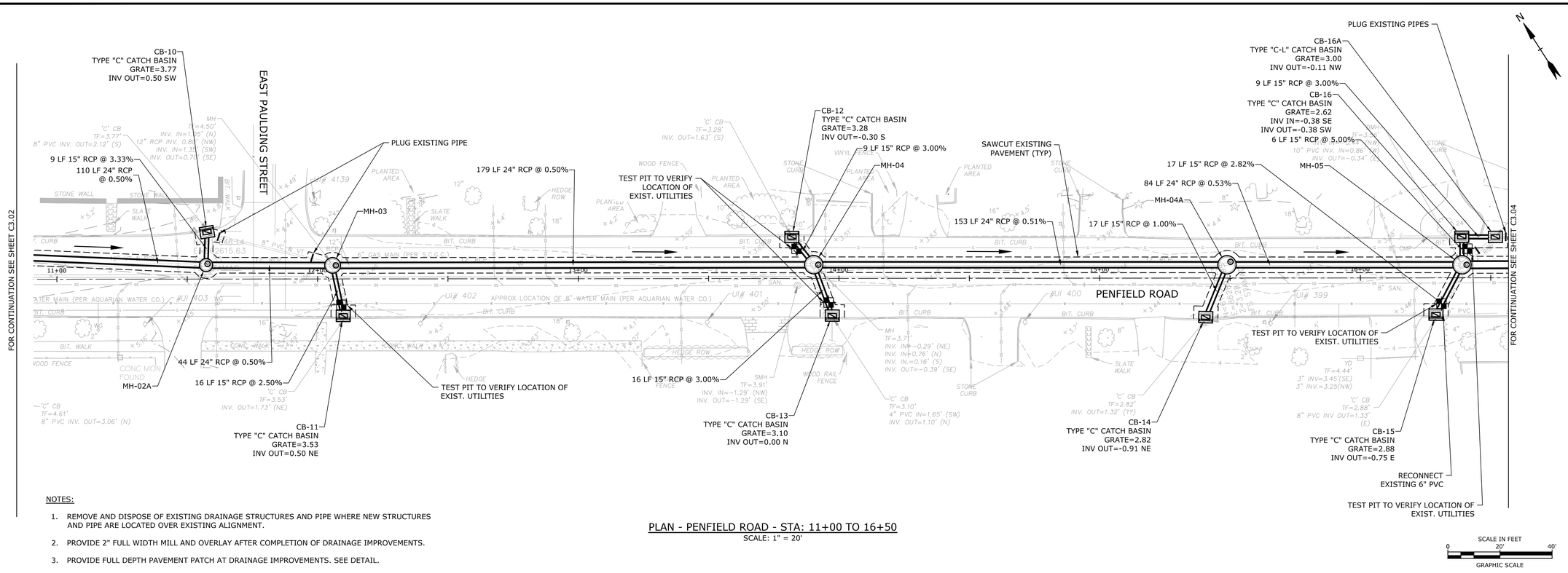
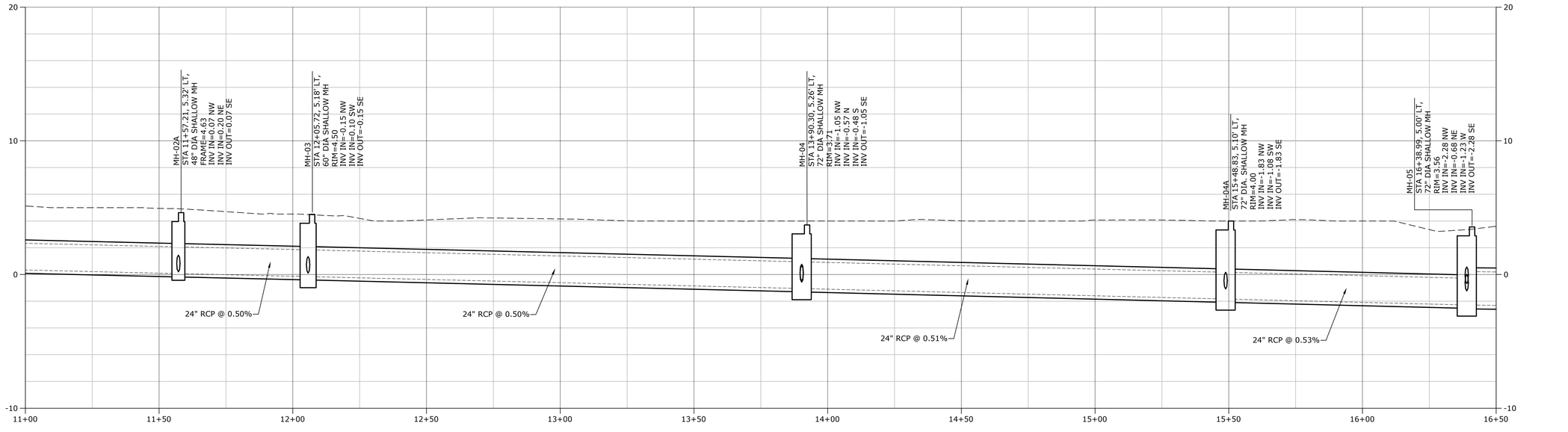


NOTES:

1. REMOVE AND DISPOSE OF EXISTING DRAINAGE STRUCTURES AND PIPE WHERE NEW STRUCTURES AND PIPE ARE LOCATED OVER EXISTING ALIGNMENT.
2. PROVIDE 2" FULL WIDTH MILL AND OVERLAY AFTER COMPLETION OF DRAINAGE IMPROVEMENTS.
3. PROVIDE FULL DEPTH PAVEMENT PATCH AT DRAINAGE IMPROVEMENTS. SEE DETAIL.

PLAN - PENFIELD ROAD - STA: 11+00 TO 16+50
SCALE: 1" = 20'



PROFILE - PENFIELD ROAD - STA: 11+00 TO 16+50
SCALE: HOR: 1" = 20' VERT: 1" = 4'

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Fairfield, Connecticut

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 1 INCH
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MARK	DATE	DESCRIPTION

PROJECT NO:	F0439-08
DATE:	05/2/2018
FILE:	F0439-08-C300-PLNPRO.dwg
DRAWN BY:	WGK
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APPROVED:	XX

PLAN AND PROFILE
PENFIELD ROAD
STA: 11+00 TO 16+50

SCALE: AS NOTED

C3.03

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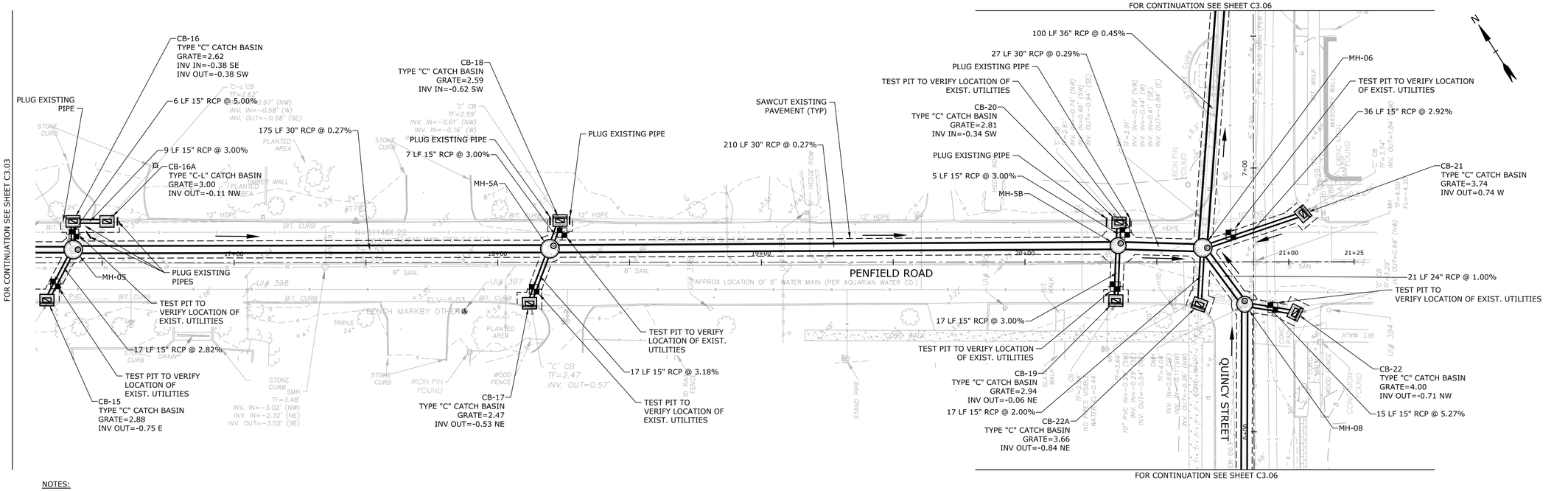

NOTES:

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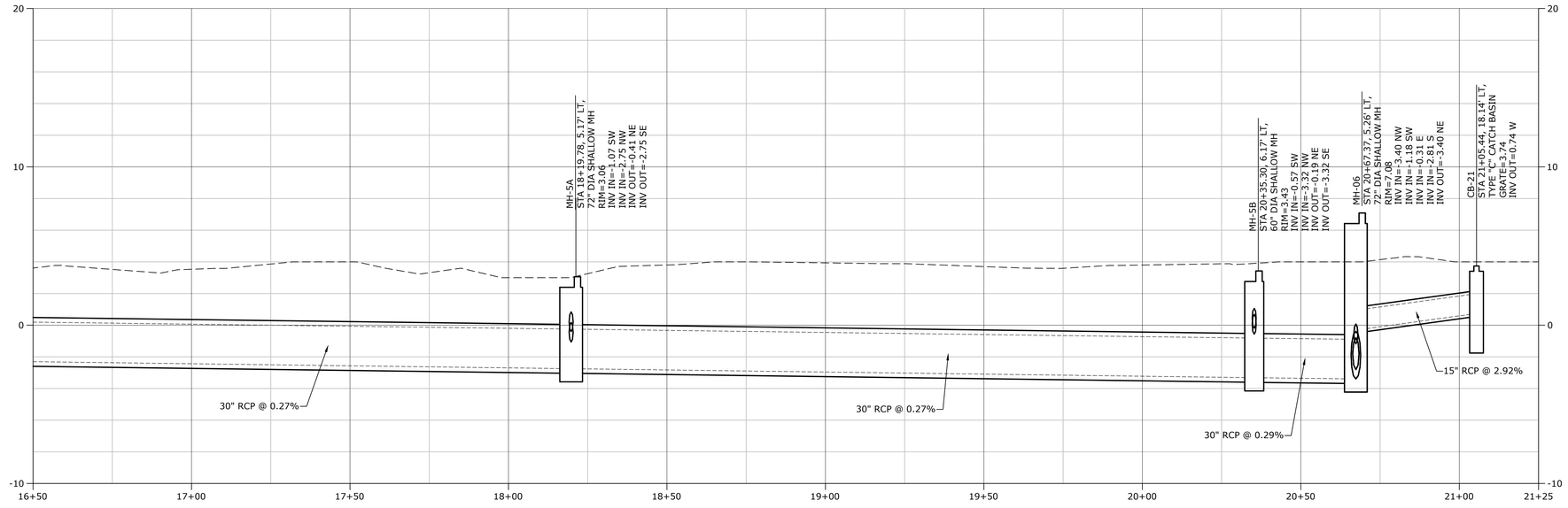
PLAN - PENFIELD ROAD - STA: 16+50 TO 21+25
SCALE: 1" = 20'



PROFILE - PENFIELD ROAD - STA: 16+50 TO 21+25
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
VERTICAL SCALE 1" = 4'

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VERIFY SCALE
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0 — 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

PROJECT NO:	F0439-08
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FILE:	F0439-08-C300-PLNPRO.dwg
DRAWN BY:	WGK
CHECKED:	JAR
APPROVED:	XX

PLAN AND PROFILE
PENFIELD ROAD
STA: 16+50 TO 21+25

SCALE: AS NOTED

C3.04

Last Saved: 9/19/2018
Plotted On: Dec 21, 2018 - 1:29pm By: JAR
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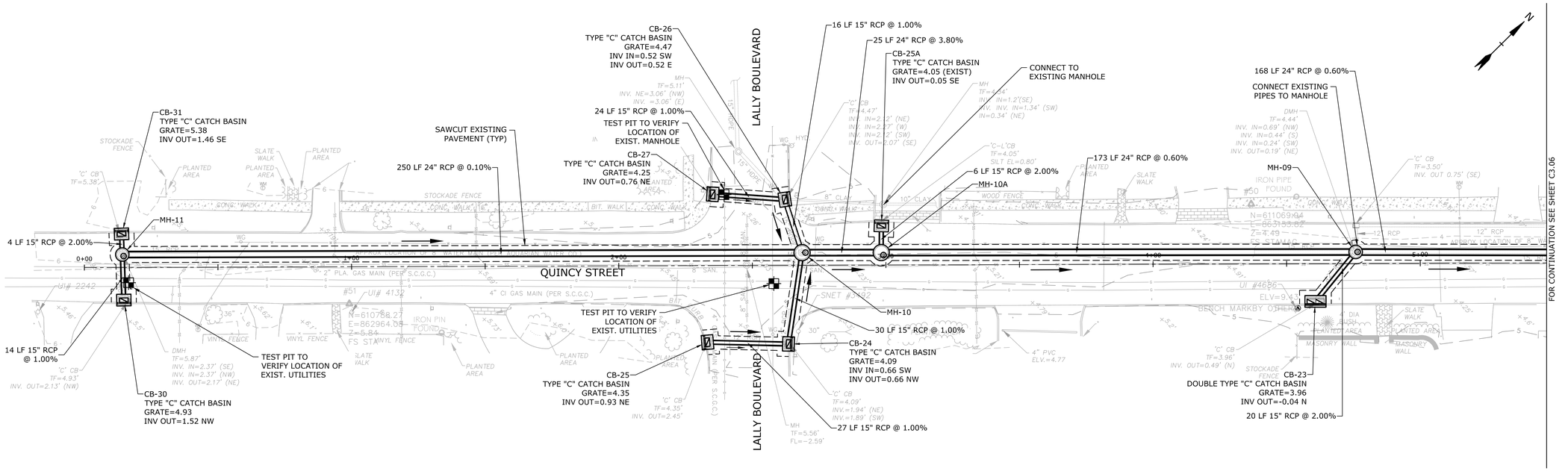

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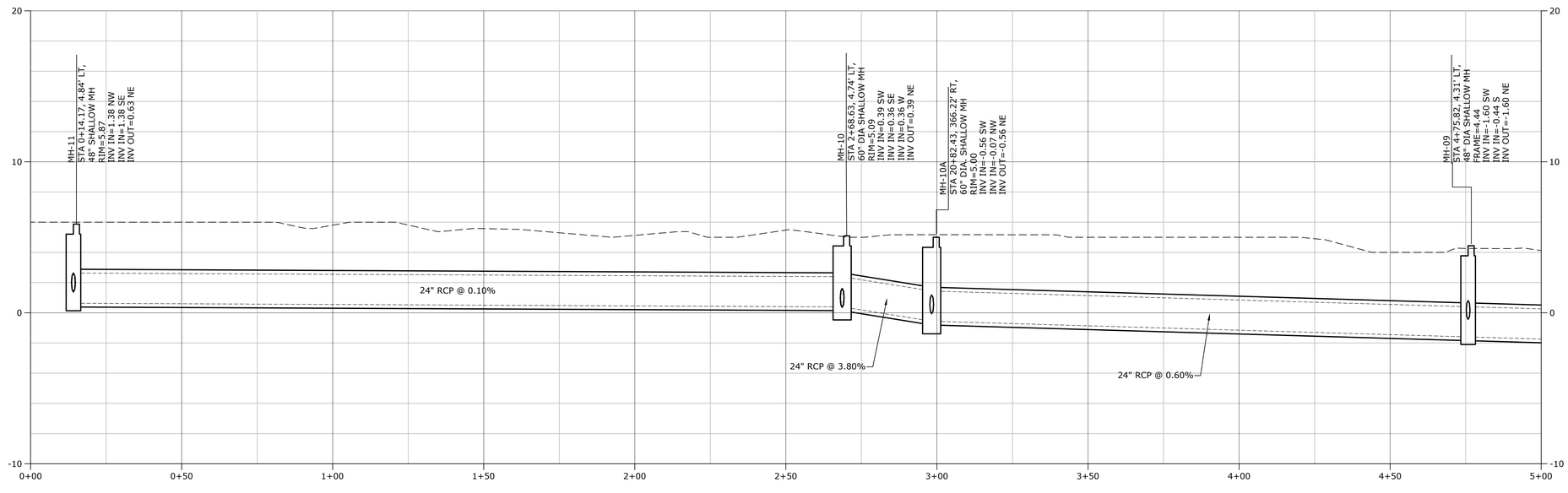
PLAN - QUINCY STREET - STA: 0+00 TO 5+00
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - QUINCY STREET - STA: 0+00 TO 5+00
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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APPROVED:	XX

PLAN AND PROFILE
QUINCY STREET
STA: 0+00 TO 5+00

SCALE: AS NOTED

C3.05

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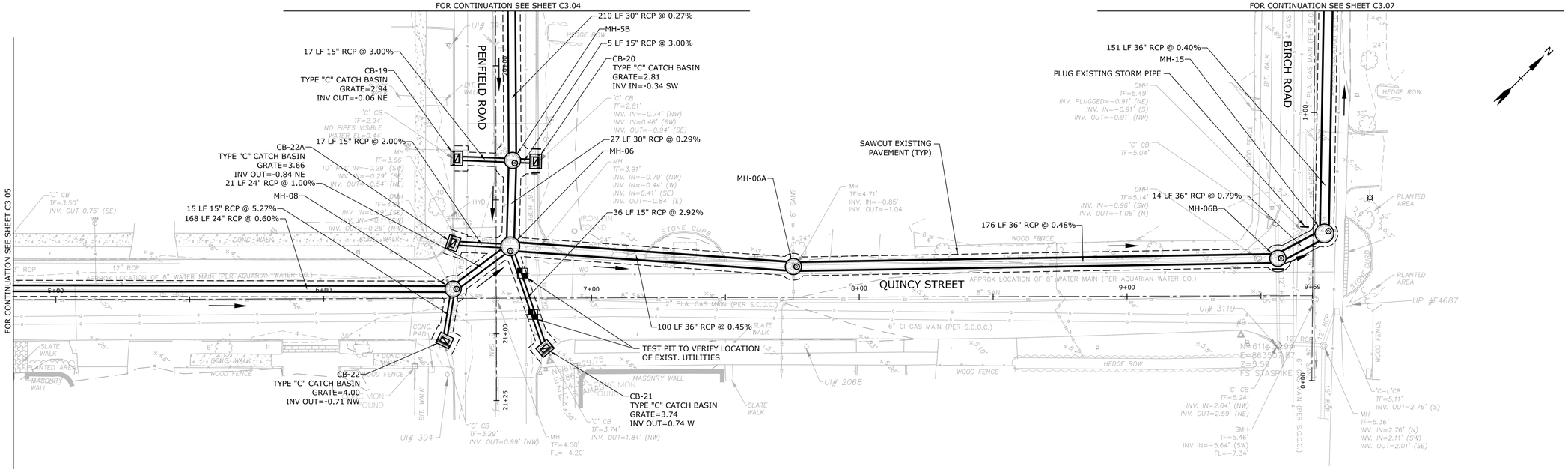

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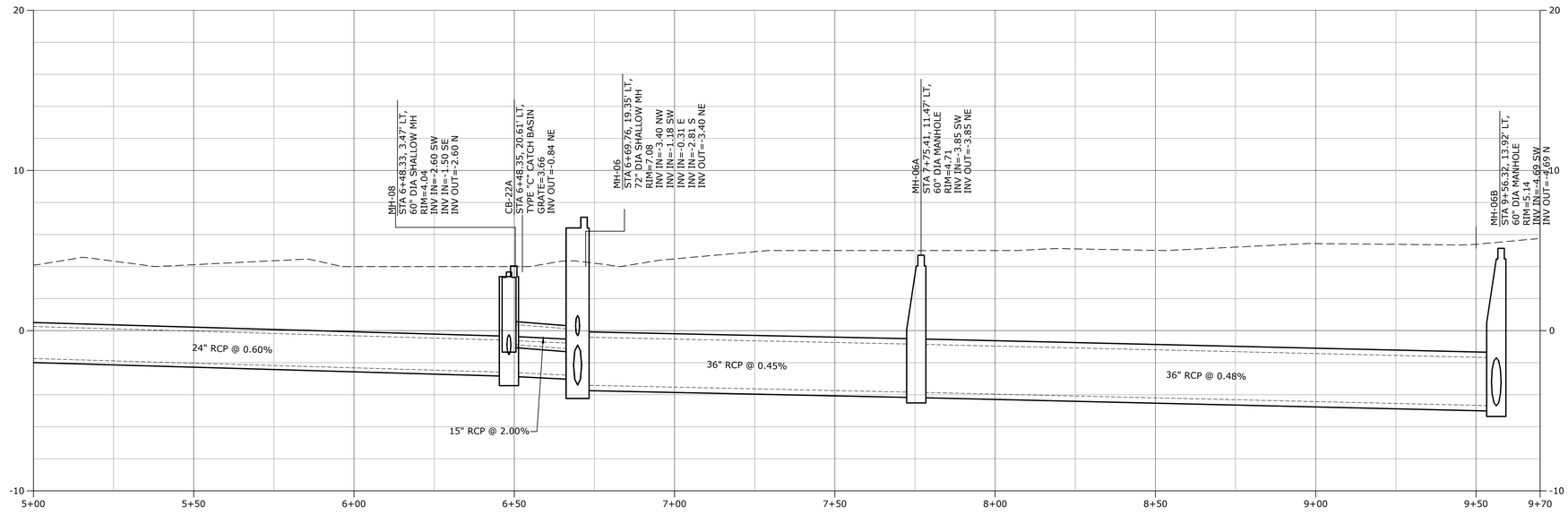
PLAN - QUINCY STREET - STA: 5+00 TO 9+69
SCALE: 1" = 20'



PROFILE - QUINCY STREET - STA: 5+00 TO 9+69
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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PLAN AND PROFILE
QUINCY STREET
STA: 5+00 TO 9+69

SCALE: AS NOTED

C3.06

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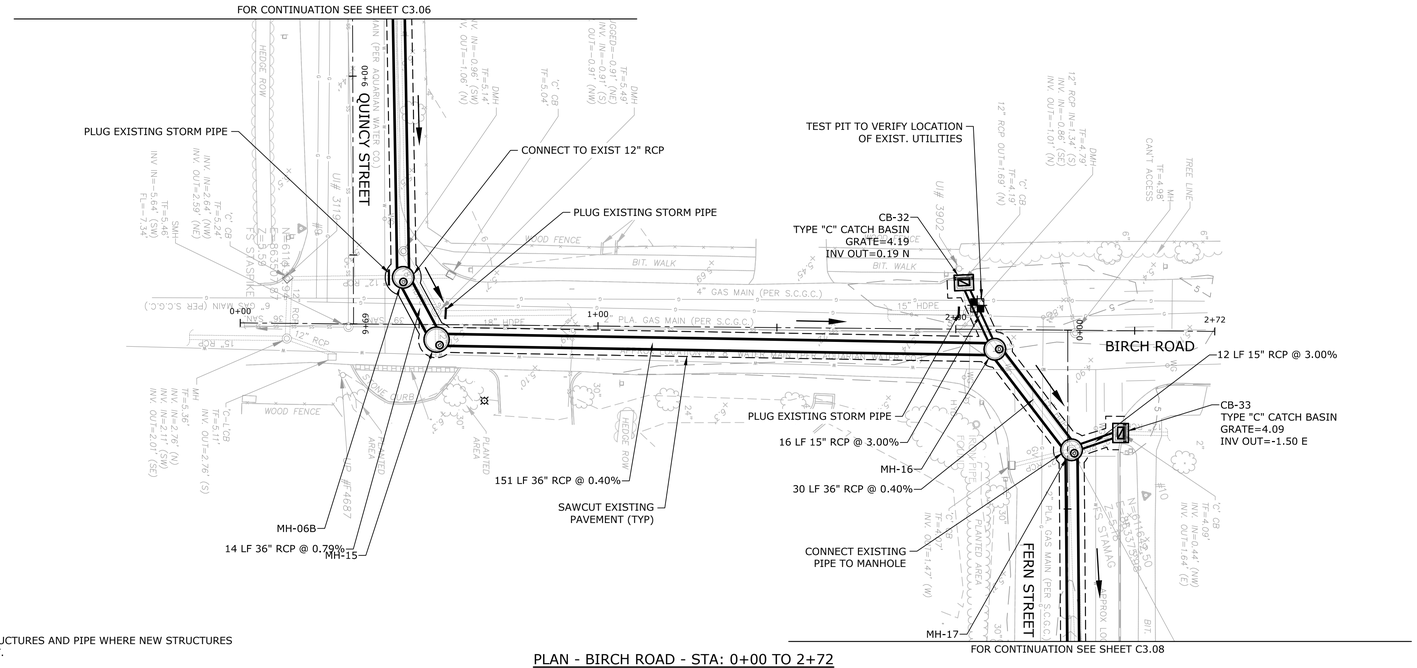

PLAN - BIRCH ROAD - STA: 0+00 TO 2+72
SCALE: 1" = 20'

NOTES:

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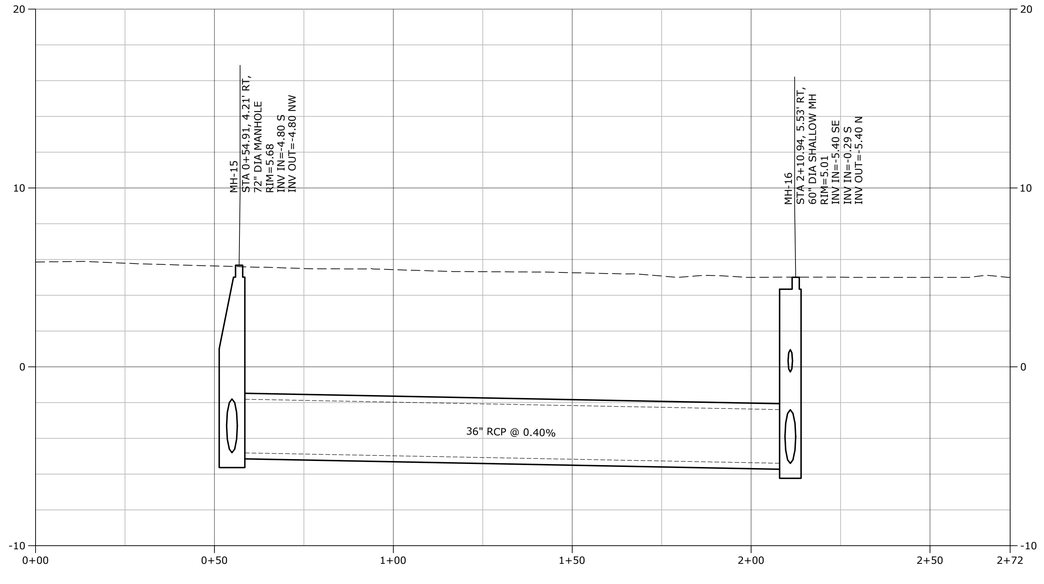
SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - BIRCH ROAD - STA: 0+00 TO 2+72
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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0 1 INCH
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PLAN AND PROFILE
BIRCH ROAD
STA: 0+00 TO 2+72

SCALE: AS NOTED

C3.07

Last Saved: 9/19/2018
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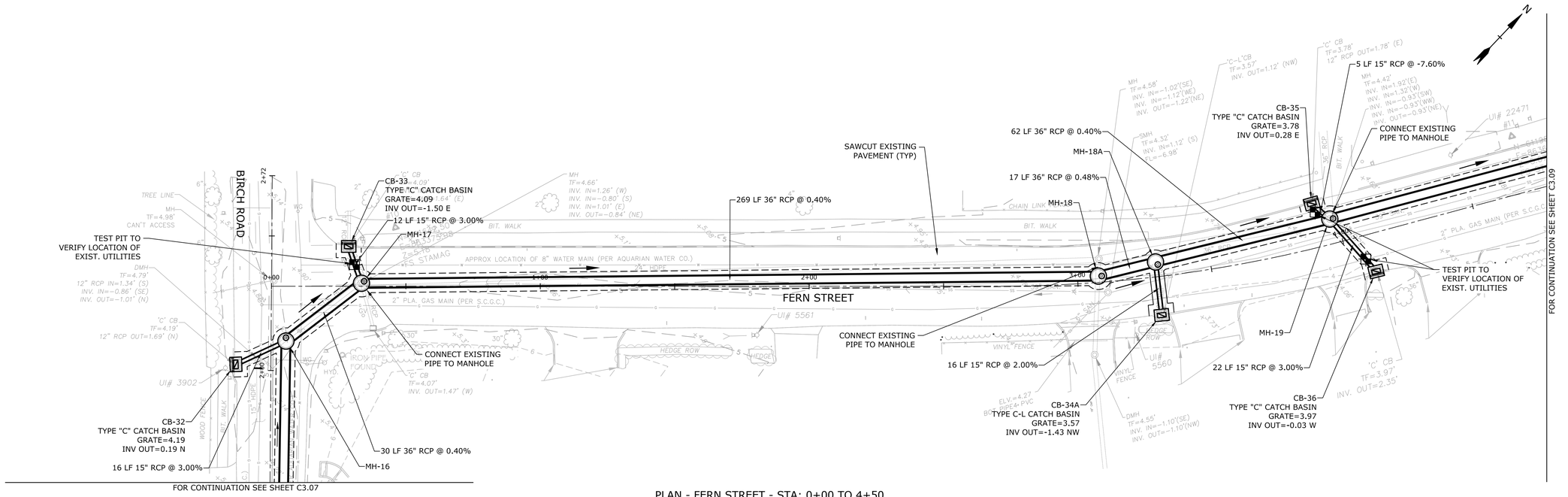

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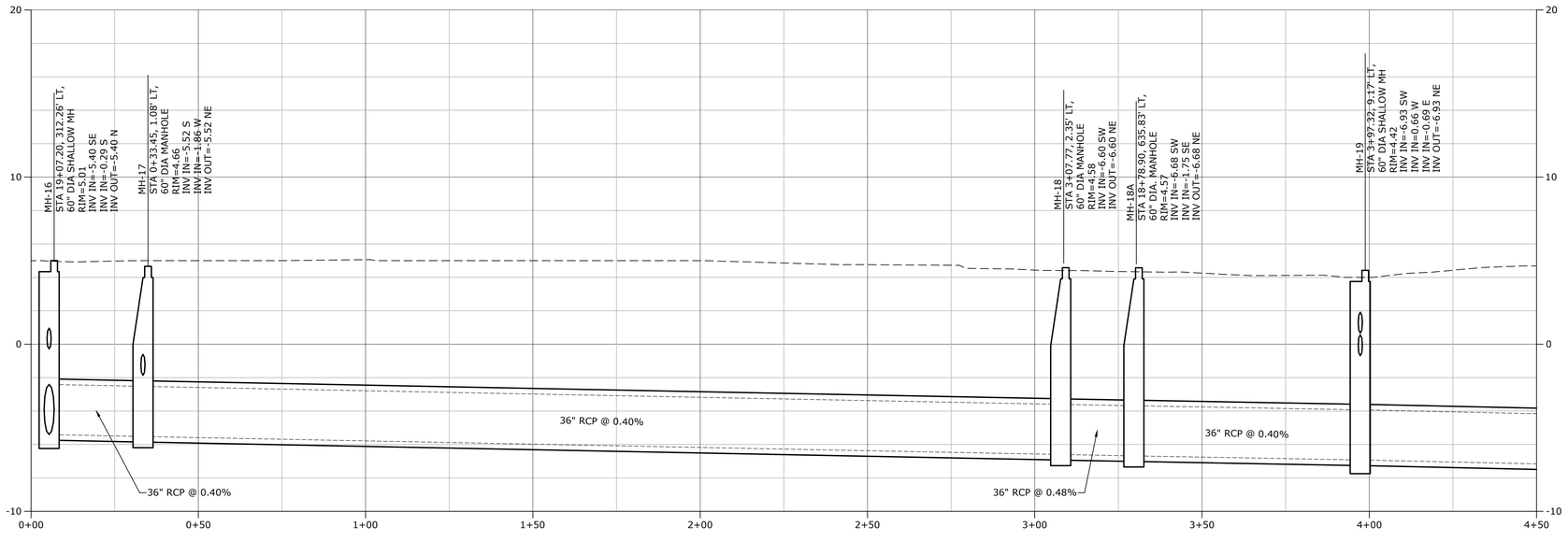
PLAN - FERN STREET - STA: 0+00 TO 4+50
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - FERN STREET - STA: 0+00 TO 4+50
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
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PLAN AND PROFILE
FERN STREET
STA: 0+00 TO 4+50

SCALE: AS NOTED

C3.08

Last Saved: 9/19/2018
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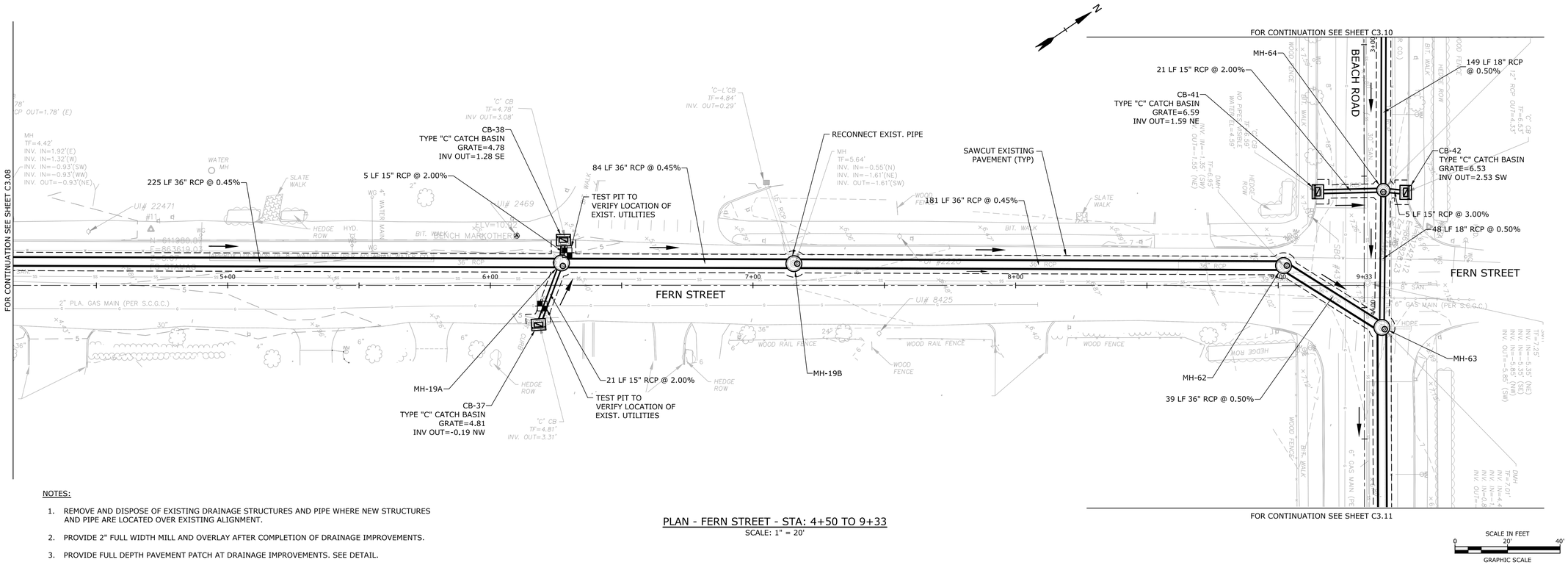

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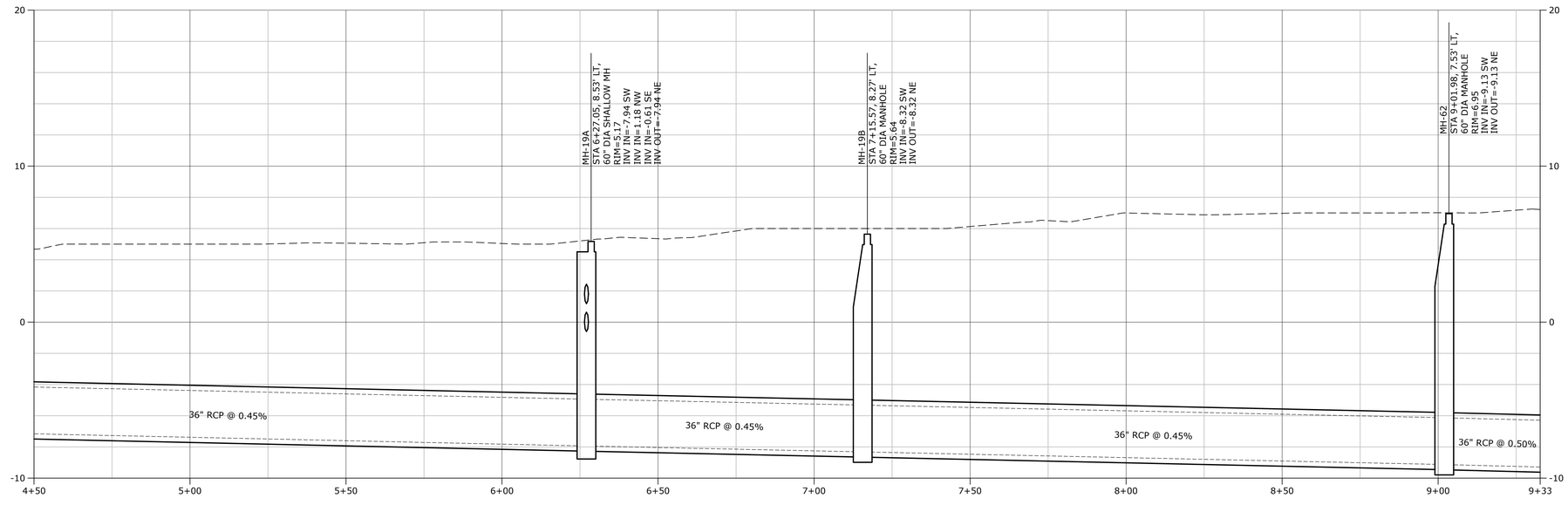
PLAN - FERN STREET - STA: 4+50 TO 9+33
SCALE: 1" = 20'



PROFILE - FERN STREET - STA: 4+50 TO 9+33
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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PLAN AND PROFILE
FERN STREET
STA: 4+50 TO 9+33

SCALE: AS NOTED

C3.09

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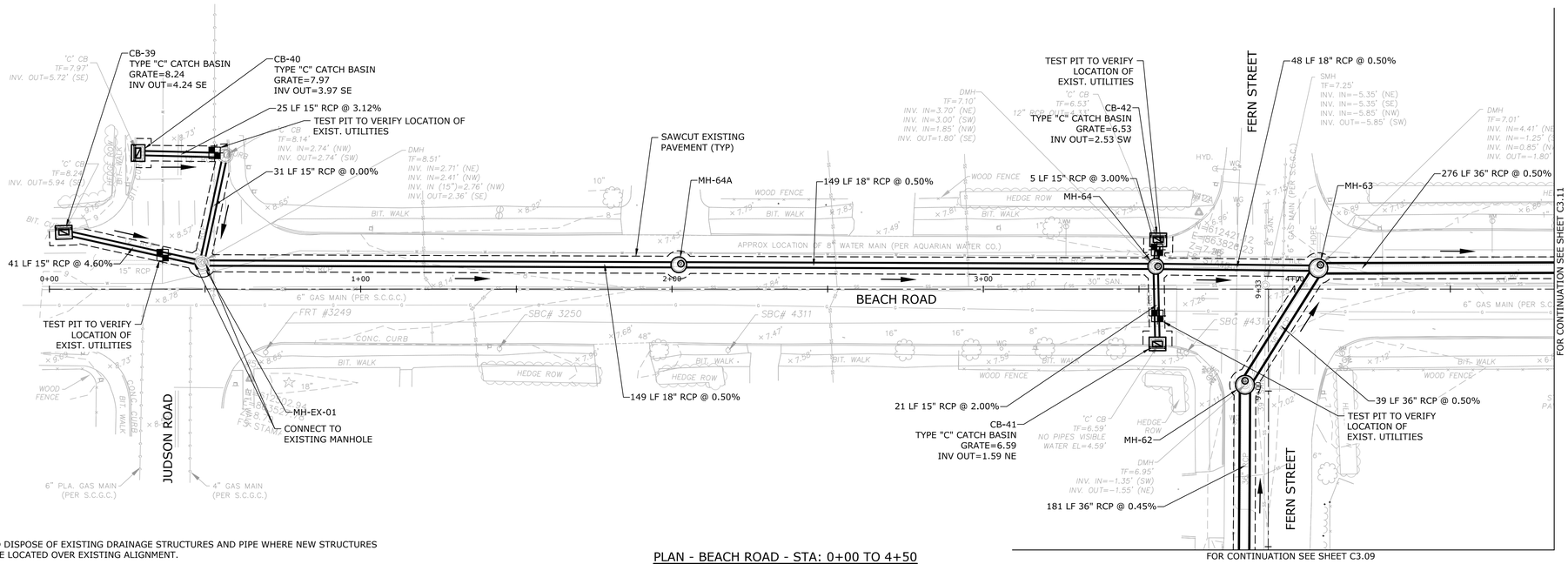

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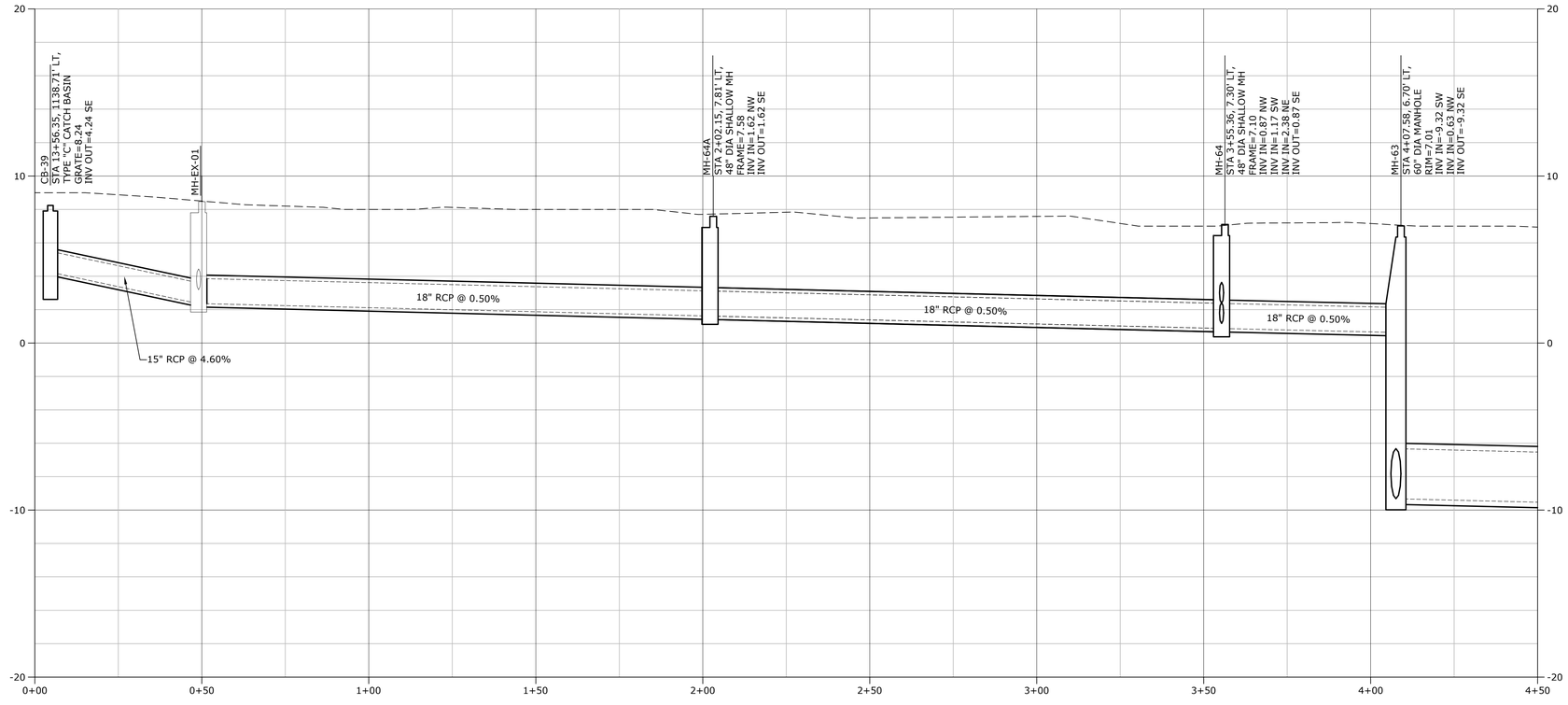
PLAN - BEACH ROAD - STA: 0+00 TO 4+50
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - BEACH ROAD - STA: 0+00 TO 4+50
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
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APPROVED:	XX

PLAN AND PROFILE
BEACH ROAD
STA: 0+00 TO 4+50

SCALE: AS NOTED

C3.10

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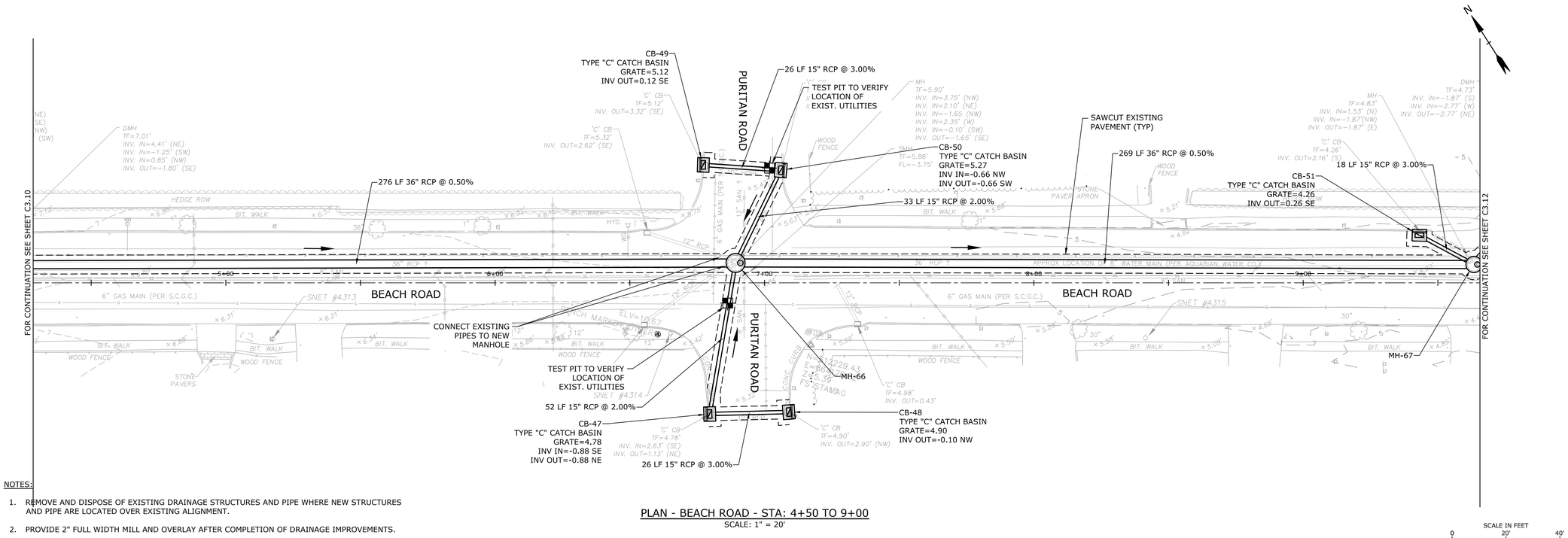

PLAN - BEACH ROAD - STA: 4+50 TO 9+00
SCALE: 1" = 20'

NOTES:

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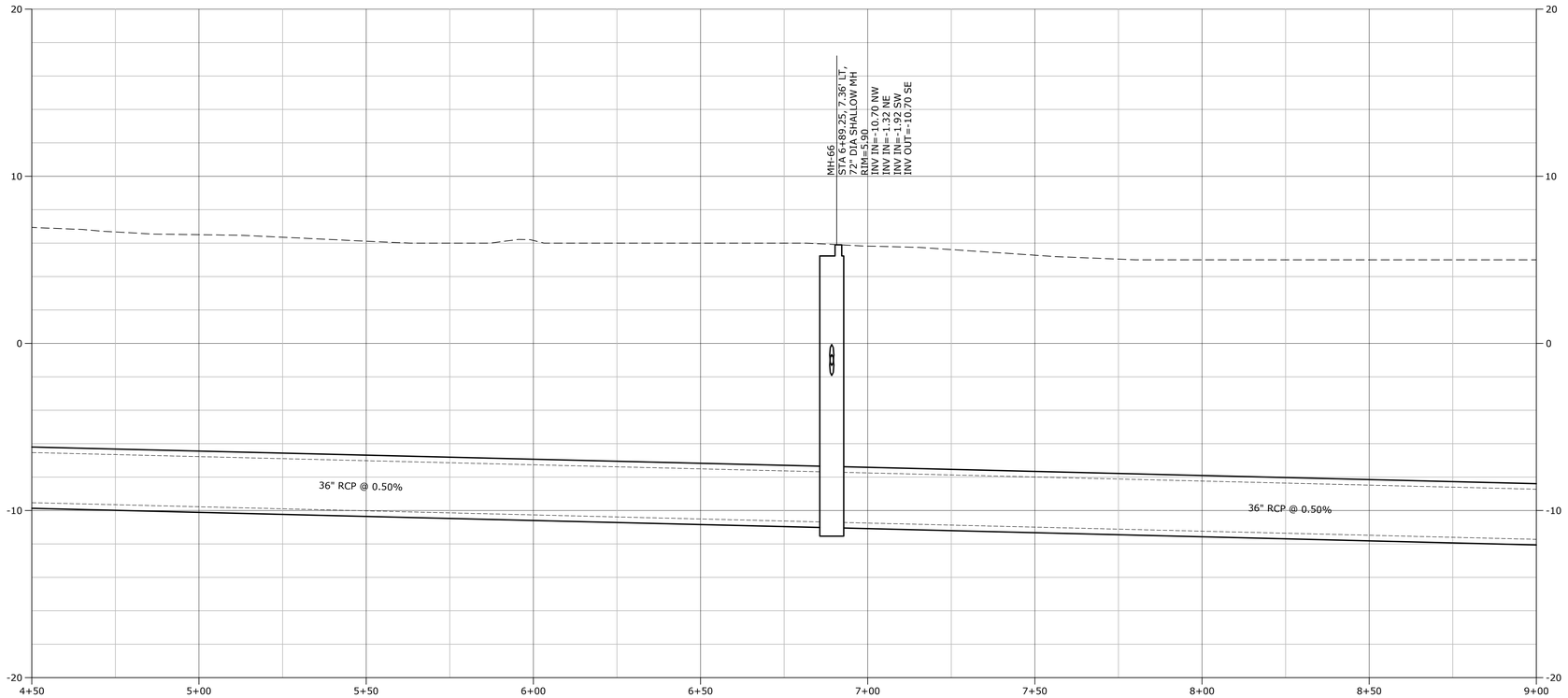

PROFILE - BEACH ROAD - STA: 4+50 TO 9+00
SCALE: HOR: 1" = 20' VERT: 1" = 4'

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VERIFY SCALE
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0 1 INCH
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DRAWN BY:	WGK
CHECKED:	JAR
APPROVED:	XX

PLAN AND PROFILE
BEACH ROAD
STA: 4+50 TO 9+00

SCALE: AS NOTED

C3.11

Last Saved: 9/19/2018
Plotted On: Dec 21, 2018 - 1:30pm By: JAR
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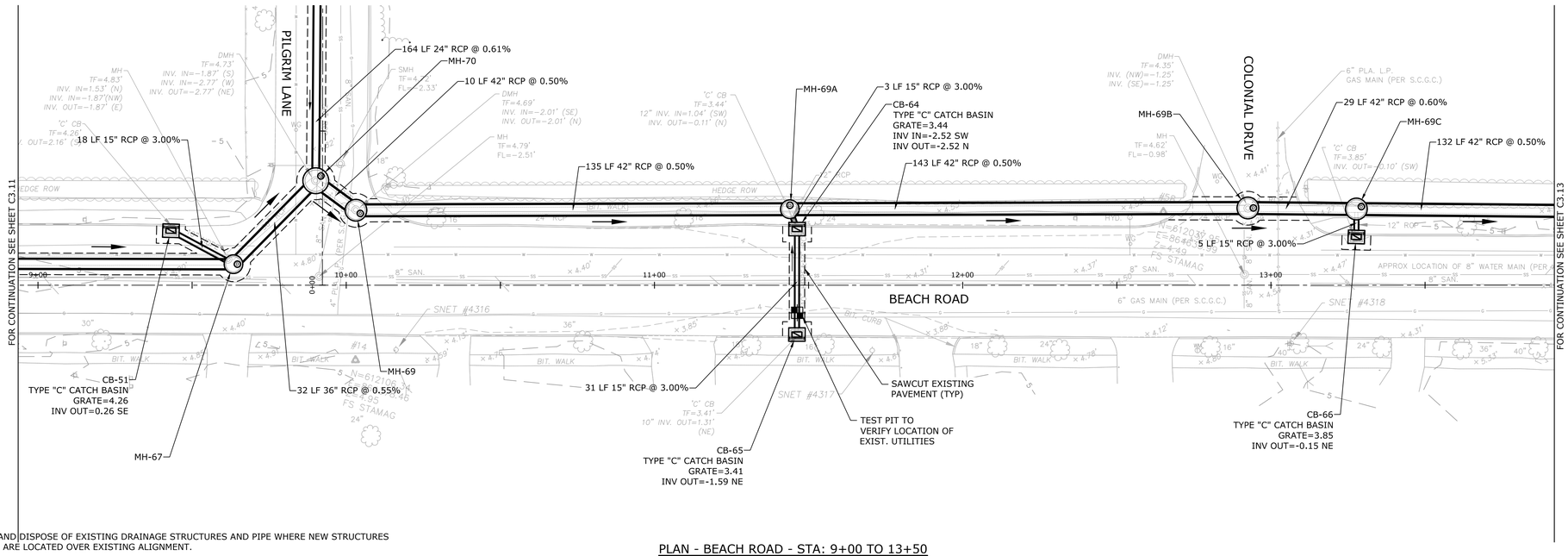

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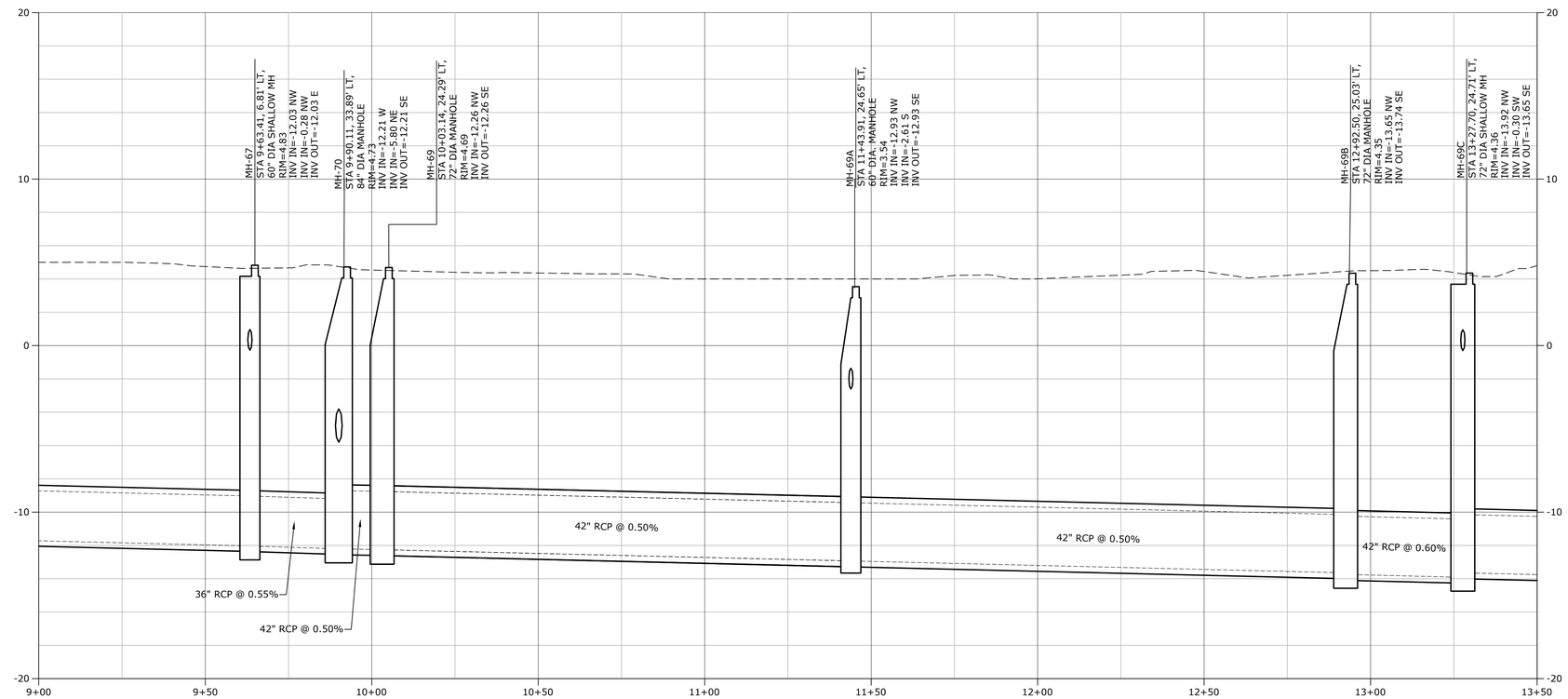
PLAN - BEACH ROAD - STA: 9+00 TO 13+50
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - BEACH ROAD - STA: 9+00 TO 13+50
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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APPROVED:	XX

PLAN AND PROFILE
BEACH ROAD
STA: 9+00 TO 13+50

SCALE: AS NOTED

C3.12

Last Saved: 9/19/2018
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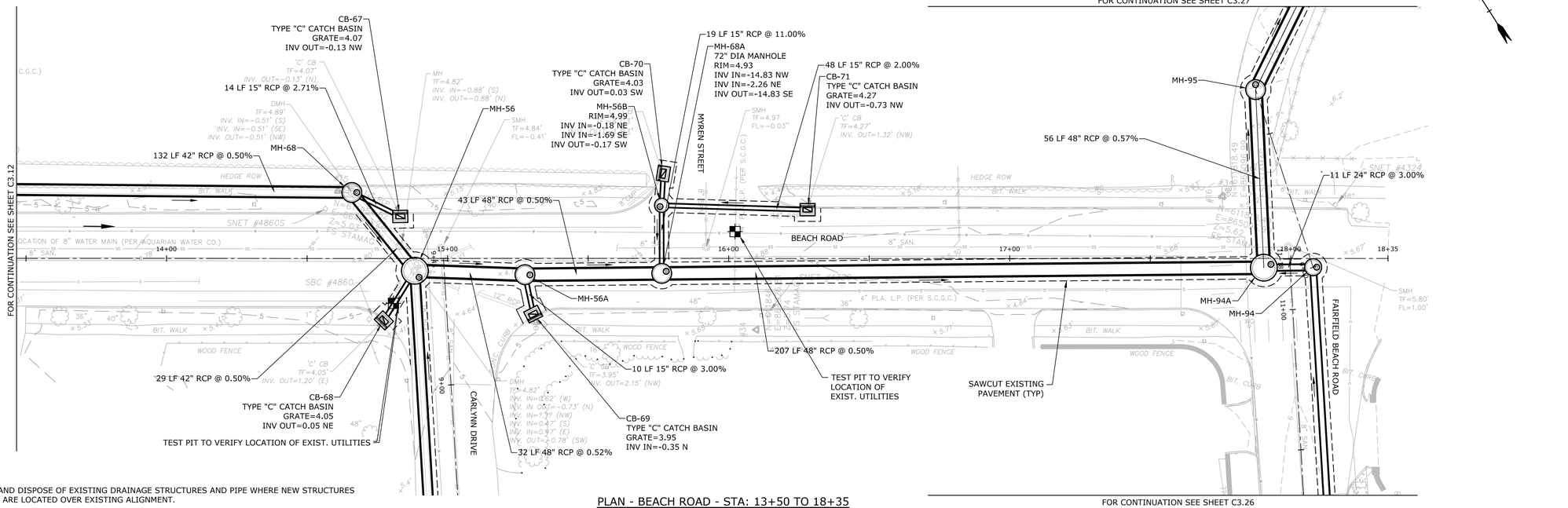


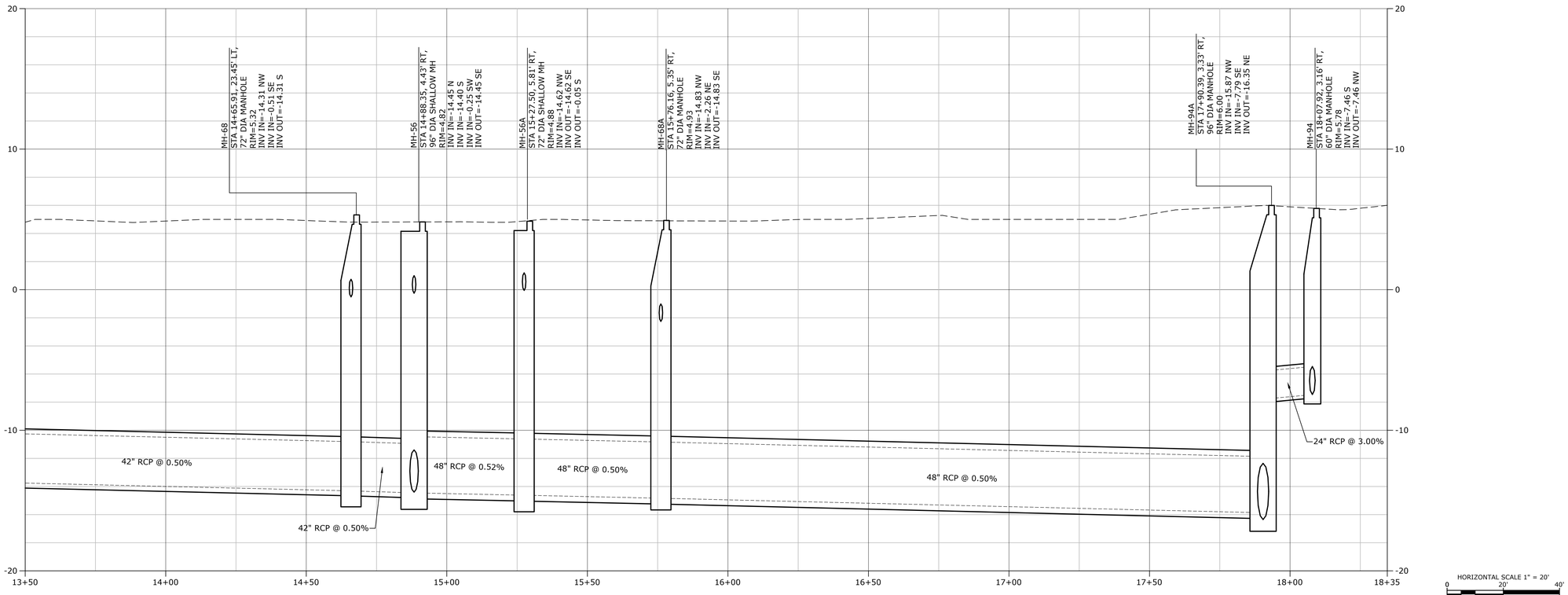
PLAN - BEACH ROAD - STA: 13+50 TO 18+35

SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

NOTES:

1. REMOVE AND DISPOSE OF EXISTING DRAINAGE STRUCTURES AND PIPE WHERE NEW STRUCTURES AND PIPE ARE LOCATED OVER EXISTING ALIGNMENT.
2. PROVIDE 2" FULL WIDTH MILL AND OVERLAY AFTER COMPLETION OF DRAINAGE IMPROVEMENTS.
3. PROVIDE FULL DEPTH PAVEMENT PATCH AT DRAINAGE IMPROVEMENTS. SEE DETAIL.



PROFILE - BEACH ROAD - STA: 13+50 TO 18+35

SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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Fairfield, Connecticut

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

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DATE:	05/2/2018
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APPROVED:	XX

PLAN AND PROFILE
BEACH ROAD
STA: 13+50 TO 18+35

SCALE: AS NOTED

C3.13

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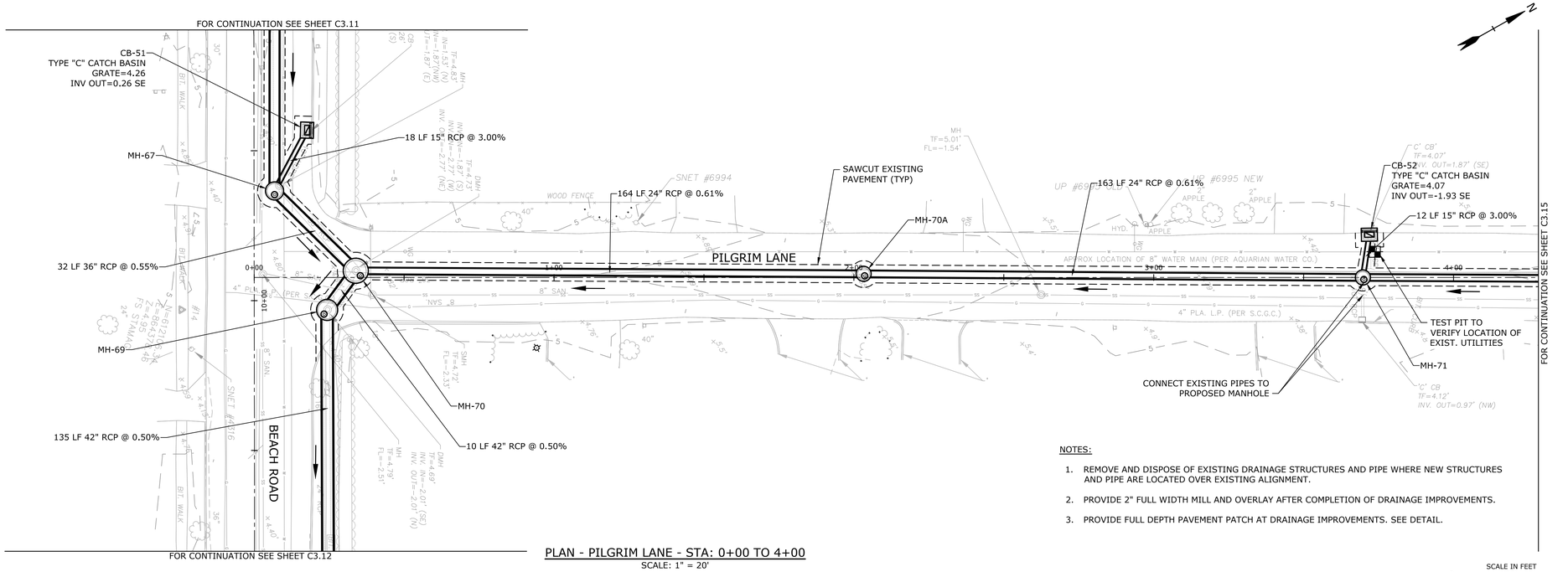

PLAN - PILGRIM LANE - STA: 0+00 TO 4+00
SCALE: 1" = 20'

NOTES:

1. REMOVE AND DISPOSE OF EXISTING DRAINAGE STRUCTURES AND PIPE WHERE NEW STRUCTURES AND PIPE ARE LOCATED OVER EXISTING ALIGNMENT.
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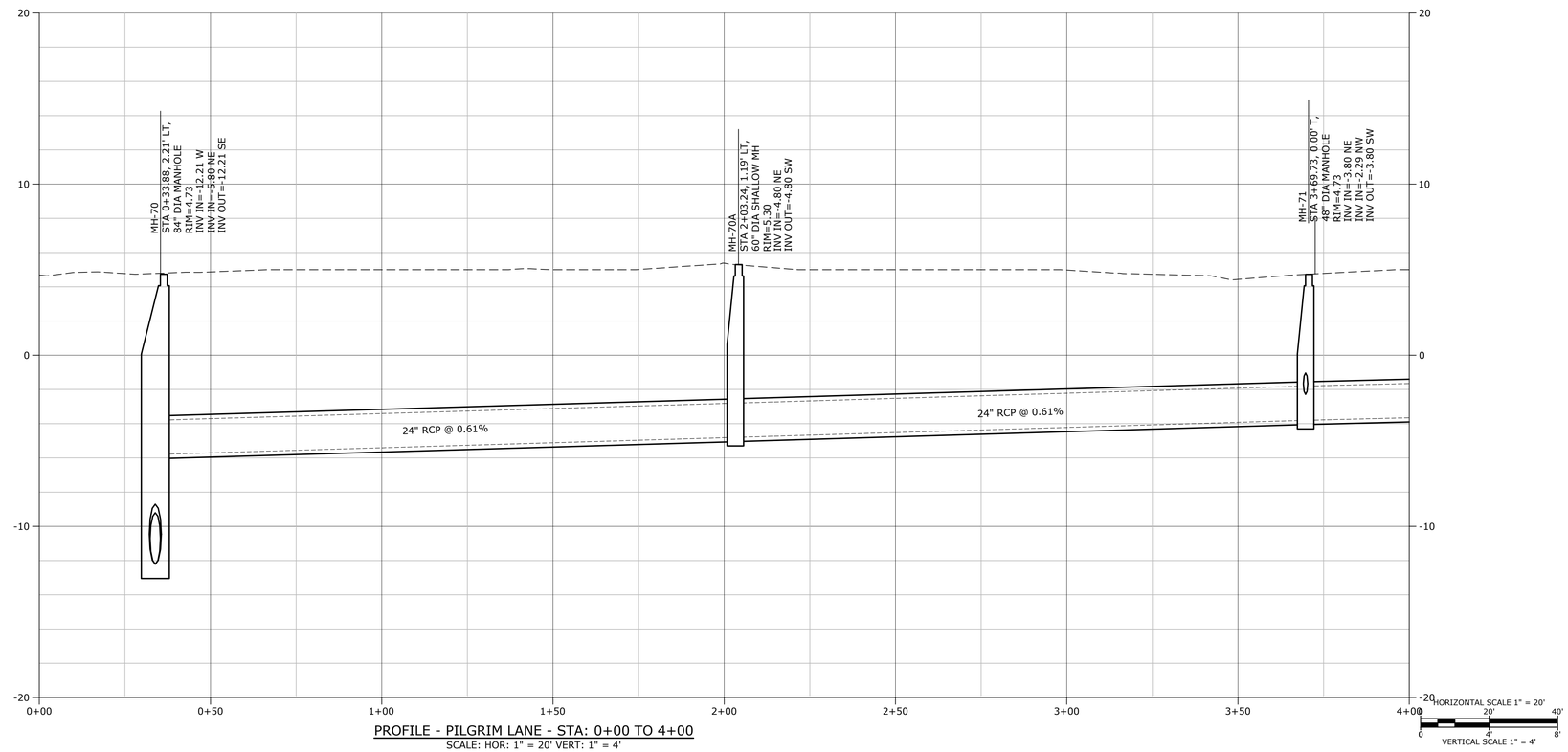

PROFILE - PILGRIM LANE - STA: 0+00 TO 4+00
SCALE: HOR: 1" = 20' VERT: 1" = 4'

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PLAN AND PROFILE
PILGRIM LANE
STA: 0+00 TO 4+00

SCALE: AS NOTED

C3.14

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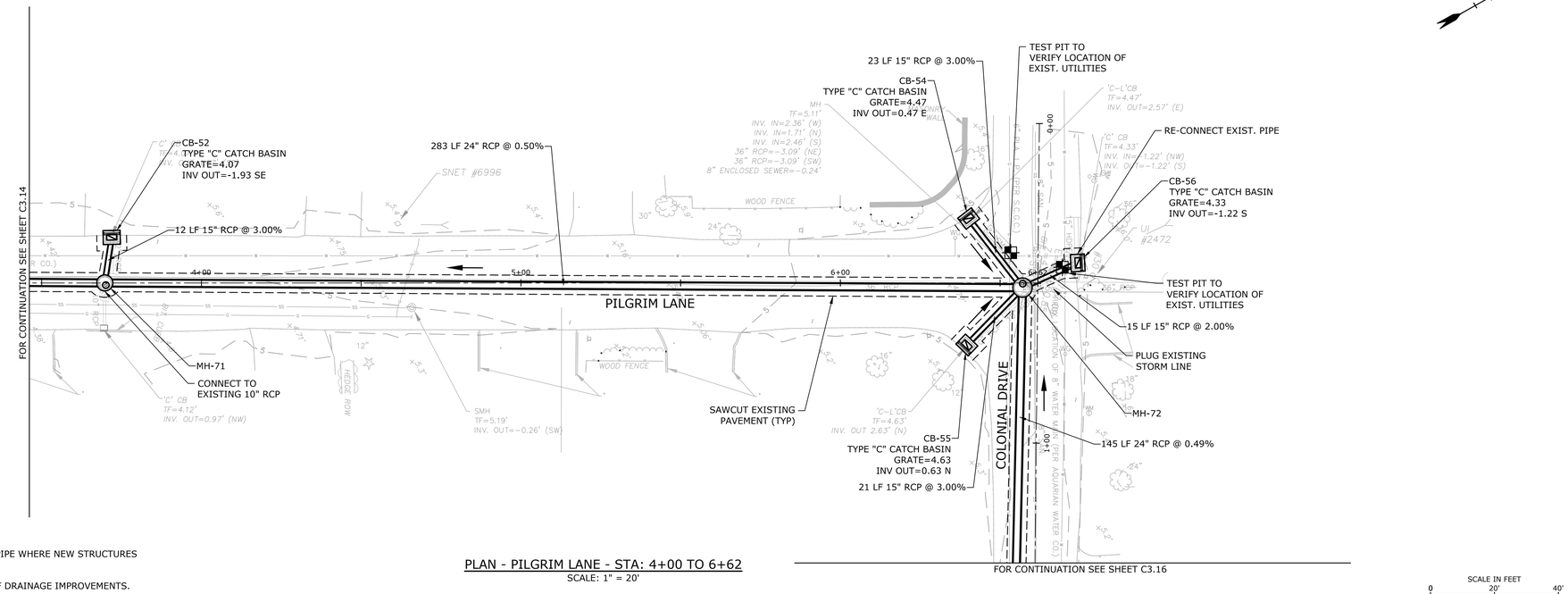

PLAN - PILGRIM LANE - STA: 4+00 TO 6+62
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

NOTES:

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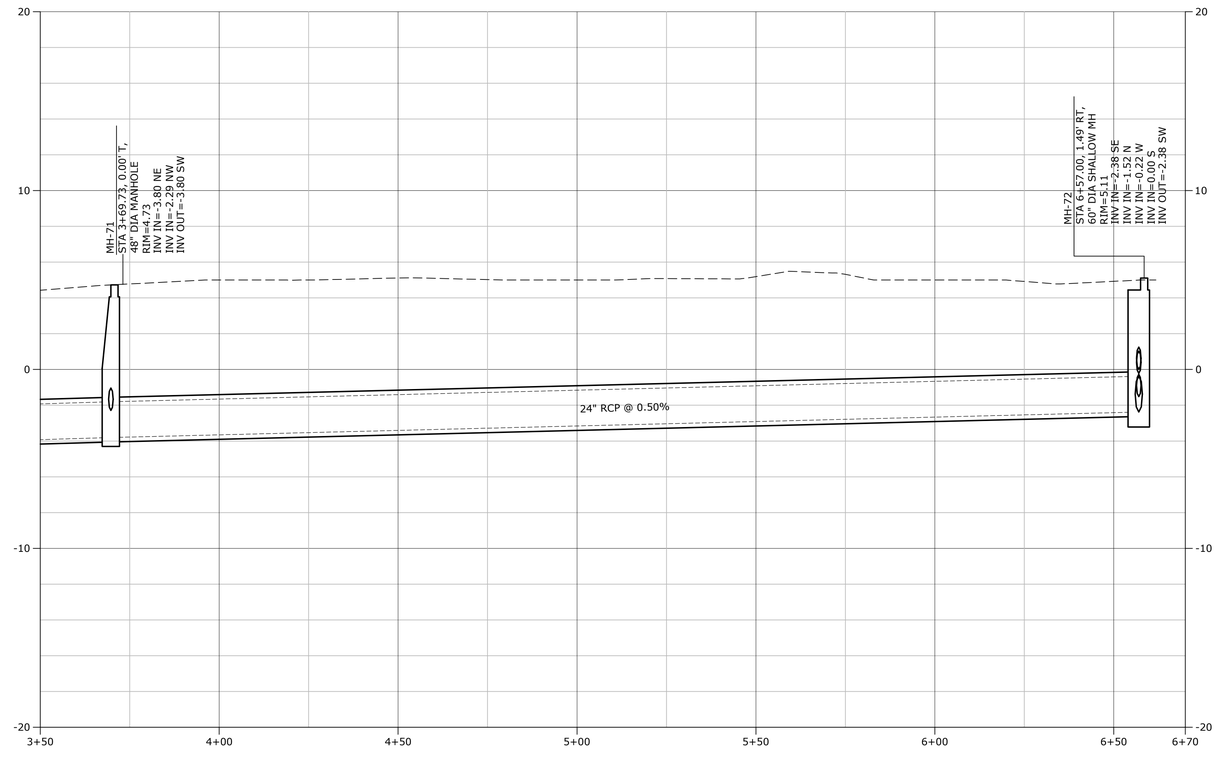

PROFILE - PILGRIM LANE - STA: 4+00 TO 6+70
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
VERTICAL SCALE 1" = 4'
0 4' 8'

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PLAN AND PROFILE
PILGRIM LANE
STA: 4+00 TO 6+70

SCALE: AS NOTED

C3.15

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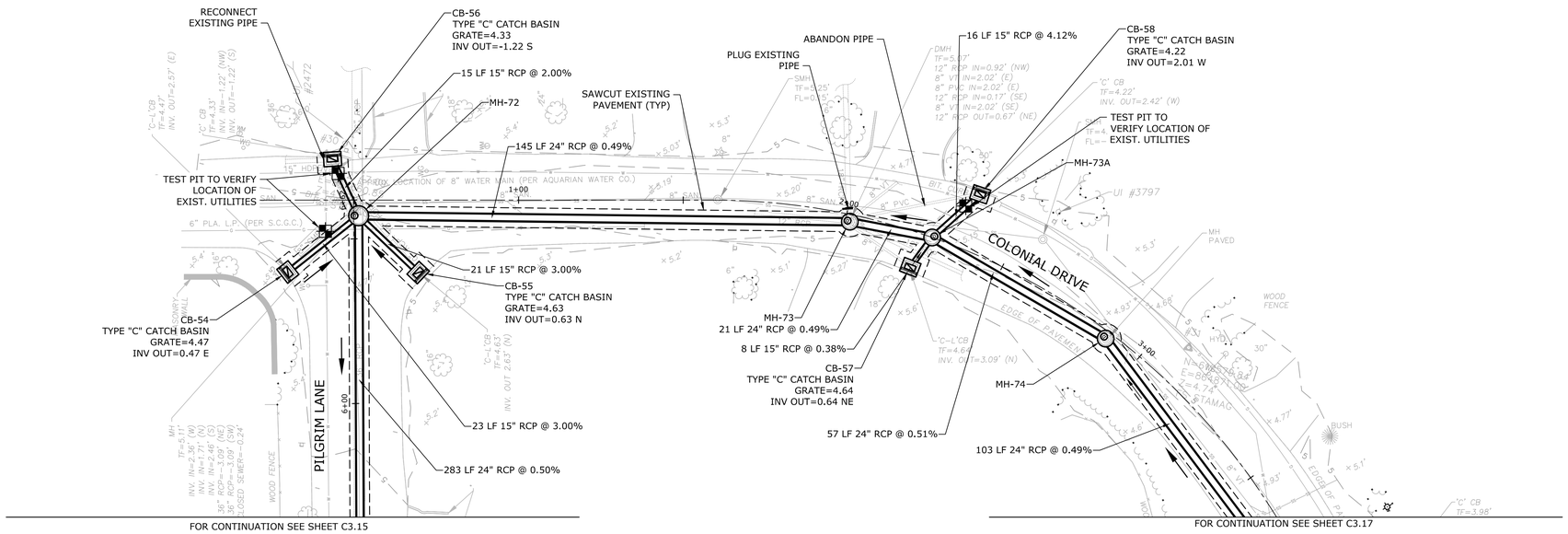

PLAN - COLONIAL DRIVE - STA: 0+00 TO 3+50
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

NOTES:

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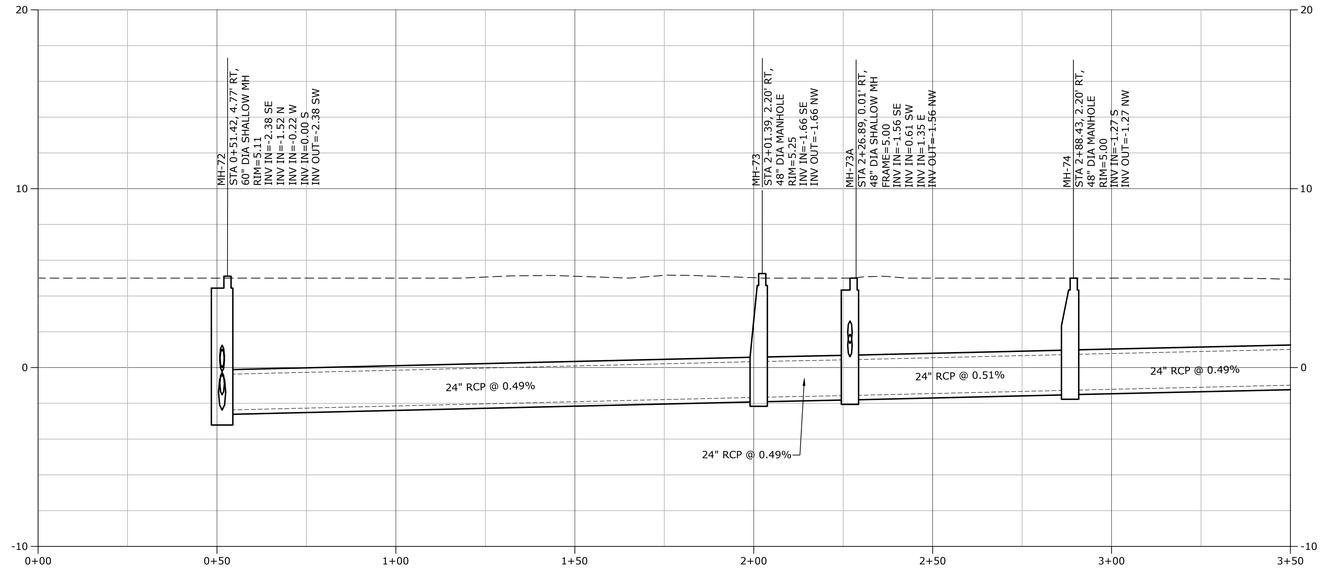

PROFILE - COLONIAL DRIVE - STA: 0+00 TO 3+50
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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PLAN AND PROFILE
COLONIAL DRIVE
STA: 0+00 TO 3+50

SCALE: AS NOTED

C3.16

Last Saved: 9/19/2018
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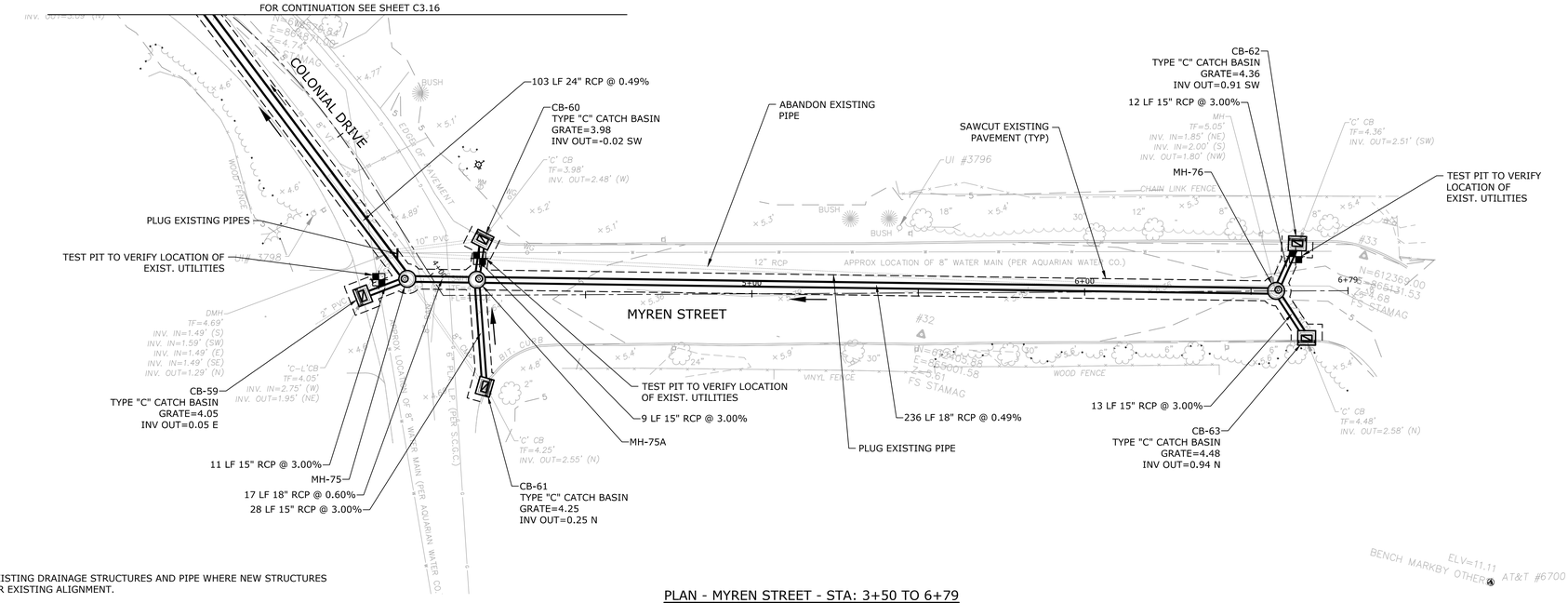

NOTES:

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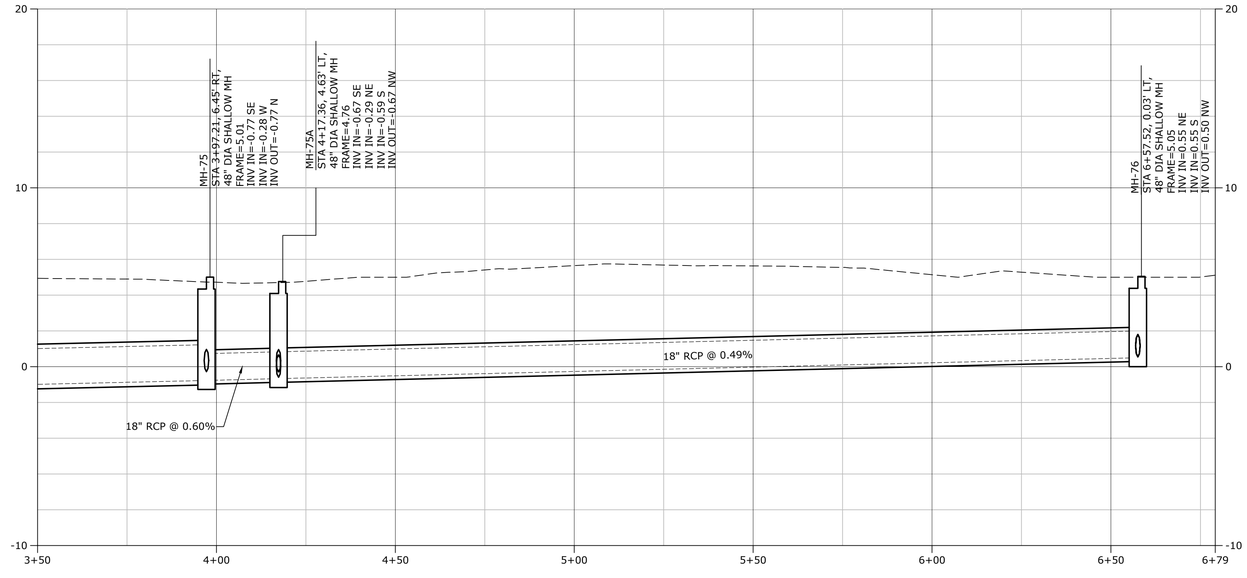
PLAN - MYREN STREET - STA: 3+50 TO 6+79
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - MYREN STREET - STA: 3+50 TO 6+79
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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PLAN AND PROFILE
MYREN STREET
STA: 3+50 TO 6+79

SCALE: AS NOTED

C3.17

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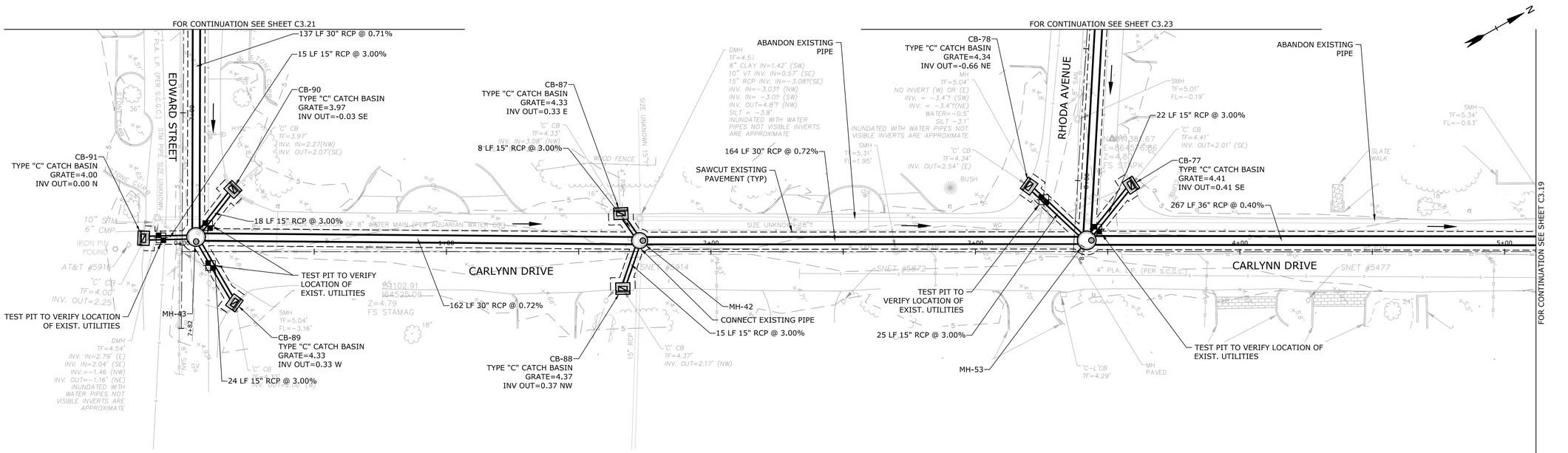

PLAN - CARLYNN DRIVE - STA: 0+00 TO 5+00
SCALE: 1" = 20'

NOTES:

1. REMOVE AND DISPOSE OF EXISTING DRAINAGE STRUCTURES AND PIPE WHERE NEW STRUCTURES AND PIPE ARE LOCATED OVER EXISTING ALIGNMENT.
2. PROVIDE 2" FULL WIDTH MILL AND OVERLAY AFTER COMPLETION OF DRAINAGE IMPROVEMENTS.
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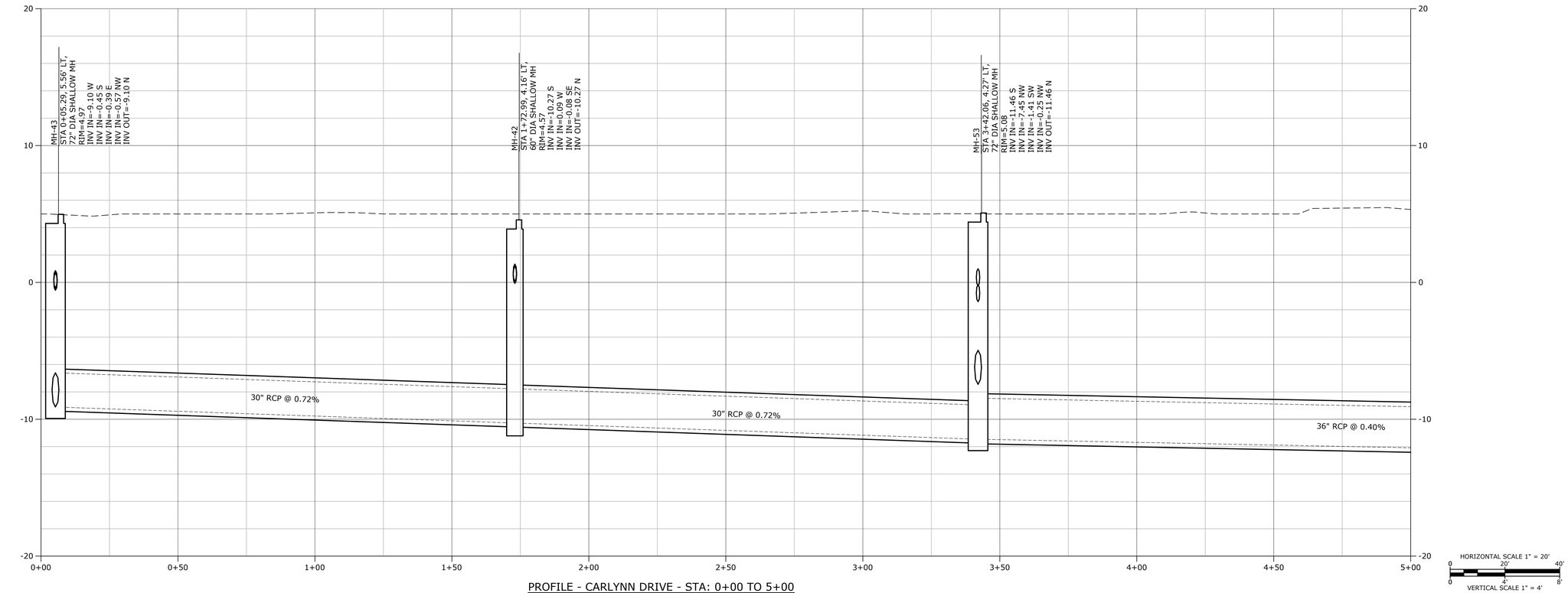

PROFILE - CARLYNN DRIVE - STA: 0+00 TO 5+00
SCALE: HOR: 1" = 20' VERT: 1" = 4'

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PLAN AND PROFILE
CARLYNN DRIVE
STA: 0+00 TO 5+00

SCALE: AS NOTED

C3.18

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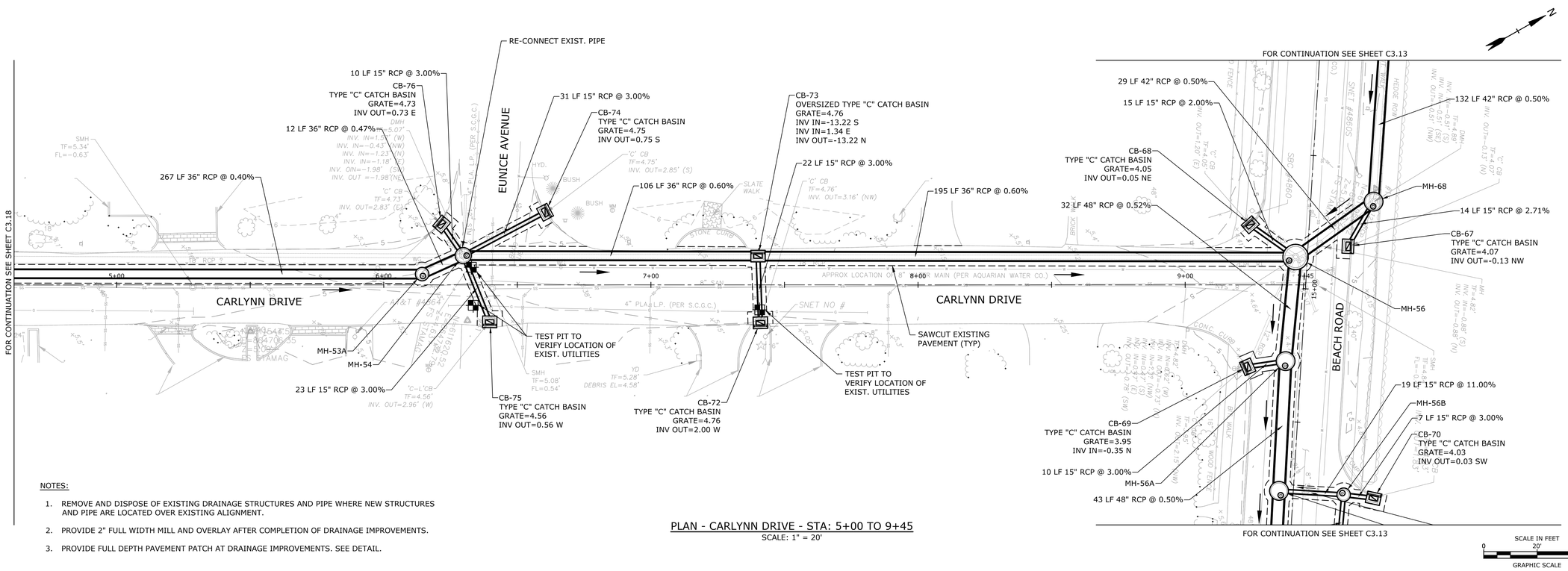

NOTES:

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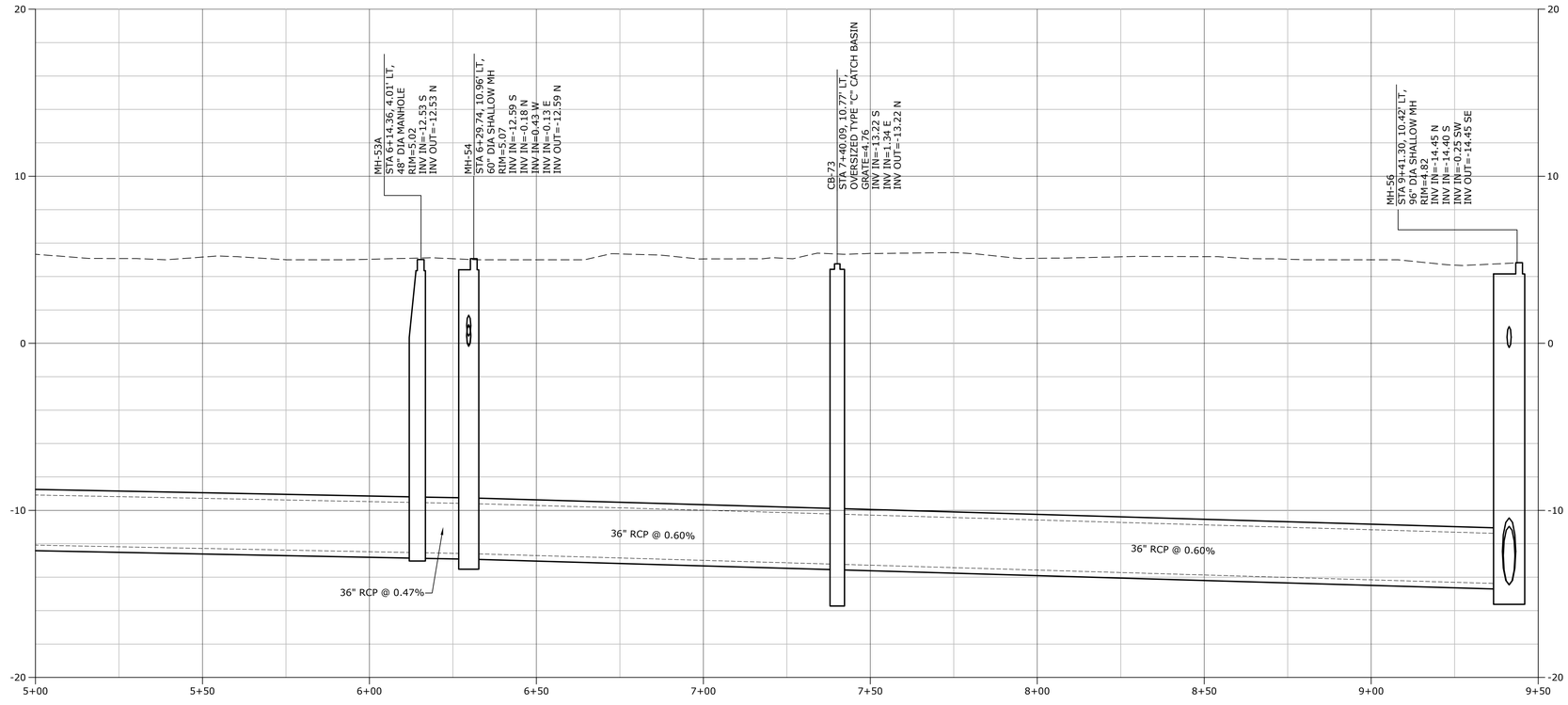
PLAN - CARLYNN DRIVE - STA: 5+00 TO 9+45
SCALE: 1" = 20'



PROFILE - CARLYNN DRIVE - STA: 5+00 TO 9+50
SCALE: HOR: 1" = 20' VERT: 1" = 4'

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PLAN AND PROFILE
CARLYNN DRIVE
STA: 5+00 TO 9+50

SCALE: AS NOTED

C3.19

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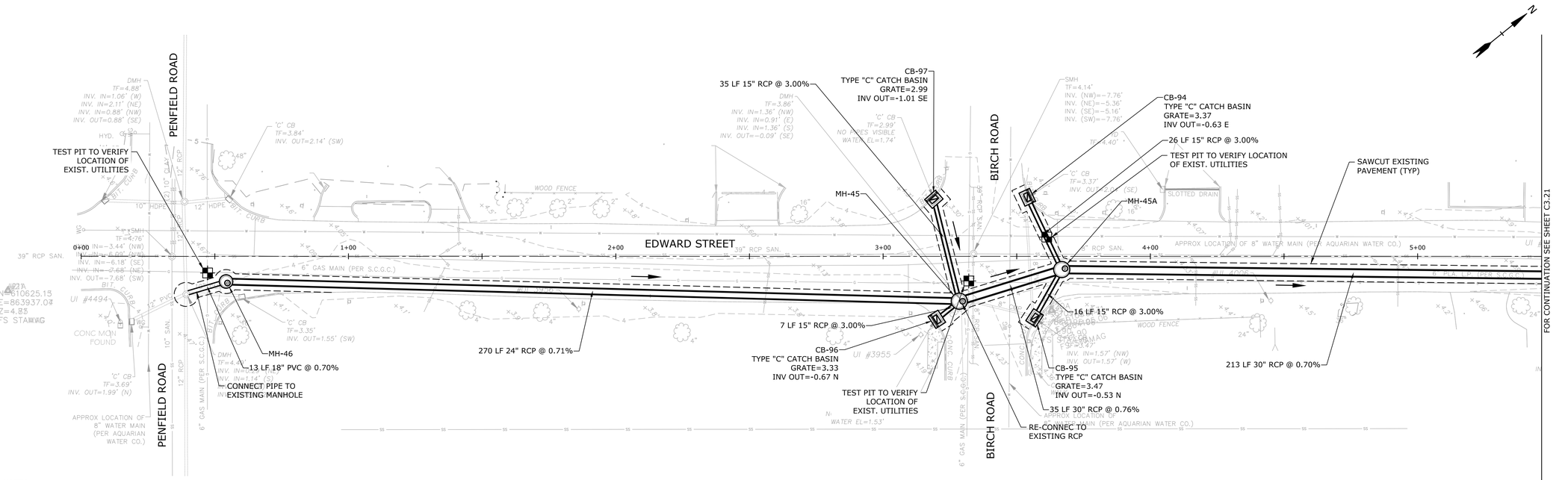

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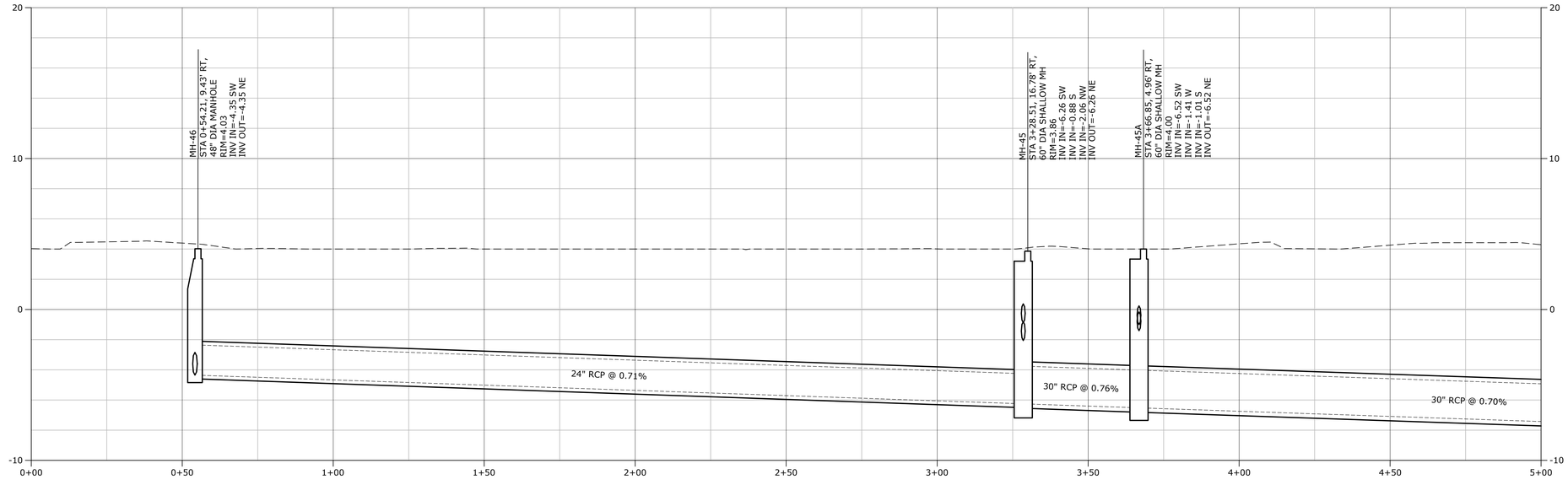
PLAN - EDWARD STREET - STA: 0+00 TO 5+00
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - EDWARD STREET - STA: 0+00 TO 5+00
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
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PLAN AND PROFILE
EDWARD STREET
STA: 0+00 TO 5+00

SCALE: AS NOTED

C3.20

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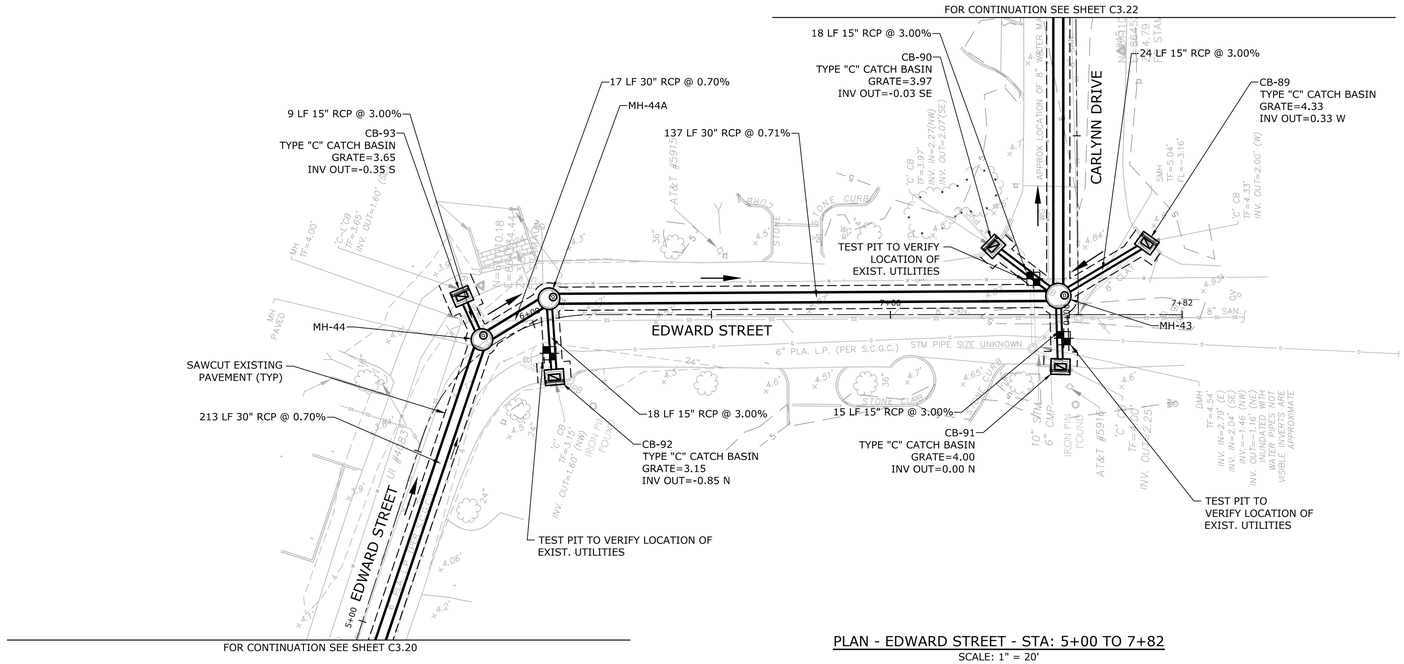

PLAN - EDWARD STREET - STA: 5+00 TO 7+82
SCALE: 1" = 20'

NOTES:

1. REMOVE AND DISPOSE OF EXISTING DRAINAGE STRUCTURES AND PIPE WHERE NEW STRUCTURES AND PIPE ARE LOCATED OVER EXISTING ALIGNMENT.
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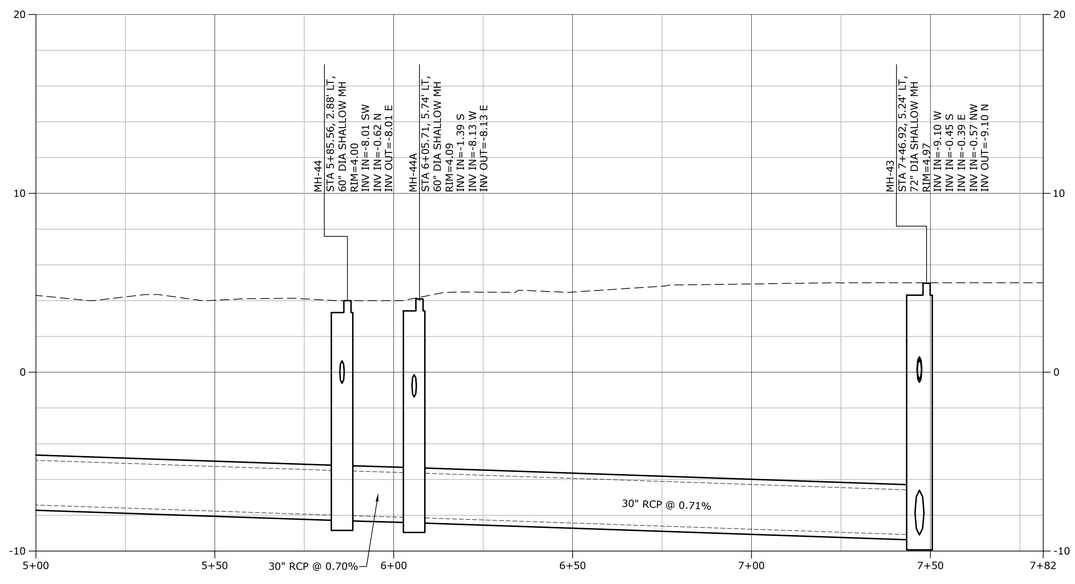
SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - EDWARD STREET - STA: 5+00 TO 7+82
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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PLAN AND PROFILE
EDWARD STREET
STA: 5+00 TO 7+82

SCALE: AS NOTED

C3.21

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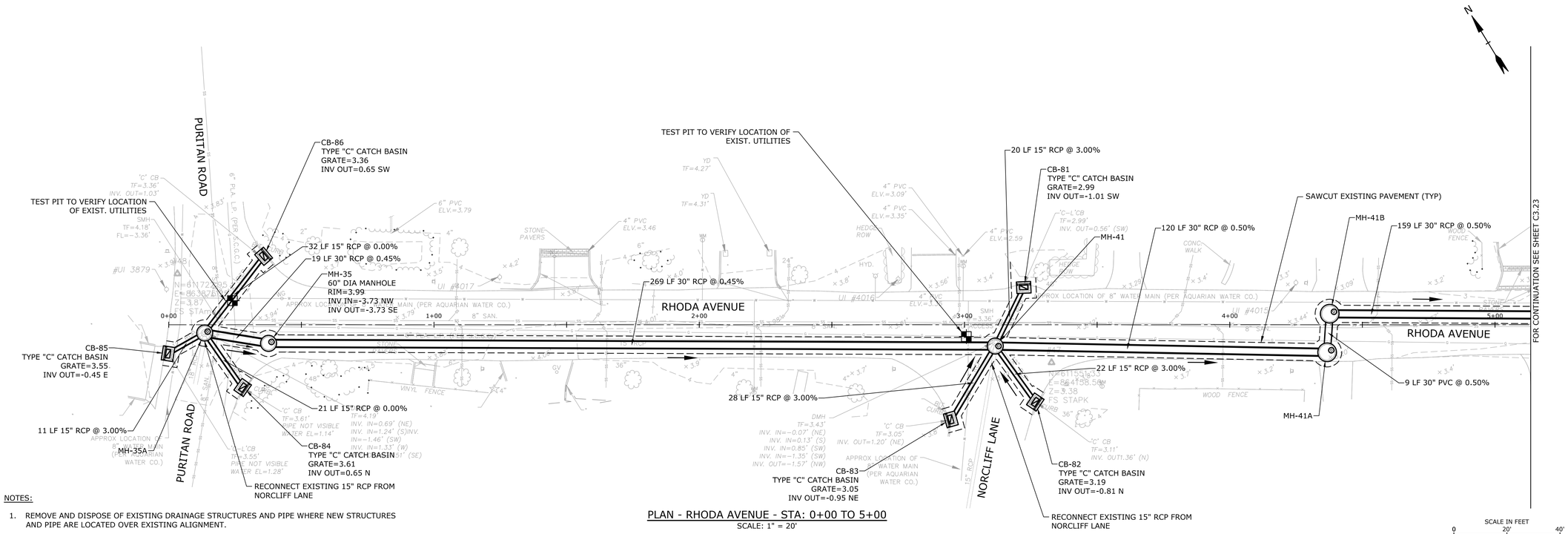

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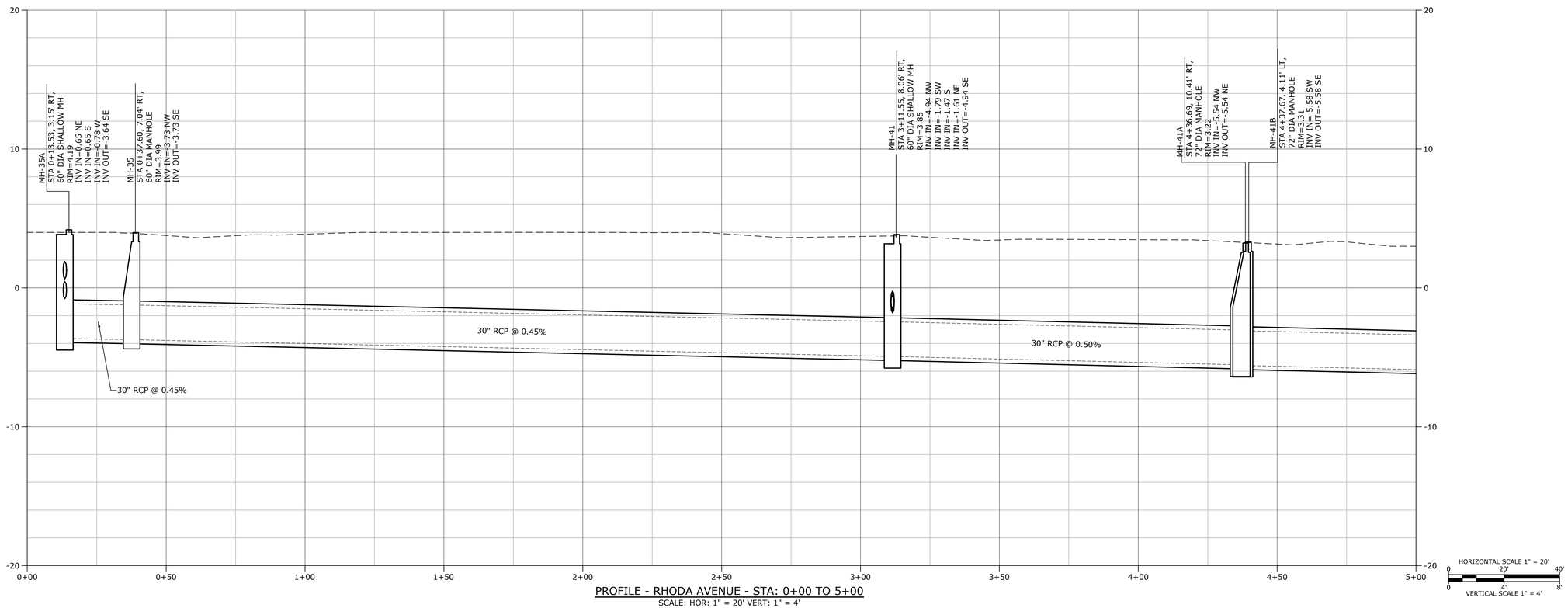
PLAN - RHODA AVENUE - STA: 0+00 TO 5+00
SCALE: 1" = 20'



PROFILE - RHODA AVENUE - STA: 0+00 TO 5+00
SCALE: HOR: 1" = 20' VERT: 1" = 4'

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PLAN AND PROFILE
RHODA AVENUE
STA: 0+00 TO 5+00

SCALE: AS NOTED

C3.22

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Plotted On: Dec 21, 2018 - 1:33pm By: JAR
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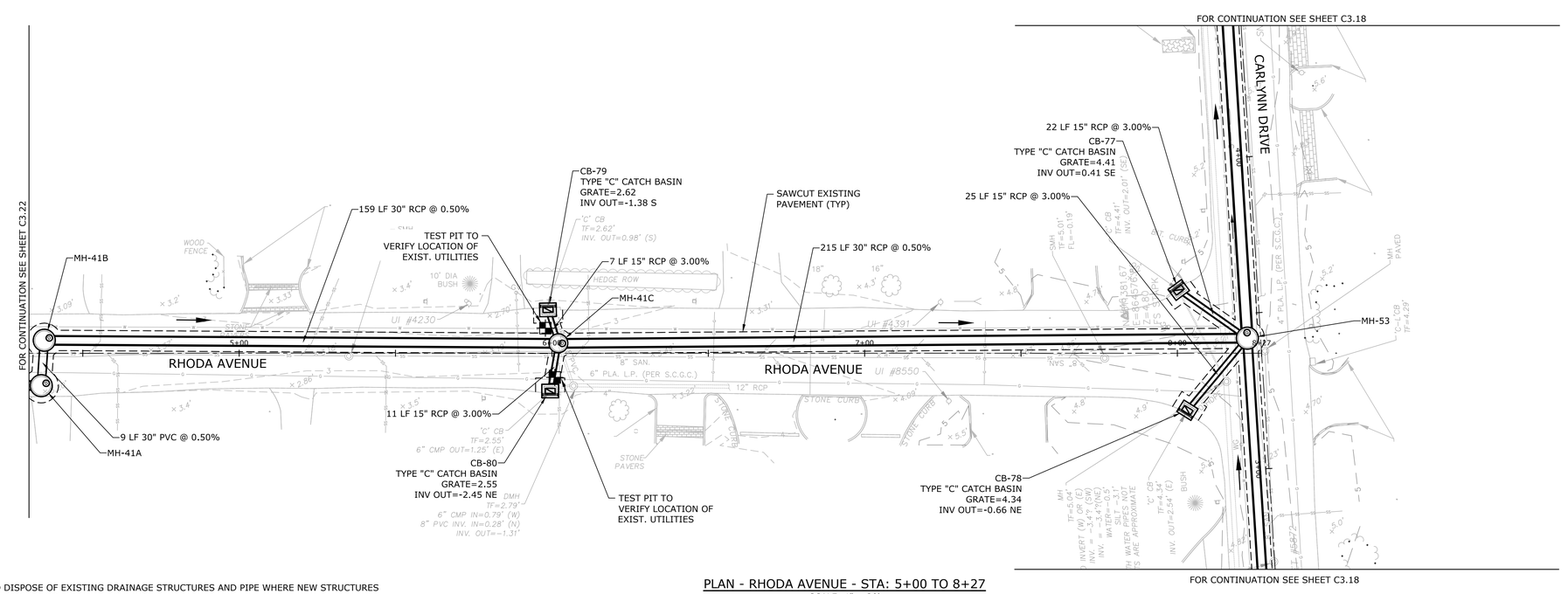
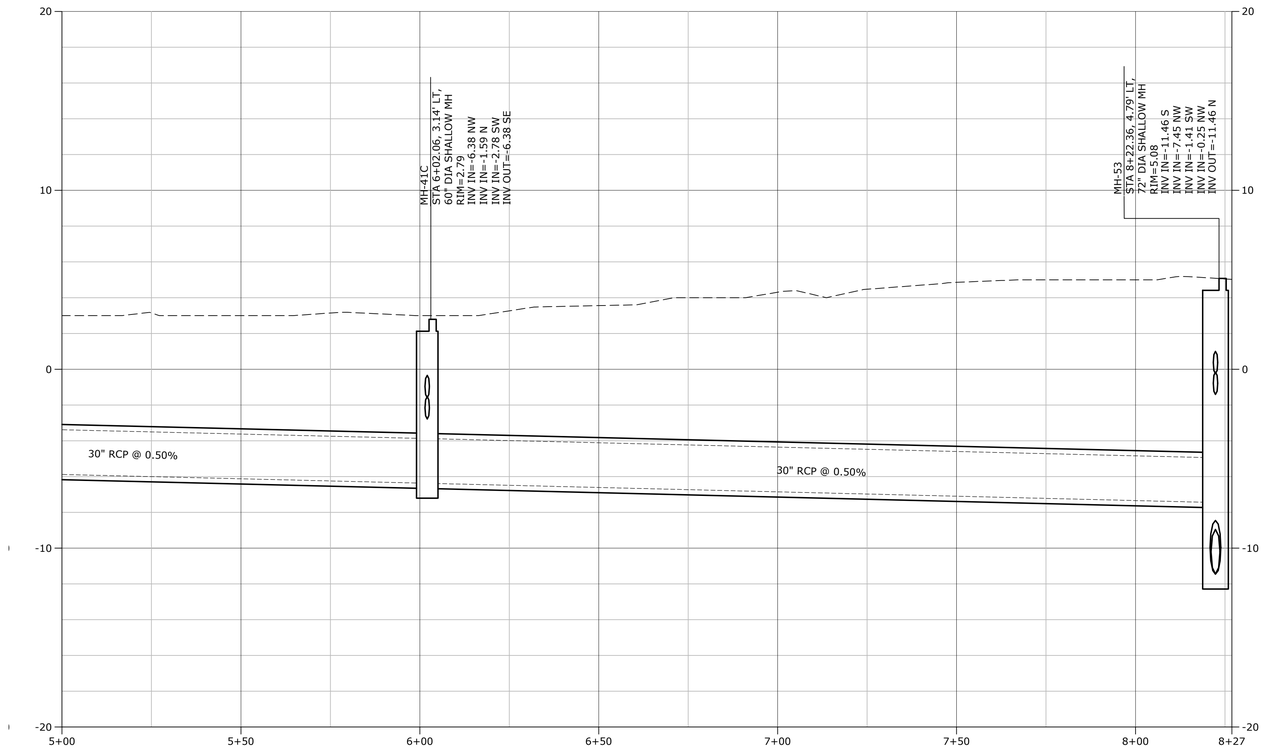


PLAN - RHODA AVENUE - STA: 5+00 TO 8+27
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

NOTES:

1. REMOVE AND DISPOSE OF EXISTING DRAINAGE STRUCTURES AND PIPE WHERE NEW STRUCTURES AND PIPE ARE LOCATED OVER EXISTING ALIGNMENT.
2. PROVIDE 2" FULL WIDTH MILL AND OVERLAY AFTER COMPLETION OF DRAINAGE IMPROVEMENTS.
3. PROVIDE FULL DEPTH PAVEMENT PATCH AT DRAINAGE IMPROVEMENTS. SEE DETAIL.



PROFILE - RHODA AVENUE - STA: 5+00 TO 8+27
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
VERTICAL SCALE 1" = 4'
0 4' 8'

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Preliminary

Town of Fairfield

South Benson Drainage Improvements

Fairfield, Connecticut

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

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APPROVED:	XX

PLAN AND PROFILE
RHODA AVENUE
STA: 5+00 TO 8+27

SCALE: AS NOTED

C3.23

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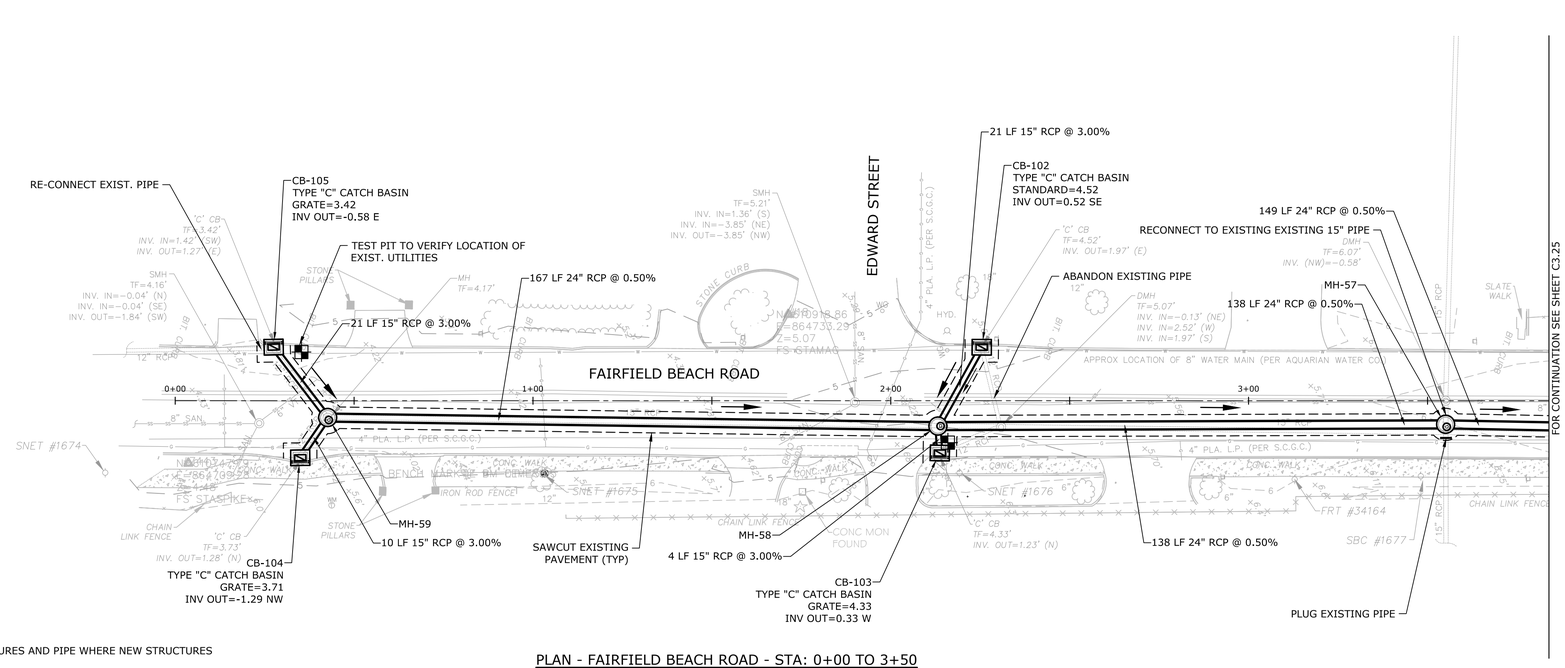

NOTES:

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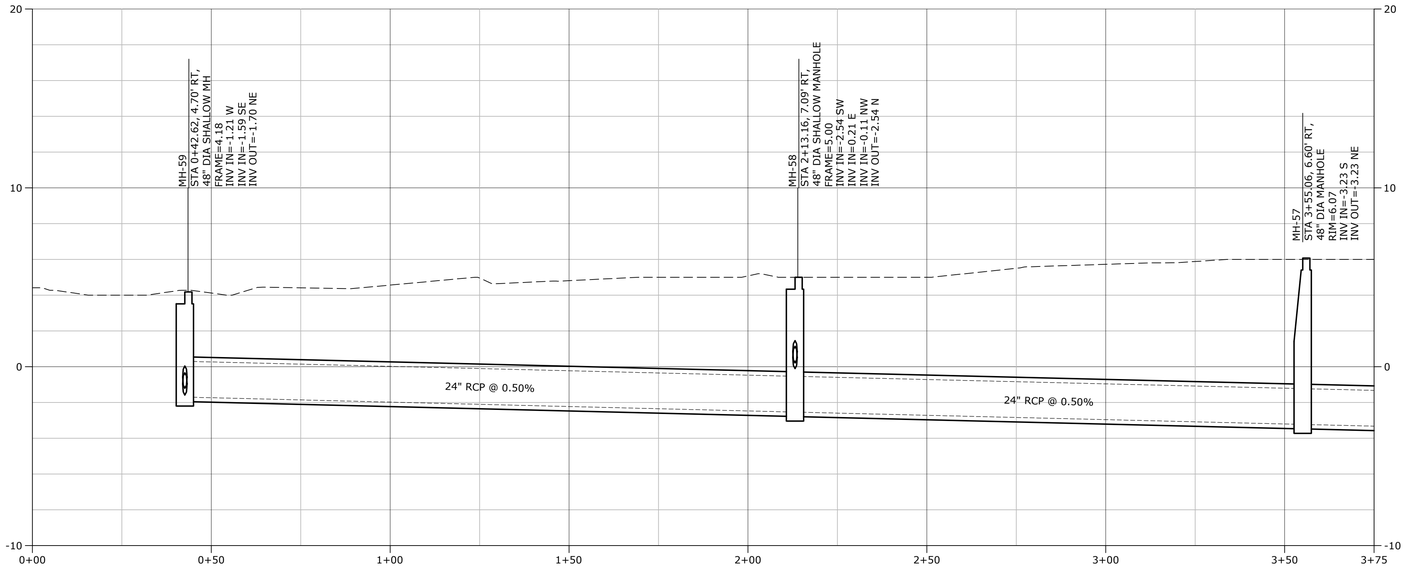
2. PROVIDE 2" FULL WIDTH MILL AND OVERLAY AFTER COMPLETION OF DRAINAGE IMPROVEMENTS.
3. PROVIDE FULL DEPTH PAVEMENT PATCH AT DRAINAGE IMPROVEMENTS. SEE DETAIL.

PLAN - FAIRFIELD BEACH ROAD - STA: 0+00 TO 3+50
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - FAIRFIELD BEACH ROAD - STA: 0+00 TO 3+50
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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PLAN AND PROFILE
FAIRFIELD BEACH ROAD
STA: 0+00 TO 3+50

SCALE: AS NOTED

C3.24

Last Saved: 9/19/2018
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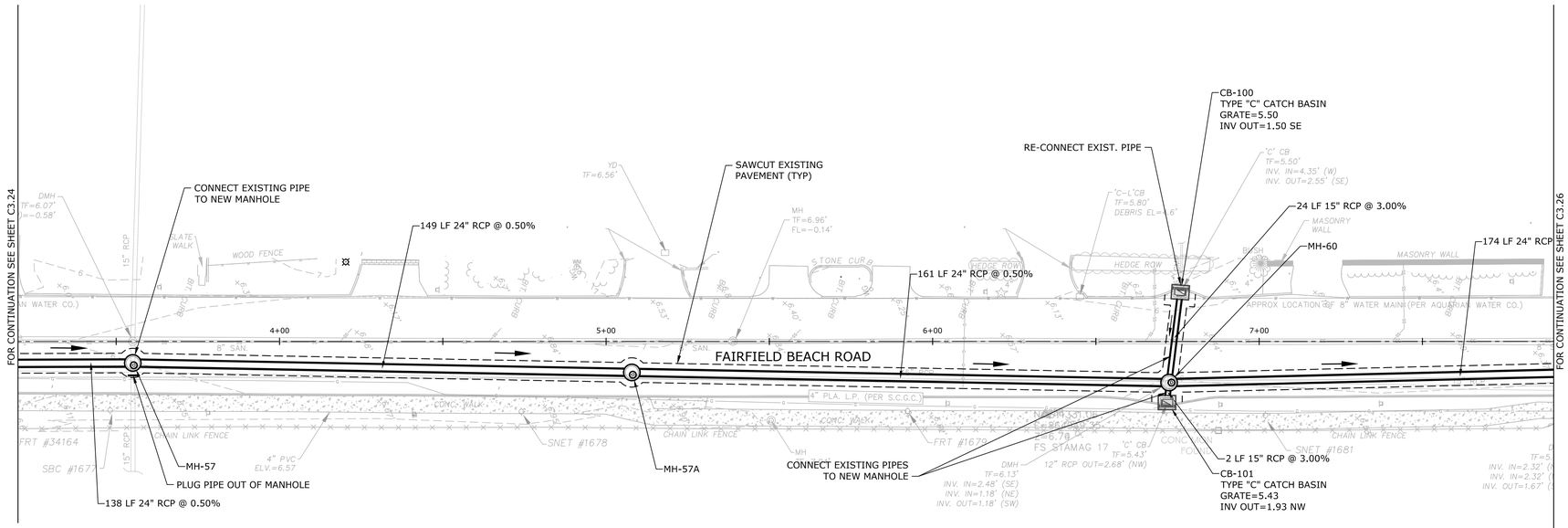

NOTES:

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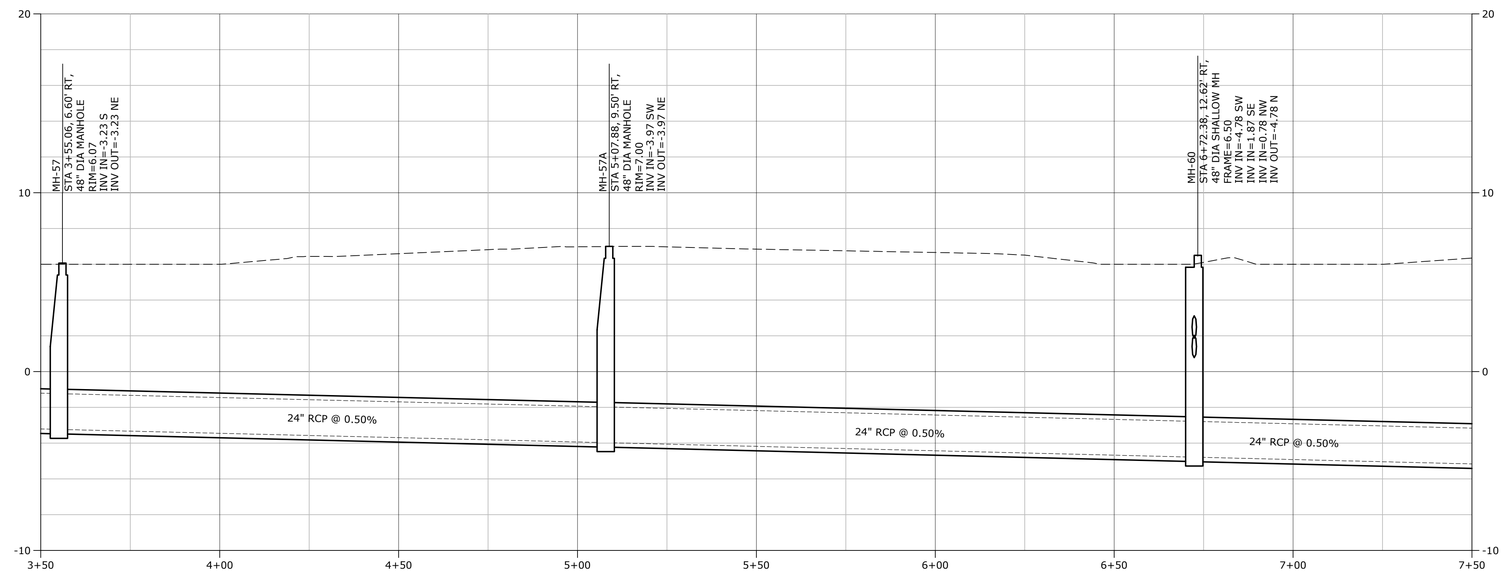
3. PROVIDE FULL DEPTH PAVEMENT PATCH AT DRAINAGE IMPROVEMENTS. SEE DETAIL.

PLAN - FAIRFILED BEACH ROAD - STA: 3+50 TO 7+50
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - FAIRFIELD BEACH ROAD - STA: 3+50 TO 7+50
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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PLAN AND PROFILE
FAIRFIELD BEACH ROAD
STA: 3+50 TO 7+50

SCALE: AS NOTED

C3.25

Last Saved: 9/19/2018
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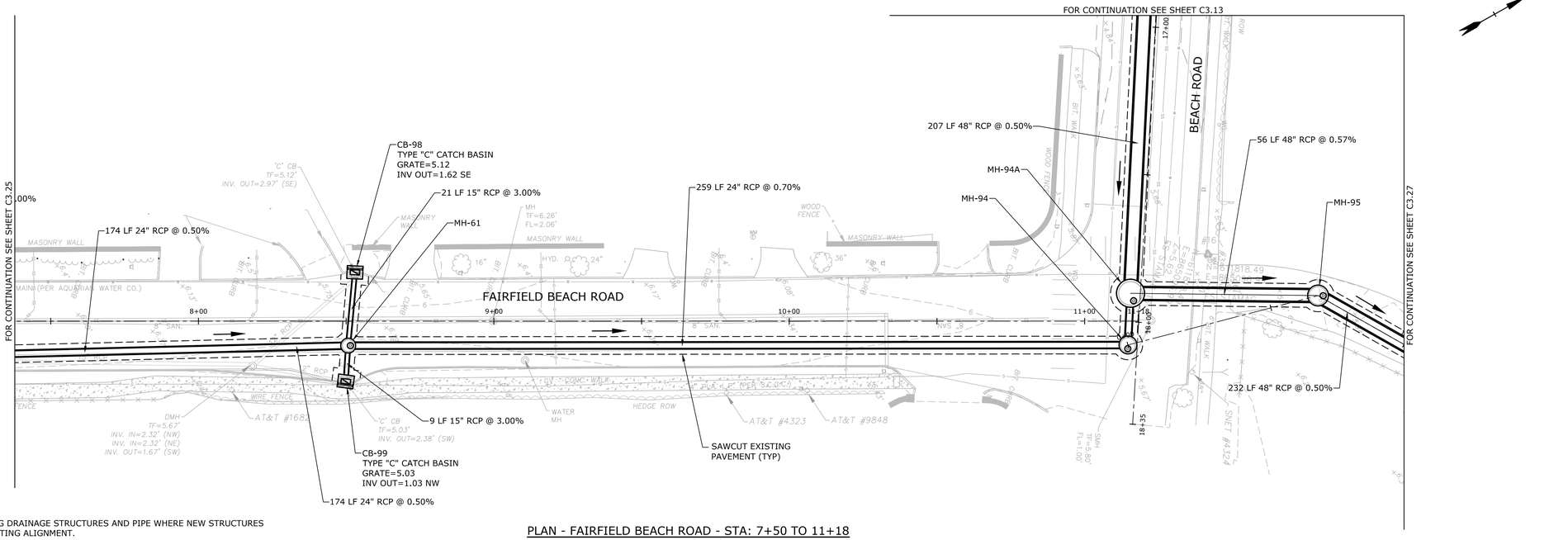

NOTES:

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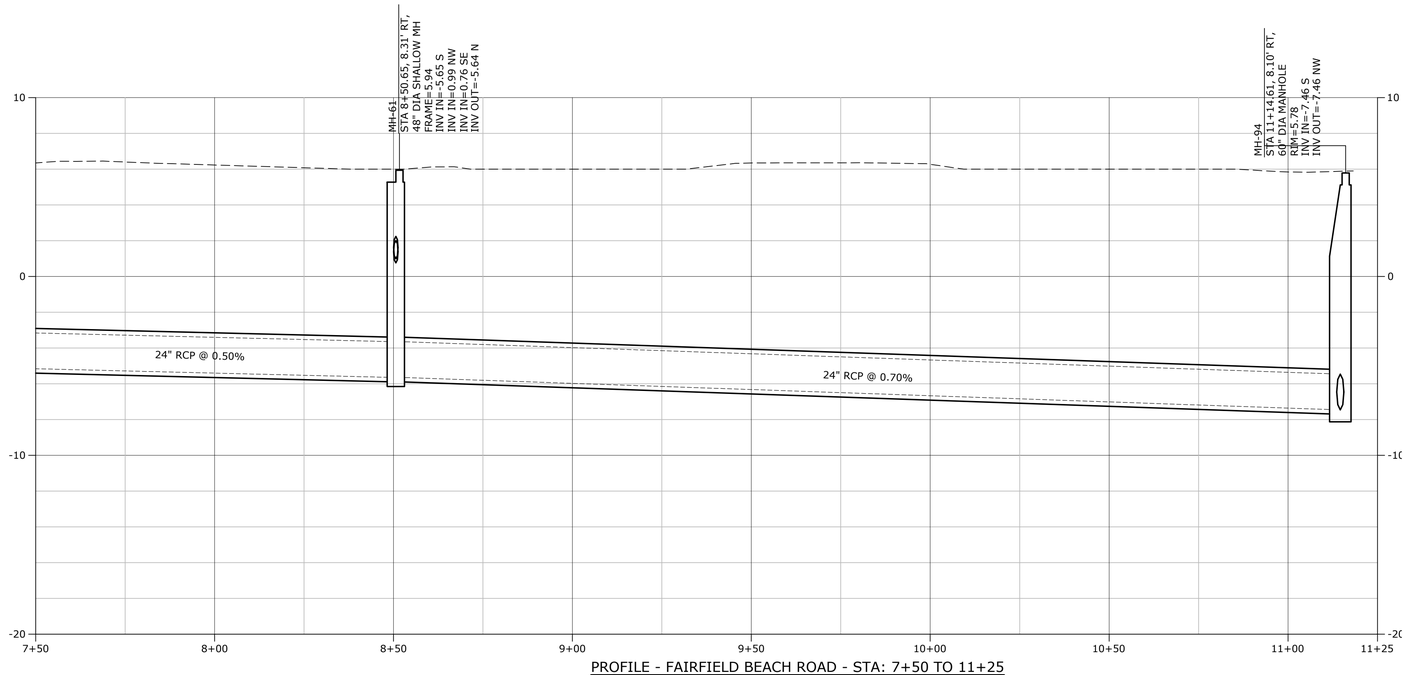
3. PROVIDE FULL DEPTH PAVEMENT PATCH AT DRAINAGE IMPROVEMENTS. SEE DETAIL.

PLAN - FAIRFIELD BEACH ROAD - STA: 7+50 TO 11+18
SCALE: 1" = 20'

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - FAIRFIELD BEACH ROAD - STA: 7+50 TO 11+25
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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PLAN AND PROFILE
FAIRFIELD BEACH ROAD
STA: 7+50 TO 11+25

SCALE: AS NOTED

C3.26

Last Saved: 9/19/2018
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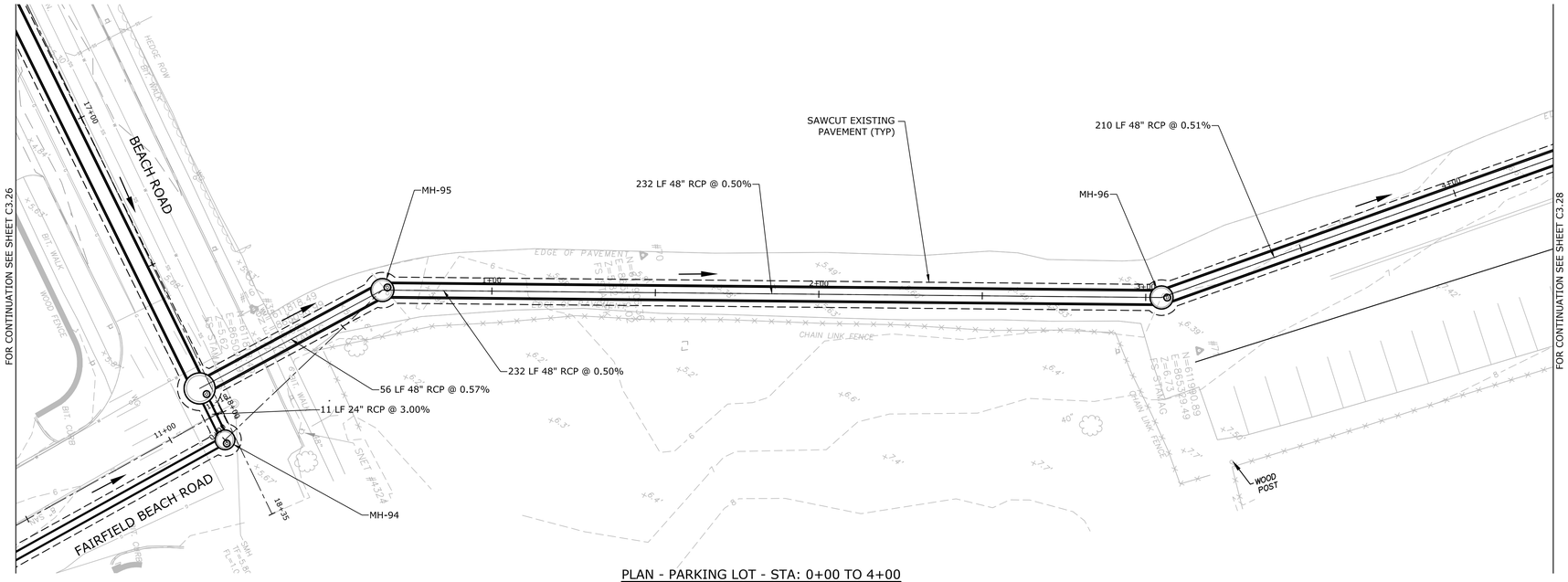

PLAN - PARKING LOT - STA: 0+00 TO 4+00
SCALE: 1" = 20'

NOTES:

1. REMOVE AND DISPOSE OF EXISTING DRAINAGE STRUCTURES AND PIPE WHERE NEW STRUCTURES AND PIPE ARE LOCATED OVER EXISTING ALIGNMENT.
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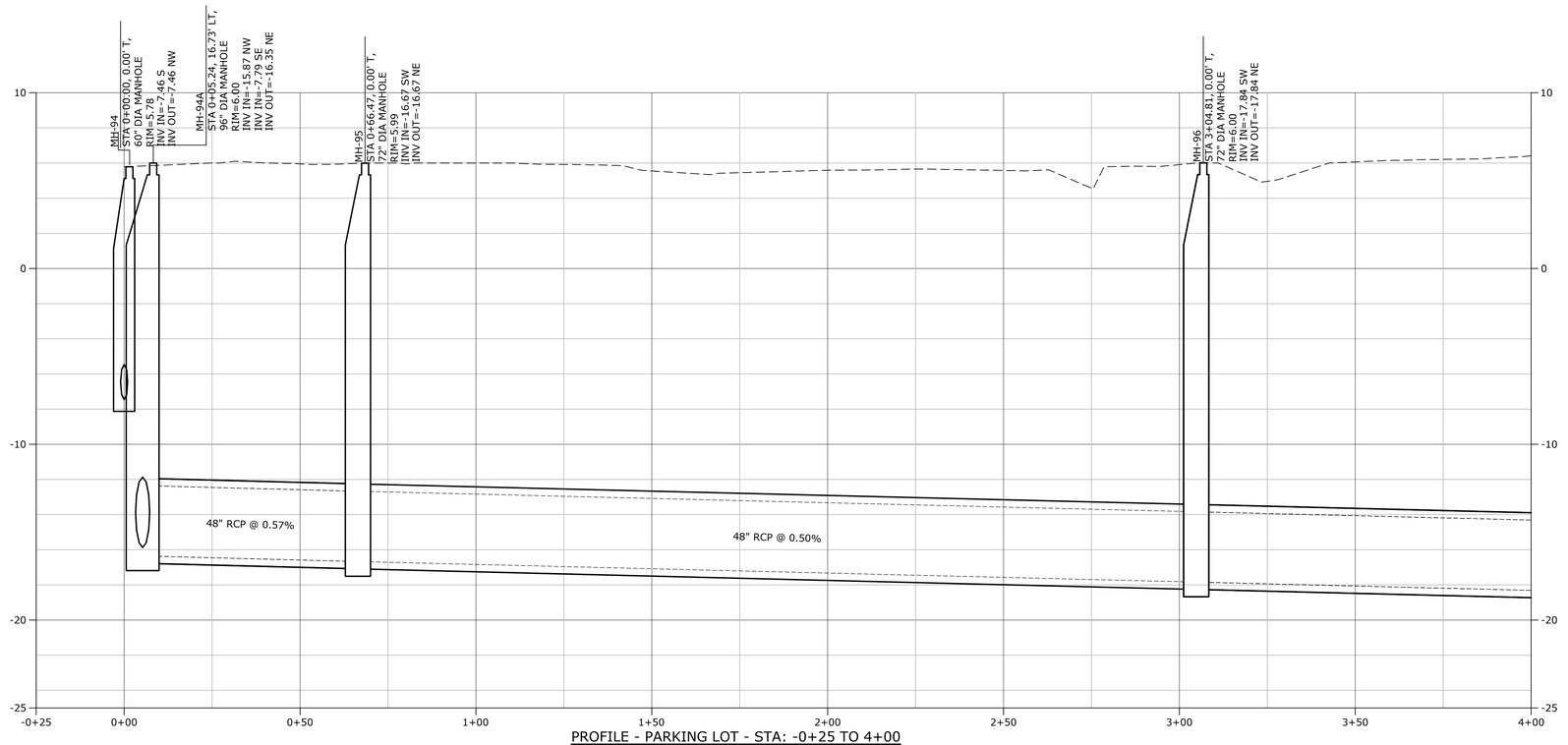
3. PROVIDE FULL DEPTH PAVEMENT PATCH AT DRAINAGE IMPROVEMENTS. SEE DETAIL.

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - PARKING LOT - STA: -0+25 TO 4+00
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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PLAN AND PROFILE
PARKING LOT
STA: -0+25 TO 4+00

SCALE: AS NOTED

C3.27

Last Saved: 9/19/2018
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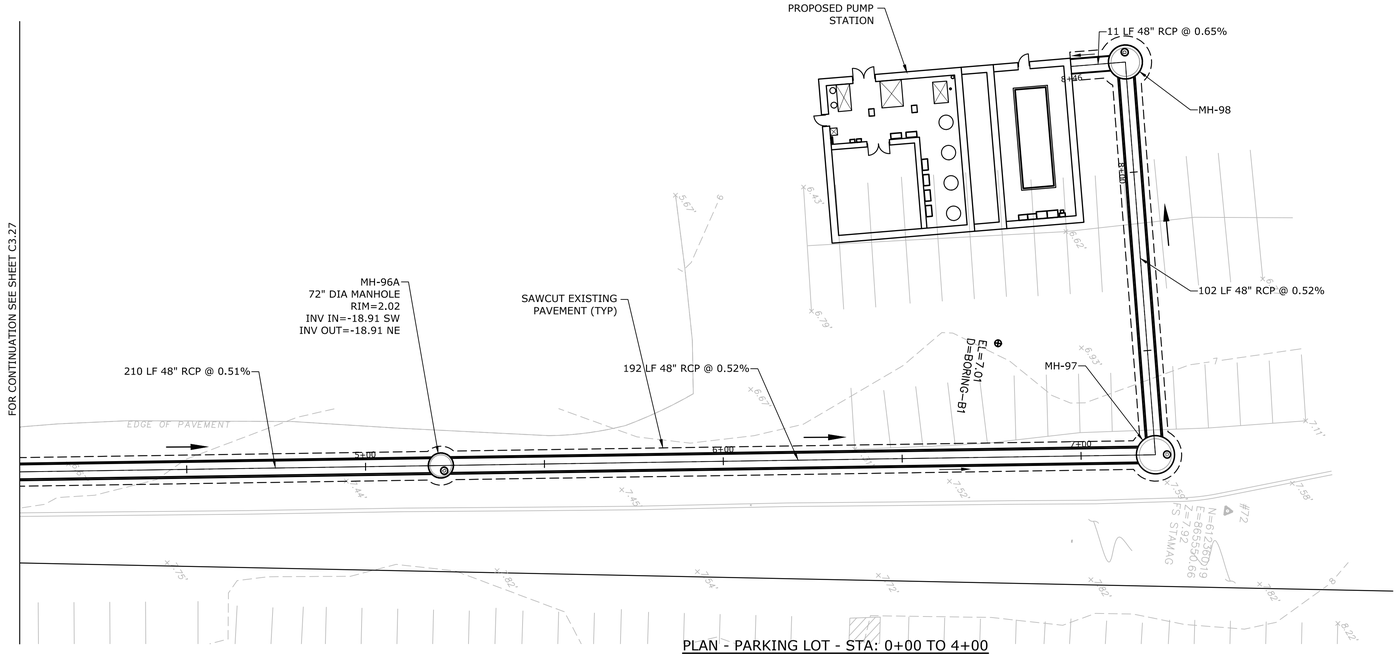
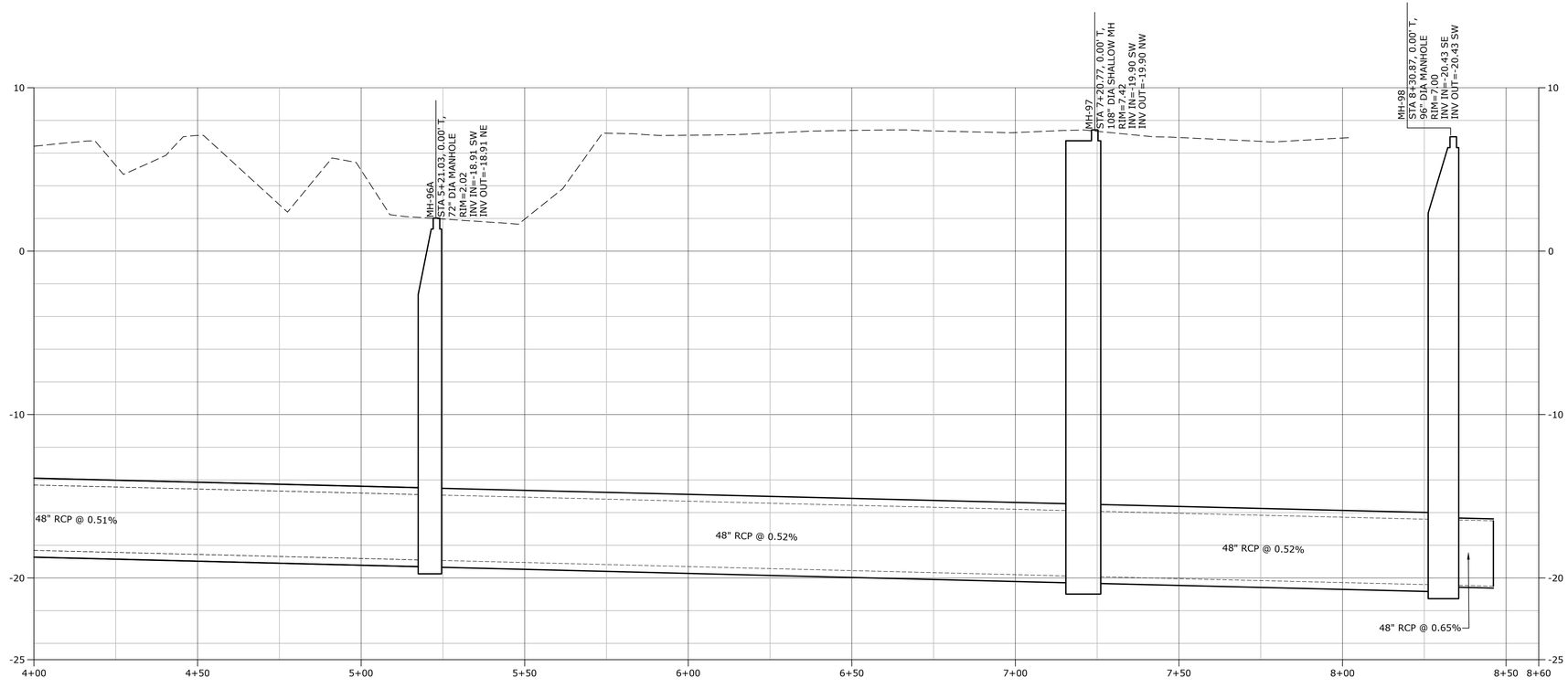


PLAN - PARKING LOT - STA: 0+00 TO 4+00
SCALE: 1" = 20'

NOTES:

1. REMOVE AND DISPOSE OF EXISTING DRAINAGE STRUCTURES AND PIPE WHERE NEW STRUCTURES AND PIPE ARE LOCATED OVER EXISTING ALIGNMENT.
2. PROVIDE 2" FULL WIDTH MILL AND OVERLAY AFTER COMPLETION OF DRAINAGE IMPROVEMENTS.
3. PROVIDE FULL DEPTH PAVEMENT PATCH AT DRAINAGE IMPROVEMENTS. SEE DETAIL.

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE



PROFILE - PARKING LOT - STA: 4+00 TO 8+60
SCALE: HOR: 1" = 20' VERT: 1" = 4'

HORIZONTAL SCALE 1" = 20'
0 20' 40'
0 4' 8'
VERTICAL SCALE 1" = 4'

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DATE:	05/2/2018
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APPROVED:	XX

PLAN AND PROFILE
PARKING LOT
STA: 4+00 TO 8+60

SCALE: AS NOTED

C3.28

Last Saved: 9/19/2018
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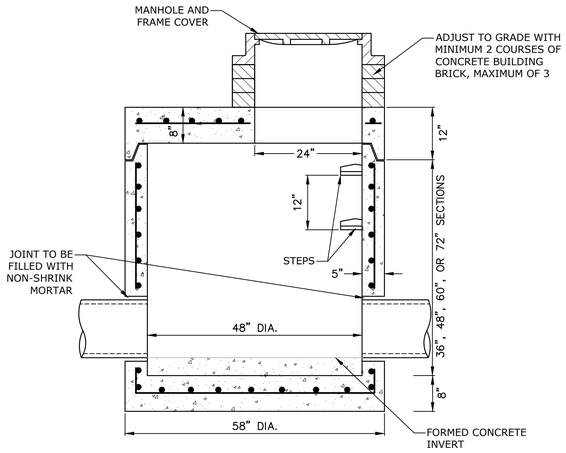
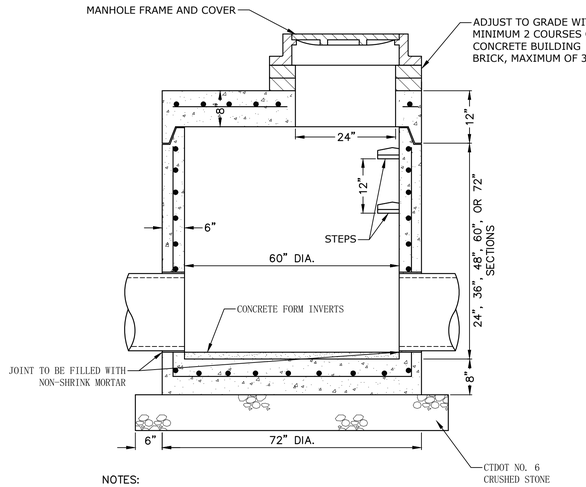


48" DIA. SHALLOW MANHOLE

NO SCALE

NOTES:

1. JOINT SEALANT SHALL BE PREFORMED BUTYL RUBBER MASTIC TYPE SEAL COMPLYING WITH AASHTO SPECIFICATION M198.
2. REINFORCING 0.12 IN²/VERTICAL FOOT PER ASTM A185.
3. CONCRETE COMPRESSIVE STRENGTH: 5,000 PSI, 28 DAYS
4. MANHOLE STEP TO BE USED MEETS OSHA REGULATION 20 CFR 1910.27 AND SECTION 11 ASTM SPECIFICATION C-473.
5. METHOD OF MANUFACTURE: WET CAST.
6. BASE SECTION MONOLITHIC.
7. KNOCKOUTS FOR PIPES 4" MIN. FROM TOP AND BOTTOM OF SECTION.

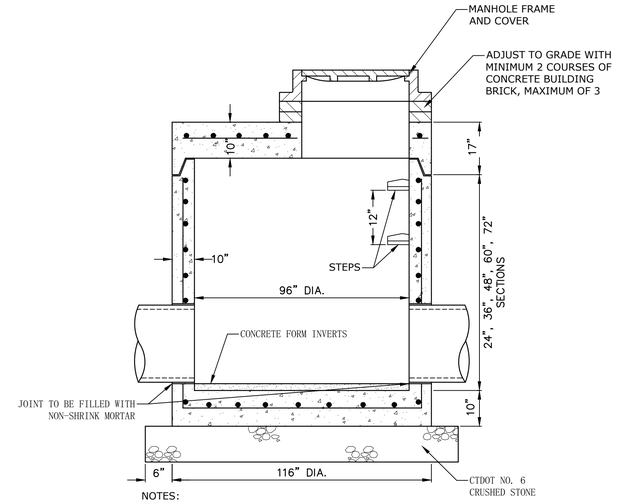


NOTES:

1. JOINT SEALANT SHALL BE PREFORMED BUTYL RUBBER MASTIC TYPE SEAL COMPLYING WITH AASHTO M198.
2. REINFORCING ASTM A185, 0.17 IN²/VERT. FT.
3. 5,000 PSI CONCRETE @ 28 DAYS.
4. MANHOLE STEP TO BE USED MEETS OSHA REGULATION 20 CFR 1910.27 AND SECTION 11 ASTM SPECIFICATION C-473.
5. METHOD OF MANUFACTURE: WET CAST.
6. BASE SECTION MONOLITHIC.
7. KNOCKOUTS FOR PIPES 4" MIN. FROM TOP AND BOTTOM OF SECTION.

60" DIA. FLAT TOP MANHOLE

NO SCALE

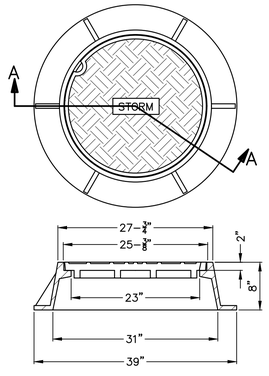


NOTES:

1. JOINT SEALANT SHALL BE PREFORORMED BUTYL RUBBER MASTIC TYPE SEAL THAT CMPLIES WITH AASHTO SPECIFICATION M-198. MEETS FEDERAL SPECIFICATION SS-S-00210(210-A).
2. REINFORCING ASTM A-185 AREA 96" DIA. 0.24 IN.²/VERT. FT. REINFORCE IN BOTH BELL & SPIGOT.
3. CONCRETE COMPRESSION STRENGTH 5000 PSI - 28 DAYS.
4. MANHOLE STEP TO BE USED MEETS OSHA REGULATION 20 CFR 1910.27 AND SECTION 11 ASTM SPECIFICATION C-473.
5. METHOD OF MANUFACTURE: WET CAST.
6. BASE SECTION MONOLITHIC.
7. KNOCKOUTS FOR PIPES 4" MIN. FROM TOP AND BOTTOM OF SECTION.

96" DIAMETER FLAT TOP MANHOLE

NO SCALE

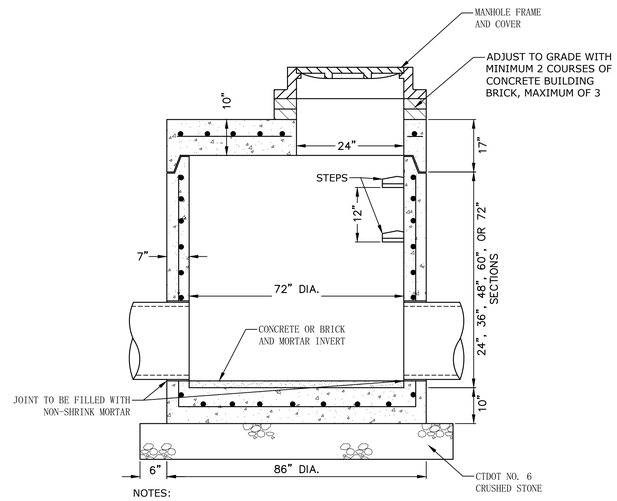


SECTION A-A

NOTE:
MANHOLE FRAMES & COVERS SHALL BE TOWN OF FAIRFIELD PATTERN AS MANUFACTURED BY THE CAMPBELL FOUNDRY COMPANY OF NORTH HAVEN, CONNECTICUT, OR APPROVED EQUIVALENT.

TOWN OF FAIRFIELD MANHOLE FRAME AND COVER

NO SCALE

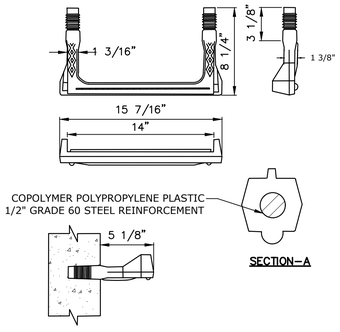


NOTES:

1. JOINT SEALANT SHALL BE PREFORORMED BUTYL RUBBER MASTIC TYPE SEAL THAT CMPLIES WITH AASHTO SPECIFICATION M-198. MEETS FEDERAL SPECIFICATION SS-S-00210(210-A).
2. REINFORCING ASTM A-185 AREA 72" DIA. 0.19 IN.²/VERT. FT. REINFORCE IN BOTH BELL & SPIGOT.
3. CONCRETE COMPRESSION STRENGTH 5000 PSI - 28 DAYS.
4. MANHOLE STEP TO BE USED MEETS OSHA REGULATION 20 CFR 1910.27 AND SECTION 11 ASTM SPECIFICATION C-473.
5. METHOD OF MANUFACTURE: WET CAST.
6. BASE SECTION MONOLITHIC.
7. KNOCKOUTS FOR PIPES 4" MIN. FROM TOP AND BOTTOM OF SECTION.

72" DIAMETER FLAT TOP MANHOLE

NO SCALE



NOTE:
MANHOLE RUNGS ARE TO BE "SAFETY GREEN" PHOSPHORESCENT COPOLYMER POLYPROPYLENE PLASTIC COATED 1/2" GRADE STEEL REINFORCEMENT STEP MODEL No. PS2-PFSL AS MANUFACTURED BY M.A. INDUSTRIES, INC. OR PRESS-SEAL GASKET,STEEL REINFORCED (GRADE 60 STEEL), COPOLYMER POLYPROPYLENE 14" MANHOLE SAFETY STEP PART # P-14850 WITH BUILT-IN REFLECTORS. STEPS ARE TO BE FACTORY INSTALLED BY THE MANUFACTURER OF THE MANHOLES

MANHOLE RUNG

NO SCALE

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APPROVED:	XX

SITE DETAILS-1

SCALE: AS NOTED

C4.10

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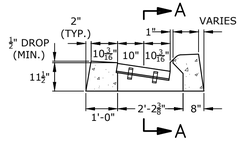
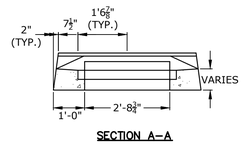
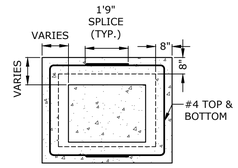


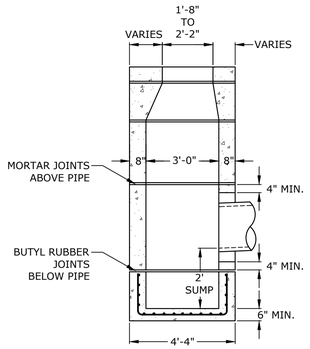
CROSS SECTION

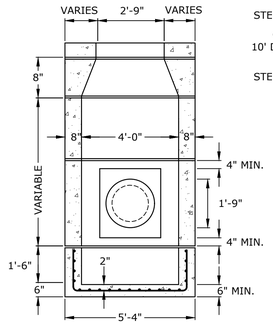


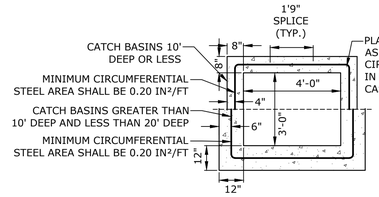
SECTION A–A



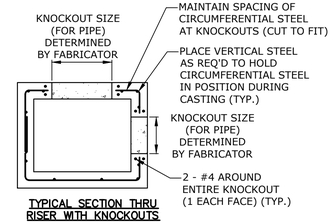
REDUCER SECTION (TYP.)







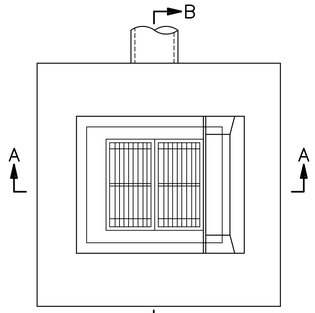
RISER SECTION (TYP.)

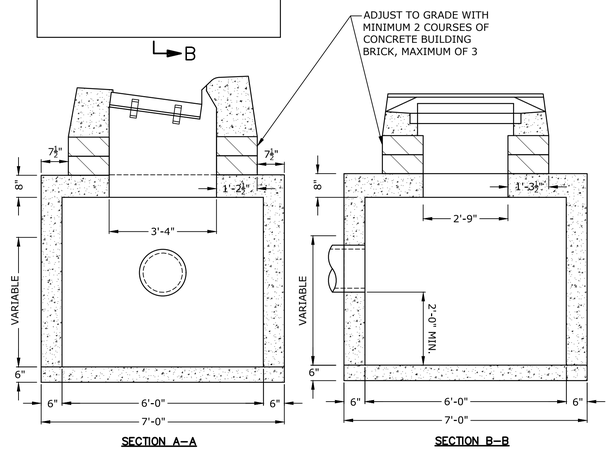


TYPICAL SECTION THRU RISER WITH KNOCKOUTS

NOTE:
CATCH BASIN TOP SECTION TO REST ATOP PRECAST BASIN ON MINIMUM OF TWO, MAXIMUM OF THREE COURSES OF CONCRETE BUILDING BLOCK.

TYPE "C" CATCH BASIN
NO SCALE





PRECAST CONCRETE SPECIAL TYPE "C" DOUBLE GRATE TYPE I CATCH BASIN
NO SCALE

NOTES:

1. REINFORCEMENT SHALL CONFORM TO ASTM A615, GRADE 60.
2. DETAILS ON THIS SHEET SHOW STANDARD REINFORCEMENT. WELDED WIRE FABRIC WITH AN AREA EQUAL TO OR GREATER THAN THE REINFORCING SHOWN MAY BE SUBSTITUTED.
3. ALL LAP SPLICES, DEVELOPMENT LENGTHS, BENDS FOR REINFORCEMENT, AND WELDED WIRE FABRIC SHALL CONFORM TO AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.
4. ALL REINFORCEMENT SHALL HAVE A MINIMUM CLEAR COVER OF 2", EXCEPT FOR BENEATH BOTTOM REINFORCEMENT IN TOP SLABS, WHERE THE MINIMUM MAY BE 1½"
5. MINIMUM CONCRETE COMPRESSIVE STRENGTH FC'=4,000PSI SHALL BE OBTAINED BEFORE SHIPPING.
6. BASES AND RISERS AT A DEPTH OF 20' AND GREATER SHALL BE DESIGNED BY THE CONTRACTOR AND WORKING DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.
7. SEE STANDARD DRAWING 507-K FOR CATCH BASIN FRAMES AND GRATES.
8. RISERS SHALL NEVER HAVE CORNER PIPE ENTRIES. WHERE THE ALIGNMENT OF THE PIPE WITH RESPECT TO THE CORNER OF THE CATCH BASIN CANNOT BE CHANGED, A ROUND STRUCTURE CONFORMING TO ASTM C478 SHALL BE USED. REINFORCING FOR THE ROUND TOP SLAB WITH A RECTANGULAR OPENING SHALL CONFORM TO DETAILS SHOWN HERE.
9. ALL PIPE OPENINGS SHALL BE CLOSED USING MATERIALS WHICH CONFORM TO STATE OF CONNECTICUT STANDARD SPECIFICATIONS SECTION M.08.02. IF THE ENGINEER DETERMINES THAT THE CLOSURE OF ANY PIPE OPENING IS UNSATISFACTORY, THE CONTRACTOR SHALL RECLOSE SAID OPENING AT NO ADDITIONAL COST TO THE STATE. KNOCKOUTS FOR PIPE OPENINGS SHALL NOT RESULT IN A REDUCED WALL THICKNESS.
10. THE LATEST STATE OF CONNECTICUT STANDARD SPECIFICATIONS AND SUPPLEMENTALS SHALL GOVERN.
11. FOR ADDITIONAL DETAILS, SEE OTHER CATCH BASIN SHEETS.
12. WALL THICKNESS OF ALL CB'S OVER 10' DEEP SHALL BE INCREASED TO 12" THICK. INSIDE DIMENSION SHALL REMAIN THE SAME. (THE 12" THICKNESS SHALL START AFTER THE FIRST 10")
13. BUTYL RUBBER JOINT SEAL SHALL CONFORM TO AASHTO M-198 AND MORTAR SHALL CONFORM TO THE LATEST STATE OF CONNECTICUT STANDARD SPECIFICATIONS MATERIAL SECTION M11.04.
14. SHRINKAGE AND TEMPERATURE REINFORCEMENT SHALL BE PROVIDED IN THE TOPS OF SLABS. THE TOTAL AREA OF REINFORCEMENT PROVIDED SHALL BE AT LEAST 0.125 IN²/FT IN EACH DIRECTION. THE MAXIMUM SPACING OF THIS REINFORCEMENT SHALL NOT EXCEED 18 INCHES.
15. THE DETAILS SHOWN IN THE PLAN VIEW FOR THE PRECAST CONCRETE ROUND STRUCTURES SHALL ALSO BE USED FOR CONVERTING MANHOLES TO CATCH BASINS.

Tighe&Bond
www.tighebond.com
1000 Bridgeport Avenue
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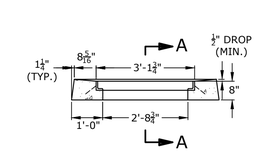
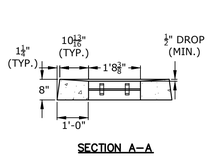
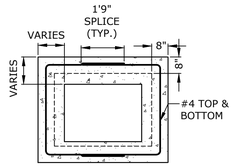
Preliminary



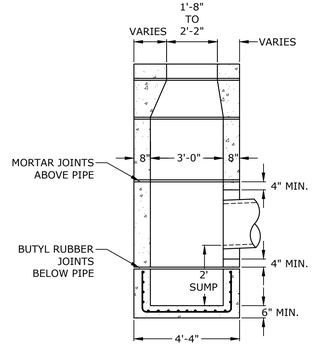
CROSS SECTION

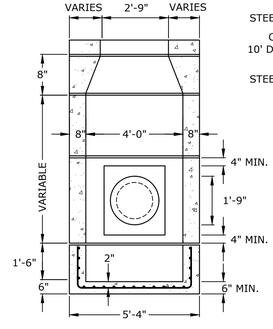


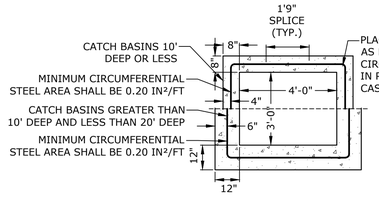
SECTION A–A



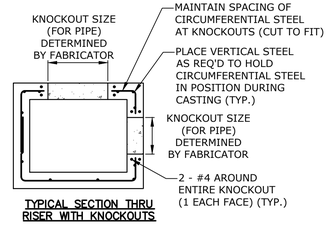
REDUCER SECTION (TYP.)







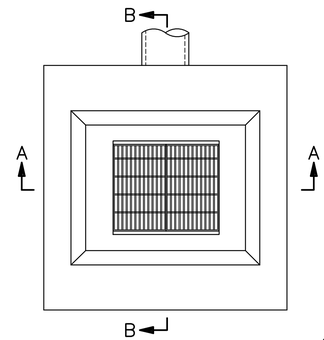
RISER SECTION (TYP.)

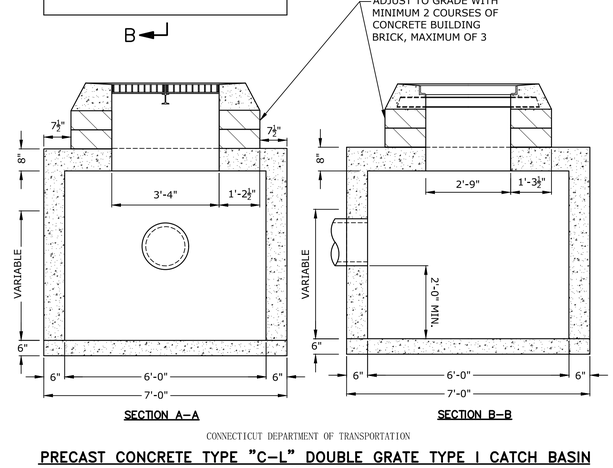


TYPICAL SECTION THRU RISER WITH KNOCKOUTS

NOTE:
CATCH BASIN TOP SECTION TO REST ATOP PRECAST BASIN ON MINIMUM OF TWO, MAXIMUM OF THREE COURSES OF CONCRETE BUILDING BLOCK.

TYPE "C–L" CATCH BASIN
NO SCALE





CONNECTICUT DEPARTMENT OF TRANSPORTATION

PRECAST CONCRETE TYPE "C–L" DOUBLE GRATE TYPE I CATCH BASIN
NO SCALE

NOTES:

1. REINFORCEMENT SHALL CONFORM TO ASTM A615, GRADE 60.
2. DETAILS ON THIS SHEET SHOW STANDARD REINFORCEMENT. WELDED WIRE FABRIC WITH AN AREA EQUAL TO OR GREATER THAN THE REINFORCING SHOWN MAY BE SUBSTITUTED.
3. ALL LAP SPLICES, DEVELOPMENT LENGTHS, BENDS FOR REINFORCEMENT, AND WELDED WIRE FABRIC SHALL CONFORM TO AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.
4. ALL REINFORCEMENT SHALL HAVE A MINIMUM CLEAR COVER OF 2", EXCEPT FOR BENEATH BOTTOM REINFORCEMENT IN TOP SLABS, WHERE THE MINIMUM MAY BE 1½"
5. MINIMUM CONCRETE COMPRESSIVE STRENGTH FC'=4,000PSI SHALL BE OBTAINED BEFORE SHIPPING.
6. BASES AND RISERS AT A DEPTH OF 20' AND GREATER SHALL BE DESIGNED BY THE CONTRACTOR AND WORKING DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.
7. SEE STANDARD DRAWING 507-K FOR CATCH BASIN FRAMES AND GRATES.
8. RISERS SHALL NEVER HAVE CORNER PIPE ENTRIES. WHERE THE ALIGNMENT OF THE PIPE WITH RESPECT TO THE CORNER OF THE CATCH BASIN CANNOT BE CHANGED, A ROUND STRUCTURE CONFORMING TO ASTM C478 SHALL BE USED. REINFORCING FOR THE ROUND TOP SLAB WITH A RECTANGULAR OPENING SHALL CONFORM TO DETAILS SHOWN HERE.
9. ALL PIPE OPENINGS SHALL BE CLOSED USING MATERIALS WHICH CONFORM TO STATE OF CONNECTICUT STANDARD SPECIFICATIONS SECTION M.08.02. IF THE ENGINEER DETERMINES THAT THE CLOSURE OF ANY PIPE OPENING IS UNSATISFACTORY, THE CONTRACTOR SHALL RECLOSE SAID OPENING AT NO ADDITIONAL COST TO THE STATE. KNOCKOUTS FOR PIPE OPENINGS SHALL NOT RESULT IN A REDUCED WALL THICKNESS.
10. THE LATEST STATE OF CONNECTICUT STANDARD SPECIFICATIONS AND SUPPLEMENTALS SHALL GOVERN.
11. FOR ADDITIONAL DETAILS, SEE OTHER CATCH BASIN SHEETS.
12. WALL THICKNESS OF ALL CB'S OVER 10' DEEP SHALL BE INCREASED TO 12" THICK. INSIDE DIMENSION SHALL REMAIN THE SAME. (THE 12" THICKNESS SHALL START AFTER THE FIRST 10")
13. BUTYL RUBBER JOINT SEAL SHALL CONFORM TO AASHTO M-198 AND MORTAR SHALL CONFORM TO THE LATEST STATE OF CONNECTICUT STANDARD SPECIFICATIONS MATERIAL SECTION M11.04.
14. SHRINKAGE AND TEMPERATURE REINFORCEMENT SHALL BE PROVIDED IN THE TOPS OF SLABS. THE TOTAL AREA OF REINFORCEMENT PROVIDED SHALL BE AT LEAST 0.125 IN²/FT IN EACH DIRECTION. THE MAXIMUM SPACING OF THIS REINFORCEMENT SHALL NOT EXCEED 18 INCHES.
15. THE DETAILS SHOWN IN THE PLAN VIEW FOR THE PRECAST CONCRETE ROUND STRUCTURES SHALL ALSO BE USED FOR CONVERTING MANHOLES TO CATCH BASINS.

Town of Fairfield

South Benson Drainage Improvements

Fairfield, Connecticut

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

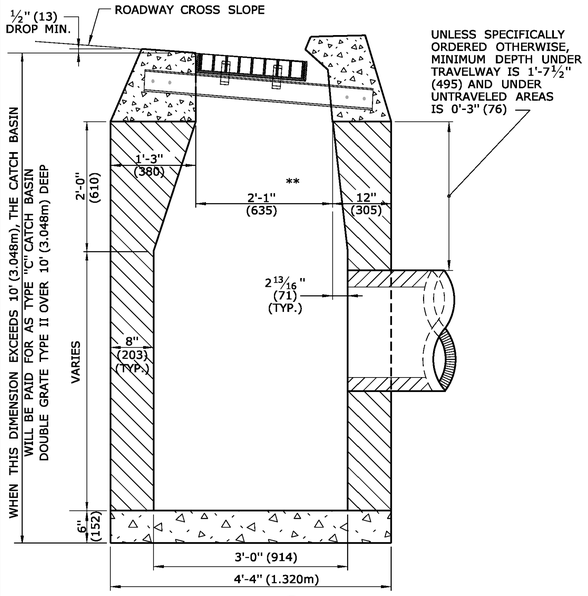
PROJECT NO:	F0439-08
DATE:	05/2/2018
FILE:	F0439-08-C400-DETL.dwg
DRAWN BY:	WGK
CHECKED:	JAR
APPROVED:	XX

SITE DETAILS-2

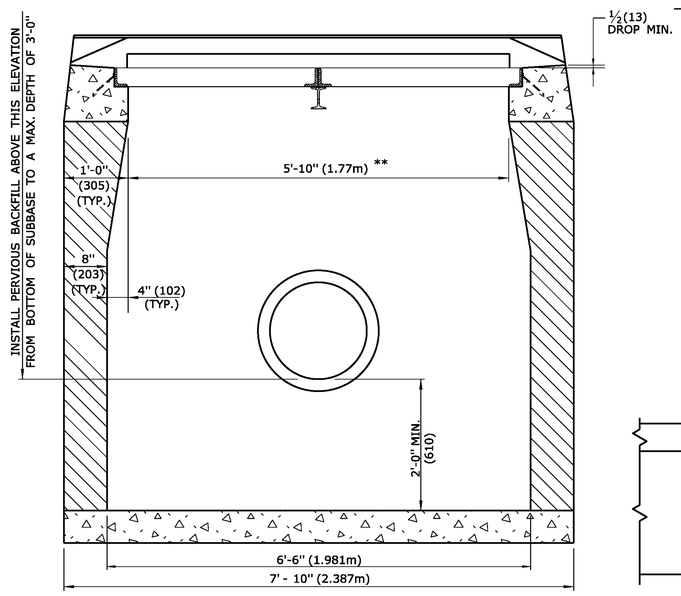
SCALE: AS NOTED

C4.20

Last Saved: 5/29/2018
Plotted On: Dec 21, 2018 - 1:36pm By: JAR
Tighe & Bond: J:\F\F0439 Fairfield Target Client Business Development\08 South Benson Pump Station\Drawings - Figures\AutoCAD\Drainage\Sheets\F0439-08-C400-DETL.dwg

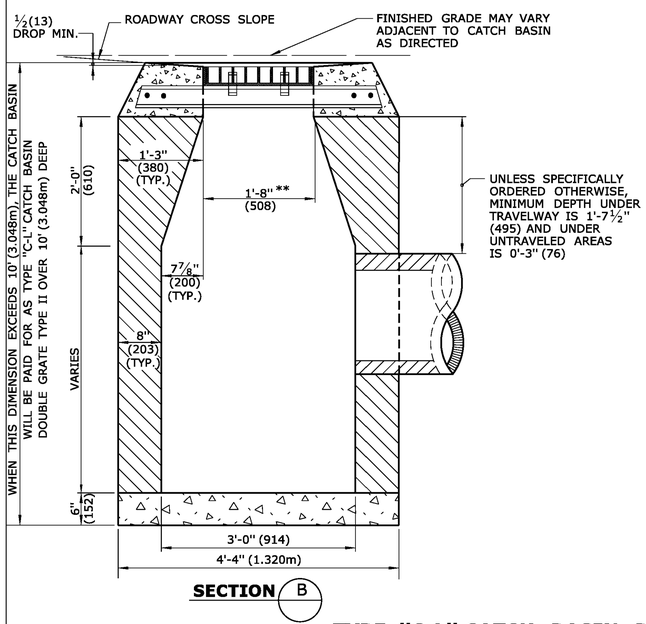


SECTION B

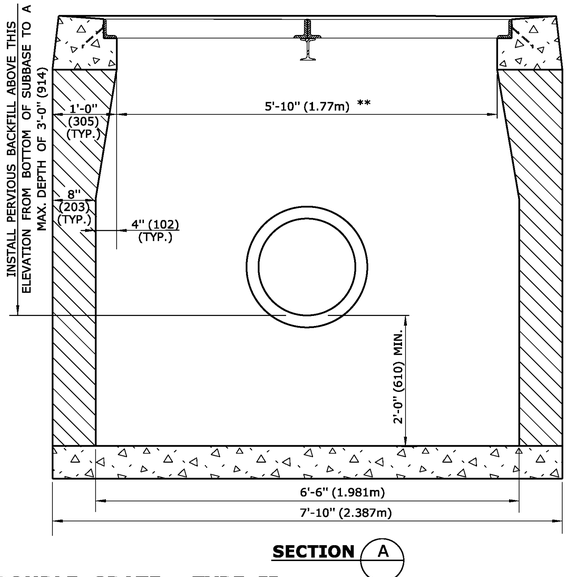


SECTION A

TYPE "C" CATCH BASIN DOUBLE GRATE - TYPE II



SECTION B

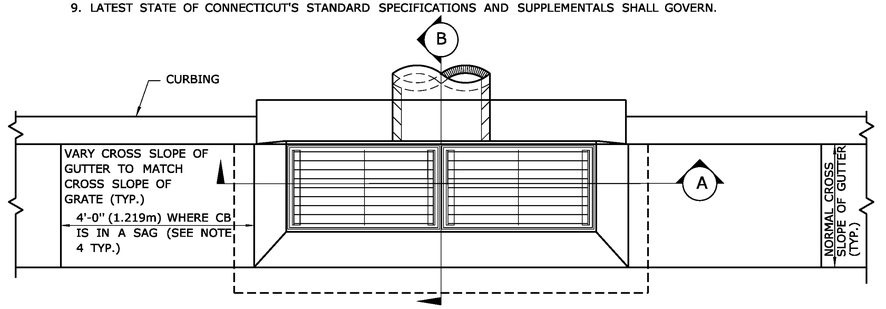


SECTION A

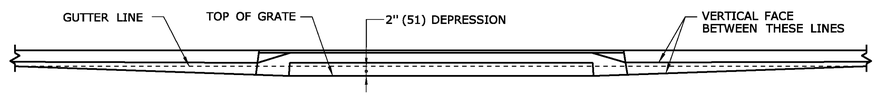
TYPE "C-L" CATCH BASIN DOUBLE GRATE - TYPE II

GENERAL NOTES:

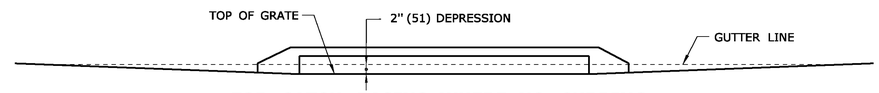
1. FOR DETAILS OF FRAME AND GRATE SEE STANDARD SHEET HW-507_08.
2. USE APPROPRIATE CONCRETE TOP FOR CURBING SHOWN ON PLANS. IF CURBING IS NOT SPECIFIED ON THE PLANS, IT SHALL BE CONSTRUCTED AS DIRECTED BY THE ENGINEER.
3. ALL FACES OF STRUCTURES IN CONTACT WITH CONCRETE PAVEMENT SHALL BE COVERED WITH A LAYER OF TAR PAPER OR APPROVED EQUAL. THE COST FOR THE PAPER SHALL BE INCLUDED IN THE BID PRICE FOR THE TYPE OF CATCH BASIN INSTALLED.
4. USE 6'-0" (1.830m) ON UPGRADE SIDE OF CONTINUOUS GRADE AND 1'-0" (305) ON DOWNGRADE SIDE OF CONTINUOUS GRADE OR AS DIRECTED.
5. IF MASONRY UNITS ARE REQUIRED, THE BASIN SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE OVER ALL DIMENSIONS SHOWN HERE AND SECTION 5.07 OF THE STATE OF CONNECTICUT'S STANDARD SPECIFICATIONS. CORBELLING SHALL BE PERMITTED TO A MAXIMUM OF 3" (75). NO PROJECTION SHALL EXTEND INSIDE THE LIMITS NOTED BY **.
6. WALL THICKNESS OF ALL CB'S OVER 10' (3.048m)DEEP SHALL BE INCREASED TO 12" (305) THICK. INSIDE DIMENSION SHALL REMAIN THE SAME. (12" (305) THICKNESS WILL START AFTER THE FIRST 10' (3.048m)).
7. TO CONVEY SUBSURFACE DRAINAGE, OPENINGS SHALL BE FORMED IN THE FOUR WALLS AT OR IMMEDIATELY ABOVE THE BOTTOM OF THE PERVIOUS BACKFILL.
8. MINIMUM CONCRETE COMPRESSIVE STRENGTH OF F'c = 4000 PSI (27,580 kPa) SHALL BE OBTAINED PRIOR TO SHIPPING.
9. LATEST STATE OF CONNECTICUT'S STANDARD SPECIFICATIONS AND SUPPLEMENTALS SHALL GOVERN.



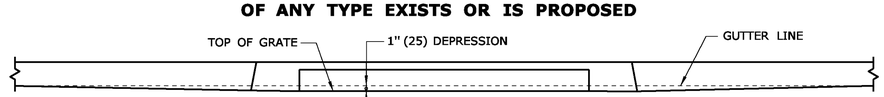
PLAN



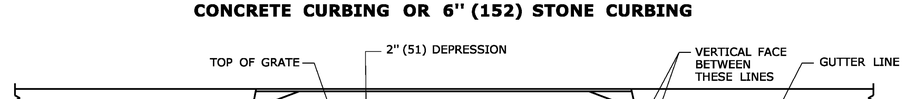
FOR CATCH BASINS IN A LINE OF 4"(102) CONCRETE PARK CURBING OR 4" (102) BITUMINOUS CONCRETE PARK CURBING



FOR CATCH BASINS WHERE NO CURBING OF ANY TYPE EXISTS OR IS PROPOSED



FOR CATCH BASINS IN A LINE OF 6" (152) CONCRETE CURBING OR 6" (152) STONE CURBING



FOR CATCH BASINS IN A LINE OF 6" (152) BITUMINOUS CONCRETE LIP CURBING (MACHINE FORMED)

DETAILS OF DEPRESSED GUTTER STRIP FOR TYPE "C" CATCH BASIN DOUBLE GRATE TYPE II

ALL METRIC DIMENSIONS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED

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Preliminary

Town of Fairfield

South Benson Drainage Improvements

Fairfield, Connecticut

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

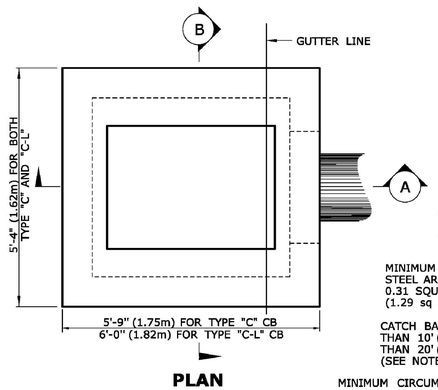
PROJECT NO:	F0439-08
DATE:	05/2/2018
FILE:	F0439-08-C400-DETL.dwg
DRAWN BY:	WGK
CHECKED:	JAR
APPROVED:	XX

SITE DETAILS-3

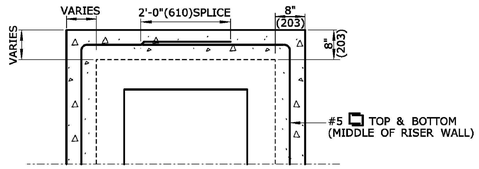
SCALE: AS NOTED

C4.30

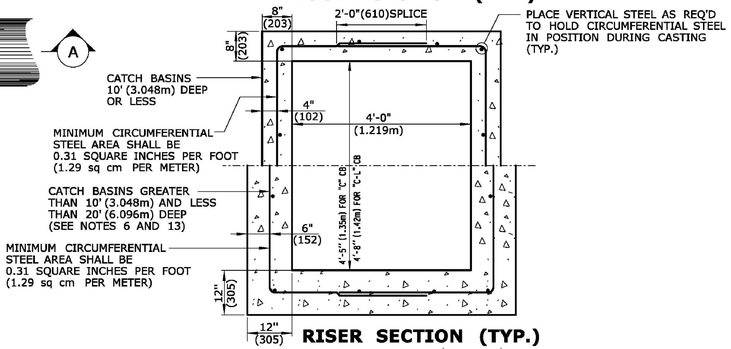
Last Saved-5/29/2018
Plotted On-Dec 21, 2018-1:36pm By: JAR
Tighe & Bond - J:\F0439 Fairfield Target Client Business Development\08 South Benson Pump Station\Drawings, Figures\AutoCAD\Drainage\Sheets\F0439-08-C400-DETL.dwg



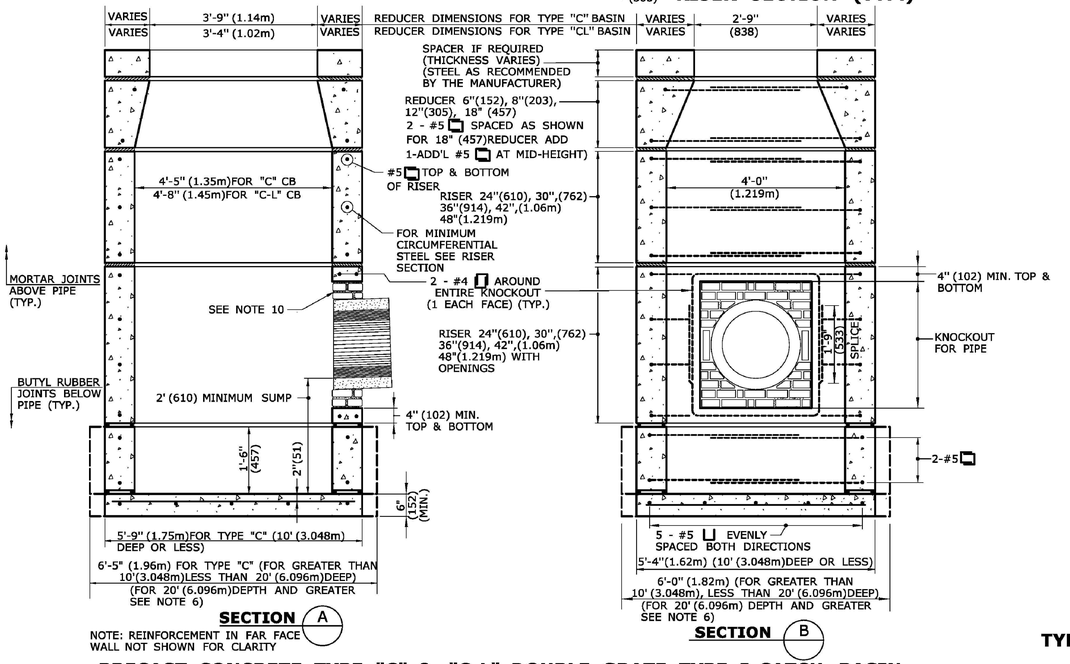
PLAN



HALF REDUCER SECTION (TYP.)



RISER SECTION (TYP.)



SECTION A

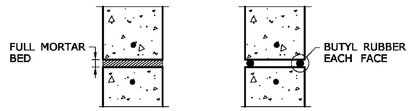
NOTE: REINFORCEMENT IN FAR FACE WALL NOT SHOWN FOR CLARITY

SECTION B

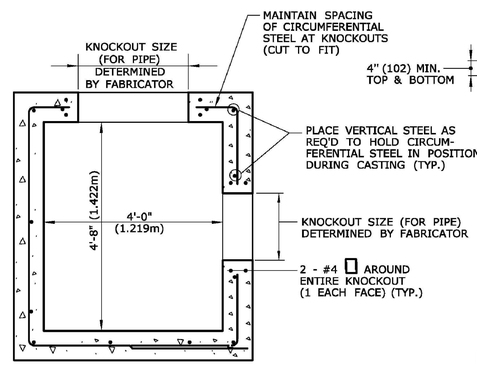
PRECAST CONCRETE TYPE "C" & "C-L" DOUBLE GRATE TYPE I CATCH BASIN
(UNDER 10' (3.048m) DEEP SHOWN)

NOTES:

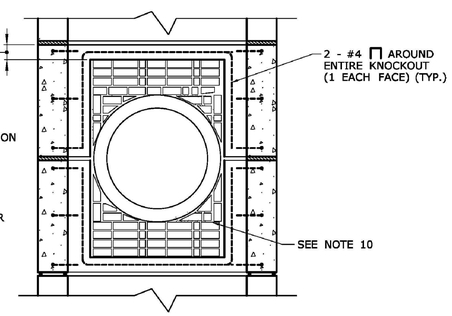
1. REINFORCEMENT SHALL CONFORM TO ASTM A615, GRADE 60.
2. DETAILS ON THIS SHEET SHOW STANDARD REINFORCEMENT. WELDED WIRE FABRIC WITH AN AREA EQUAL TO OR GREATER THAN THE REINFORCING SHOWN MAY BE SUBSTITUTED.
3. ALL LAP SPLICES, DEVELOPMENT LENGTHS, BENDS FOR REINFORCEMENT, AND WELDED WIRE FABRIC SHALL CONFORM TO AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.
4. ALL REINFORCEMENT SHALL HAVE A MINIMUM CLEAR COVER OF 2", EXCEPT FOR BENEATH BOTTOM REINFORCEMENT IN TOP SLABS, WHERE THE MINIMUM MAY BE 1½"
5. MINIMUM CONCRETE COMPRESSIVE STRENGTH FC'=4,000PSI SHALL BE OBTAINED BEFORE SHIPPING.
6. BASES AND RISERS AT A DEPTH OF 20' AND GREATER SHALL BE DESIGNED BY THE CONTRACTOR AND WORKING DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.
7. SEE STANDARD DRAWING 507–K FOR CATCH BASIN FRAMES AND GRATES.
8. RISERS SHALL NEVER HAVE CORNER PIPE ENTRIES. WHERE THE ALIGNMENT OF THE PIPE WITH RESPECT TO THE CORNER OF THE CATCH BASIN CANNOT BE CHANGED, A ROUND STRUCTURE CONFORMING TO ASTM C478 SHALL BE USED. REINFORCING FOR THE ROUND TOP SLAB WITH A RECTANGULAR OPENING SHALL CONFORM TO DETAILS SHOWN HERE.
9. ALL PIPE OPENINGS SHALL BE CLOSED USING MATERIALS WHICH CONFORM TO STATE OF CONNECTICUT STANDARD SPECIFICATIONS SECTION M.08.02. IF THE ENGINEER DETERMINES THAT THE CLOSURE OF ANY PIPE OPENING IS UNSATISFACTORY, THE CONTRACTOR SHALL RECLOSE SAID OPENING AT NO ADDITIONAL COST TO THE STATE. KNOCKOUTS FOR PIPE OPENINGS SHALL NOT RESULT IN A REDUCED WALL THICKNESS.
10. THE LATEST STATE OF CONNECTICUT STANDARD SPECIFICATIONS AND SUPPLEMENTALS SHALL GOVERN.
11. FOR ADDITIONAL DETAILS, SEE OTHER CATCH BASIN SHEETS.
12. WALL THICKNESS OF ALL CB'S OVER 10' DEEP SHALL BE INCREASED TO 12" THICK. INSIDE DIMENSION SHALL REMAIN THE SAME. (THE 12" THICKNESS SHALL START AFTER THE FIRST 10")
13. BUTYL RUBBER JOINT SEAL SHALL CONFORM TO AASHTO M–198 AND MORTAR SHALL CONFORM TO THE LATEST STATE OF CONNECTICUT STANDARD SPECIFICATIONS MATERIAL SECTION M11.04.
14. SHRINKAGE AND REMPERATURE REINFORCEMENT SHALL BE PROVIDED IN THE TOPS OF SLABS. THE TOTAL AREA OF REINFORCEMENT PROVIDED SHALL BE AT LEAST 0.125 IN^2/FT IN EACH DIRECTION. THE MAXIMUM SPACING OF THIS REINFORCEMENT SHALL NOT EXCEED 18 INCHES.
15. CATCH BASIN TOP SECTION TO REST ATOP PRECAST BASIN ON MINIMUM OF TWO, MAXIMUM OF THREE COURSES OF CONCRETE BUILDING BLOCK.



MORTAR JOINT DETAIL **BUTYL RUBBER JOINT DETAIL**



TYPICAL SECTION THRU SINGLE RISER WITH KNOCKOUTS



DOUBLE RISER OPENING (TYP.) PIPES GREATER THAN 24" (610) O.D.

ALL METRIC DIMENSIONS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED

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1000 Bridgeport Avenue
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Preliminary

Town of Fairfield

South Benson Drainage Improvements

Fairfield, Connecticut

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

PROJECT NO:	F0439-08
DATE:	05/2/2018
FILE:	F0439-08-C400-DETL.dwg
DRAWN BY:	WGK
CHECKED:	JAR
APPROVED:	XX

SITE DETAILS-4

SCALE: AS NOTED

C4.40

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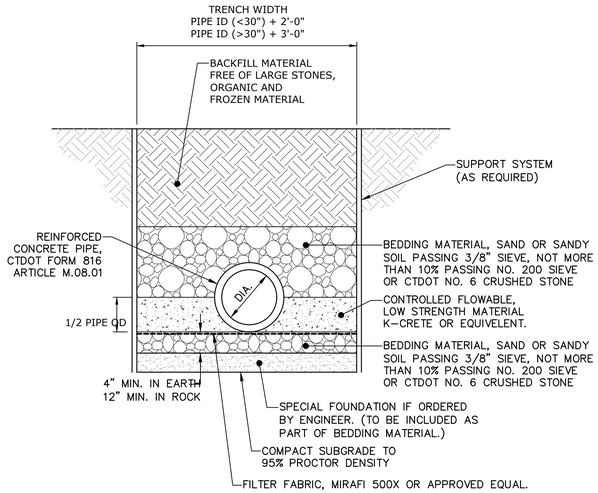
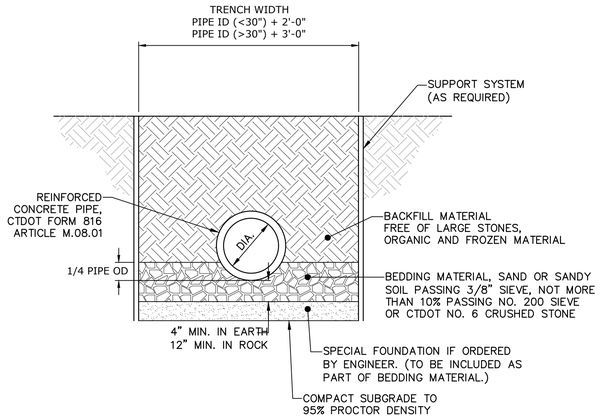
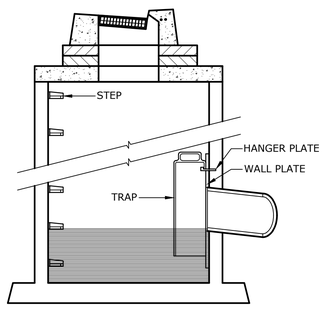
Plotted On: Dec 21, 2018 - 1:36pm By: JAR
Tighe & Bond: J:\F\F0439 Fairfield Target Client Business Development\08 South Benson Pump Station\Drawings - Figures\AutoCAD\Drainage\Sheets\F0439-08-C400-DETL.dwg



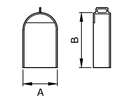
CIRCULAR R.C.P. TRENCH BEDDING
PIPES GREATER THAN 24"
NO SCALE



CIRCULAR R.C.P. TRENCH BEDDING
PIPES 24" OR LESS
NO SCALE



TYPICAL CATCH BASIN



CAST IRON HOOD

CAST IRON HANGER PLATE

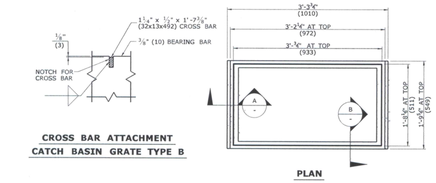
NOTE:
CAST IRON HANGER PLATE FURNISHED WITH HOOD.

DIMENSION IN INCHES			PIPE SIZE (IN.)
A	B	C	
9 1/2	16	4 3/4	6
11 1/2	20 1/2	5 1/2	8
13 1/4	23 1/2	6 1/2	10
15 3/4	26	7 1/2	12
18	27	9	15
20	27	10	18
25 1/4	30	11 1/4	21
30	35 3/4	15	24

NOTES:

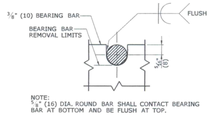
1. TO BE USED ONLY WHERE THERE ARE NO UPSTREAM CATCH BASINS CONTRIBUTING TO THE STRUCTURE.

CATCH BASIN TRAP DETAIL
NO SCALE

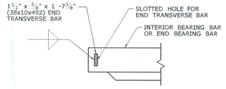


CROSS BAR ATTACHMENT
CATCH BASIN GRATE TYPE B

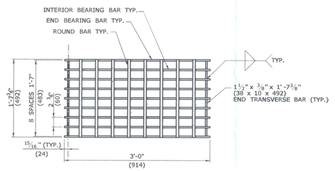
PLAN



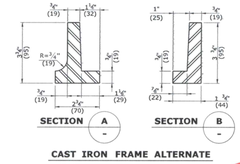
ROUND BAR ATTACHMENT
CATCH BASIN GRATE TYPE A



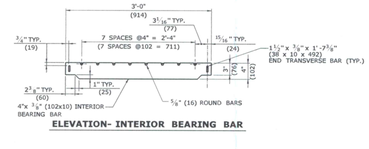
END TRANSVERSE BAR ATTACHMENT
CATCH BASIN GRATE TYPE A & B



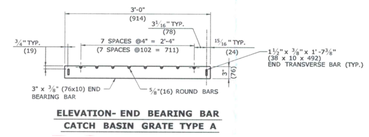
PLAN



CAST IRON FRAME ALTERNATE



ELEVATION- INTERIOR BEARING BAR

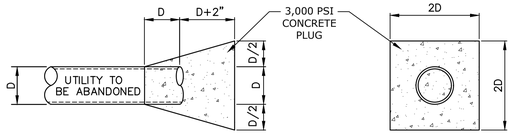


ELEVATION- END BEARING BAR
CATCH BASIN GRATE TYPE A

NOTES:

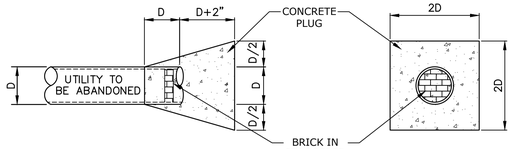
1. STEEL OR CAST IRON SHALL BE USED FOR FRAMES. STEEL SHALL BE USED FOR TYPE "A" GRATES.
2. TYPE "A" GRATES SHALL BE USED ON ALL ROADWAYS WHERE BICYCLE TRAFFIC IS ALLOWED OR AS DIRECTED BY THE ENGINEER.
3. STEEL FRAMES AND GRATES SHALL BE GALVANIZED IN ACCORDANCE WITH ARTICLE M.06.03.
4. DO NOT GALVANIZE CAST IRON FRAMES.
5. DIMENSION TOLERANCES SHALL BE ±1/16" .(1.6)
6. ALL STEEL BARS SHALL BE WELDED AT ALL INTERSECTIONS
7. ALL WELDING SHALL CONFORM TO THE REQUIREMENTS OF AWS STRUCTURAL WELDING CODE, D1.1.

CATCH BASIN FRAME AND GRATE DETAIL
NO SCALE



FOR DIAMETERS 10" AND SMALLER

FRONT VIEW



FOR DIAMETERS 12" AND LARGER

FRONT VIEW

TYPICAL PLUGS FOR
SANITARY AND STORM SEWER ABANDONMENT
NO SCALE

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Preliminary

Town of Fairfield

South Benson Drainage Improvements

Fairfield, Connecticut

VERIFY SCALE
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APPROVED:	XX

SITE DETAILS-5

SCALE: AS NOTED

C4.50

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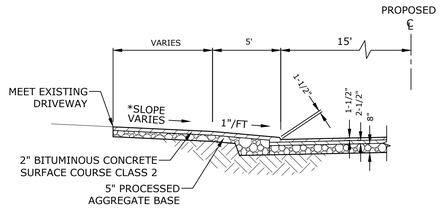
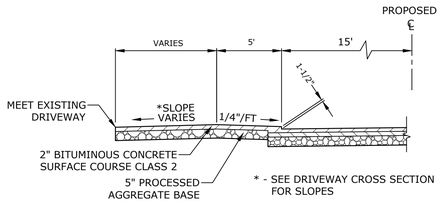
Plotted On: Dec 21, 2018 - 1:36pm By: JAR
Tighe & Bond: J:\F0439 Fairfield Target Client Business Development\08 South Benson Pump Station\Drawings Figures\AutoCAD\Drainage\Sheets\F0439-08-C400-DETL.dwg

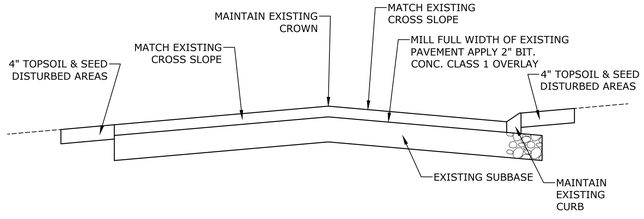


DRIVEWAY IN CUT



DRIVEWAY IN FILL

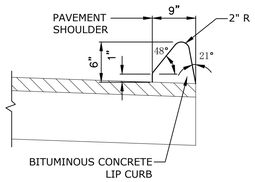
DRIVEWAYS AND SIDEWALKS ON LOCAL ROADS
N.T.S.



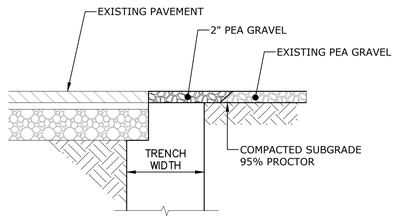
NOTES:

1. MATCH EXISTING GRADE AT EDGE OF ROAD.
2. WHERE DIRVEWAYS ARE DISTURBED, RESTORE IN KIND.

MILL & OVERLAY OF EXISTING PAVEMENT
NO SCALE

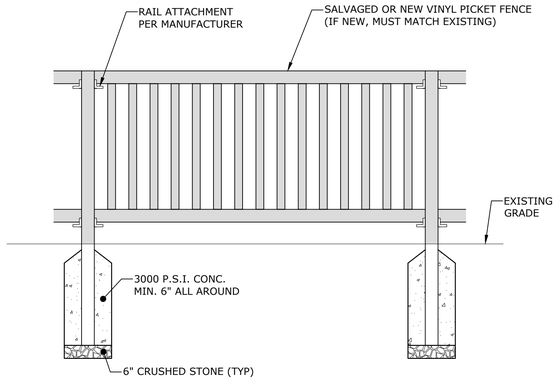


BITUMINOUS CONCRETE LIP CURBING
NO SCALE

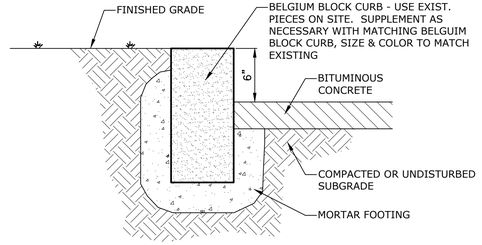


NOTE:
1. PEA GRAVEL TO MATCH SIZE AND APPEARANCE OF EXISTING PEA GRAVEL.

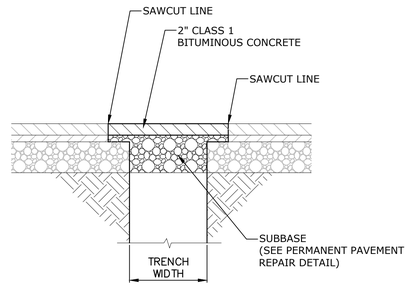
PEA GRAVEL PARKING AREA
NO SCALE



VINYL PICKET FENCE DETAIL
NO SCALE

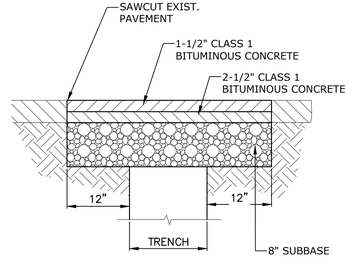


BELGIUM BLOCK CURBING
NO SCALE



NOTE:
1. TEMPORARY PAVEMENT REPAIR ONLY FOR SHORT-TERM USE.

TEMPORARY PAVEMENT REPAIR
NO SCALE



PERMANENT PAVEMENT REPAIR
NO SCALE

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Preliminary

Town of Fairfield

South Benson Drainage Improvements

Fairfield, Connecticut

VERIFY SCALE
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FILE:	F0439-08-C400-DETL.dwg
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APPROVED:	XX

SITE DETAILS-6

SCALE: AS NOTED

C4.60

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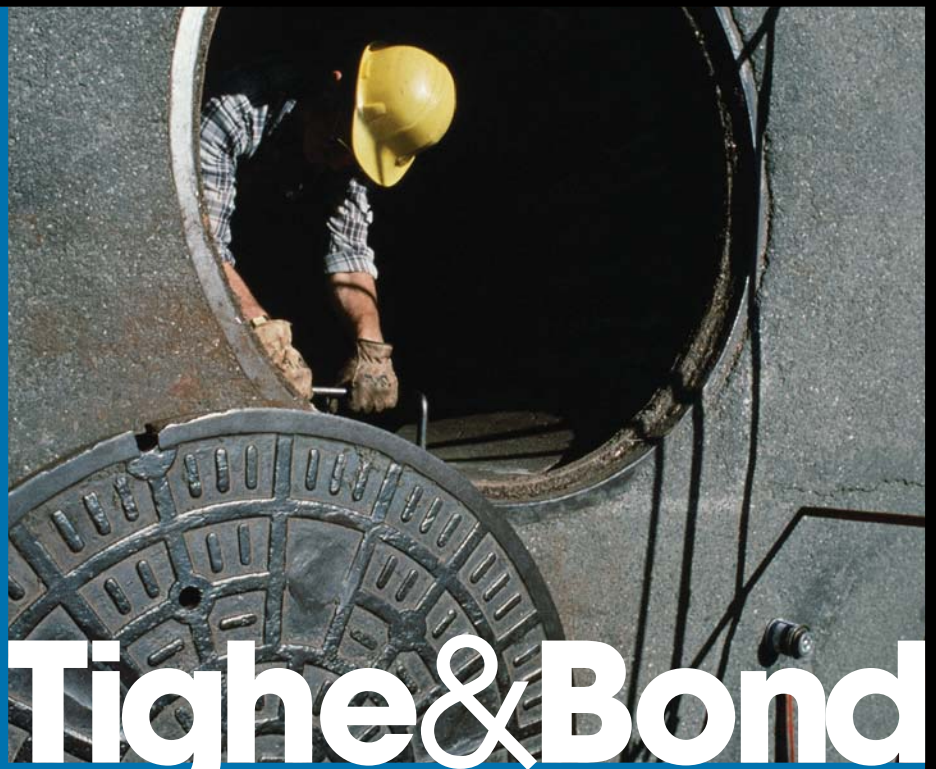

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APPENDIX I

TOWN OF FAIRFIELD, CT

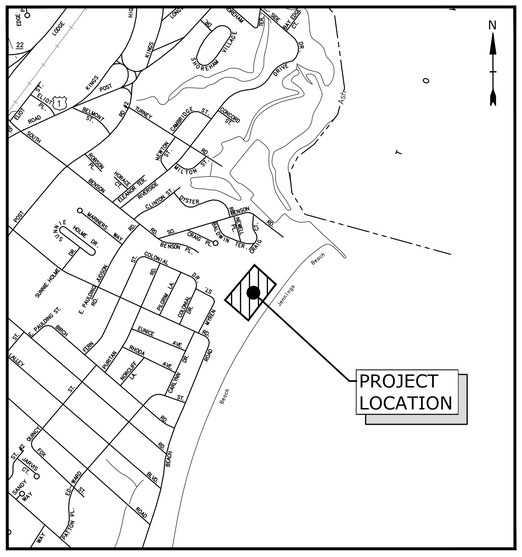
SOUTH BENSON PUMP STATION

PROJECT NO: F0439-08

CONCEPTUAL PLANS - NOT FOR CONSTRUCTION

OCTOBER 1, 2018

LIST OF DRAWINGS	
SHEET NO.	SHEET TITLE
	COVER
C-101	OVERALL SITE PLAN
C-102	SITE PLAN
M-101	MECHANICAL PLAN LOWER LEVEL AND ROOF PLAN
M-102	MECHANICAL PLAN INTERMEDIATE AND UPPER LEVEL
M-103	MECHANICAL SECTIONS AND DETAILS - 1
M-104	MECHANICAL SECTIONS AND DETAILS - 1
M-105	MECHANICAL SECTIONS AND DETAILS - 2
M-106	MECHANICAL SECTIONS AND DETAILS - 2
M-107	MECHANICAL DETAILS
E-101	ELECTRIC LIGHTING PLAN
E-102	ELECTRICAL POWER INTERMEDIATE AND ROOF LEVEL
H-102	HVAC AND PLUMBING PLAN INTERMEDIATE AND ROOF LEVEL
S-001	GENERAL NOTES AND DETAILS CONCRETE AND REINFORCING
S-002	GENERAL NOTES AND DETAILS CONCRETE AND REINFORCING
S-101	STRUCTURAL PLAN LOWER LEVEL
S-102	STRUCTURAL PLAN INTERMEDIATE AND UPPER LEVEL
S-103	STRUCTURAL SECTIONS AND DETAILS
S-104	STRUCTURAL SECTIONS AND DETAILS
S-105	STRUCTURAL SECTIONS AND DETAILS
S-106	STRUCTURAL SECTIONS AND DETAILS
S-107	CAST-IN-PLACE BEAM SCHEDULE AND DETAILS
S-108	MISCELLANEOUS METAL DETAILS



LOCATION MAP
SCALE: 1" = 1000'

PREPARED BY:
Tighe&Bond
www.tighebond.com

JONATHAN A. RICHER, P.E.

DANA C. HUFF, P.E.

PREPARED FOR:

TOWN OF FAIRFIELD
MICHAEL C. TETREAU, FIRST SELECTMAN

DEPARTMENT OF PUBLIC WORKS
JOSEPH MICHELANGELO, P.E., DIRECTOR

COMPLETE SET 20 SHEETS

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CONCEPTUAL DRAWINGS

NOT FOR CONSTRUCTION

South Benson Pump Station

Town Of Fairfield

Fairfield, CT

VERIFY SCALE

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MARK	DATE	DESCRIPTION

PROJECT NO:	F0439-08
DATE:	03/01/2017
FILE:	F0439-08-Aerial - Site Plan.dwg
DRAWN BY:	
CHECKED:	
APPROVED:	DCH

OVERALL SITE PLAN

SCALE: 1" = 100'

C-101

Last Saved: 5/29/2018
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South Benson Pump Station

Town Of Fairfield

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DATE:	03/01/2017
FILE:	F0439-08-Aerial - Site Plan.dwg
DRAWN BY:	
CHECKED:	
APPROVED:	DCH

SITE PLAN

SCALE: 1" = 20'

C-102

Last Saved: 5/29/2018
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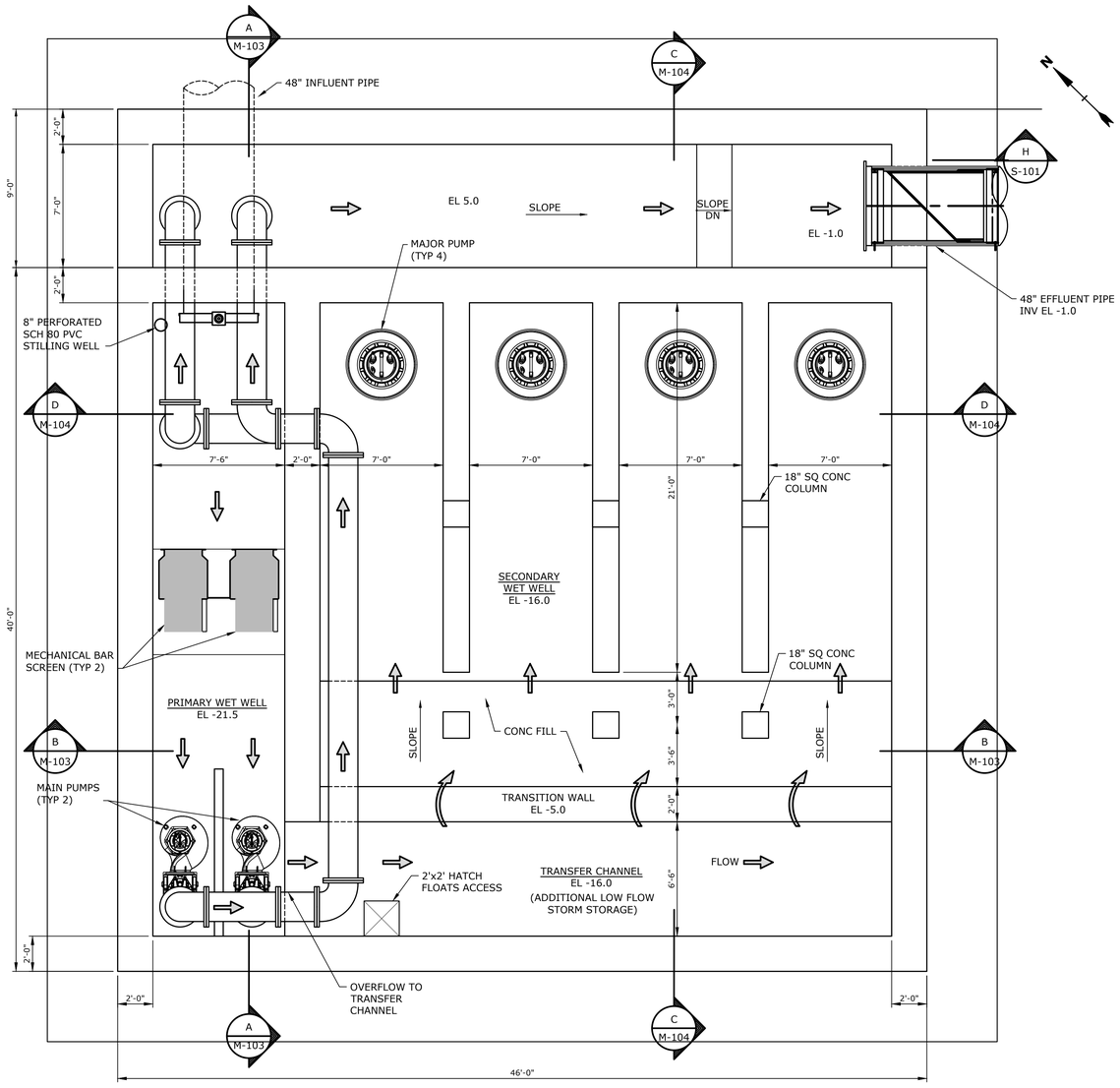

LOWER FLOOR PLAN
1/4"=1'-0"

NOTE:
THESE ARE "CONCEPTUAL PHASE" DRAWINGS AND ARE NOT FOR CONSTRUCTION. THE WALL THICKNESSES AND OTHER STRUCTURAL, ELECTRICAL AND MECHANICAL ITEMS SHOWN ON THESE DRAWINGS MAY CHANGE, AS THE DESIGN DEVELOPS AND PROGRESSES AND THE SITE CONDITIONS ARE FURTHER INVESTIGATED AND UNDERSTOOD.

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South Benson Pump Station

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MARK	DATE	DESCRIPTION

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DATE:	03/01/2017
FILE:	F0439-08-M-101.dwg
DRAWN BY:	TMP
CHECKED:	DRF
APPROVED:	DCH

MECHANICAL PLAN
LOWER LEVEL AND ROOF PLAN

SCALE: AS SHOWN

M-101
SHEET X OF X

Last Saved: 9/20/2018
Plotted On: Dec 21, 2018-4:12pm By: JAR
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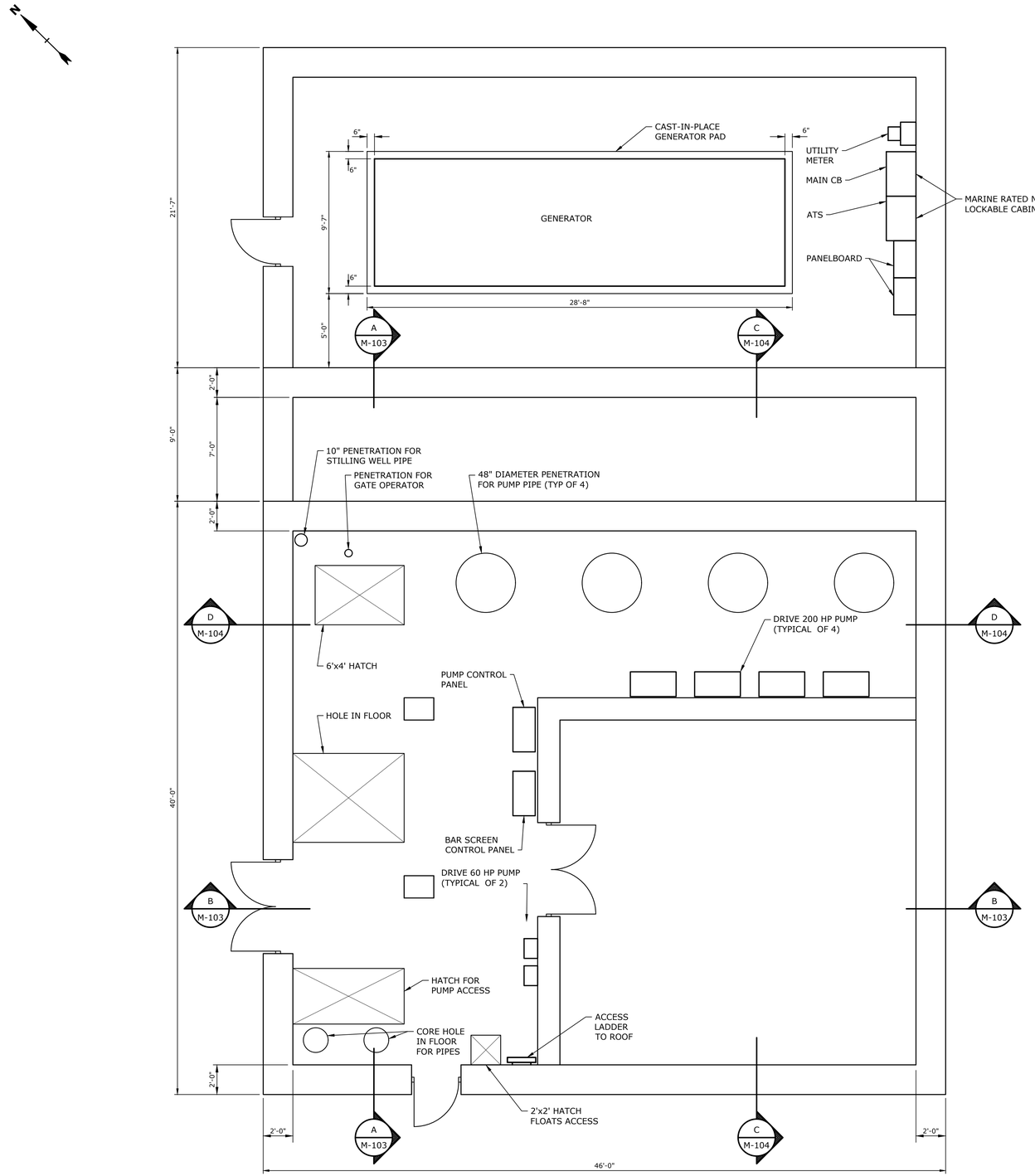

TOP OF SLAB EL 6.00
1/4"=1'-0"

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South Benson Pump Station

Town Of Fairfield

Fairfield, CT

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FILE:	F0439-08-M-102.dwg
DRAWN BY:	TMP
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APPROVED:	DCH

MECHANICAL PLAN
INTERMEDIATE AND UPPER LEVEL

SCALE: AS SHOWN

M-102
SHEET X OF X

Last Saved: 5/29/2018
Plotted On: Dec 21, 2018 4:12pm By: JAR
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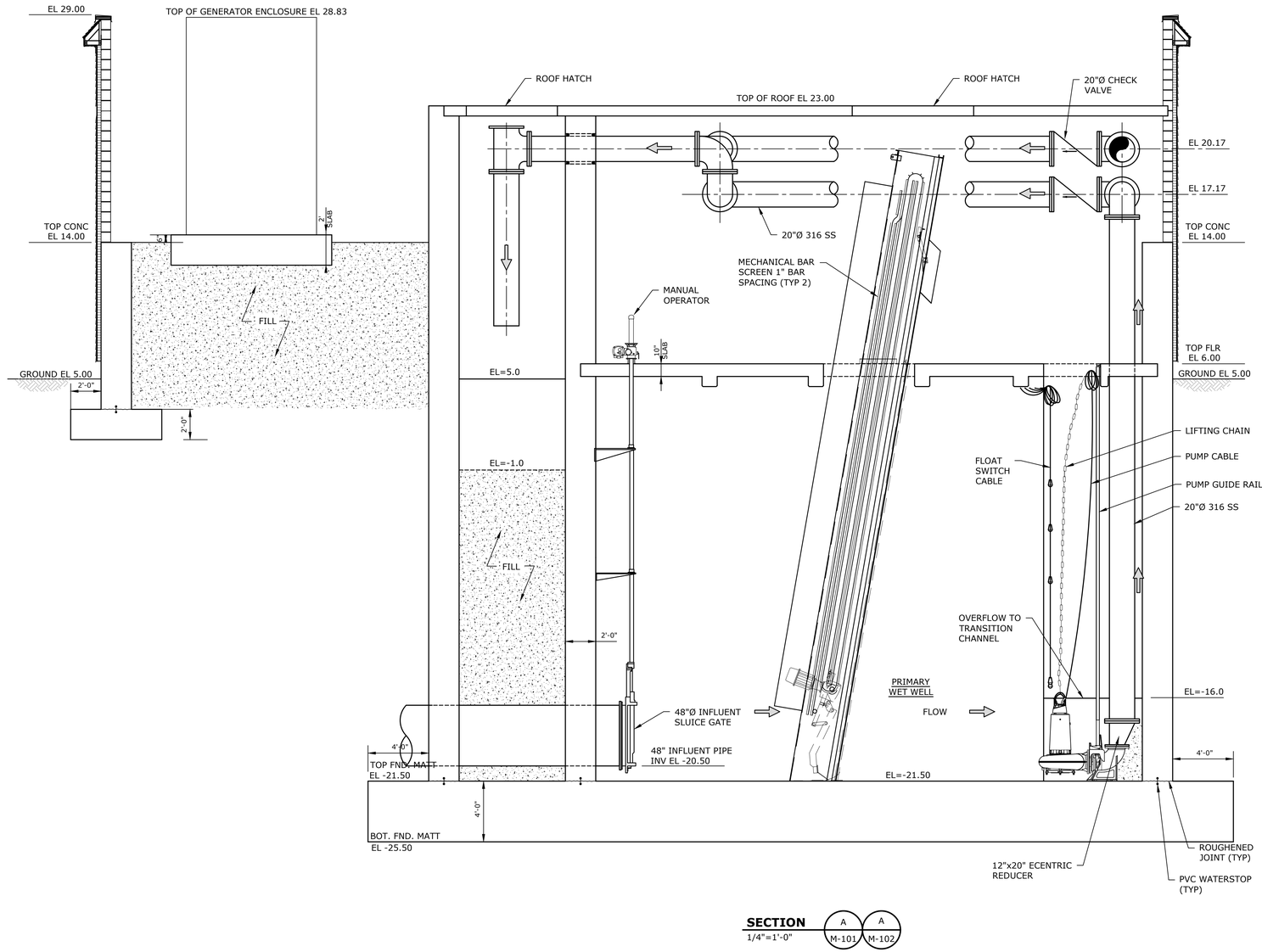

SECTION A M-101 / A M-102
1/4"=1'-0"

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South Benson Pump Station

Town Of Fairfield

Fairfield, CT

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DRAWN BY:	TMP
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APPROVED:	DCH

MECHANICAL SECTIONS AND DETAILS - 1

SCALE: AS SHOWN

M-103
SHEET X OF X

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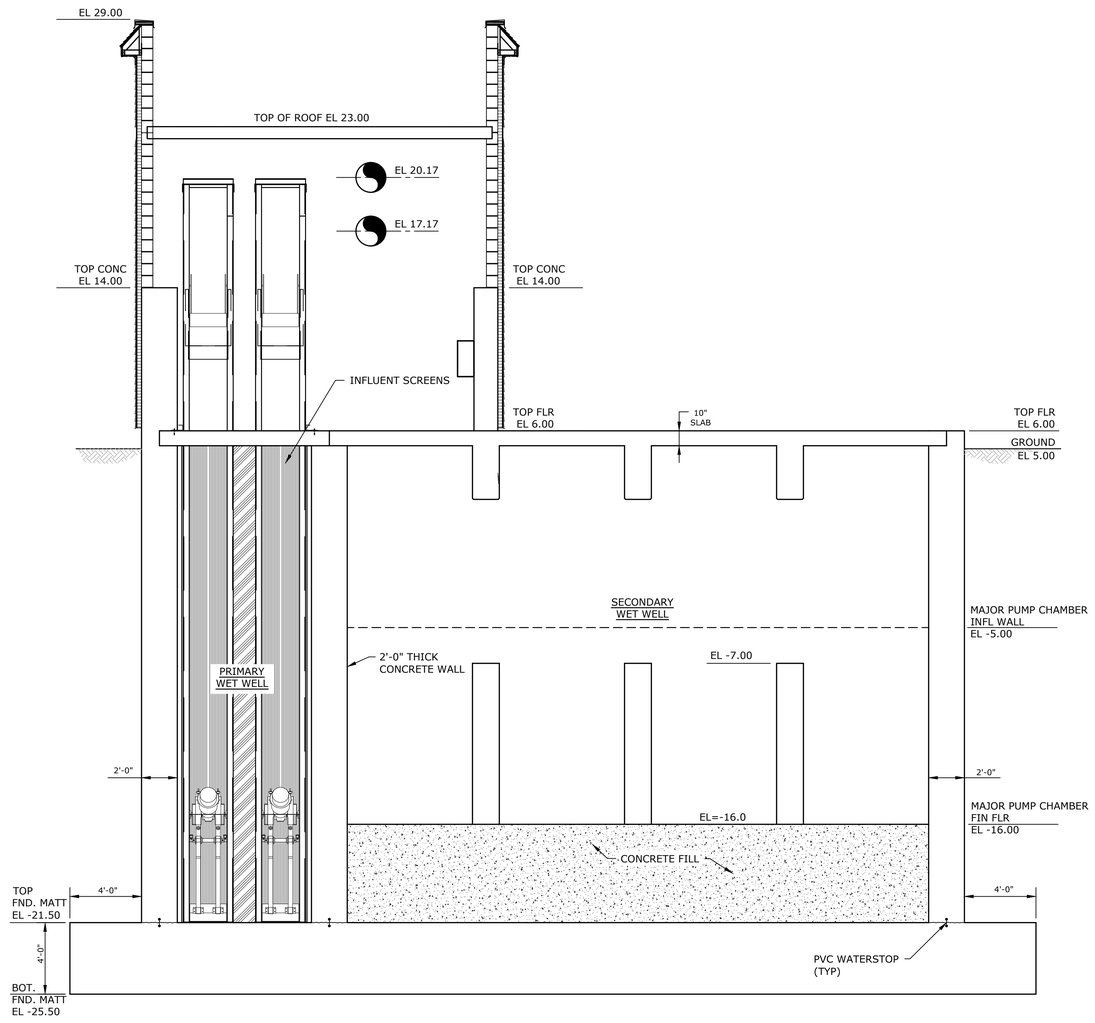

SECTION B / M-101 — B / M-102
1/4"=1'-0"

NOTE:
THESE ARE "CONCEPTUAL PHASE" DRAWINGS AND ARE NOT FOR CONSTRUCTION. THE WALL THICKNESSES AND OTHER STRUCTURAL, ELECTRICAL AND MECHANICAL ITEMS SHOWN ON THESE DRAWINGS MAY CHANGE, AS THE DESIGN DEVELOPS AND PROGRESSES AND THE SITE CONDITIONS ARE FURTHER INVESTIGATED AND UNDERSTOOD.

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CONCEPTUAL DRAWINGS

NOT FOR CONSTRUCTION

South Benson Pump Station

Town Of Fairfield

Fairfield, CT

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 — 1 INCH
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MARK	DATE	DESCRIPTION

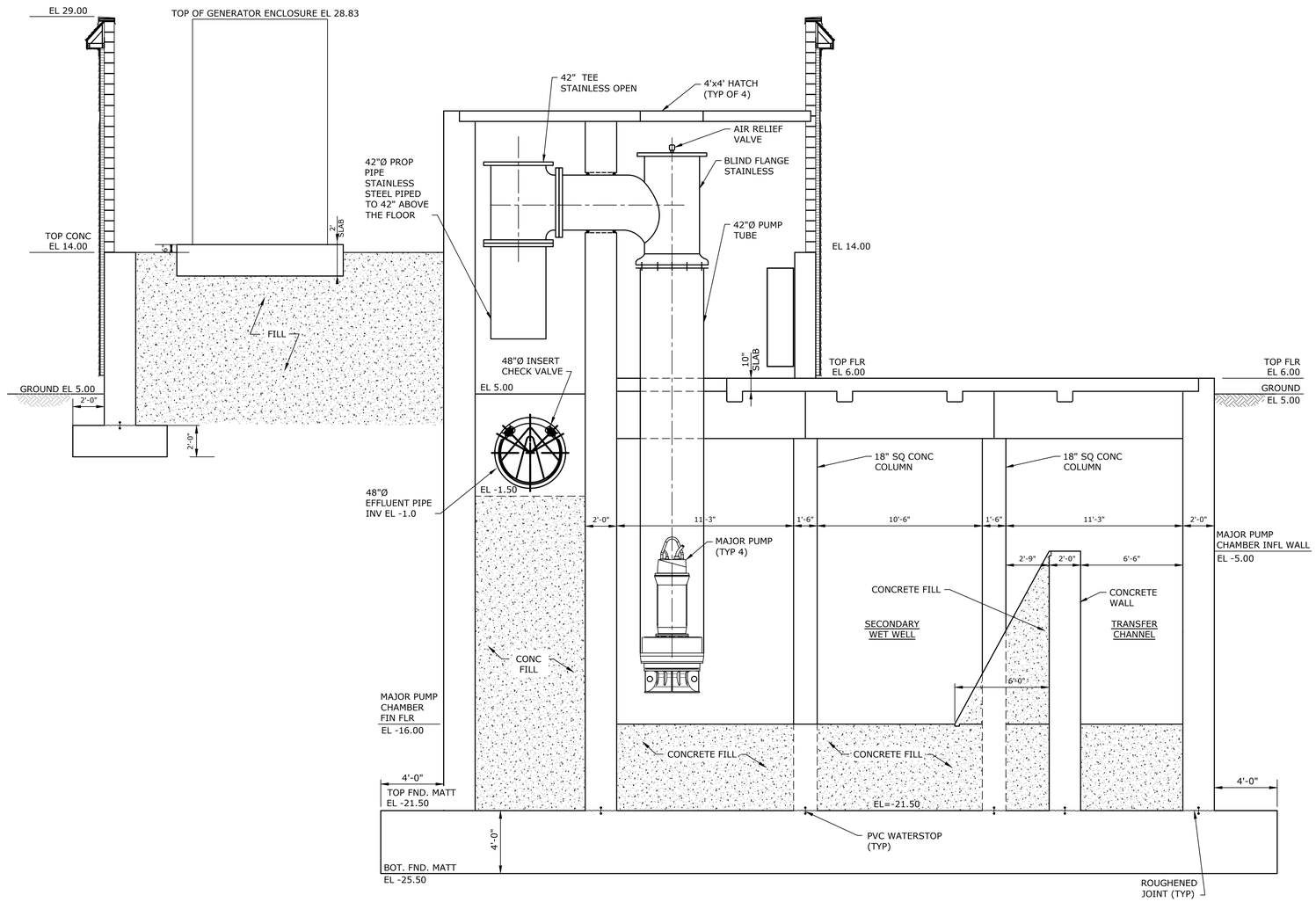
PROJECT NO:	F0439-08
DATE:	03/01/2017
FILE:	F0439-08-M-103.dwg
DRAWN BY:	TMP
CHECKED:	JF
APPROVED:	DCH

MECHANICAL SECTIONS AND DETAILS - 1

SCALE: AS SHOWN

M-103
SHEET X OF X

Last Saved: 5/29/2018
Plotted On: Dec 21, 2018 - 4:12pm By: JAR
Tighe & Bond: J:\F\F0439 Fairfield Target Client Business Development\08 South Benson Pump Station\Drawings - Figures\AutoCAD\Sheet\F0439-08-M-103.dwg



SECTION C M-101 / C M-102
1/4"=1'-0"

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APPROVED:	DCH

MECHANICAL SECTIONS AND DETAILS - 2

SCALE: AS SHOWN

M-105
SHEET X OF X

Last Saved: 5/29/2018
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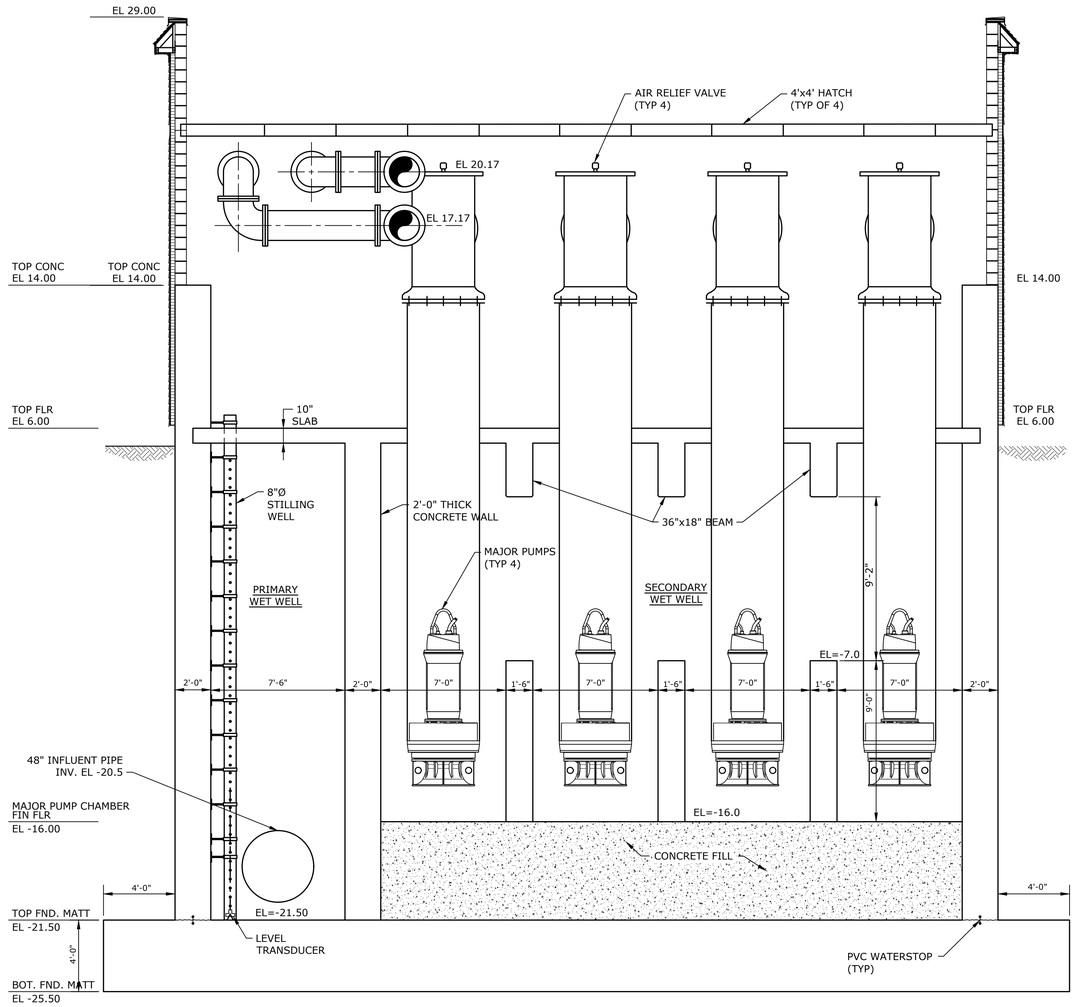

SECTION D D
1/4"=1'-0" M-101 M-102

NOTE:
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MECHANICAL SECTIONS AND DETAILS - 2

SCALE: AS SHOWN

M-106
SHEET X OF X

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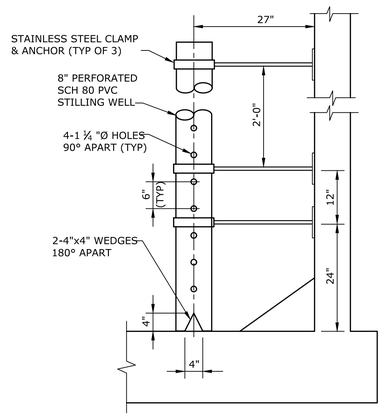
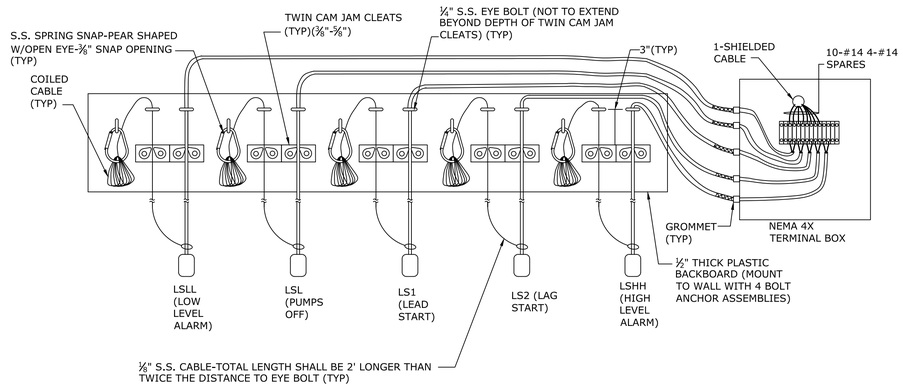


STILLING WELL DETAIL
NO SCALE



FLOAT SWITCH DETAIL
NO SCALE

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FILE:	F0439-08-M-107.dwg
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CHECKED:	
APPROVED:	DCH

MECHANICAL DETAILS

SCALE: NO SCALE

M-107
SHEET X OF X

Last Saved: 5/29/2018
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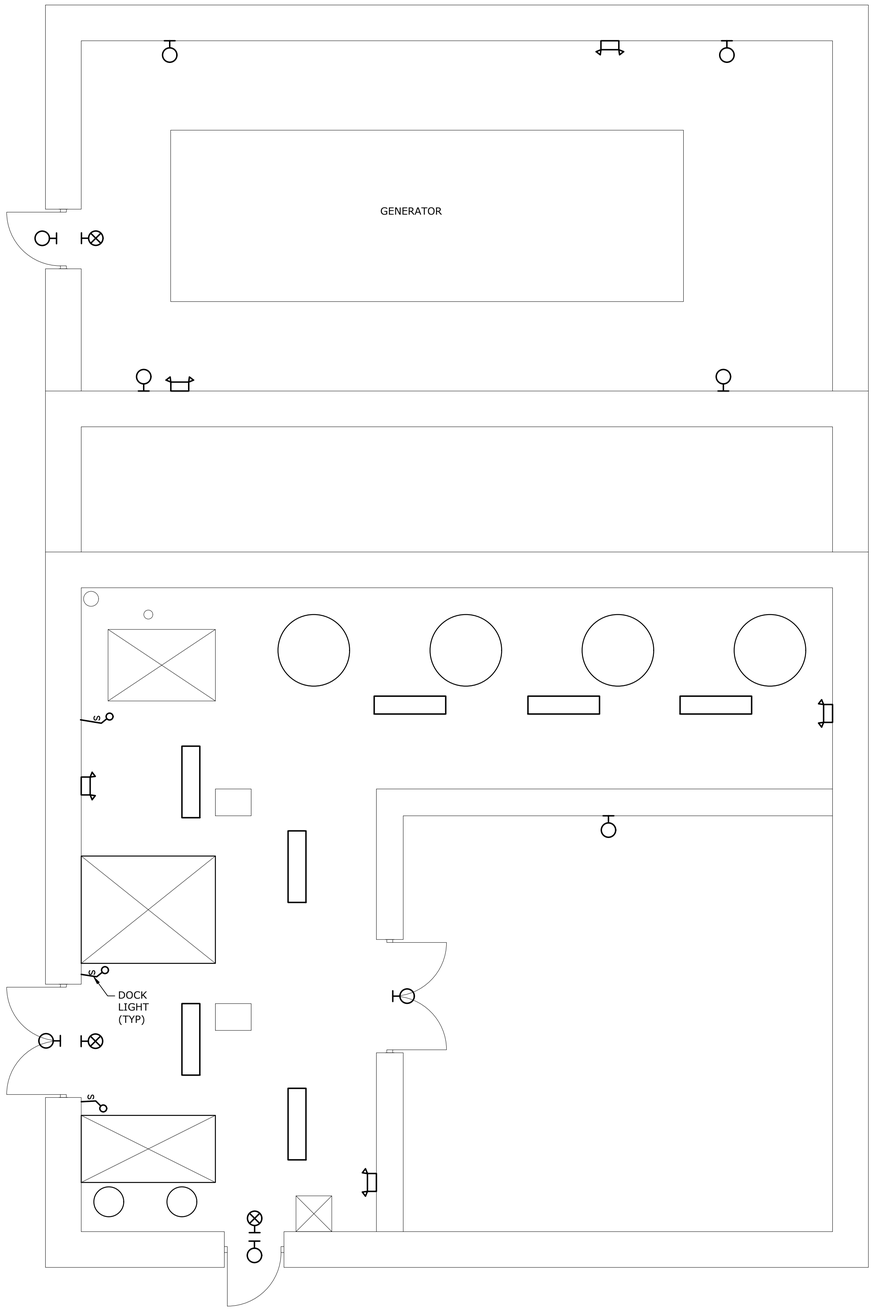

TOP OF SLAB EL 6.00
1/4"=1'-0"

NOTE:
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MARK	DATE	DESCRIPTION

PROJECT NO:	F0439-08
DATE:	03/01/2017
FILE:	F0439-08-E-101.dwg
DRAWN BY:	TMP
CHECKED:	X
APPROVED:	DCH

ELECTRIC LIGHTING PLAN

SCALE: AS SHOWN

E-101
SHEET X OF X

Last Saved: 5/29/2018
Plotted On: Dec 21, 2018 - 1:13pm By: JAR
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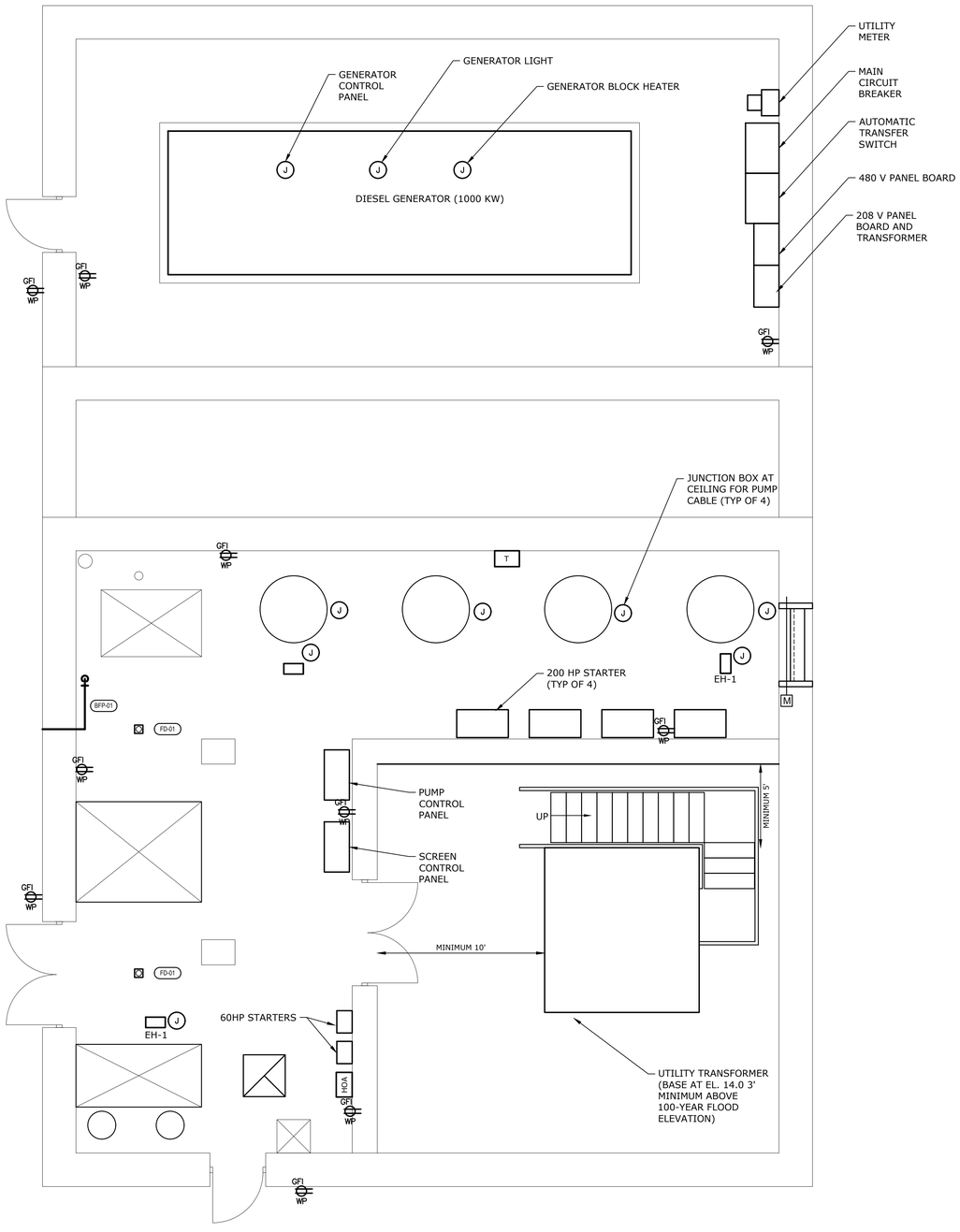
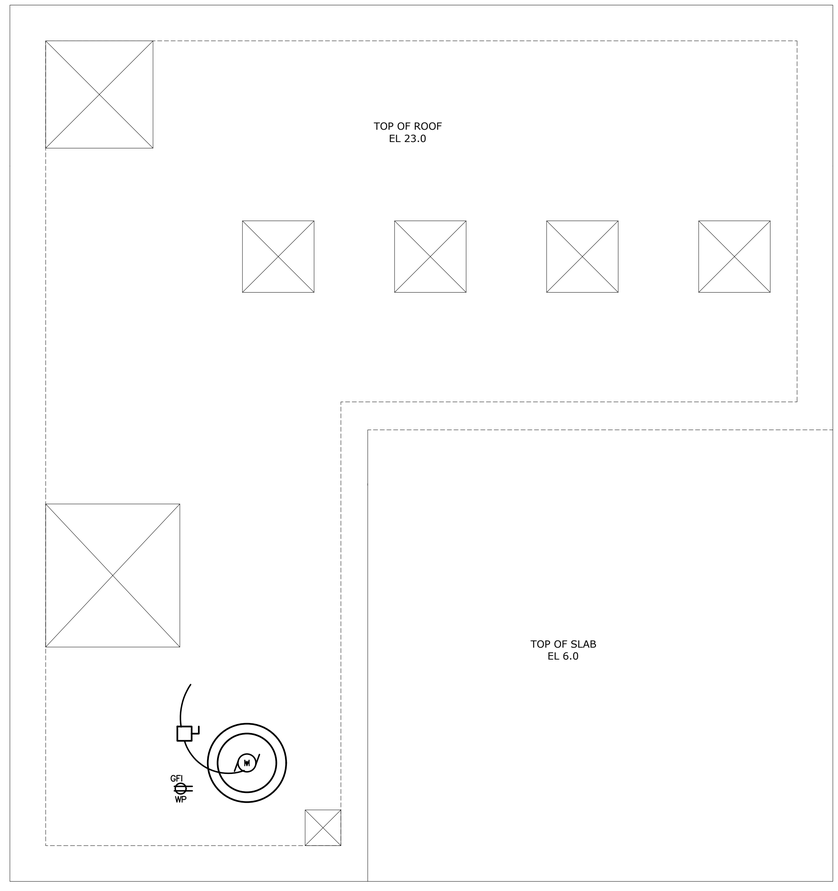


TOP OF SLAB EL 6.00
1/4"=1'-0"



ROOF PLAN
1/4"=1'-0"

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South Benson Pump Station

Town Of Fairfield

Fairfield, CT

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FILE:	F0439-08-E-102.dwg
DRAWN BY:	TMP
CHECKED:	JF
APPROVED:	DCH

ELECTRICAL POWER
INTERMEDIATE AND ROOF LEVEL

SCALE: AS SHOWN

E-102
SHEET X OF X

NOTE:
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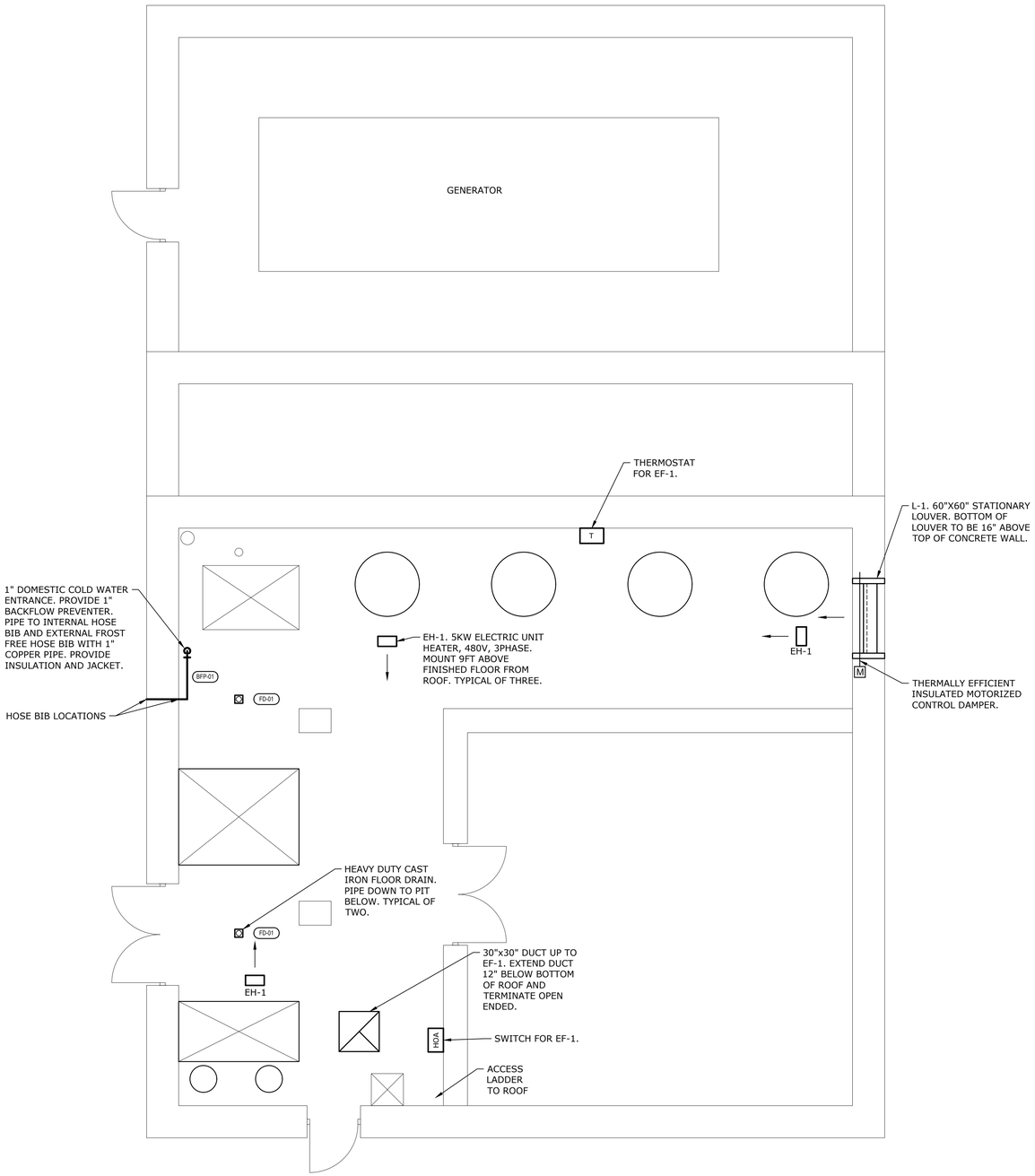
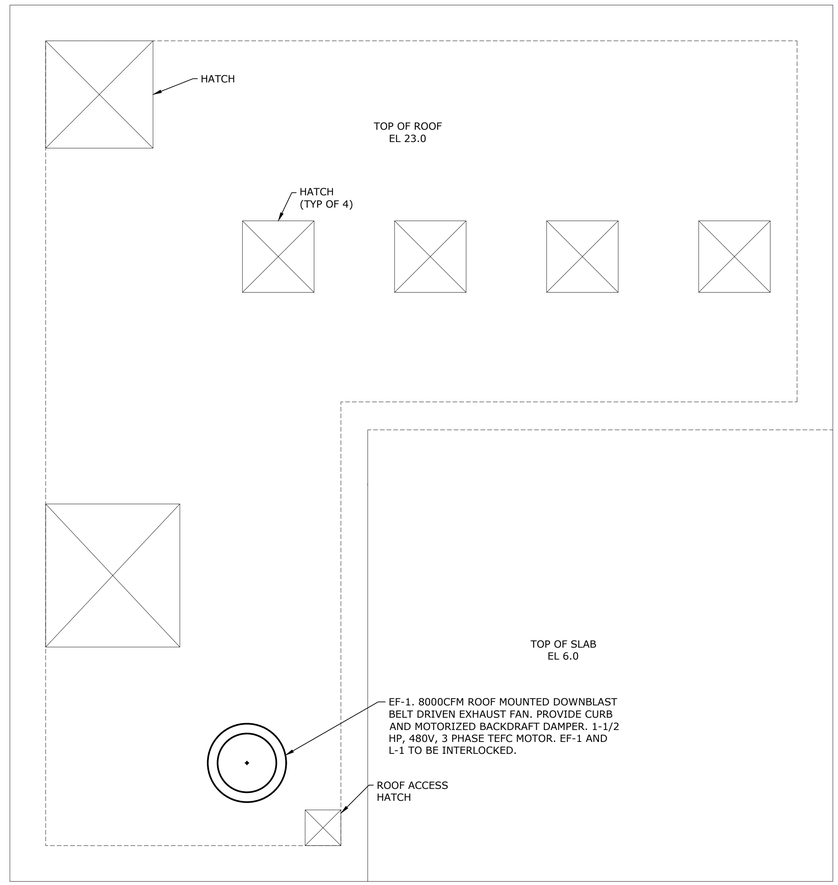


TOP OF SLAB EL 6.00
1/4"=1'-0"



ROOF PLAN
1/4"=1'-0"

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PROJECT NO:	F0439-08
DATE:	03/01/2017
FILE:	F0439-08-H-102.dwg
DRAWN BY:	TMP
CHECKED:	JF
APPROVED:	DCH

HVAC AND PLUMBING PLAN
INTERMEDIATE AND ROOF LEVEL

SCALE: AS SHOWN

H-102
SHEET X OF X

Last Saved: 5/29/2018
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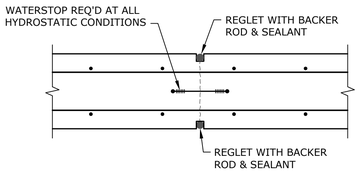
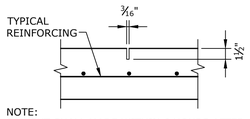


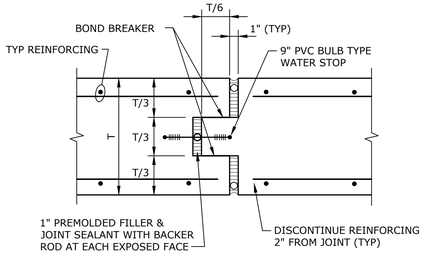
NOTE:
CONCRETE IS PLACED MONOLITHICALLY ON BOTH SIDES OF ALL CONTRACTION JOINTS

CONCRETE WALL CONTRACTION JOINT
NO SCALE

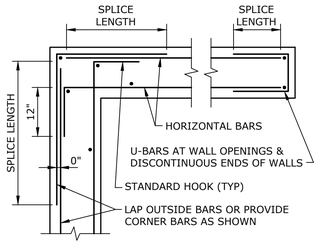


NOTE:
SAWCUT SHALL MADE WITHIN 6 HOURS AFTER POUR & CLEANED PRIOR TO APPLICATION OF FLOOR TREATMENT. PROVIDE TOOLED JOINT WITH BACKER ROD & JOINT SEALANT WHERE NOTED ON PLANS.

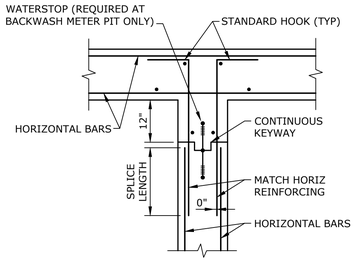
SECTION THROUGH SAWCUT CONTROL JOINT
NO SCALE



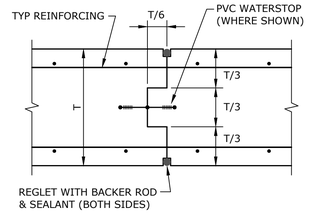
CONCRETE WALL EXPANSION JOINT
NO SCALE



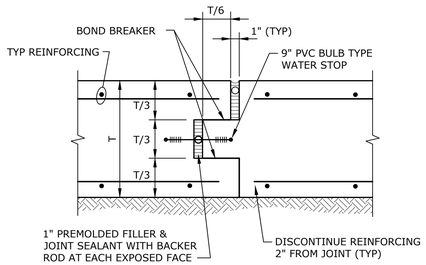
PLAN OF HORIZONTAL REINFORCING AT CORNERS OF CONCRETE WALLS
NO SCALE



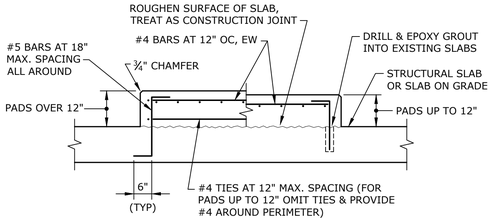
PLAN OF HORIZONTAL REINFORCING AT CONCRETE WALL INTERSECTIONS
NO SCALE



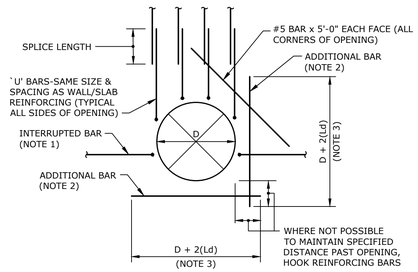
CONSTRUCTION JOINT
NO SCALE



CONCRETE SLAB EXPANSION JOINT
NO SCALE



EQUIPMENT PAD DETAIL
NO SCALE



NOTES:
1. FOR SLAB OR WALL APPLICATION WITH A CONCRETE THICKNESS LESS THAN 12 INCHES, 180° OR 90°, HOOK BARS MAY BE USED IN LIEU OF `U' BARS.
2. PROVIDE ADDITIONAL BARS USING NOT LESS THAN ONE HALF OF INTERRUPTED BARS AT EACH SIDE OF OPENING AT 3" ON CENTER.
3. FOR TOP BARS IN SLAB, INCREASE DEVELOPEMENT LENGTH BY 30%.

TYPICAL REINFORCING AT OPENINGS IN CONCRETE WALLS AND SLABS
NO SCALE

GENERAL

G1 STRUCTURAL WORK SHALL CONFORM TO CONNECTICUT STATE BUILDING CODE, LATEST EDITION, INCLUDING MOST RECENT ADDENDA, AND CONTRACT DOCUMENTS. IN CASE OF CONFLICT, MOST STRINGENT REQUIREMENT SHALL GOVERN.

G2 CONTRACTOR SHALL VERIFY AND COORDINATE DIMENSIONS RELATED TO THIS PROJECT.

G3 CONTRACTOR SHALL EXAMINE DRAWINGS FOR ALL TRADES FOR THE VERIFICATION OF LOCATION AND DIMENSIONS OF ALL CHASES, INSERTS, OPENINGS, SLEEVES AND OTHER PROJECT REQUIREMENTS NOT SHOWN ON THE STRUCTURAL DRAWINGS.

G4 PROVIDE CAULKING AT ALL CONTROL JOINTS. PROVIDE COMPRESSIBLE FILLER AND SEALANT AT ALL EXPANSION AND ISOLATION JOINTS.

G5 PROVIDE PREMOLDED JOINT FILLER WHERE SLABS ON GRADE ABUT WALLS AND COLUMNS.

REINFORCEMENT

R1 DETAILING, FABRICATION, AND ERECTION OF REINFORCEMENT, UNLESS OTHERWISE NOTED, SHALL CONFORM TO ACI "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318)" AND ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES (ACI 315)", LATEST EDITION.

R2 STEEL REINFORCEMENT UNLESS OTHERWISE SHOWN SHALL CONFORM TO ASTM A615 GRADE 60 MINIMUM (YIELD STRENGTH - 60,000 PSI).

R3 WELDED WIRE FABRIC REINFORCEMENT SHALL CONFORM TO: ASTM A185.

R4 PROVIDE AND SCHEDULE ON SHOP DRAWINGS, ALL NECESSARY ACCESSORIES TO HOLD REINFORCEMENT SECURELY IN POSITION: MINIMUM REQUIREMENTS SHALL BE: HIGH CHAIRS, 4'-0" ON CENTER, #5 SUPPORT BAR FOR HIGH CHAIRS, SLAB BOLSTERS, 3'-6" ON CENTER, ALL WIRE CHAIRS AND BOLSTERS TO BE PLASTIC TIPPED.

R5 THE CONCRETE PROTECTIVE COVERING FOR REINFORCEMENT SHALL BE AS FOLLOWS, UNLESS OTHERWISE SHOWN:

(A) CAST-IN-PLACE CONCRETE.

	EXPOSED TO EARTH, WATER, OR WEATHER	NOT EXPOSED TO EARTH, WATER, OR WEATHER
(A) SLAB ON GRADE	3 INCHES	2 INCHES
(B) COLUMN TIES	2 INCHES	1 1/2 INCHES
(C) COLUMN MAIN REBARS	2 1/2 INCHES	2 INCHES
(D) BEAM STIRRUPS	2 INCHES	1 1/2 INCHES
(E) BEAM MAIN REBARS	2 1/2 INCHES	2 INCHES
(F) SLAB'S #3 TO #5 INCL'S	1 1/2 INCHES	3/4 INCHES
(G) SLABS #6 TO #11 INCL'S	2 INCHES	3/4 INCHES
(H) WALL #11 BAR OR SMALLER	2 INCHES	3/4 INCHES

(I) NOTE: MAXIMUM DEVIATION FROM THESE REQUIREMENTS SHALL BE +1/4" FOR SECTIONS TEN (10) INCHES OR LESS, AND +1/2" FOR SECTIONS OVER TEN (10) INCHES THICK.

(B) PRECAST CONCRETE

	EXPOSED TO EARTH, WATER, OR WEATHER	NOT EXPOSED TO EARTH, WATER, OR WEATHER
(A) COLUMN TIES	1 1/4 INCHES	3/8 INCHES
(B) COLUMN MAIN REBARS	1 1/2 INCHES	5/8 INCHES
(C) BEAM STIRRUPS	1 1/4 INCHES	3/8 INCHES
(D) BEAM MAIN REBARS	1 1/2 INCHES	5/8 INCHES
(E) SLABS #11 BAR AND SMALLER	1 1/4 INCHES	5/8 INCHES
(F) WALL #11 BAR AND SMALLER	3/4 INCHES	5/8 INCHES

(C) IN NO CASE SHALL THE COVER BE LESS THAN THE BAR DIAMETER.

BAR SIZE	DEVELOPMENT LENGTH (INCHES)	SPLICE LENGTH (INCHES)	
	Ld	CLASS B	TOP BARS
#3	15	19	25
#4	19	25	33
#5	24	31	40
#6	29	37	48
#7	42	54	70
#8	48	62	81
#9	54	70	91
#10	61	79	103

REBAR SPLICE LENGTH SCHEDULE

NOTES:
1. IF THE CLEAR SPACING BETWEEN THE REBARS IS LESS THAN THREE BAR DIAMETERS, OR IF THE COVER IS LESS THAN TWO BAR DIAMETERS, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 50%.
2. IF EPOXY COATED REBAR IS USED, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 50%.
3. IF LIGHTWEIGHT CONCRETE IS USED, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 30%.
4. THE MINIMUM REBAR SPLICE LENGTH SCHEDULE IS BASED ON F'c= 4,000 PSI AND Fy= 60,000 PSI.
5. FOR HORIZONTAL REINFORCEMENT SO PLACED THAT MORE THAN 12 INCHES OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW, INCREASE THE DEVELOPMENT LENGTH BY AN ADDITIONAL 30%.
6. WHEN BARS OF DIFFERENT SIZE ARE LAP SPLICED, THE SPLICE LENGTH SHALL BE THE LARGER OF EITHER THE DEVELOPMENT LENGTH OF THE LARGER BAR OR THE SPLICE LENGTH OF THE SMALLER BAR.

REINFORCEMENT (CONTINUED)

R6 WHERE CONTINUOUS BARS ARE CALLED FOR THEY SHALL BE RUN CONTINUOUSLY AROUND CORNERS AND LAPPED AT NECESSARY SPLICES OR HOOKED AT DISCONTINUOUS ENDS.

R7 WHERE REINFORCEMENT IS NOT SHOWN ON DRAWINGS, PROVIDE REINFORCEMENT IN ACCORDANCE WITH APPLICABLE TYPICAL DETAILS OR SIMILAR TO THAT SHOWN FOR MOST NEARLY SIMILAR SITUATIONS, AS DETERMINED BY THE ENGINEER. IN NO CASE SHALL REINFORCEMENT BE LESS THAN MINIMUM REINFORCEMENT PERMITTED BY THE APPLICABLE CODES, NOR LESS THAN THE FOLLOWING:

(A) BEAM STIRRUPS-#3 @ 12" OC
(B) BEAM STIRRUP SUPPORTS-1-#5 @ EACH STIRRUP BEND
(C) FACE REINFORCEMENT IN BEAMS OR PORTIONS OF BEAMS-#4 @ 12" EF
(D) STRUCTURAL SLABS-.0028 GROSS CONCRETE AREA IN EACH DIRECTION
(D) STRUCTURAL WALLS-.0028 GROSS CONCRETE AREA IN EACH DIRECTION

R8 WHERE REINFORCEMENT IS CALLED FOR IN SECTION, REINFORCEMENT IS CONSIDERED TYPICAL WHEREVER THE SECTION APPLIES.

R9 REINFORCEMENT SHALL BE CONTINUOUS THROUGH ALL CONSTRUCTION JOINTS UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

R10 WELDED WIRE FABRIC SHALL LAP 12" OR TWO SPACES, WHICHEVER IS LARGER, AND SHALL BE WIRED TOGETHER.

R11 REINFORCEMENT COUPLER SPLICES SHALL BE MECHANICAL DEVICES CAPABLE OF TRANSMITTING THE ULTIMATE TENSILE AND COMPRESSIVE STRENGTH OF THE BAR.

R12 INSTALLATION OF REINFORCEMENT SHALL BE COMPLETED AT LEAST 24 HOURS PRIOR TO SCHEDULED CONCRETE PLACEMENT. NOTIFY ENGINEER OF COMPLETION AT LEAST 24 HOURS PRIOR TO SCHEDULED COMPLETION OF PLACEMENT OR REINFORCEMENT.

R13 REINFORCEMENT SHALL BE SET BEFORE PLACING CONCRETE. SETTING ANY REINFORCEMENT INTO WET CONCRETE IS PROHIBITED.

CONCRETE

C1 CONCRETE WORK SHALL CONFORM TO THE LATEST EDITIONS OF THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318), AND SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDING (ACI 301).

C2 CONCRETE SHALL BE CONTROLLED CONCRETE, PROPORTIONED, MIXED AND PLACED UNDER THE SUPERVISION OF AN APPROVED CONCRETE TESTING AGENCY OR THE ENGINEER.

C3 CONCRETE SHALL BE NORMAL WEIGHT CONCRETE AND SHALL HAVE A COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, UNLESS OTHERWISE NOTED AND SHALL BE AIR ENTRAINED (SEE SPECS)

C4 THE USE OF CONSTRUCTION JOINTS WHERE SHOWN ON THE DRAWINGS IS MANDATORY. OMISSIONS, ADDITIONS OR CHANGES SHALL NOT BE MADE EXCEPT WITH THE SUBMISSION OF A WRITTEN REQUEST TOGETHER WITH DRAWINGS OF THE PROPOSED JOINT LOCATIONS FOR APPROVAL OF THE STRUCTURAL ENGINEER.

C5 WHERE CONSTRUCTION JOINTS ARE NOT SHOWN, DRAWINGS SHOWING LOCATION OF CONSTRUCTION JOINTS AND CONCRETE PLACING SEQUENCE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO PREPARATION OF THE REINFORCEMENT SHOP DRAWINGS.

C6 CONCRETE SLABS SHALL BE CAST SO THAT THE SLAB THICKNESS IS AT NO POINT LESS THAN THAT INDICATED ON THE DRAWINGS.

C7 CONCRETE SLABS AND WALLS SHALL BE CAST ALTERNATELY OR IN A CHECKERBOARD FASHION SO THAT ADJACENT SECTIONS ARE PLACED NO SOONER THAN THREE DAYS APART. AT LEAST TWO DAYS MUST ELAPSE AFTER PLACING CONCRETE IN WALLS BEFORE PLACING FLOOR SYSTEM SUPPORTED THEREON.

C8 CONCRETE SHALL BE PLACED WITHOUT HORIZONTAL CONSTRUCTION JOINTS EXCEPT WHERE SHOWN OR NOTED.

C9 EXPOSED EDGES OF CONCRETE ELEMENTS SHALL HAVE CHAMFERED CORNERS.

C10 ONLY CRITICAL CONSTRUCTION JOINTS ARE SHOWN. SEE SPECIFICATIONS FOR REQUIRED MAXIMUM SPACING OF CONSTRUCTION JOINTS.

C11 CONTRACTOR SHALL COORDINATE CONNECTION OF BUILDING GROUND SYSTEM TO SLAB ON GRADE REINFORCEMENT.

FOUNDATIONS

F1 NO CONCRETE SHALL BE PLACED IN WATER OR ON FROZEN GROUND.

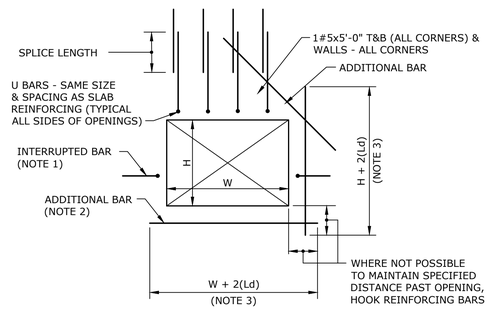
F2 BOTTOM OF FOUNDATION ELEVATIONS GIVEN ON PLANS ARE TO BE CONSIDERED MINIMUM DEPTHS. CONTRACTOR SHALL HAVE FURTHER EXCAVATION AS REQUIRED TO REACH GOOD BEARING.

F3 ALL EXCAVATIONS FOR FOOTINGS SHALL BE FINISHED BY HAND FOR THE LAST 6".

F4 ALL FINISHED EXCAVATIONS SHALL BE INSPECTED BY THE ENGINEER BEFORE ANY CONCRETE IS PLACED.

F5 ALL BACKFILL UNDER OR ADJACENT TO ANY PORTION OF THE STRUCTURES SHALL BE COMPACTED IN 6" LIFTS. SEE SPECIFICATIONS.

F6 REMOVE UNSUITABLE FILL AND/OR IMPROVE THE SUBGRADE PER SPECIFICATION REQUIREMENTS. BACKFILL WITH COMPACTED STRUCTURAL (GRANULAR) FILL UP TO THE UNDERSIDE OF THE BUILDING SLABS. SEE SPECIFICATIONS.



TYP REINFORCING AT OPENINGS IN SLABS AND WALLS
NO SCALE

NOTES:
1. FOR SLAB OR WALL APPLICATION WITH A CONCRETE THICKNESS LESS THAN 12 INCHES, 180° OR 90° HOOK BARS MAY BE USED IN LIEU OF U-BARS.
2. PROVIDE ADDITIONAL BARS USING NOT LESS THAN ONE HALF OF INTERRUPTED BARS AT EACH SIDE OF OPENING AT 3" ON CENTER.
3. FOR TOP BARS IN SLAB, INCREASE DEVELOPMENT LENGTH BY 30%.
4. FOR CIRCULAR OPENINGS, H = W = DIAMETER OF OPENING.

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Town Of Fairfield

Fairfield, CT

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GENERAL NOTES AND DETAILS CONCRETE AND REINFORCING

SCALE: NO SCALE

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MASONRY CONSTRUCTION

M1 CONCRETE MASONRY CONSTRUCTION SHALL CONFORM TO THE LATEST EDITIONS OF THE "BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES (ACI 530/ASCE 5)", "SPECIFICATIONS FOR MASONRY STRUCTURES (ACI 530.1/ASCE 6)" AND TO THE NATIONAL CONCRETE MASONRY ASSOCIATION "SPECIFICATION FOR THE DESIGN AND CONSTRUCTION OF LOAD BEARING CONCRETE MASONRY" (TR758).

M2 MATERIALS STRENGTH SHALL BE AS FOLLOWS:
(A) CONCRETE MASONRY UNITS SHALL CONFORM TO ASTM C-90 NORMAL WEIGHT, COMPRESSIVE STRENGTH ON NET AREA = 1,900 PSI PER ASTM C-90.
(B) MORTAR SHALL CONFORM TO ASTM C-270 TYPE S.
1 PART CEMENT, 1/4 TO 1/2 LIME, 2-1/4 TO 3 SAND (ASTM C270).
(C) GROUT SHALL CONFORM TO ASTM C-476 FINE OR COARSE.
1 PART CEMENT, 0 TO 1/10 LIME, 2-1/4 TO 3 SAND (ASTM C476), PLUS COARSE AGGREGATE.

M3 PRIOR TO GROUTING CELLS, BARS AND CELLS MUST BE INSPECTED BY THE ENGINEER.

M4 THE BASE OF EACH CELL IN WHICH A BAR IS PLACED MUST HAVE A CLEANOUT HOLE.

M5 REINFORCED MASONRY WALLS SHALL HAVE #9 GA. WIRE (LADDER TYPE) AT 16" O.C. HORIZONTAL REINFORCEMENT.

M6 PLACE HORIZONTAL REINFORCING BARS CONTINUOUSLY THROUGH EXPANSION JOINTS. WRAP MASTIC TAPE ON TWO #5 HORIZONTAL BOND BEAM BARS FOR 18" ON SIDE OF JOINT.

M7 MASONRY OPENINGS MORE THAN 16" WIDE REQUIRE APPROVED LINTELS.

M8 MASONRY OPENINGS FOR UTILITIES ARE TO BE CLOSED UP WITH NEW MASONRY WORK AROUND THE UTILITY.

M9 FILL THREE COURSES OF CONCRETE BLOCKS UNDER ALL BEARING PLATES WITH GROUT FOR A WIDTH EQUAL TO THREE TIMES THE BEARING PLATE LENGTH.

M10 PROVIDE 1-#6 VERTICAL REINFORCING BARS AT 48" O.C. THIS REINFORCING BAR SHALL BE CONTINUOUS FULL HEIGHT AND SPLICED 2' ABOVE EACH FLOOR LEVEL. AT OPENINGS THAT INTERRUPT BARS, ADD AN ADDITIONAL BAR TO EACH SIDE OF THE OPENING FOR EACH INTERRUPTED BAR.

M11 PROVIDE ONE 1-#6 (MIN.) VERTICALLY GROUTED SOLID ON EACH SIDE OF CONTROL AND EXPANSION JOINTS AND OPENINGS AND EXTEND 24" BEYOND EACH SIDE OF OPENING.

M12 PROVIDE 1-#6 (MIN) AT EACH SIDE OF ALL DOOR AND WINDOW OPENINGS AND EXTEND FULL HEIGHT OF WALL.

M13 MASONRY BLOCK CELLS CONTAINING VERTICAL REINFORCING SHALL BE GROUTED SOLID. FILLING CELLS WITH MORTAR IS UNACCEPTABLE. THE COMPRESSIVE STRENGTH OF GROUT AT THE END OF 28 DAYS SHALL BE 3000PSI MINIMUM.

M14 REINFORCED MASONRY WALLS SHALL HAVE BOND BEAMS AT EACH FLOOR LEVEL. BOND BEAM REINFORCING BARS SHALL BE EXTENDED INTO AND BE CONTINUOUS WITH ALL INTERSECTING BOND BEAMS.

M15 BONDING METHODS, TIES, LINTELS, AND ACCESSORIES SHALL BE APPROVED BY THE ENGINEER.

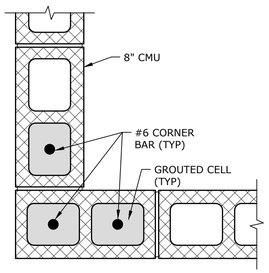
M16 INSTALL LINTELS FOR ALL OPENINGS IN ACCORDANCE WITH THE DETAILS ON THE DRAWINGS.

BAR SIZE DESIGNATION	MINIMUM SPLICE LENGTH (INCHES)	MINIMUM DEVELOPMENT LENGTH (INCHES) BASED ON BAR IN CENTER OF:			
		6" CMU	8" CMU	10" CMU	12" CMU
#3	27	16	16	16	16
#4	36	21	21	21	21
#5	45	32	26	26	26
#6	54	61 (3)	43	40	40
#7	63	NP (4)	60	46	46
#8	72	NP (4)	92	71	61
#9	82	NP (4)	NP (4)	91	74

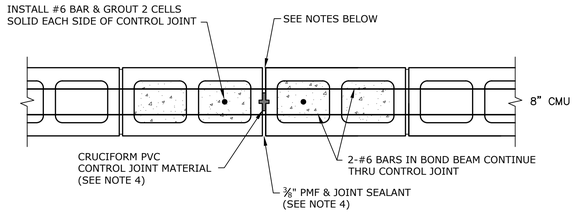
REBAR SPLICE LENGTH SCHEDULE IN MASONRY (ACI 530-05)

NOTES:

1. THE MINIMUM REBAR SPLICE LENGTH SCHEDULE IS BASED ON F'm=1,500 PSI AND Fy=60,000 PSI. ADJUST FOR OTHER STRENGTHS USING ACI-530.
2. IF EPOXY COATED REBAR IS USED, INCREASE DEVELOPMENT LENGTH BY AN ADDITIONAL 50%.
3. PERMITTED ONLY IF MORTAR FINS ARE REMOVED FROM THE CELL TO BE GROUTED.
4. NOT PERMITTED, BAR IS TOO LARGE FOR THIS WALL.
5. WHEN BARS OF DIFFERENT SIZE ARE LAP SPLICED, THE SPLICE LENGTH SHALL BE THE LARGER OF EITHER THE DEVELOPMENT LENGTH OF THE LARGER BAR OR THE SPLICE LENGTH OF THE SMALLER BAR.



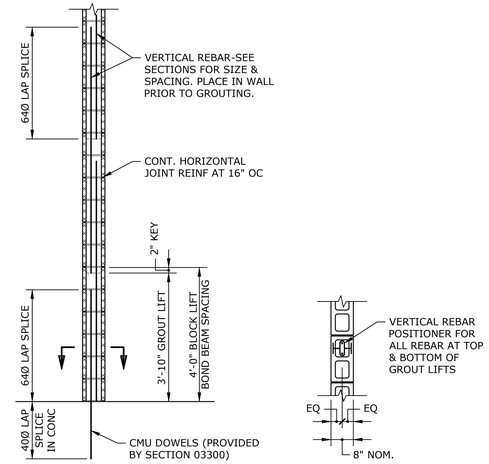
MASONRY WALL CORNER DETAIL
NO SCALE



NOTES:

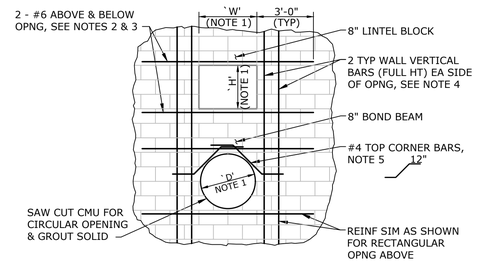
1. RAKE EXCESS MORTAR FROM CONTROL JOINT.
2. PROVIDE BACKER ROD AND CAULK JOINT FOR FINAL COMPLETION.
3. EXTEND CONTROL JOINT FULL HEIGHT OF THE WALL.
4. DELTE CRUCIFORM PVC CONTROL JOINT MATERIAL AND ⅜ " PMF & JOINT SEALANT AT BOND BEAM COURSE.

EXTERIOR MASONRY WALL CONTROL JOINT DETAIL
NO SCALE



(BY SECTION 04800 UNLESS NOTED)

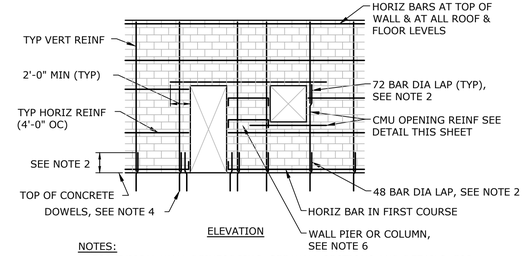
CMU REINFORCING CONSTRUCTION DETAILS
NO SCALE



NOTES:

1. TYPICAL FOR ALL OPENINGS WITH (W, H, OR D) 2'-0" OR GREATER AND 4'-0" OR LESS, UNLESS NOTED OTHERWISE. SEE PLANS FOR LARGER OPENINGS.
2. AT ADJACENT OPENINGS WITH LESS THAN 8'-0" WALL BETWEEN, CONTINUE HORIZONTAL REINFORCING TO 2'-8" BEYOND FARTHEST OPENING.
3. AT OPENINGS LOCATED WITHIN 2'-8" OF CORNER, CONTINUE HORIZONTAL REINFORCING AROUND CORNER 48 BAR DIAMETERS.
4. LOCATE VERTICAL BARS CENTERED IN 2 ADJACENT CELLS IN 8" WALLS, AND EACH FACE IN SINGLE GROUT CELL IN 12" WALLS. LAP 48 BAR DIAMETERS WITH MATCHING FOUNDATION DOWELS.
5. LOCATE #4 CORNER BARS CENTERED IN 8" WALLS, AND EACH FACE IN 12" WALLS.

CMU OPENING REINFORCING
NO SCALE



ELEVATION

NOTES:

1. FOR TYPICAL WALL REINFORCING, SEE WALL SECTIONS AND DETAILS. FOR MINIMUM REINFORCING REQUIREMENTS, SEE GENERAL STRUCTURAL NOTES.
2. FOR VERTICAL REINFORCING LOCATIONS
3. LAP VERTICAL REINFORCING WITH WALL DOWELS PER `REBAR SPLICE LENGTH SCHEDULE IN MASONRY'.
4. STAGGER SPLICES IN ADJACENT HORIZONTAL BARS IN THE SAME COURSE BY 2'-0".
5. PROVIDE DOWEL BARS IN FOUNDATION TO MATCH ALL VERTICAL REINFORCING.
6. GROUT EACH SIDE OF OPENING AS NOTED IN TYPICAL OPENING REINFORCING DETAIL.
7. FOR HORIZONTAL REINFORCING AT OPENINGS SEE COLUMN AND PIER DETAILS.

REINFORCED CMU WALL
NO SCALE

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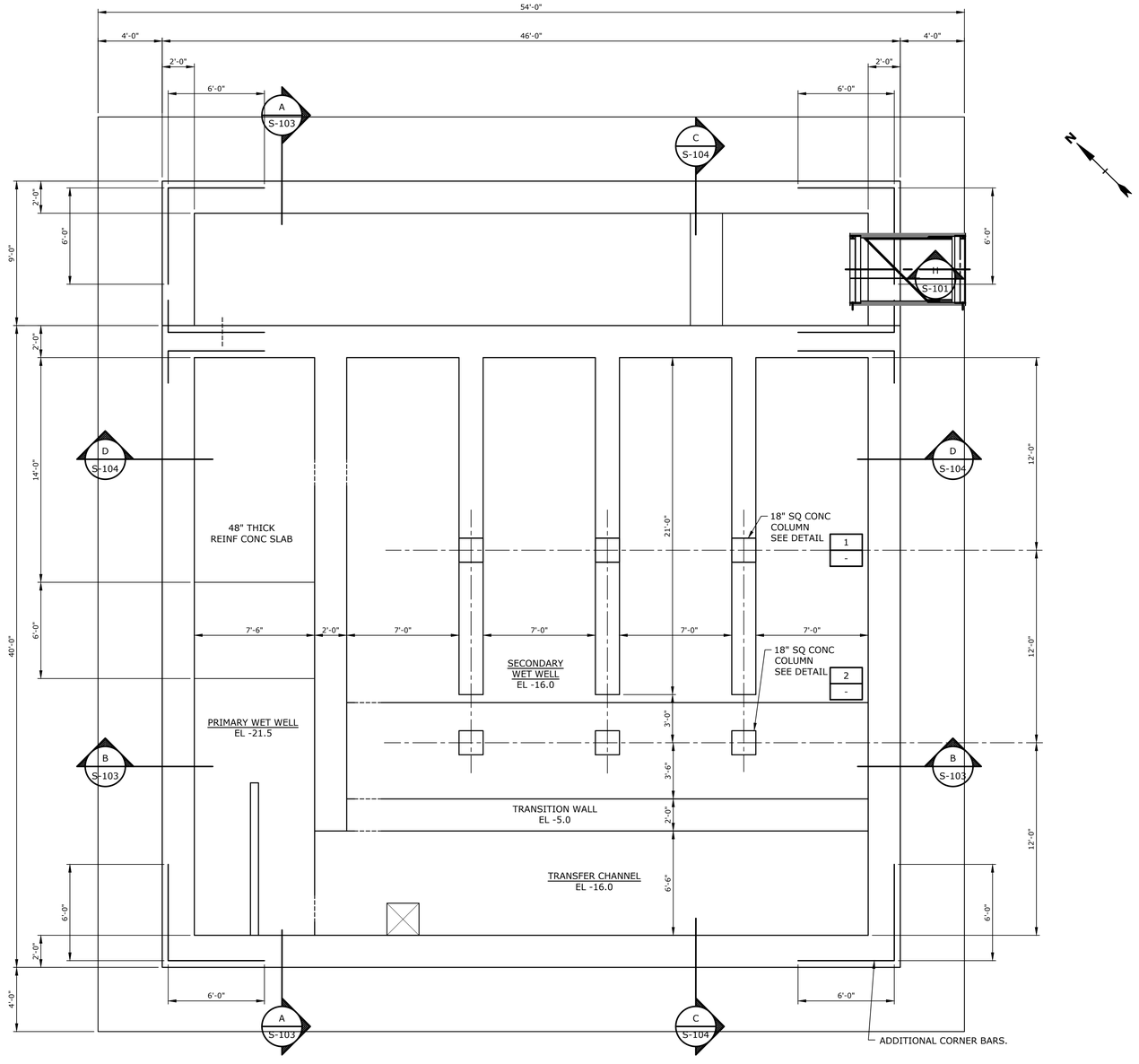
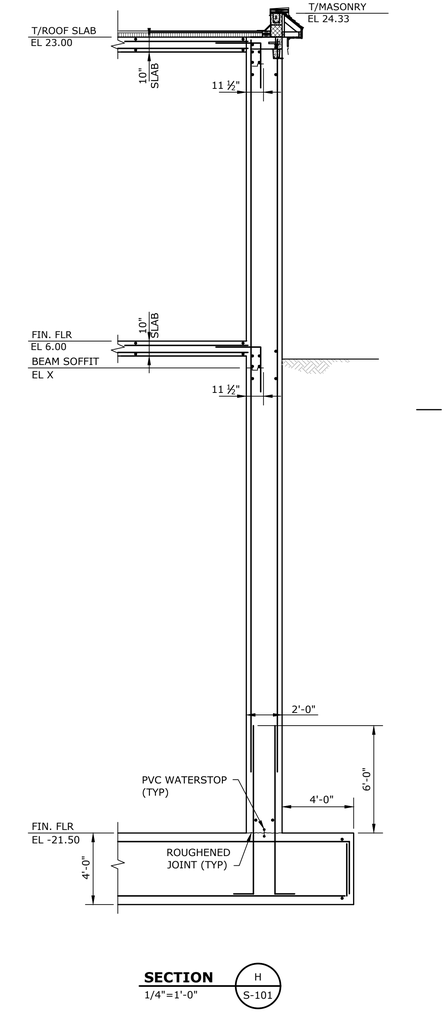
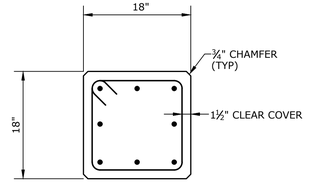


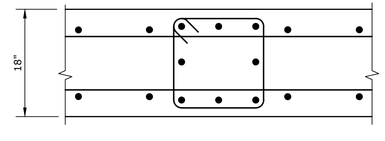
LOWER FLOOR PLAN
1/4"=1'-0"



SECTION H / S-101
1/4"=1'-0"



DETAIL 2 / -
1"=1'-0"



DETAIL 1 / -
1"=1'-0"

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STRUCTURAL PLAN
LOWER LEVEL

SCALE: AS SHOWN

S-101
SHEET X OF X

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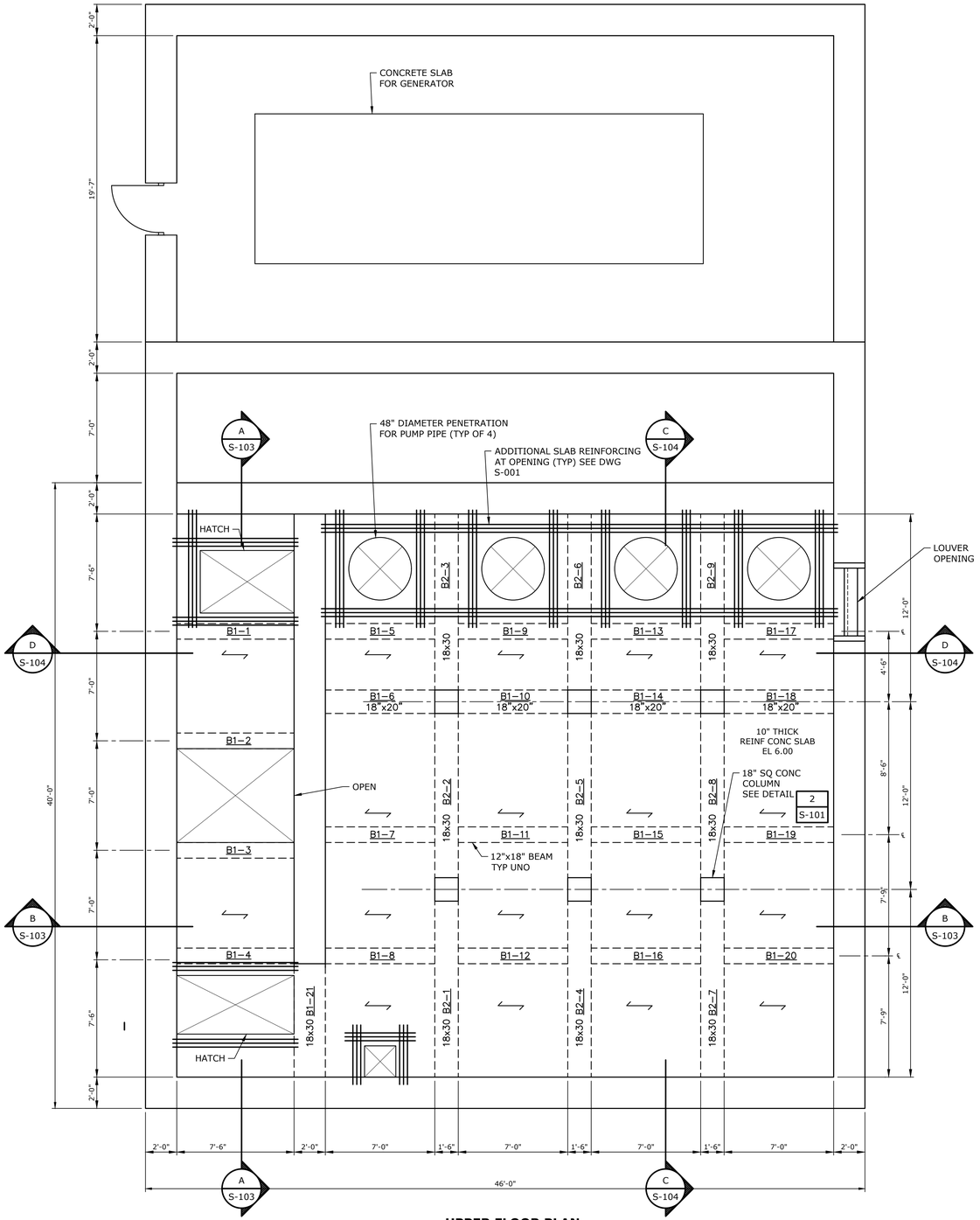

UPPER FLOOR PLAN
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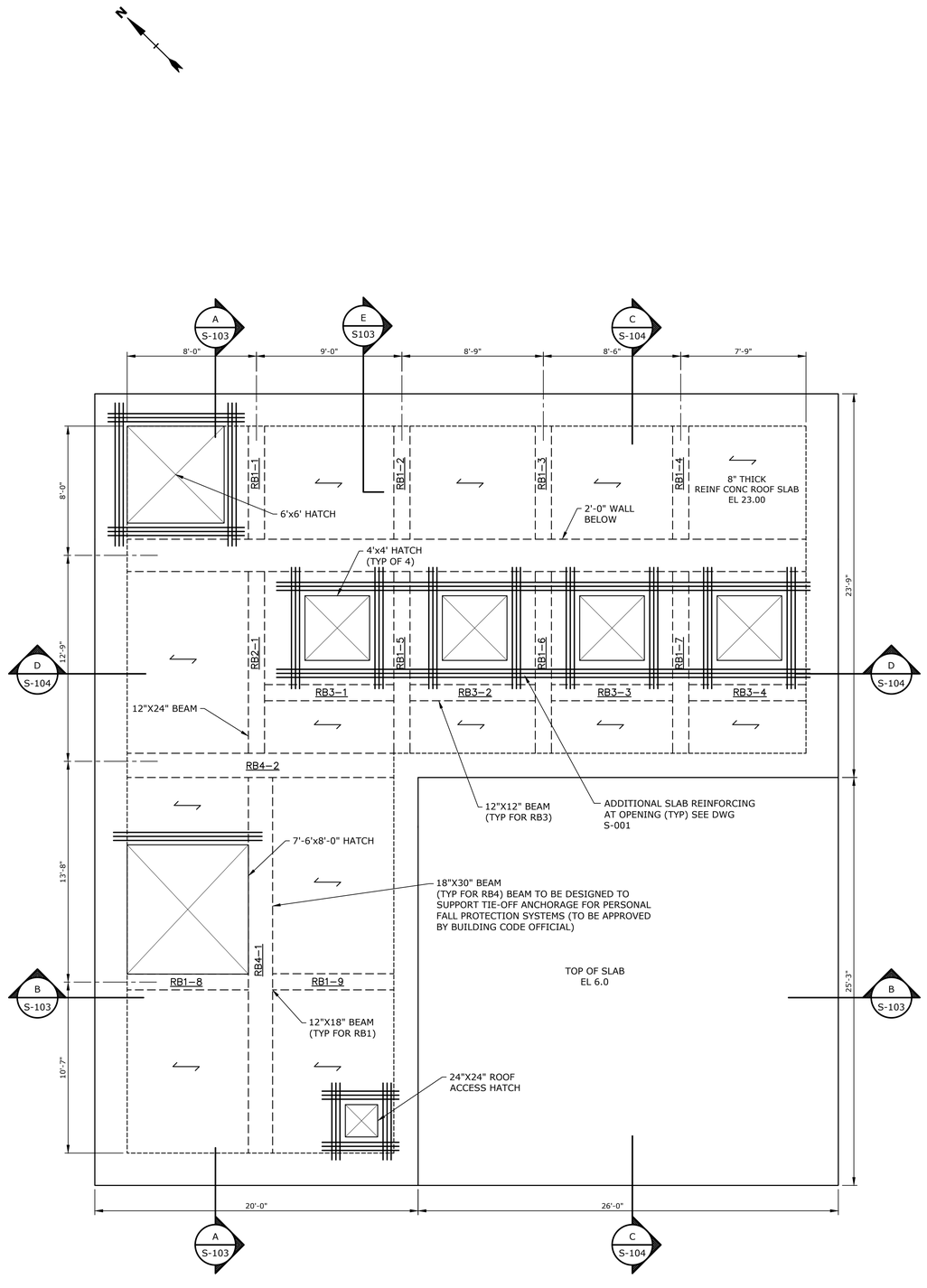

ROOF PLAN
1/4"=1'-0"

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STRUCTURAL PLAN
INTERMEDIATE AND UPPER LEVEL

SCALE: AS SHOWN

S-102
SHEET X OF X

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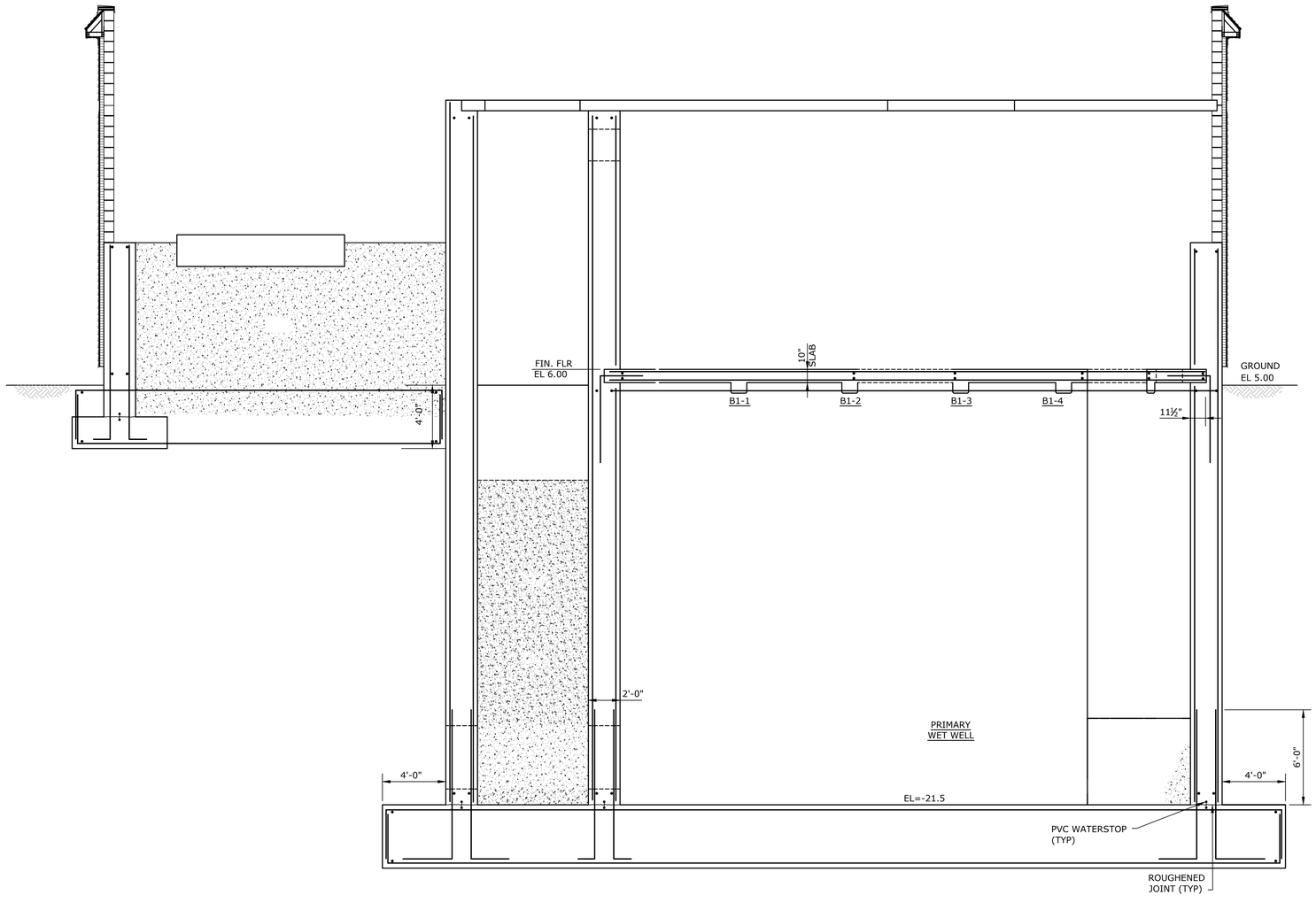

SECTION A S-101 / A S-102
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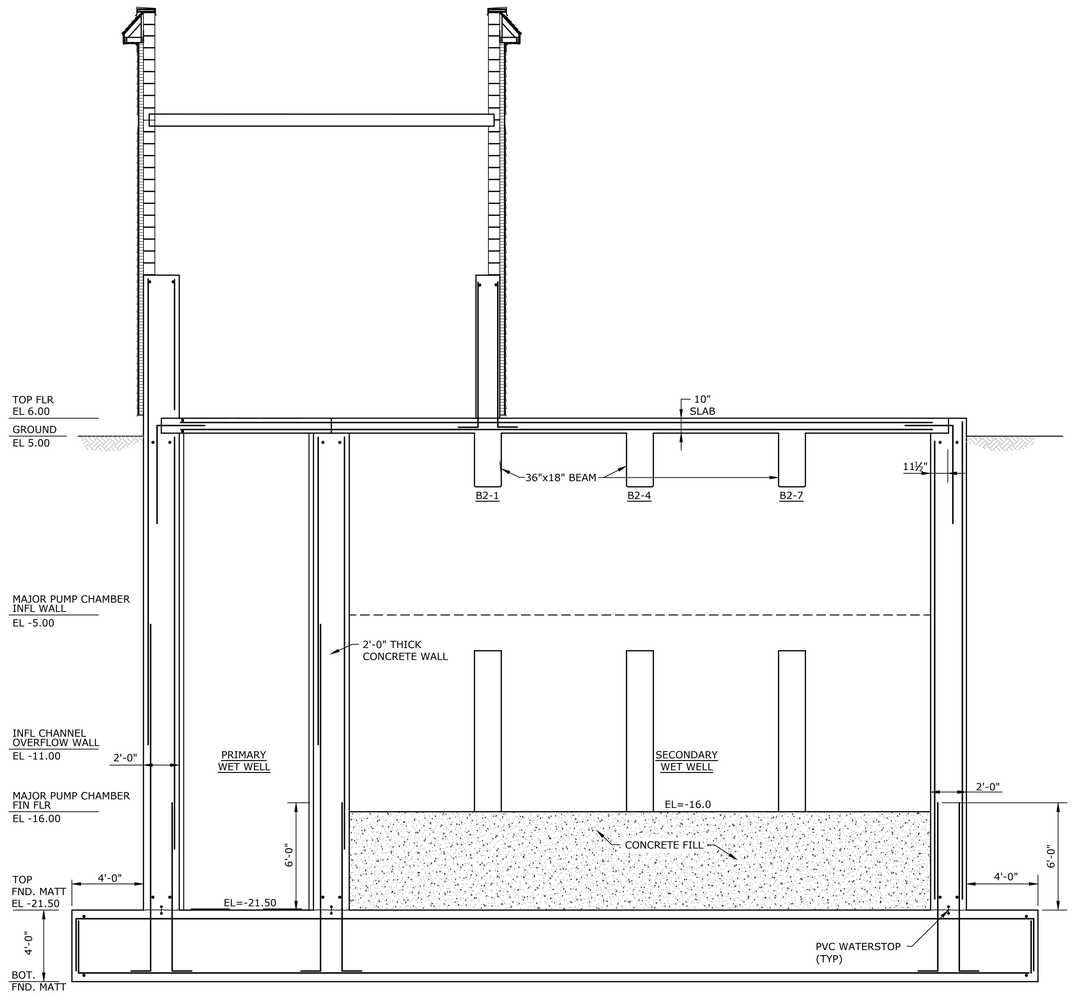
STRUCTURAL SECTIONS AND DETAILS

SCALE: AS SHOWN

S-103
SHEET X OF X



SECTION B / S-101 — B / S-102
1/4"=1'-0"

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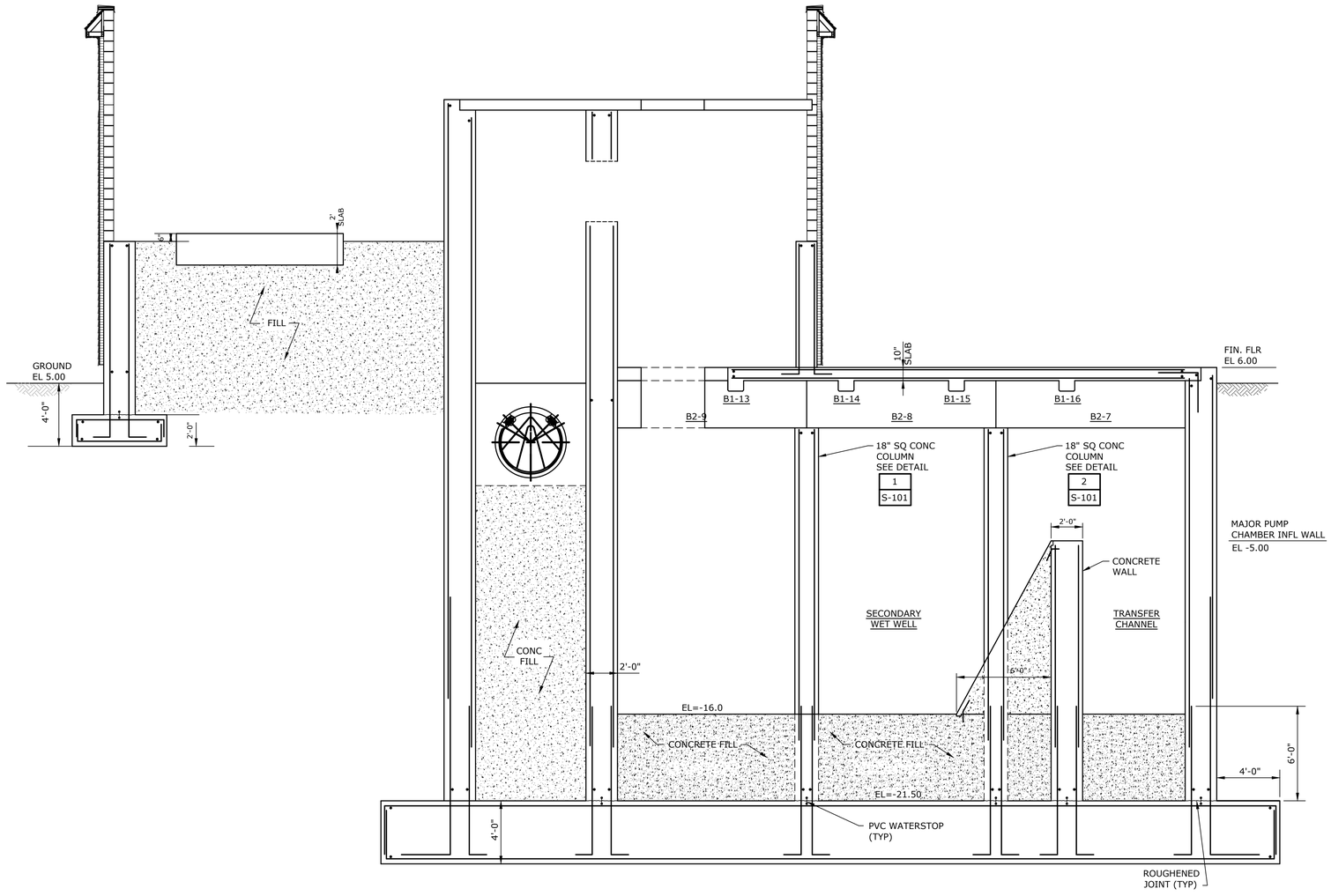

SECTION C S-101 / C S-102
1/4"=1'-0"

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STRUCTURAL SECTIONS AND DETAILS

SCALE: AS SHOWN

S-104
SHEET X OF X

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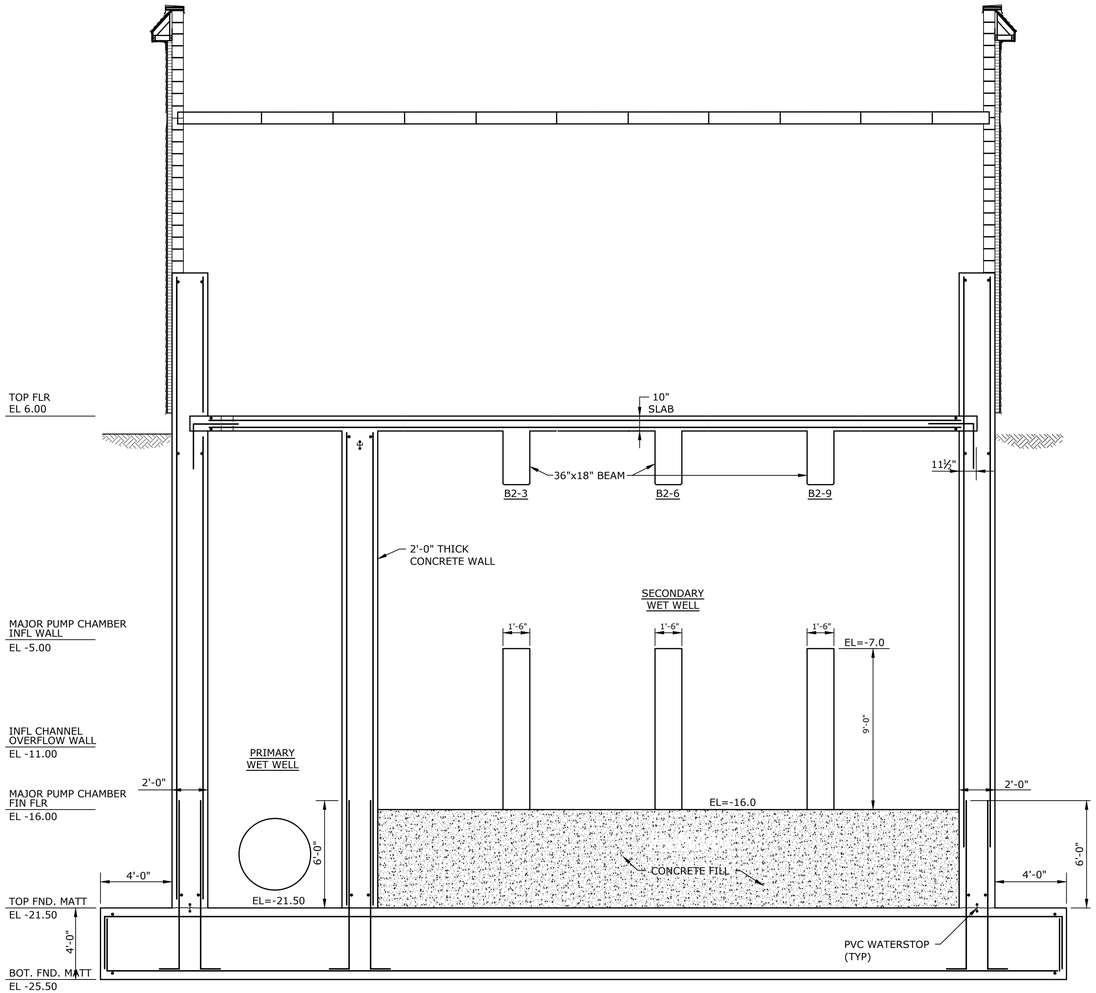

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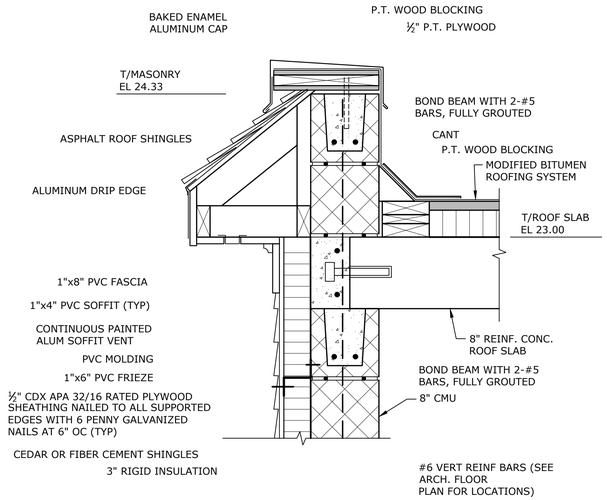

SECTION E/–
1 1/2"=1'–0"

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CONCEPTUAL DRAWINGS

NOT FOR CONSTRUCTION

South Benson Pump Station

Town Of Fairfield

Fairfield, CT

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 — 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

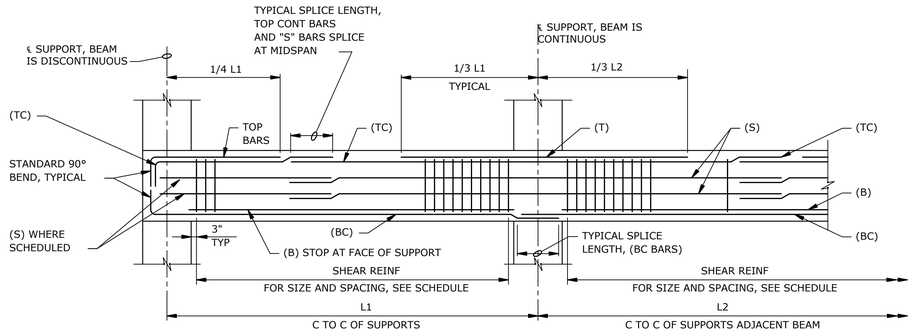
PROJECT NO:	F0439-08
DATE:	03/01/2017
FILE:	F0439-08-S-105-106.dwg
DRAWN BY:	TMP
CHECKED:	JF
APPROVED:	DCH

STRUCTURAL SECTIONS AND DETAILS

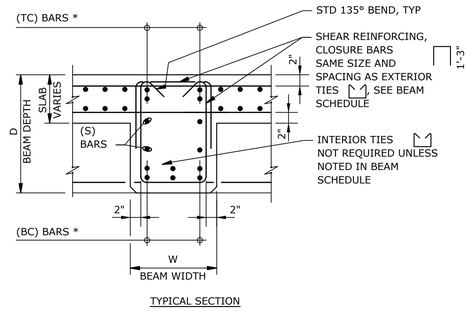
SCALE: AS SHOWN

S-105
SHEET X OF X

Last Saved: 5/29/2018
Plotted On: Dec 21, 2018 - 4:44pm By: JAR
Tighe & Bond: J:\F\F0439 Fairfield Target Client Business Development\08 South Benson Pump Station\Drawings - Figures\AutoCAD\Sheet\F0439-08-S-105-106.dwg



BEAM REINFORCING
NO SCALE



TYPICAL SECTION

BEAM CAMBER

UNLESS SHOWN OTHERWISE IN SCHEDULE, MIDSPAN BEAM CAMBER SHALL BE AS FOLLOWS:

BM SPAN	CAMBER
15'-0" OR LESS	NONE
15'-0" TO 25'-0"	1/2"
25'-0" TO 35'-0"	1"
35'-0" TO 45'-0"	1 1/2"

NOTES:

1. PROVIDE MINIMUM 1 - #5 x CONT AT EACH CORNER OF ALL TIES, LAP SPLICE WITH LONGITUDINAL REINFORCING.

2. * INDICATES LOCATION FOR BARS AT SINGLE ROW. WHERE MORE THAN ONE ROW OF TOP OR BOTTOM BARS OCCUR, PROVIDE ONE INCH CLEAR BETWEEN ROWS. SEE SCHEDULES FOR MAXIMUM NUMBER OF BARS PER LAYER.

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CONCEPTUAL DRAWINGS

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South Benson Pump Station

Town Of Fairfield

Fairfield, CT

VERIFY SCALE
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MARK	DATE	DESCRIPTION

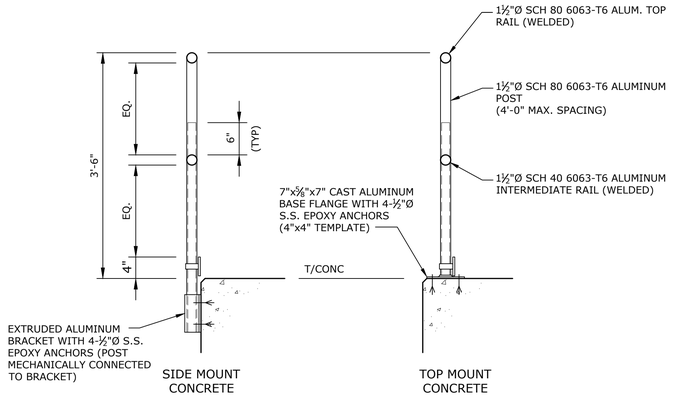
PROJECT NO:	F0439-08
DATE:	03/01/2017
FILE:	F0439-08-S-107.dwg
DRAWN BY:	TMP
CHECKED:	JF
APPROVED:	DCH

CAST-IN-PLACE BEAM SCHEDULE AND DETAILS

SCALE: AS SHOWN

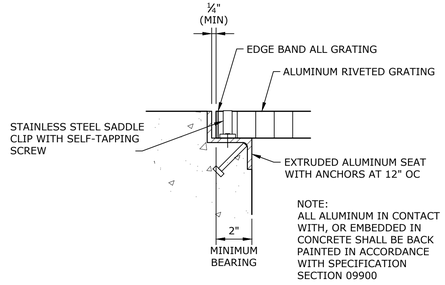
S-106
SHEET X OF X

Last Saved: 5/29/2018
Plotted On: Dec 21, 2018 - 4:15pm By: JAR
Tighe & Bond: J:\F\F0439 Fairfield Target Client Business Development\08 South Benson Pump Station\Drawings, Figures\AutoCAD\Sheet\F0439-08-S-107.dwg



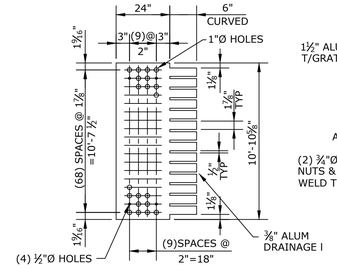
ALUMINUM GUARDRAIL

DETAIL	1
3/4"=1'-0"	-

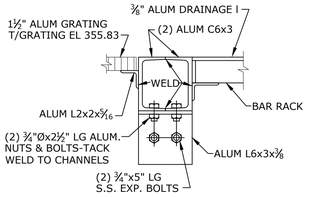


ALUMINUM GRATING BEARING ON CONCRETE

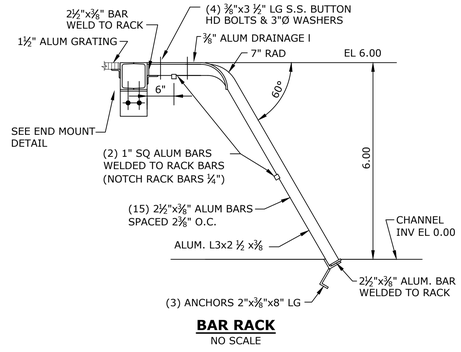
DETAIL	2
NO SCALE	-



DRAINAGE PLATE
NO SCALE



END MOUNT
1 1/2"=1'-0"



BAR RACK
NO SCALE

BAR RACK & DRAINAGE PLATE

DETAIL	3
NO SCALE	X

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CONCEPTUAL DRAWINGS

NOT FOR CONSTRUCTION

South Benson Pump Station

Town Of Fairfield

Fairfield, CT

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MARK	DATE	DESCRIPTION

PROJECT NO:	F0439-08
DATE:	03/01/2017
FILE:	F0439-08-S-108.dwg
DRAWN BY:	TMP
CHECKED:	JF
APPROVED:	DCH

MISCELLANEOUS METAL DETAILS

SCALE: AS SHOWN

S-107
SHEET X OF X

Last Saved: 5/29/2018
Plotted On: Dec 21, 2018 - 4:15pm By: JAR
Tighe & Bond: J:\F\F0439 Fairfield Target Client Business Development\08 South Benson Pump Station\Drawings - Figures\AutoCAD\Sheet\F0439-08-S-108.dwg

Tighe&Bond

APPENDIX J

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST Tighe&Bond

Project: South Benson Pump Station
Location: Fairfield, CT
Component: SUMMARY

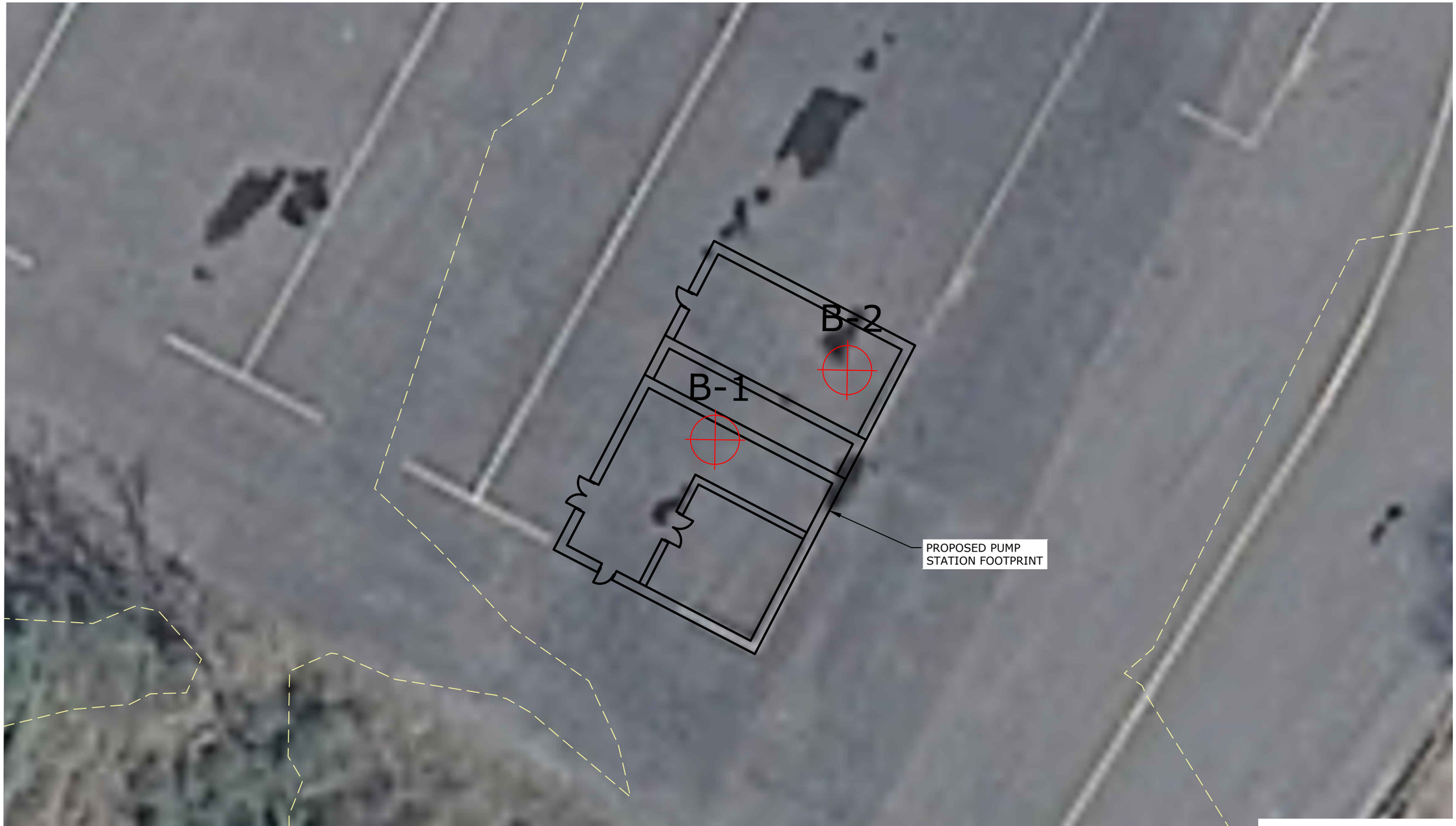
Estimate Type: ☑ Conceptual ☐ Preliminary Design ☐ Design Development @ ____ % Complete ☐ Construction ☐ Change Order Project #: F0439-8 QC: Date: Rev. 10/01/2018

Spec. Section	Item No.	Description	Qty	Units	Material/Installed Cost $/Unit	Material/Installed Cost Total	Installation $/Unit	Installation Total	Total
DIVISION 1 - GENERAL CONDITIONS		(Costs included in unit prices in other Divisions)							
		See Below							
SUBTOTAL - DIVISION 1									**$0**
DIVISION 2 - SITE WORK									
		Task 1							
		Test Pit Excavation	25	CY	$25	$625	$0	$0	$625
		Gas Service	0	LF	$120	$0	$120	$0	$0
		Sheeting (Sheet piles) (Pump Station Site Only)	8122	SF	$75	$609,150	$0	$0	$609,150
		Excavation/Backfill/Compaction (Pump Station Site Only)	4923	CY	$85	$418,455	$0	$0	$418,455
		Dewatering (Wet Well Excavation) (Pump Station Site Only)	1	LS	$250,000	$250,000	$0	$0	$250,000
		Crushed Stone (Under Building Mat)	122	CY	$120	$14,667	$0	$0	$14,667
		Crushed Stone (Under Generator Area Mat)	44	CY	$120	$5,333	$0	$0	$5,333
		- NOT USED - (Additional)	0		$0	$0	$0	$0	$0
		Task 2							
		Test Pit Excavation	50	CY	$100	$5,000	$0	$0	$5,000
		Sheeting (Sheet piles) (Outfall Pipe & Headwall)	1500	SF	$100	$150,000	$0	$0	$150,000
		Excavation/Backfill/Compaction (Outfall Pipe & Headwall) (Trenches Not Slo	5000	CY	$85	$425,000	$0	$0	$425,000
		Dewatering (Outfall Piping Trench and Outfall Pipe Headwall Excavation)	1	LS	$100,000	$100,000	$0	$0	$100,000
		Crushed Stone	520	CY	$35	$18,200	$0	$0	$18,200
		Manholes	6	EA	$3,000	$18,000	$5,000	$30,000	$48,000
		48" Triplewall PE Outfall Pipe	1750	LF	$100	$175,000	$100	$175,000	$350,000
SUBTOTAL - DIVISION 2									**$2,394,430**
DIVISION 3 - CONCRETE									
		Task 1							
		Concrete & Rebar - Cast in Place	0	0	$0	$0	$0	$0	$0
		Concrete Walls	860.1	CY	$1,400	$1,204,140	$0	$0	$1,204,140
		Concrete Columns	11.75	CY	$1,400	$16,450	$0	$0	$16,450
		Concrete Beams (Upper Floor)	28.2	CY	$1,200	$33,840	$0	$0	$33,840
		Roof Beams	13.2	CY	$1,200	$15,840	$0	$0	$15,840
		First Floor Slab	56.8	CY	$1,200	$68,160	$0	$0	$68,160
		Roof Slab	39.5	CY	$1,200	$47,400	$0	$0	$47,400
		MAT Foundation (Pump Station Structure & Building)	635	CY	$1,000	$635,000	$0	$0	$635,000
		MAT Foundation (Generator Area)	177.77778	CY	$1,000	$177,778	$0	$0	$177,778
		Concrete Fill	260.2	CY	$1,000	$260,200	$0	$0	$260,200
SUBTOTAL - DIVISION 3									**$2,458,808**
DIVISION 4 - MASONRY/BUILDINGS									
		Task 1							
		CMU	2229	SF	$50	$111,450	$0	$0	$111,450
		Siding	3483	SF	$25	$87,075	$0	$0	$87,075
SUBTOTAL - DIVISION 4									**$198,525**
DIVISION 5 - METALS									
		Task 1							
		Misc Metals (wet well hatch & safety grating)	6	EA	$5,000	$30,000	$1,250	$7,500	$37,500
		Manual Bar Rack	1	EA	$50,000	$50,000	$12,500	$12,500	$62,500
		Building - Handrail	30	LF	$85	$2,550	$0	$0	$2,550
		Building - Bollards	30	EA	$250	$7,500	$0	$0	$7,500
		Building - Gutters	199	LF	$150	$29,850	$0	$0	$29,850
SUBTOTAL - DIVISION 5									**$139,900**
DIVISION 6 - WOOD & PLASTICS (SEE BUILDINGS)									
SUBTOTAL - DIVISION 6									**$0**
DIVISION 7 - THERMAL & MOISTURE PROTECTION (SEE BUILDINGS)									
		Task 1							
		Building Insulation	0	0	$0	$0	$0	$0	$0
		Building - 2" rigid, Ext. Walls (CMU)	2229	SF	$10	$22,290	$0	$0	$22,290
		Building - 2" rigid, Ext. Walls (Concrete)	1254	SF	$10	$12,540	$0	$0	$12,540
		Building - Roof Polyiso Insulation	1598	SF	$10	$15,980	$0	$0	$15,980
		Membrane Roofing	0	0	$0	$0	$0	$0	$0
		PVC Applied Membrane Roof	1598	SF	$18	$28,764	$0	$0	$28,764
		Building - Metal Flashing	199	LF	$40	$7,960	$0	$0	$7,960
		Joint Sealants	0	0	$0	$0	$0	$0	$0

		Building - Joint Sealants	44	LF	$30	$1,320	$0	$0	$1,320
SUBTOTAL - DIVISION 7									**$88,854**
DIVISION 8 - DOORS & WINDOWS (SEE BUILDINGS)									
		Task 1							
		Single Door - (Flood Secure Door)	2	EA	$9,925	$19,850	$4,963	$9,925	$29,775
		Double Door - (Flood Secure Door)	1	EA	$16,423	$16,423	$8,212	$8,212	$24,635
SUBTOTAL - DIVISION 8									**$54,410**
DIVISION 9 - FINISHES									
		Task 1							
		Painting	1	LS	$1,000	$1,000	$4,000	$4,000	$5,000
SUBTOTAL - DIVISION 9									**$5,000**
DIVISION 10 - SPECIALTIES									
SUBTOTAL - DIVISION 10									**$0**
DIVISION 11 - EQUIPMENT									
		Task 1							
		Main Stromwater Pumps	2	EA	$47,500	$95,000	$23,750	$47,500	$142,500
		Major Stromwater Pumps & Discharge Tubes	4	EA	$147,500	$590,000	$73,750	$295,000	$885,000
		Mechanical Bar Screens	2	EA	$230,000	$460,000	$115,000	$230,000	$690,000
		In-Pipe Discharge Check Valve (54")	1	EA	$27,357	$27,357	$5,471	$5,471	$32,828
		54" Tee	4	EA	$50,000	$200,000	$10,000	$40,000	$240,000
		54" SS Drop Tubes	4	EA	$50,000	$200,000	$10,000	$40,000	$240,000
SUBTOTAL - DIVISION 11									**$2,230,328**
DIVISION 12 - FURNISHINGS									
SUBTOTAL - DIVISION 12									**$0**
DIVISION 13 - SPECIAL CONSTRUCTION									
		Task 1							
		Backup Float Switches in Wetwell	10	EA	$425	$4,250	$106	$1,063	$5,313
		Level Senser &Transmitter in Wetwell	2	EA	$3,600	$7,200	$2,700	$5,400	$12,600
SUBTOTAL - DIVISION 13									**$17,913**
DIVISION 14 - CONVEYING SYSTEMS									
SUBTOTAL - DIVISION 14									**$0**
DIVISION 15 - MECHANICAL (assume HVAC incorporated into BUILDINGS)									
		Task 1							
		HVAC	0	0	$0	$0	$0	$0	$0
		Louvers - 60"x60"	1	EA	$3,008	$3,008	$1,975	$1,975	$4,983
		Roof mounted exhaust fan	1	EA	$3,500	$3,500	$1,500	$1,500	$5,000
		Ductwork	1	EA	$250	$250	$100	$100	$350
		Electric unit heater	3	EA	$850	$2,550	$85	$255	$2,805
		Controls	3	EA	$0	$0	$1,000	$3,000	$3,000
		Plumbing	0	0	$0	$0	$0	$0	$0
		4" PVC - DWV San	6	LF	$30	$180	$25	$150	$330
		Floor Drain	2	EA	$750	$1,500	$150	$300	$1,800
		3/4" Water - hot and cold domestic	10	LF	$11	$110	$14	$135	$245
		1" Water - hot and cold domestic	20	LF	$15	$290	$14	$280	$570
		1" backflow	1	EA	$1,000	$1,000	$100	$100	$1,100
		1" Gas	50	LF	$15	$750	$10	$500	$1,250
		Piping specialties and accessories - allowance	1	EA	$1,000	$1,000	$0	$0	$1,000
SUBTOTAL - DIVISION 15									**$22,433**
DIVISION 16 - ELECTRICAL									
		Task 1							
		Generator	1	EA	$443,682	$443,682	$110,921	$110,921	$554,603
		VFD for 60 HP Pumps	2	EA	$40,000	$80,000	$10,000	$20,000	$100,000
		VFD for 200 HP Pumps	4	EA	$80,000	$320,000	$20,000	$80,000	$400,000
		Pump Controls Panel	1	EA	$40,000	$40,000	$10,000	$10,000	$50,000
		Mechanical Bar Sceen Controls Panel	1	EA	$0	$0	$0	$0	$0
		Misc. Electrical & Controls (Assume 10% of Powered Equip Costs)	1	LS	$284,002	$284,002	$0	$0	$284,002
SUBTOTAL - DIVISION 16									**$1,388,604**
CONSTRUCTION TOTAL COST									**$8,999,204**
CONTRACTOR GENERAL CONDITIONS			15%						**$1,349,881**
CONTINGENCY			20%						**$2,069,817**
SUBTOTAL									**$12,418,901**
		Enginering Services & Construction Admin./Observation:	15%						**$1,862,835**
							TOTAL:		**$14,281,736**

Tighe&Bond

APPENDIX K



N

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

SOUTH BENSON PS
FAIRFIELD, CONNECTICUT

BORING LOCATION PLAN

DATE: 09/14/2017
SCALE: 1" = 20'
FIGURE 01

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APPENDIX L

Tighe&Bond
Engineers | Environmental Specialists

Project: South Benson Pump Station
Location: Fairfield, CT
Client: Town of Fairfield

Boring No. **B-1**
Page 1 of 2
File No. F-04398-03-01
Checked by: D. Brogan

Drilling Co.: General Borings
Foreman: John W.
T&B Rep.: R. Symington
Date Start: 08/09/17 End: 08/09/17
Location See Exploration Location Plan
GS. Elev. ± 7' Datum: NAVD 88

	Casing	Sampler
Type	HSA/HW	Split Spoon
I.D./O.D.	2.3/5.6"-4/4.5"	1-3/8"/2"
Hammer Wt.		140#
Hammer Fall		30"
Other	Auto Hammer	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
8/9/2017		± 10'		End of boring

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
					2" of Asphalt Pavement	0.2' Asphalt		
		S-1/24	1-3	6-8	Medium dense, black, fine to medium SAND, trace Gravel, trace Silt			
				8-6				
5		S-2/12	5-7	1-1	Very loose, brown, fine SAND and SILT			
				2-6				
10		S-3/12	10-12	7-7	Medium dense, brown, fine to medium SAND, trace Silt, trace Gravel			
				8-7				
15		S-4/24	15-17	7-11	Medium dense, brown, fine to medium SAND trace Silt, trace Gravel	SAND	1	
				12-9				
20		S-5/18	20-22	12-13	Dense, brown, fine SAND, little Silt			
				26-21				
25		S-6/12	25-27	7-7	Medium dense, fine SAND, trace Silt			
				8-11				
30								

Notes:
1. Switched from augers to flush joint casing at a depth of 15 feet

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
Engineers | Environmental Specialists

Project: South Benson Pump Station
Location: Fairfield, CT
Client: Town of Fairfield

Boring No. **B-1**
Page 2 of 2
File No. F-04398-03-01
Checked by: D. Brogan

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
		S-7/18	30-32	6-8	Medium dense, brown, fine SAND, little Silt	SAND		
				11-9				
35		S-8/22	35-37	6-7	Medium dense, grey, fine SAND and SILT			
				7-8				
40		S-9/12	40-42	5-8	Medium dense, brown, fine SAND, some Silt			
				7-13				
45		S-10/12	45-47	4-4	Medium dense, brown, fine SAND, some Silt			
				8-7				
					Bottom of exploration at 47 feet			
50								
55								
60								
65								

Notes:

Tighe&Bond
Engineers | Environmental Specialists

Project: South Benson Pump Station
Location: Fairfield, CT
Client: Town of Fairfield

Boring No. **B-2**
Page 1 of 2
File No. F-04398-03-01
Checked by: D. Brogan

Drilling Co.: General Borings
Foreman: John W.
T&B Rep.: R. Symington
Date Start: 08/09/17 End: 08/09/17
Location See Exploration Location Plan
GS. Elev. ± 7' Datum: NAVD 88

	Casing	Sampler
Type	HSA/HW	Split Spoon
I.D./O.D.	2.3/5.6"-4/4.5"	1-3/8"/2"
Hammer Wt.		140#
Hammer Fall		30"
Other	Auto Hammer	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
8/9/2017		± 10'		End of boring

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
					2" of Asphalt Pavement	0.2' Asphalt		
		S-1/18	1-3	4-5	Medium dense, light brown, fine SAND, trace Silt			
				7-8				
5		S-2/24	5-7	1-1	Very loose, brown, fine SAND, trace Silt, trace Gravel			
				1-1				
10		S-3/12	10-12	38-17	Medium dense, brown, fine SAND, trace Silt			
				11-8				
15		S-4/12	15-17	5-9	Medium dense, brown, fine SAND, trace Silt	SAND	1	
				13-11				
20		S-5/18	20-22	7-8	Medium dense, brown, fine SAND, little Silt			
				7-11				
25		S-6/12	25-27	6-10	Medium dense, brown, fine SAND, little Silt			
				10-10				
30								

Notes:
1. Switched from augers to flush joint casing at a depth of 15 feet

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Tighe&Bond
Engineers | Environmental Specialists

Project: South Benson Pump Station
Location: Fairfield, CT
Client: Town of Fairfield

Boring No. **B-2**
Page 2 of 2
File No. F-04398-03-01
Checked by: D. Brogan

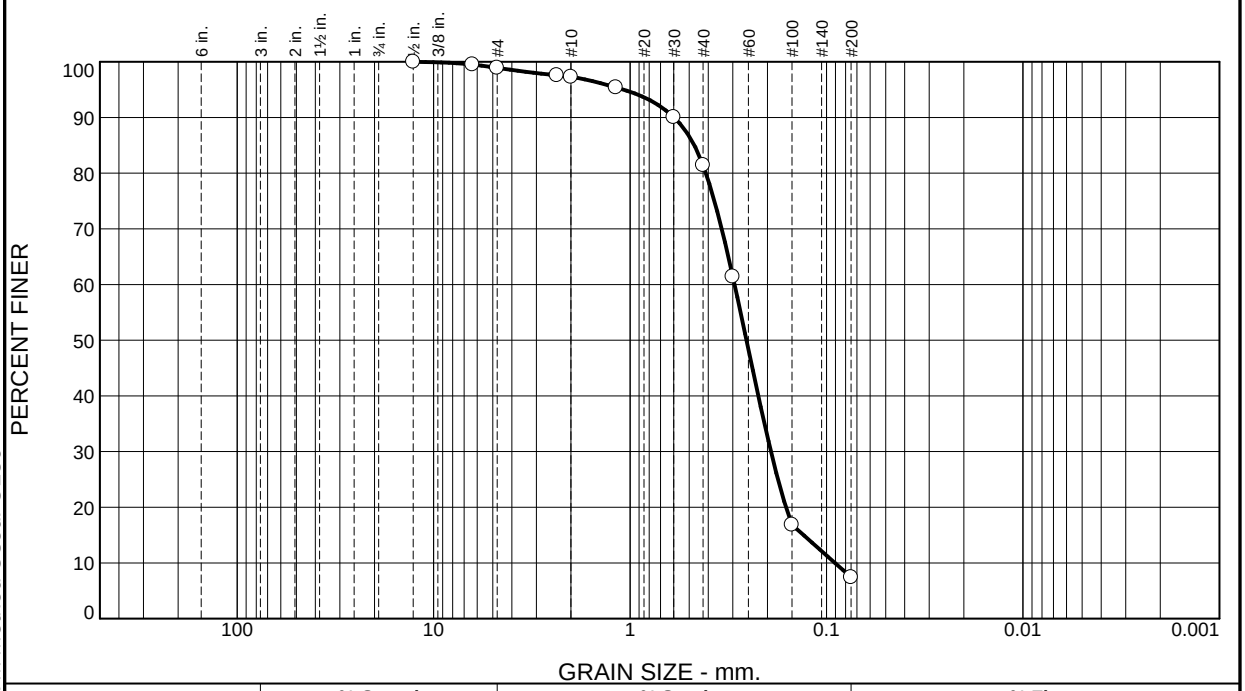
Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec. (in)	Sample Depth (ft.)	Blows Per 6"	Sample Description	General Stratigraphy	Notes	Well Construction
		S-7/12	30-32	6-11	Medium dense, brown, fine SAND, trace Silt			
				10-12				
35		S-8/14	35-37	10-17	Dense, brown, fine SAND, some Silt	SAND		
				15-14				
40		S-9/16	40-42	5-9	Medium dense, grey, fine SAND and SILT			
				17-22				
						43.5'		
45		S-10/12	45-47	8-15	Dense, grey, SILT, little fine Sand	SILT		
				17-18				
						48.5'		
50		S-11/18	50-52	3-7	Medium dense, grey, fine SAND, little Silt			
				10-10				
55		S-12/18	55-57	4-6	Medium dense, grey to brown, fine SAND, some Silt	SAND		
				6-8				
60		S-13/12	60-62	3-5	Medium dense, grey to brown, fine SAND, some Silt			
				6-11				
					Bottom of exploration at 62 feet			
65								

Notes:

Tighe&Bond

APPENDIX M

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	1.6	15.9	74.0	7.4	

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2	100.0		
1/4	99.5		
#4	98.9		
#8	97.6		
#10	97.3		
#16	95.4		
#30	90.0		
#40	81.4		
#50	61.4		
#100	16.8		
#200	7.4		

* (no specification provided)

Material Description

Brown fine to medium SAND, trace Silt, trace Gravel

Atterberg Limits (ASTM D 4318)

PL= N/A **LL=** N/A **PI=** N/A

Classification

USCS (D 2487)= N/A **AASHTO (M 145)=** N/A

Coefficients

D_{90}= 0.5981 D_{85}= 0.4706 D_{60}= 0.2940
D_{50}= 0.2556 D_{30}= 0.1918 D_{15}= 0.1309
D_{10}= 0.0907 C_u= 3.24 C_c= 1.38

Remarks

Date Received: 08/18/2017 **Date Tested:** 08/25/2017

Tested By: John Andrighetti

Checked By: Salah AL-Bakri

Title: Lab Manager

Location: B-1-Sample #S4
Sample Number: 17-1512

Date Sampled: 08/18/2017

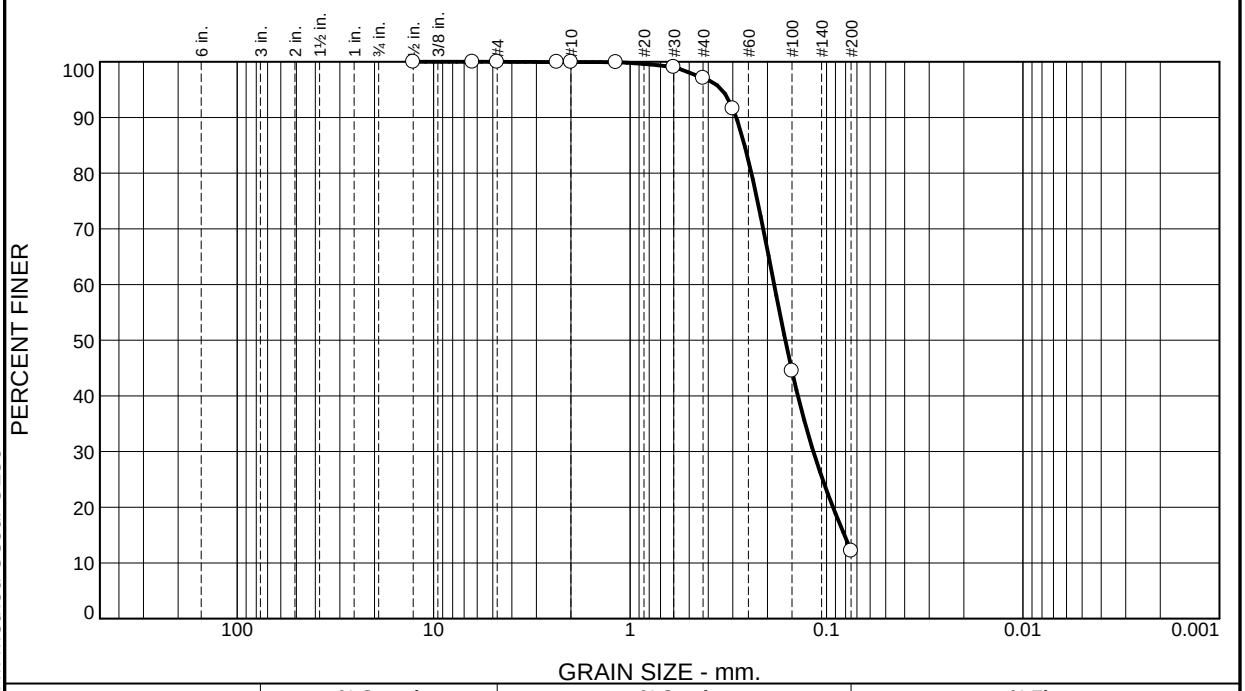
COASTAL MATERIALS TESTING LAB, LLC
West Haven, Connecticut

Client: Tighe & Bond
Project: Fairfield South Benson Pump Station-#F0439-8

Project No: 17-596 **Figure**

These results are for the exclusive use of the client for whom they were obtained.
They apply only to the samples tested and are not indicitive of apparently identical samples.ASTM Method Used: C136

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.9	84.9	12.2	

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2	100.0		
1/4	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#16	99.9		
#30	99.1		
#40	97.1		
#50	91.6		
#100	44.5		
#200	12.2		

* (no specification provided)

Material Description

Brown, fine SAND, little Silt

Atterberg Limits (ASTM D 4318)

PL= N/A **LL=** N/A **PI=** N/A

Classification

USCS (D 2487)= N/A **AASHTO (M 145)=** N/A

Coefficients

D_{90}= 0.2881 D_{85}= 0.2612 D_{60}= 0.1847
D_{50}= 0.1621 D_{30}= 0.1167 D_{15}= 0.0811
D_{10}= C_u= C_c=

Remarks

Date Received: 08/18/2017 **Date Tested:** 08/25/2017

Tested By: John Andrighetti

Checked By: Salah Al-Bakri

Title: Lab Manager

Location: B-1-Sample #S5
Sample Number: 17-1513

Date Sampled: 08/18/2017

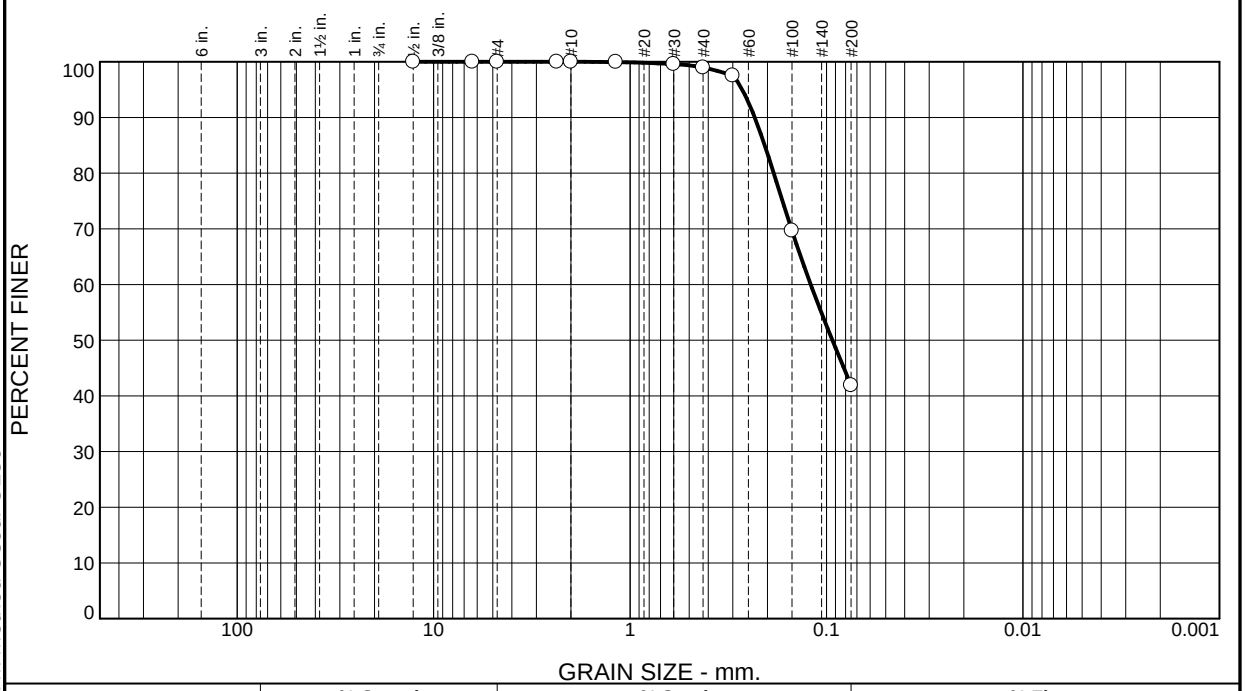
COASTAL MATERIALS TESTING LAB, LLC
West Haven, Connecticut

Client: Tighe & Bond
Project: Fairfield South Benson Pump Station-#F0439-8

Project No: 17-596 **Figure**

These results are for the exclusive use of the client for whom they were obtained.
They apply only to the samples tested and are not indicitive of apparently identical samples.ASTM Method Used: C136

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.0	57.1	41.9	

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2	100.0		
1/4	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#16	100.0		
#30	99.6		
#40	99.0		
#50	97.5		
#100	69.7		
#200	41.9		

* (no specification provided)

Material Description

Grey, fine SAND and SILT

Atterberg Limits (ASTM D 4318)

PL= N/A **LL=** N/A **PI=** N/A

Classification

USCS (D 2487)= N/A **AASHTO (M 145)=** N/A

Coefficients

D_{90}= 0.2319 D_{85}= 0.2064 D_{60}= 0.1204
D_{50}= 0.0934 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 08/18/2017 **Date Tested:** 08/25/2017

Tested By: John Andrighetti

Checked By: Salah AL-Bakri

Title: Lab Manager

Location: B-1-Sample #S8
Sample Number: 17-1514

Date Sampled: 08/18/2017

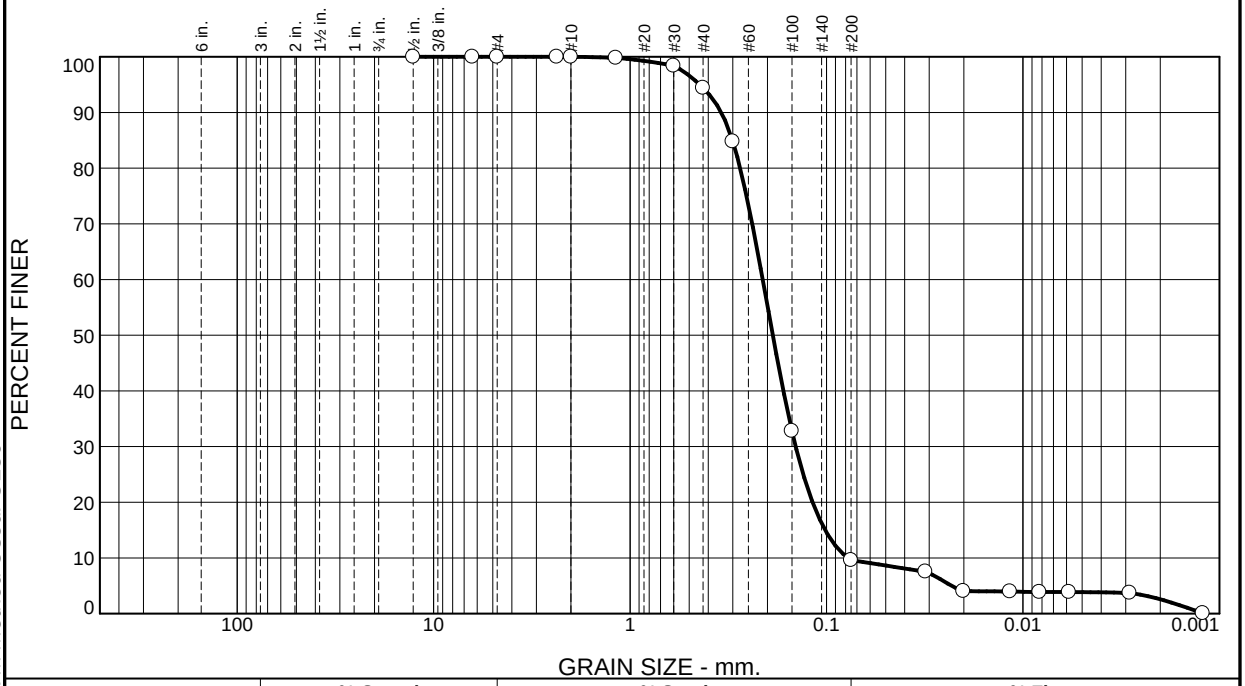
COASTAL MATERIALS TESTING LAB, LLC
West Haven, Connecticut

Client: Tighe & Bond
Project: Fairfield South Benson Pump Station-#F0439-8

Project No: 17-596 **Figure**

These results are for the exclusive use of the client for whom they were obtained.
They apply only to the samples tested and are not indicitive of apparently identical samples.ASTM Method Used: C136

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.6	84.8	7.0	2.6

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2	100.0		
1/4	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#16	99.8		
#30	98.4		
#40	94.4		
#50	84.8		
#100	32.8		
#200	9.6		
0.0314 mm.	7.5		
0.0201 mm.	4.0		
0.0116 mm.	4.0		
0.0082 mm.	3.9		
0.0058 mm.	3.9		
0.0029 mm.	3.7		
0.0012 mm.	0.1		

* (no specification provided)

Material Description

Brown, fine SAND, trace Silt

Atterberg Limits (ASTM D 4318)

PL= N/A **LL=** N/A **PI=** N/A

Classification

USCS (D 2487)= N/A **AASHTO (M 145)=** N/A

Coefficients

D_{90}= 0.3434 D_{85}= 0.3012 D_{60}= 0.2113
D_{50}= 0.1876 D_{30}= 0.1436 D_{15}= 0.1016
D_{10}= 0.0779 C_u= 2.71 C_c= 1.25

Remarks

Date Received: 08/18/2017 **Date Tested:** 08/25/2017

Tested By: John Andrighetti

Checked By: Salah Al-Bakri

Title: Lab Manager

Location: B-2-Sample #S7 **Date Sampled:** 08/18/2017
Sample Number: 17-1515 **Depth:** 30'-32'

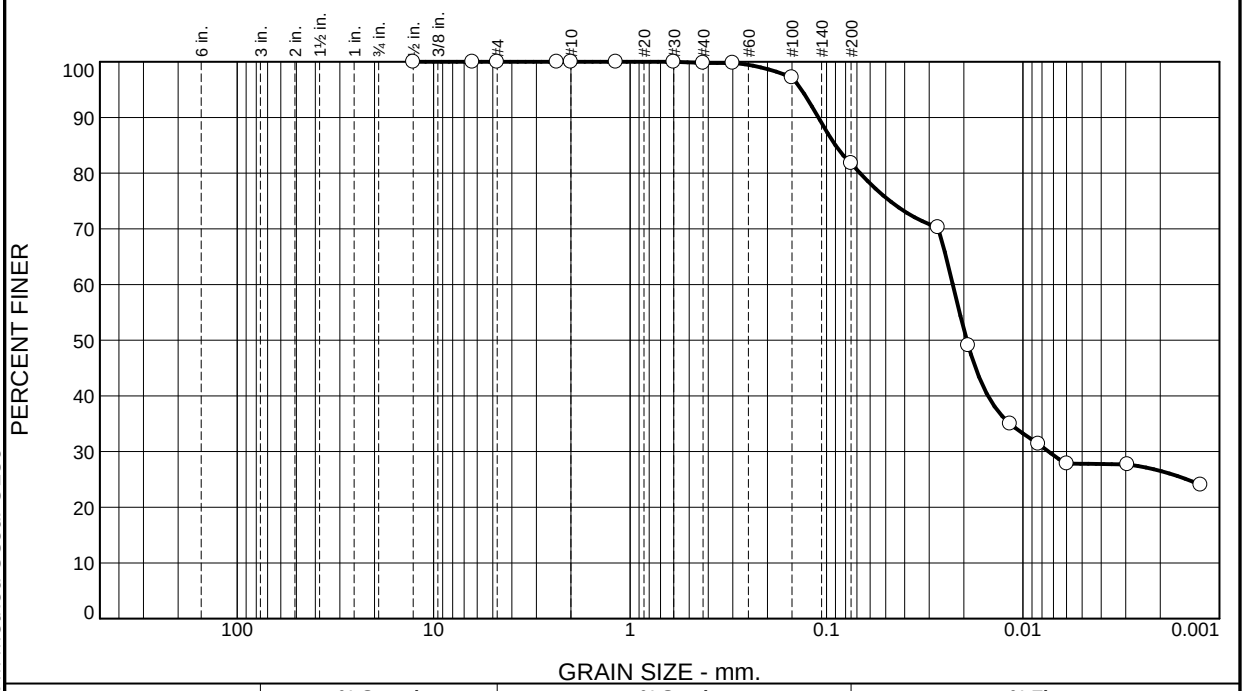
COASTAL MATERIALS TESTING LAB, LLC
West Haven, Connecticut

Client: Tighe & Bond
Project: Fairfield South Benson Pump Station-#F0439-8

Project No: 17-596 **Figure**

These results are for the exclusive use of the client for whom they were obtained.
They apply only to the samples tested and are not indicitive of apparently identical samples.ASTM Method Used: C136

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	18.0	55.3	26.5

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2	100.0		
1/4	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#16	100.0		
#30	100.0		
#40	99.8		
#50	99.8		
#100	97.2		
#200	81.8		
0.0271 mm.	70.3		
0.0190 mm.	49.1		
0.0116 mm.	35.0		
0.0084 mm.	31.4		
0.0060 mm.	27.9		
0.0029 mm.	27.7		
0.0012 mm.	24.0		

* (no specification provided)

Material Description

Grey SILT, little fine Sand

Atterberg Limits (ASTM D 4318)

PL= N/A **LL=** N/A **PI=** N/A

Classification

USCS (D 2487)= N/A **AASHTO (M 145)=** N/A

Coefficients

D_{90}= 0.1100 D_{85}= 0.0900 D_{60}= 0.0228
D_{50}= 0.0193 D_{30}= 0.0074 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 08/18/2017 **Date Tested:** 08/25/2017

Tested By: John Andrighetti

Checked By: Salah Al-Bakri

Title: Lab Manager

Location: B-2-Sample #S10 **Date Sampled:** 08/18/2017

Sample Number: 17-1516 **Depth:** 45'-47'

COASTAL MATERIALS TESTING LAB, LLC
West Haven, Connecticut

Client: Tighe & Bond

Project: Fairfield South Benson Pump Station-#F0439-8

Project No: 17-596 **Figure**