ADDENDUM NO. 2

TO

BIDDING AND CONTRACT REQUIREMENTS AND SPECIFICATIONS

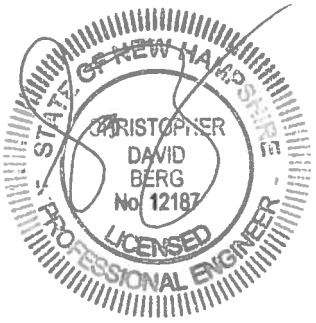
FOR

GRANITE STATE BUSINESS PARK WATER MAIN EXTENSION

ROCHESTER, NH

BID NO. 20-03

7/19/2019



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As a point of clarification, it should be understood that the Contract Documents govern all aspects of the project. Discussions held during the Pre-Bid Conference or over phone or email are informal and informational only. All official changes to the Contract Documents are made only by addenda. The following changes and additional information are hereby made a part of the Contract Documents:

QUESTIONS

1. ***Q: When and for how long can Albany's water service be shut down in order to install the meter pit, tri-cluster of 12" gate valves, 40' of pipe, and new hydrant connection?***

   A: The plan sheets have been revised to facilitate a shorter shut-down required for the 12-inch gate valve cluster and hydrant connection as shown on the attached revised drawing sheet C-7. Once this is valve cluster is installed, the intent is to supply continuous water service to Albany through a hydrant to hydrant temporary water service connection for the remainder of the work required to install the meter pit, piping. Scheduling the initial shut down shall be coordinated with Albany either on the weekend or at night at the Owner's option.

2. Q: ***STA. 51+00 to STA. 54+50 appears to locate the new water main in the same location as the existing gas main. Are we supposed to relocate the gas main in this location? Will the Gas Co. be relocating the main? How does this get paid?***

   A: The plan sheets have been revised to locate the proposed water main between the existing water main and the gas main. Relocation of the gas main is not anticipated.

3. Q: ***STA. 51+00 to STA. 52+00 appears to locate the new water main in the same trench as the existing gas, existing water, existing underground electrical and the existing drainage. This is an extremely congested section and we're questioning the feasibility of installing the new water main in this corridor while installing adequate shoring and maintaining service to existing utilities.***

A: The plan sheets have been revised to cross the existing utilities here instead of run in parallel with the gas, water, underground electric and drainage from STA. 51+20 to STA. 51+45. The proposed water main shall cross under all existing utilities including the existing water main. The Contractor shall maintain one-way traffic through this area to ensure safe vehicular passage through this corridor during water main installation.

4. Q: ***Given the surrounding landscape, there appears to be a relatively high water table. Is additional information available for subsurface conditions?***

   A: Subsurface and groundwater conditions are included in the geotechnical report of findings in Appendix A of the contract documents. As outlined in section 01010 paragraph 1.6A, it is the responsibility of the contractor to acquaint themselves with the site conditions.

5. Q: ***Section 01010 paragraph 1.7B states that the Contractor is responsible for the disposal fees of hazardous materials. Requesting an allowance item for disposal of hazardous materials.***

   A: There are no known hazardous materials in the project alignment.

6. Q: T***he addendum issued on 7-21-19 indicates that there are no crossing and/or need to access the railroad as the jacking is to take place beyond the fouling limits of the railway. Please advise regarding access for dewatering and potential costs from Railroad or maybe the possibility of inserting an allowance item for railroad flagging and railroad engineering costs at the crossing location?***

   If the contractor proposes to access and/or work within the Railroad Right of Way, coordination with the Railroad will be needed. The Owner does not anticipate the Contractor needing access across the Railroad ROW but is not prohibiting the Contractor from coordinating with the Railroad to conduct work within the Railroad ROW completed in accordance the Railroad standards and guidelines. All costs related to construction of the casing and water main crossing the Railroad, including dewatering, shall be included in lump sum cost of Bid Item 12. An allowance has been included for costs specifically associated with railroad flaggers, railroad site inspection and railroad engineering review and permitting fees. See the revised Bid Form and Measurement and Payment Section attached with this Addendum.

7. Q: ***Can the existing water main between Sta 53+80 and Sta 54+60 be shut down for the duration of constructing the work as shown on drawing C-7?***

A: See question number 1 in this addendum.

8. Q: ***Who is responsible for any electrical work associated with the flow meters?***

   A: The Contractor shall be responsible for all work associated with installation of the flow meters and conduit. The City will supply and install the wiring and meter reading device on the post.

9. Q: ***Erosion and Sedimentation control notes state the locations of siltation and erosion control structures are show on the drawings. The drawings do not show any siltation and sedimentation control.***

   A: The drawings have been revised to show erosion control locations and are attached to this addendum.

10. Q: ***Will the access roads between Stations 22+00 and 44+50 have to be loamed and seeded at the end of the project?***

    A: No, there is to be no loaming and seeding of this section as it is a class VI road that the city wishes to maintain for future use.

11. Q: ***Who is responsible for the relocation of any existing utilities in the area between Stations 51+00 and 54+50 in order to install the new 12" water main?***

    A: Utility coordination and relocation is the responsibility of the Contractor and included as an incidental item. No utility relocation is anticipated for the installation of the new water main. See revised Drawing C-7.

12. Q: ***RR crossing shown on drawings C-5 and C-8 is 80 linear feet. Bid Item 12 is 100 linear feet. Please clarify.***

    A: The quantity of casing pipe as shown on C5 and C-8 is 80 LF as shown. The unit for Item 12 on the Bid form has been revised to be lump sum to correspond with the item in the Measurement and Payment section.

13. Q: ***Can concrete thrust blocks be replaced with fittings furnished with megalugs?***

    A: Mechanical joint restraint is required at all fittings. Concrete thrust blocks, as detailed, are required in addition to the mechanical joint restraint.

14. Q: ***New Bid Item 17 states 100 lf. Is this correct?***

    A: Yes, that is the correct bid quantity.

15. Q: ***Is there a specification for the strainers?***

    A: The specified 8" and 4" meter have a strainer that are integral to the body of the meter. No independent strainer assembly is required.

GENERAL PROJECT AND DOCUMENTS CLARIFICATIONS

1. The answer to question number 4 regarding the use of trench dewatering in Addendum No. 1 referred to an email for clarification. That email is included as an attachment in this addendum.
2. Bid Item 20 has been added to the contract as an allowance for the Contractor to install a drain line from the meter vault to a location to be determined during construction.

SPECIFICATIONS

DIVISION 0 –REMOVE and **REPLACE** Section 00310 Bid Form with the attached section.

DIVISION 1 – REMOVE and **REPLACE** Section 01150 Measurement and Payment with the attached section.

DIVISION 2 – ADD Specification Section 02601 Manholes, Frames and Covers

DIVISION 3 – ADD Specification Section 03420 Precast Concrete Structures.

DRAWINGS

REMOVE and REPLACE Drawing C-3. The required sedimentation and erosion control structures have been added to this sheet. Also added is the 6-inch temporary water main to make a hydrant-to-hydrant bypass connection for the shutdown required to install the valve cluster at the intersection of Shaw Drive and Whitehall Rd. The hydrant bypass shall connect the first existing hydrant to the west of Shaw Drive with the second hydrant east of Shaw Drive on Whitehall Rd across from 168 Whitehall Rd. The distance between these two hydrants is approximately 850 feet. Temporary water main shall be buried across Shaw Drive to ensure safe vehicular traffic on Shaw Drive during construction.

REMOVE and **REPLACE** Drawing C-4. The required sedimentation and erosion control structures have been added to this sheet.

REMOVE and **REPLACE** Drawing C-5. The required sedimentation and erosion control structures have been added to this sheet.

REMOVE and **REPLACE** Drawing C-6. The required sedimentation and erosion control structures have been added to this sheet.

REMOVE and **REPLACE** Drawing C-7. The required sedimentation and erosion control structures have been added to this sheet. Revisions also include the shift in alignment for the new water main at STA. 51+00 to 54+50. The connection to existing water main at Airport Drive has been realigned and approximately 190 feet of 6-inch temporary water main has been added to make a hydrant-to-hydrant connection to maintain service to Albany while the existing 12-inch main is shutdown to install the meter vault and piping. A note has been added for provision to provide and install ½ inch conduit extending from the meter vault to a 4"x4" post to be field located for the installation of a meter reading device to be installed by the City. A callout has been added to note that 4-inch outlet drain piping to is be installed from the meter vault to an outlet location to be determined in the field. Bid form and measurement and payment sections have been revised accordingly.

REMOVE and **REPLACE** - Drawing C-10. Note 8 has been added for the provision to provide and install ½ inch PVC conduit from the flow meter out through the 4-inch knockout to a 4x4 vinyl post that is to be installed outside the meter vault no more than 10 ft from the vault for the mounting of a meter reading device to be supplied and installed by the City. Actual location of the post shall be determined in the field.

This Addendum consists of 58 pages, which includes this Addendum document (6 pages), Revised and Additional Specifications (45 pages), Revised Drawings C-3, C-4, C-5, C-6, C-7 and C-10 (6 pages) and the NHDES email clarification on allowable trench dewatering concerning this project's wetland permit (1 page).

END OF ADDENDUM No. 2

Attachments follow.

SECTION 00310

BID FORM

PROJECT IDENTIFICATION: Granite State Business Park Water Main Extension

THIS BID IS SUBMITTED TO: City of Rochester, NH Public Works Department
31 Wakefield Street
Rochester, NH 03867

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to the Owner, as identified above.

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No.	**Addendum, Date**

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the e execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

UNIT PRICE SCHEDULE

Item No.	Estimated Quantity	Brief Description of Item with Unit Price in Words	Unit Price In Figures	Total Estimated Price In Figures
1	Lump Sum	Mobilization/Demobilization The sum of $_____ _____ Per Lump Sum	$_____	$_____
2.A	5,400 LF	Furnish and Install 12-inch Ductile Iron Water Main The sum of $_____ _____ Per Linear Foot	$_____	$_____
2.B	40 LF	Furnish and Install 8-inch Ductile Iron Water Main The sum of $_____ _____ Per Linear Foot	$_____	$_____

Item No.	Estimated Quantity	Brief Description of Item with Unit Price in Words	Unit Price In Figures	Total Estimated Price In Figures
3	2,000 LB	Furnish and Install Ductile Iron Fittings The sum of $_____ _____ Per Pound	$_____	$_____
4.A	14 EA	Furnish and Install 12-inch Gate Valves and Boxes The sum of $_____ _____ Per Each	$_____	$_____
4.B	2 EA	Furnish and Install 8-inch Gate Valves and Boxes The sum of $_____ _____ Per Each	$_____	$_____
5	565 CY	Ledge Excavation, Disposal, and Replacement Backfill The sum of $_____ _____ Per Cubic Yard	$_____	$_____
6	4 EA	Furnish and Install Hydrant Assemblies The sum of $_____ _____ Per Each	$_____	$_____

Item No.	Estimated Quantity	Brief Description of Item with Unit Price in Words	Unit Price In Figures	Total Estimated Price In Figures
7	1,000 LF	Furnish and Install 1-inch Copper Service Pipe The sum of $_____ _____ Per Linear Foot	$_____	$_____
8	17 EA	Furnish and Install 1-inch Corporation and Service Setup Assembly The sum of $_____ _____ Per Each	$_____	$_____
9	5 EA	Test Pits Excavation and Backfill The sum of $_____ _____ Per Each	$_____	$_____
10.A	367 Ton	Furnish and Install Initial Bituminous Concrete Pavement for Trench The sum of $_____ _____ Per Ton	$_____	$_____
10.B	220 Ton	Furnish and Install Final Bituminous Concrete Pavement for Trench The sum of $_____ _____ Per Ton	$_____	$_____

Item No.	Estimated Quantity	Brief Description of Item with Unit Price in Words	Unit Price In Figures	Total Estimated Price In Figures
11	Allowance	Flaggers for Traffic Control The sum of $ twenty thousand dollars and no cents Allowance	$ 20,000	$ 20,000
12	1 LS	Rail Road Crossing The sum of $_____ Lump Sum	$_____	$_____
13	1 EA	Furnish and Install Meter Vault The sum of $_____ Per Each	$_____	$_____
14	20 LF	Furnish and Install Chain-link Fence The sum of $_____ Per Linear Foot	$_____	$_____
15	1 EA	Furnish and Install Locking Double-Swing Gate The sum of $_____ Per Each	$_____	$_____

Item No.	Estimated Quantity	Brief Description of Item with Unit Price in Words	Unit Price In Figures	Total Estimated Price In Figures
16	1 EA	Furnish and Install 15-inch Culvert The sum of $_____ Per Each	$_____	$_____
17	100 LF	Furnish and Install Stop Bars The sum of $_____ Per Linear Foot	$_____	$_____
18	1,600 LF	Furnish and Install 4-inch Wide Pavement Stripping The sum of $_____ Per Linear Foot	$_____	$_____
19	Allowance	Railroad Coordination Related Expenses The sum of $ twenty thousand dollars and no cents Allowance	$ 20,000	$ 20,000
20	Allowance	Meter Vault Drainage The sum of $ ten thousand dollars and no cents Allowance	$ 10,000	$ 10,000

* Indeterminate quantities assumed for comparison of bids. Quantities are not guaranteed. Payment will be based on actual quantities constructed.

SUBTOTAL: Total of Items 1 through 20 above.

_____ ($_____)

_____ (use figures)

(use words)

5.01 Time of Completion **BIDDER AGREES THAT THE WORK WILL BE SUBSTANTIALLY COMPLETE WITHIN __120__ CALENDAR DAYS AFTER THE DATE WHEN THE CONTRACT TIMES COMMENCE TO RUN AS PROVIDED IN PARAGRAPH 4.01 OF THE GENERAL CONDITIONS, AND WILL BE COMPLETED AND READY FOR FINAL PAYMENT IN ACCORDANCE WITH PARAGRAPH 15.06 OF THE GENERAL CONDITIONS WITHIN __150___ CALENDAR DAYS AFTER THE DATE WHEN THE CONTRACT TIMES COMMENCE TO RUN.**

5.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 6 – ATTACHMENTS TO THIS BID

6.01 The following documents are submitted with and made a condition of this Bid:

A. Required Bid security;

B. List of Proposed Subcontractors;

C. List of Proposed Suppliers;

D. List of Project References;

E. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;

F. Contractor's License No.: _____

G. Required Bidder Qualification Statement with supporting data; and

ARTICLE 7 – DEFINED TERMS

7.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

The rest of this page is intentionally left blank.

7.02

ARTICLE 8 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

_____

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

_____

Bidder's License No.: _____
(where applicable)

END OF SECTION

SECTION 01150A

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. For lump sum items, payment shall be made to the contractor in accordance with an accepted progress schedule and schedule of values on the basis of actual work completed.

B. For unit-price items, payment shall be based on the actual amount of work accepted and for the actual amount of materials in place, as shown by final measurements.

1. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by the Engineer.
2. At the end of each day's work, the Contractor's Superintendent or other authorized representative of the Contractor shall meet with the Resident Project Representative and determine the quantities of unit price work accomplished and/or completed during the work day.
3. Once each month the Contractor will produce a payment request that will be based upon quantities reconciled with the Owner and Resident Project Representative.
4. After the work is completed and before final payment is made, the Engineer may make final measurements to determine the quantities of various items of work accepted as the basis for final settlement.

1.2 SCOPE OF PAYMENT

A. Payments to the Contractor will be made for the actual quantities of the Contract items performed and accepted in accordance with the Contract Documents.

B. The Contractor shall accept in compensation, as herein provided, in full payment for furnishing all materials, labor, tools, equipment, and incidentals necessary to the completed work and for performing all work contemplated and embraced by the Contract

C. The payment of any partial estimate or of any retained percentage except by and under the approved final invoice, in no way shall affect the obligation of the Contractor to repair or renew any defective parts of the construction or to be responsible for all damage due to such defects.

1.3 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

A. When alterations in the quantities of work not requiring supplemental agreements, as here in before provided for, are ordered and performed, the Contractor shall accept payment in full at the Contract price for the actual quantities of work done. No allowance will be made for anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

1.4 OMITTED ITEMS

A. Should any items contained in the bid form be found unnecessary for the proper completion of the work contracted, the Engineer may eliminate such items from the Contract, and such action shall in no way invalidate the Contract, and no allowance will be made for items so eliminated in making final payment to the Contractor.

1.5 PARTIAL PAYMENTS

A. Partial payments shall be made monthly as the work progresses. Partial payments shall be made subject to the provisions of the Supplemental and General Conditions. The breakdown of partial payments for lump sum items shall be agreed upon at the start of the project, according to the approved schedule of values.

1.6 PAYMENT FOR MATERIAL DELIVERED

A. When requested by the Contractor and at the discretion of the Owner, payment may be made for all or part of the value of acceptable, non-perishable materials and equipment which are to be incorporated into bid items, have not been used and have been delivered to the construction site, or placed in storage places acceptable to the Owner. Payment shall be subject to the provisions of the General and Supplemental Conditions.

B. No payment shall be made upon fuels, supplies, lumber, false work, or other materials, or on temporary structures of any kind which are not a permanent part of the Contract.

1.7 FINAL PAYMENT

A. The Engineer will make, as soon as practicable after the entire completion of the project, a final quantity invoice of the amount of the Work performed and the value of such Work. Owner shall make final payments of the sum found due less retainages subject to provisions of the General and Supplemental Conditions.

1.8 INCIDENTAL WORK

A. Incidental work items for which separate payment will not be made includes, but is not limited to, the following items:

1. Project record documents maintained during course of project.
2. Marking public and private utilities.
3. Signs damaged and not scheduled for replacement.
4. Tree trimming as required for utility installations
5. Preparing the site for construction.
6. Cooperation and coordination with other Contractors and utility companies including related inspection costs and other costs (Refer to Section 01050).
7. Utility crossings and relocations, unless otherwise paid for.
8. Temporary water main and utility services to buildings, as required to maintain service during construction.
9. Minor Items--such as relocation of mail boxes, curbs, traffic loop detectors, pavement markings, etc., damaged as a result of construction activities.
10. Trench boxes, steel and/or wood sheeting as required, including that left in place.

11. Earthwork (except ledge).
12. Maintaining existing sewer flows and repair of existing sewer pipes.
13. Dewatering as necessary.
14. Dust control (Section 01562).
15. Quality assurance testing (Section 01400).
16. Final cleaning of sewers, force mains and storm drains.
17. Repair and replacement of water lines under 2-inches in size, culverts, underdrains, rock-lined drainage trenches in streets and other utilities damaged by construction activities and corresponding proper disposal of removed materials unless otherwise paid for.
18. Temporary construction necessary for construction sequencing and other facilities not permanently incorporated into the work, unless otherwise indicated.
19. Weather protection as necessary.
20. Permits not otherwise paid for or provided by the Owner.
21. Visits to the project site or elsewhere by personnel or agents of the Contractor, including manufacturer's representatives, as may be required.
22. All excavation except the test pits specifically shown or ordered by the Engineer to establish sewer line and water line locations, earth excavation below grade and rock excavation.
23. Test pits to establish in place field soils density, groundwater conditions, or requirements for dewatering and all others test pitting for the Contractor's convenience.
24. Pipe markings.
25. Removal of existing castings, signs and existing granite curbing and transport to City of Rochester Public Works Facility.
26. Winterization of site.
27. Temporary sheds, field offices, telephone, power, water and sanitation facilities for the contractors own needs and those of any subcontractor.
28. Project record documentation (Section 01720).
29. Preconstruction Photos and Videos.
30. Construction Administration and Insurance.
31. Replacement of unsuitable material above pipe bedding and backfill.

1.9 DESCRIPTION OF PAY ITEMS

A. The following sections describe the measurement of and payment for the work to be done under the respective items listed in the Bid Form.

B. Each unit or lump-sum price stated in the Bid Form shall constitute full compensation, as herein specified, for each item of the work completed.

Item No. 1 – Mobilization and Demobilization

A. Method of Measurement: Mobilization and Demobilization shall be paid for on a lump sum basis. The amount bid for this item shall not exceed 10% of the Base Bid.

B. Basis of Payment: Mobilization/demobilization costs are those costs of initiating and ending the contract. Payment for mobilization/demobilization shall be a lump sum at the price bid as stated in the Bid Form. One half of the lump sum will be payable when

the Contractor is operational on the site and the remaining half of the lump sum will be payable when the Contractor leaves the site following completion of all contract work. For purposes of payment on this item, "operational" shall mean the Engineer has approved the following: Construction Schedule, Erosion Control Plan, SWPPP plan, Traffic Control Plan, and pre-construction photographs. Only one lump sum payment divided into the two partial payments described herein shall be made to cover all mobilization/demobilization costs throughout the entire contract including but not limited to Preconstruction photographs and documentation, bonds, insurance, contract administration, shop drawings, warranties, guarantees, certifications and other submittals required by the Contract Documents.

Item No. 2A and 2B - Furnish and Install 12-inch and 8-inch Ductile Iron Water Main

A. Method of Measurement: The quantity of water main to be paid for under this item shall be the actual length in feet as measured along the center line of the pipe as laid including all fittings and valves.

B. Basis of Payment:

1. Water main shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all pipes, polywrap, labor, equipment, tools, and other materials required for the installation of the pipelines; for installing the polywrap; for excavating, laying, setting, and jointing all pipes and fittings; for connections to existing pipes; for dewatering; for furnishing and placing all bedding, haunching and initial backfill; for backfilling; for thrust blocks and supports; for restraining joints; saddles; for furnishing and placing all temporary sheeting and bracing; for cleaning and testing; for removal and disposal of existing water lines being replaced within the trench; for all labor, tools and construction equipment; and for all other work and expenses incidental thereto for which payment is not provided under other items.
2. Payment for fire hydrant branch piping will be paid for under the Furnish and Install Hydrant Assemblies Item.
3. Payment for this work on interim requisitions shall be according to the following percentages:
    a. Water main successfully set in place and backfilled - 80 percent.
    b. Water main pressure tested and disinfected - 20 percent.

Item No. 3 – Ductile Iron Fittings

A. Method of Measurement: Ductile Iron Fittings measured for payment shall be the actual weight of ductile iron fittings furnished and installed complete in place.

B. Basis of Payment: Ductile Iron Fittings shall be paid for at the unit price per pound stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools; for installing, setting, and joining, and protective polyethylene wrap; and for all other work and expenses incidental thereto. Mechanical joint restraints and thrust blocks shall not be included in the fitting weight for payment and are considered incidental to this item.

Item No. 4A and 4B - Furnish and Install 8-inch and 12-inch Gate Valves

A. Method of Measurement: The quantity of gate valves to be paid for under this item shall be the actual number of valves and valve boxes installed complete in place. Payment for gate valves installed on hydrant branches shall be paid for under the Furnish and Install Hydrant Assemblies Item.

B. Basis of Payment: Gate valves shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment, polywrap, and tools; for installing, setting, and jointing the valve and valve box; for restraining joints; for thrust blocks and supports; for valve box extensions; for testing all valves and valve boxes; and for all other work and expenses incidental thereto for which payment is not provided under other items.

Item No. 5 – Ledge Excavation, Disposal, and Replacement Backfill

A. Method of Measurement: Ledge excavation measured for payment shall be the number of cubic yards of ledge removed during construction. This quantity shall be determined by:

1. Exposing the ledge profile for measurement. Excavation and backfill of the earth overburden shall be considered incidental, and no separate payment shall be made therefore.
2. Should the Contractor elect to pre-drill and blast ledge without exposing the ledge surface for measurement, ledge depths shall be determined by the Resident Project Representative at the time of drilling or, when direct drilling observation is not conducted, the ledge profile shall be measured after excavation, and 20% of the ledge volume thus measured shall be deducted due to ledge expansion caused by the blasting operation.
3. The payment limit for trench width shall be between vertical planes which are a distance apart equal to the sum of 18 inches plus 1-1/3 times the nominal outside diameter of pipe which is to be installed in the trench (min. of 3 feet) and extending from the top of the ledge surface to a depth of 6 inches below the invert grade of the pipe. Where two pipes are installed in the same trench, trench ledge excavation shall be measured as the actual volume of ledge removed between vertical planes which are a distance apart equal to the sum of 3 feet plus the sum of the pipes nominal outside diameter. Where three pipes are installed in the same trench, trench ledge excavation shall be measured as the actual volume of ledge removed between vertical planes which are a distance apart equal to the sum of 4.5 feet plus the sum of the pipes nominal outside diameter.
    a. Ledge excavation for structures (including manholes) shall be measured as 18 inches outside the structure and extending to a depth of 6 inches below the base of the structure indicated on the Drawings.
    b. Rocks or boulders greater than two cubic yards volume shall be considered as ledge excavation. Volume of rocks shall be determined from their average length, width, and depth as measured by the Engineer.

B. Basis of Payment: The contract unit price per cubic yard for ledge excavation shall be full compensation for all labor, materials, tools and equipment necessary to complete the excavation including conducting the pre-blast survey, drilling, blasting,

excavating, loading and disposing the excess or unusable material outside the work limits, suitable replacement backfill, and all else incidental thereto for which payment is not provided under other items.

Item No. 6 - Furnish and Install Hydrant Assemblies

A. Method of Measurement: The quantity of hydrant assemblies to be paid for under this item shall be the actual number installed complete in place.

B. Basis of Payment:

1. Hydrant assemblies shall be paid for at the unit price for each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment, and tools; for installing, setting, and jointing; for excavation; for removal of existing hydrants where directed; for all thrust blocks and supports; restraining joints; for the hydrant branch gate valve, tee, pipe and hydrant; hydrant snow markers; polywrap; cleaning, testing and disinfection and of all other work and expenses incidental thereto for which payment is not provided under other items.

Item No. 7 - Furnish and Install 1-inch Copper Service Pipe

A. Method of Measurement: The quantity of service pipe to be paid for under this item shall be the actual length in feet as measured along the center line of the pipe as laid.

B. Basis of Payment: Pipe shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for all service pipe and fittings, labor, equipment, tools, and other materials required for the installation of service pipes; for excavating, laying, setting, and jointing all pipes and fittings; dewatering; for making all connections to existing services; for cleaning, testing, and disinfecting; for backfilling; for replacing or rebuilding shrubs, fences, lawns, trees, or other materials, except other such items specifically included in the Bid Schedule; and for all other work and expenses incidental thereto for which payment is not provided under other items.

Item No. 8 - Furnish and Install 1-inch Corporation and Service Setup Assembly

A. Method of Measurement: The quantity of 1-inch corporation and service setup assemblies to be paid for under this item shall be the actual number furnished and installed for service connections.

B. Basis of Payment: 1-inch corporation and service setup assemblies shall be paid for at the unit price per each 1-inch corporation and service setup assembly stated in the Bid Schedule. Said unit price shall be full compensation for all fittings, labor, equipment, tools, and materials required for the installation of the 1-inch corporation stop installed in main, curb stop and box installed to the right of way, protection of services, curb stops and boxes for the duration of the project, and the connection of service and all service pipe required; for excavating and backfilling, raising to grade, for replacing or rebuilding shrubs, fences, lawns, trees, tapping of main, and all materials except other such items specifically included in the Bid Schedule; and for all other work and expenses incidental thereto for which payment is not provided under other items.

Item No. 9 - Test Pit Excavation and Backfill

A. Method of Measurement: The quantity to be paid for under this item shall be the actual number of test pits excavated as authorized by the Engineer.

B. Basis of Payment: Test pit excavations shall be paid for at the unit price per each test pit excavated as stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, tools, and equipment; for excavation, backfilling and compacting; for temporary pavement; providing the test pit result information to the Engineer and for all other work and expenses incidental thereto for which payment is not provided under other items.

Items No. 10A and 10B – Furnish and Install Initial and Final Bituminous Concrete Pavement for Trench

A. Method of Measurement:
   1. The quantity of bituminous concrete pavement to be paid for under this item includes:
      a. Machine placed - The number of tons of machine placed pavement within the limits as shown on the drawings.
      b. Hand Placed - The number of tons of hand placed pavement within the limits as shown on the drawings.
      c. Actual widths will be used in computing areas wherever the width of pavement is less that the above specified limits.
   2. The conversion factor to change volume of bituminous concrete pavement measured in place to tons will be 0.055 tons per square yard per inch of thickness.

B. Basis of Payment:
   1. Pavement shall be paid for at the Contract unit price per ton or square yard stated in the Bid Schedule.
   2. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary for the placement of all bituminous materials, including, preparation of base material, application of tack coat and seam "shoe" if requested. No additional payment will be made to the contractor for repair work done by him in maintaining bituminous concrete pavement.

Item No. 11 Flaggers for Traffic Control

A. Method of Measurement: Flaggers for Traffic Control will be paid an allowance as stated in the bid schedule.

B. Basis of Payment:
   1. The payment shall be full compensation for furnishing flaggers for traffic control completed to the satisfaction of the Owner and Engineer. The payment shall be on an hourly basis per flagger, and payment shall be based on invoiced hours for this project.
   2. Payment will only be made if the traffic control effort is satisfactory to the Owner/Engineer. Contractor will be notified if daily effort is not satisfactory, such that improvements can be made in order to receive full payment under the item. Owner reserves the right to make partial payment or no payment under this item if traffic control is not to the Owner's satisfaction.

Item No. 12 – Rail Road Crossing

A. Method of Measurement - Payment for specialty pipe installations shall be full compensation for all work indicated between station within the limits detailed on the plans.

B. Basis of Payment:

1. The contract lump sum price for installation of casing pipe, water main and appurtenances across the existing rail road easement shall be full compensation for labor, materials, tools and equipment necessary to complete the work including; jacking; excavation; pipe, casing, casing spacers, casing ends, sand fill/ballast, valves, fittings and appurtenances; backfill, dewatering, concrete work and all else incidental thereto for which payment is not provided under other items.
2. Rail road engineering review fees, rail road flaggers and rail road site inspection costs may are included in Bid Item #19.

Item No. 13 – Furnish and Install Meter Vault

A. Method of Measurement - Payment for meter vault installation shall be full compensation for all work indicated within the limits detailed on the plans.

B. Basis of Payment:

1. The contract lump sum price for installation of precast meter vault, frames and covers, meters, and dual check valve backflow preventers, stone base, conduit, shall be full compensation for labor, materials, tools and equipment necessary to complete the work including; excavation, pipe, valves, fittings and appurtenances; backfill, dewatering, concrete work, and any associated costs of the meter vault and all else incidental thereto for which payment is not provided under other items.

Item No. 14 – Furnish and Install Chain-link Fence

A. Method of Measurement: The quantity of chain-link fence to be paid for under this item shall be the actual quantity installed complete in place.

B. Basis of Payment:

1. Chain-link fence shall be paid for at the unit price for each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment, and tools; for installing; for excavation; for removal of existing posts and chain; and of all other work and expenses incidental thereto for which payment is not provided under other items.

Item No. 15 – Furnish and Install Locking Double-swing Gate

A. Method of Measurement: The quantity of double-swing gate to be paid for under this item shall be the actual number installed complete in place.

B. Basis of Payment:

1. Double-swing gate shall be paid for at the unit price for each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment, and tools; for installing; for excavation; for removal of existing posts and chain; and of all other work and expenses incidental thereto for which

payment is not provided under other items.

Item No. 16 – Furnish and Install 15-inch Culvert

A. Method of Measurement: Payment for culvert installation shall be full compensation for all actual number installed complete as detailed on the plans.

B. Basis of Payment:

1. The contract lump sum price for installation of culvert, shall be full compensation for labor, materials, tools and equipment necessary to complete the work including; excavation, pipe, fittings and appurtenances; backfill, dewatering, concrete work, and any associated costs of the culvert and all else incidental thereto for which payment is not provided under other items.

Item No. 17 and 18 - Furnish and Install Stop Bars and 4-inch Wide Pavement Striping

A. Method of Measurement: Stop bars shall be measured as the actual length of the stop bars installed. The quantity of 4-inch wide pavement stripes to be paid for under this item shall consist of the actual number of linear feet of single width stripes placed at the direction of the Engineer within the payment limits shown on the Drawings.

B. Basis of Payment:

1. Payment for Stop Bars and 4-inch wide stripes shall be paid at the Contract Unit Prices per linear feet stated in the Bid Schedule.
2. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary for furnishing and placement of striping and stop bars.

Item No. 19 - Railroad Coordination Related Expenses

A. Method of Measurement: Expenses for coordination with the Railroad will be paid an allowance as stated in the bid schedule.

B. Basis of Payment:

1. The payment shall be full compensation for inspections required from the Railroad, for furnishing railroad flaggers completed to the satisfaction of the Railroad and other railroad specific fees incurred from coordination.
2. Payment will only be made if the coordination effort is satisfactory to the Railroad and Owner/Engineer. Contractor will be notified if daily effort is not satisfactory, such that improvements can be made in order to receive full payment under the item. Owner reserves the right to make partial payment or no payment under this item if traffic control is not to the Railroad and Owner's satisfaction.

Item No. 20 – Meter Vault Drainage

C. Method of Measurement: Expenses for meter vault drainage piping will be paid as an allowance as stated in the bid schedule.

D. Basis of Payment:

1. The payment shall be full compensation for expenses incurred related installation of meter vault drainage piping and its related appurtenances as directed by the Owner and Engineer.

END OF SECTION

SECTION 02601

MANHOLES, COVERS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Construct manholes, covers, frames, brick masonry, inverts and apply waterproofing in conformance with the dimensions, elevations, and locations shown on the Drawings and as specified herein. Remove existing masonry, existing frame supports, frames and covers and replace with new materials to final grades. In the case of concrete man holes, existing masonry shall be removed down to the top of the concrete. In the case of non-concrete manholes, existing masonry shall be removed a minimum of 1.5 feet down from final rim elevation.

B. Related Work Specified Elsewhere (when applicable):
   1. Final sewer testing is specified in this Division.
   2. Pipe, earthwork, paving and dewatering are specified in the appropriate Sections in this Division.

1.2 QUALITY ASSURANCE

A. Precast Reinforced Concrete Manhole Base, Barrel and Top Sections:
   1. Conform to ASTM C478 except as modified herein, and on the Drawings.
   2. Average strength of 4,000 psi at 28 days.
   3. Testing:
      a. Determine concrete strength by tests on 6-inch by 12-inch vibrated test cylinders cured in the same manner as the bases, barrels and tops.
      b. Have tests conducted at the manufacturer's plant or at a testing laboratory approved by the Engineer.
      c. Have not less than 2 tests made for each 100 vertical feet of precast manhole sections.

B. Frames and Covers (AIS Compliant):
   1. Acceptable Manufacturers:
      b. Neenah Foundry Co.
      c. E.J. Group Inc.
      d. Or equivalent.

C. Masonry:
   1. Brick: Shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick.
   2. Cement: ASTM C-150.
   3. Hydrated Lime: ASTM C-207
   4. Sand: ASTM C33
   5. Type S Mortar mix shall meet or exceed the requirements of ASTM C-387 and C-270.

D. Waterproofing:
   1. Acceptable Manufacturers:
      a. Minwax Fibrous Brush Coat, Minwax Co., N.Y., N.Y.
      b. Tremco 121 Foundation Coating, Tremco Mfg. Co., Newark, N.J.

c. Or approved equal.

E. Frost Protection Polyethylene Encasement: Polyethylene Encasement (Polywrap) 8 mil low density (LLD) polyethylene film.

1.3 SUBMITTALS TO THE ENGINEER

A. Submit shop drawings and manufacturer's literature in conformance with Section 01340 and the Standard General Conditions of the Construction Contract.

B. Precast Manhole Sections: Submit test results and receive approval from the Engineer prior to delivery to the site.

PART 2 - PRODUCTS

2.1 PRECAST REINFORCED CONCRETE MANHOLE SECTIONS

A. Dimensions, shall be as shown on the Drawings:
   1. Base & Riser Sections:
      a. Diameter: As shown on the Drawings.
      b. Length: As required.
      c. Wall Thickness: Not less than 5 inches.
      d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
   2. Tops:
      a. Diameter: Eccentric cone type, 30 inches I.D. at top, 48 inches I.D. at bottom unless otherwise shown on the Drawings.
      b. Length: 4 feet.
      c. Wall thickness: Not less than 5 inches at the base, tapering to not less than 8 inches at the top.
      d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
      e. Exterior face of cone sections shall not flare out beyond the vertical plane.
   3. Flat Slab Tops:
      a. Location: Where shallow installations do not permit the use of a cone-type top and where indicated on the Drawings.
      b. Slab thickness: Not less than 6 inches. Limit of one each one foot high riser or one each flat top per structure.
      c. Constructed to support an HS-20 wheel loading.

B. Openings:
   1. Provide openings in the risers to receive pipes entering the manhole.
   2. Make openings at the manufacturing plant.
   3. Size: To provide a uniform annular space between the outside wall of pipe and riser.
   4. Location: To permit setting of the entering pipes at the correct elevations.
   5. Openings shall have a flexible watertight union between pipe and the manhole base.
      a. Cast into the manhole base and sized to the type of pipe being used.
      b. Type of flexible joint being used shall be approved by the Engineer. Install materials according to the Manufacturer's instructions.

1. Lock Joint Flexible Manhole Sleeve made by Interpace Corporation.
2. Kor N Seal made by National Pollution Control System, Inc.
3. Press Wedge II made by Press-Seal Gasket Corporation.
4. A-Lok Manhole Pipe Seal made by A-Lok Corporation.
5. Or equivalent.

C. Joints:
1. Joint gaskets to be flexible self-seating butyl rubber joint sealant installed according to manufacturer's recommendations. Install a double row of joint sealants for every manhole joint. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.
Acceptable Materials:
a. Kent-Seal No. 2
b. Ram-Nek
c. Or equivalent.
2. Joints between precast sections shall conform to related standards and manufacturer's instructions.
3. All manholes greater than 6 foot diameter and all manholes used as wet wells, valve pits and other dry-pit type structures shall be installed with exterior joint collars. The joint collar shall be installed according to the manufacturer's instructions. Acceptable materials:
a. MacWrap exterior joint sealer as manufactured by Mar-Mac Manufacturing Company.
b. Press-Seal EZ Wrap with EZ Stik No. 4 primer.
c. Or equal.

D. Waterproofing:
1. The exterior surface of all manholes shall be given two coats of bituminous waterproofing material at an application rate of 75 to 100 square feet per gallon, per coat.
2. The coating shall be applied after the manholes have cured adequately and can be applied by brush or spray in accordance with the manufacturer's written instruction.
3. Sufficient time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.

E. Frost Protective Wrapping: The frost protective wrap shall be constructed of an ultraviolet resistant linear low-density (LLD) polyethylene material and shall be a minimum thickness of 8 mils.

2.2 FRAMES AND COVERS

A. Standard Units:
1. Made of cast iron conforming to ASTM A48-76, Class 30 minimum.
2. Have machined bearing surfaces to prevent rocking.
3. Castings shall be smooth with no sharp edges.
4. Constructed to support an HS-20 wheel loading.
5. Dimensions and Style shall conform to the Drawings, Standard castings differing in non-essential details are subject to approval by the Engineer:
a. Covers - solid with WATER in 3 inch letters and diamond pattern.

b. Frame - 36 inch diameter clear opening, with flange bracing ribs.

6. Minimum weight of frame and cover shall be 405 lbs.

2.3 MASONRY

A. Brick:
1. Sound, hard, uniformly burned, regular and uniform in shape and size, compact texture, Grade SS and satisfactory to the Engineer.
2. Immediately remove rejected brick from the work.

B. Mortar:
1. Composition (by volume):
a. 1 part Portland cement.
b. 1/2 part hydrated lime.
c. 4-1/2 parts sand.
2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.

C. Cement shall be Type II Portland cement.

D. Hydrated lime shall be Type S.

E. Sand:
1. Shall consist of inert natural sand.
2. Grading:

Sieve	Percent Passing
3/8-inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 50	10-30
No. 100	2-10
Fineness Modulus	2.3 - 3.1

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Precast Manhole Sections:
1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
2. Install riser sections and tops level and plumb.
3. Make all joints watertight.
4. When necessary, cut openings carefully to prevent damage to barrel sections and tops. Replace damaged manhole sections and tops at no additional cost to the Owner.

B. Drop Manholes:
1. The difference in elevation between the invert of the inlet pipe to the invert of the outlet pipe shall not exceed 24 inches without use of a drop structure.

2. Where difference in elevation exceeds 24 inches, construct a drop manhole as shown on the Drawings or as directed by the Engineer.
3. Drops greater than 6 inches yet less than 24 inches are not allowed by NHDES and shall be eliminated at the direction of the Engineer.

C. Adjust to Grade:
1. Adjust tops of manholes to grade with brick masonry.
2. Concrete rings are not acceptable for adjusting to grade.

D. Pipe Connections to Manholes: Connect pipes to manholes with joint design and materials approved by the Engineer.

E. Invert Channels:
1. Smooth and semicircular in shape conforming to the inside of the adjacent sewer section.
2. Make changes in direction of flow with smooth curves having a radius as large as permitted by the size of the manhole.
3. Stop the pipes at the inside face of the manhole where changes of direction occur.
4. Form invert channels with brick.
5. Shape invert to make smooth transition in vertical grade.
6. Slope the floor of the manhole to the flow channel, as shown on the Drawings.
7. Brick inverts and channels shall be constructed entirely of brick and mortar masonry.

F. Masonry:
1. Laying Brick:
a. Use only clean bricks in brickwork for manholes. The underlayment of the invert and shelf shall consist of brick masonry.
b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
d. Construct all joints in a neat workmanlike manner. Construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.
e. Outside faces of brick masonry shall be plastered with mortar from 1/4-inch to 3/8-inch thick.
f. Completed brickwork shall be watertight.
g. All bricks are to be laid flat, not on edge, with a maximum of 5 courses .
h. Inverts and shelves shall be placed after testing of the manhole.
2. Curing:
a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
b. Protect brick masonry from the weather and frost as required.

G. Frames and Covers:
1. Set all frames in a full bed of mortar, true to grade and concentric with the manhole opening.
2. Completely fill all voids beneath the bottom flange to make a watertight fit.

3. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the manhole all around its circumference.
4. Clean the frame seats before setting the covers in place.

H. Plugging and Patching:
1. Fill all exterior cavities with non-shrink grout and with bituminous waterproofing once the concrete and mortar has set.
2. Touch up damaged water proofing.

I. Cleaning: Thoroughly clean manholes, frames and covers of all debris and foreign matter.

J. Bedding and Backfilling:
1. Bedding of manholes shall be 6 inches of 3/4-inch screened stone.
2. Backfill a minimum of 18 inches all around manhole with gravel borrow.

K. Frost Protective Wrap:
1. The Contractor shall comply with the manufacturer's instructions for the particular conditions of installations in each case.
2. Clean each manhole exterior of all dirt and remove any sharp protrusions.
3. Apply two 6 inch wide vertical strips of bituminous waterproofing material and/or duct tape from the top to bottom of the manhole per layer.
4. Prior to installing pipe through each manhole or valve pit, wrap each manhole to the maximum depth of frost penetration, but not less than 5 feet below grade, with 4 layers of the polyethylene material by beginning the wrap at the adhesive strip and proceeding around the manhole, valve pit, etc., continuously by overlapping the adhesive strip by 24 inches on the final layer. Cut the polyethylene wrap in areas where piping exits the manhole. The size of the cut is to be equivalent to the pipes outside diameter.
5. Tuck and pleat the polyethylene wrap at the top of each manhole in a continuous manner, minimizing the size of each fold. Extend the polyethylene wrap past the top of the manhole frame and temporarily tuck the remainder inside the frame, until final backfill and paving.
6. In paved areas, cut the polyethylene wrap flush with the manhole rim after the pavement is in place.
7. In unpaved areas, pull the polyethylene wrap together, and tie around frame with galvanized wire.
8. Protect the installed frost barrier from harmful weather exposures and from possible physical abuses, where possible by prompt installation of concealing work or, where that is not possible, by temporary covering or enclosure.
9. Backfill around the manhole/frost barrier with material as outlined in Division 2, earthwork related specifications.

L. A flexible pipe coupling shall be installed on sewers within 48 inches of the manhole for RCP pipe, and within 60 inches of the manhole for PVC pipe larger than 15 inch diameter. Flexible couplings shall be as manufactured by Fernco, or equivalent.

3.2 MANHOLE TESTING

A. General:
   1. Perform a vacuum test on all manholes, including existing sewer man holes whose frames and covers have been replaced. Testing is incidental to the removal and replacement of existing sewer manhole covers.
   2. All testing must be performed in the presence of the Engineer.
   3. Suitably plug all pipes entering each manhole and brace plugs to prevent blow out.

B. Vacuum Test:
   1. The manhole shall be tested by a vacuum test after assembly of the manhole, connection piping and backfilling. Vacuum testing to be conducted prior to construction of invert and shelf channels.
   2. Plug all lifting holes completely with non-shrink grout.
   3. Properly tighten all boot clamps and brace all plugs to prevent them from being sucked into the manhole.
   4. Install the testing equipment according to the manufacturer's instructions.
   5. A vacuum of 10 inches of Hg shall be drawn on the manhole and the loss of 1 inch of Hg vacuum timed. The manhole shall be considered to have passed the test if the time for the loss of 1 inch of Hg vacuum is not less than 10 minutes.
   6. If the manhole fails the initial test, the Contractor shall locate the leak(s) and make repairs. The manhole shall be retested until a satisfactory test result is obtained.

C. Manhole Repairs:
   1. Correct leakage by reconstruction, replacement of gaskets, Waterplug Hydraulic Cement (or equal) and/or other methods as approved by the Engineer.
   2. The use of lead-wool or expanding mortar will not be permitted.

D. After the manholes have been backfilled and prior to final acceptance, any signs of leaks or weeping visible inside the manholes shall be repaired and the manhole made watertight.

END OF SECTION

SECTION 03420

PRECAST CONCRETE STRUCTURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Precast concrete structures:
   1. All rectangular or square precast concrete structures of all sizes (sections assembled vertically).

1.2 RELATED SECTIONS

B. Joint sealants
C. Waterproofing
D. Leak testing
A. Section 01340 - Submittals
B. Section 02200 - Earthwork
C. Section 03300 - Cast-in-Place Concrete

1.3 REFERENCES

A. This section contains references that are applicable to this Specification Section. The applicable edition of the indicated references shall be the version that was the most current at the time of the Advertisement of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued, or replaced.
B. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials
C. ACI 301 Specifications for Structural Concrete
D. ACI 302.1R Guide for Concrete Floor and Slab Construction
E. ACI 304.2R Placing Concrete by Pumping Methods
F. ACI 306.1 Specification for Cold Weather Concreting
G. ACI 306R – Guide to Cold Weather Concreting
H. ACI 308.1 – Standard Specification for Curing Concrete
I. ACI 318 Building Code Requirements for Structural Concrete and Commentary
J. ACI 347 Guide to Formwork for Concrete
K. ACI 350 Code Requirements for Environmental Engineering Concrete Structures
L. ACI 355.2 – Qualifications of Post-Installed Mechanical Anchors in Concrete
M. ACI 355.4 – Qualifications of Post-Installed Adhesive Anchors in Concrete
N. ACI ITG -7 – Specification For Tolerances for Precast Concrete
O. ACI SP-66 – ACI Detailing Manual
P. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

Q. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
R. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
S. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
T. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
U. ASTM A675/A675M - Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
V. ASTM A706/A706M – Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
W. ASTM A775/A775M - Specification for Epoxy-Coated Reinforcing Steel Bars
X. ASTM A1064/A1064M – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain or Deformed, for Concrete
Y. ASTM A1094/A1094M - Specification for Continuous Hot-Dip Galvanized Steel Bars for Concrete Reinforcement
Z. ASTM C33/C33M - Specification for Concrete Aggregates
AA. ASTM C40/C40M – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
BB. ASTM C88/C88M – Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
CC. ASTM C94/C94M - Specification for Ready Mixed Concrete
DD. ASTM C131/C131M – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Abrasion Machine
EE. ASTM C150/C150M - Specification for Portland Cement
FF. ASTM C171/C171M - Standard Specification for Sheet Materials for Curing Concrete
GG. ASTM C260/C260M - Specification for Air Entraining Admixtures for Concrete
HH. ASTM C309/C309M – Standard Specification for Liquid Membrane - Forming Compounds for Curing Concrete
II. ASTM C443/C443M - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
JJ. ASTM C478/C478M - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
KK. ASTM C494/C494M - Specification for Chemical Admixtures for Concrete
LL. ASTM C535/C535M – Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Abrasion Machine
MM. ASTM C595/C595M - Specification for Blended Hydraulic Cements
NN. ASTM C618/C618M - Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
OO. ASTM C857/C857M - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
PP. ASTM C877/C877M - Standard Specification for External Sealing Bands for

Concrete Pipe, Manholes, and Precast Box Sections

QQ. ASTM C881/C881M - Specification for Epoxy-Resin-Base Bonding Systems for Concrete

RR. ASTM C887/C887M - Standard Specification for Packaged, Dry, Combined Materials for Surface Bonding Mortar

SS. ASTM C890/C890M - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures

TT. ASTM C913 - Specification for Precast Concrete Water and Wastewater Structures

UU. ASTM C920/C920M - Standard Specification for Elastomeric Joint Sealants

VV. ASTM C923/C923M - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals

WW. ASTM C989/C989M - Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

XX. ASTM C990/C990M - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

YY. ASTM C1240/C1240M - Specification for Silica Fume Used in Cementitious Mixtures

ZZ. ASTM C1260/C1260M – Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

AAA. ASTM C1293/C1293M – Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction

BBB. ASTM C1433 - Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers

CCC. ASTM C1478/C1478M - Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes, and Laterals

DDD. ASTM C1567/C1567M – Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar Bar Method)

EEE. ASTM C1602/C1602M – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Production

FFF. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal

GGG. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing

HHH. ASTM D4101/D4101M - Standard Specification for Polypropylene Injection and Extrusion Materials

III. ASTM E329/E329M – Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

JJJ. AWS D1.4/D1.4M – Structural Welding Code – Reinforcing Steel

KKK. Concrete Reinforcing Steel Institute - 10MSP, Manual of Standard Practice

LLL. Concrete Reinforcing Steel Institute - Placing Reinforcing Bars

MMM. AASHTO Standard Specifications for Highway Bridges (17th Edition)

NNN. Precast/Prestressed Concrete Institute (PCI) – Manual for Quality Control for Plants and Production of Structural Precast Concrete Products (MNL-116)

OOO. Precast/Prestressed Concrete Institute (PCI), Manual for Quality Control for Plants

and Production of Architectural Precast Concrete Products (MNL-117)

PPP. Precast/Prestressed Concrete Institute (PCI), Manual for Quality Control for Plants and Production of Glass Fiber-Reinforced Concrete Products (MNL-130)

QQQ. Precast/Prestressed Concrete Institute (PCI), Tolerance Manual for Precast and Prestressed Concrete Constrcution (MNL-135)

RRR. CSA Group – A23.4 Precast Concrete – Materials and Construction

1.4 DESIGN REQUIREMENTS

A. All precast units shall be constructed with interlocking ship lap joints and of shapes and sizes as shown on the Drawings.

B. Design shall be for normal environmental exposure areas and shall be done by the ACI 350 "Strength Design Method" (Normal Environmental Exposure Condition) or the ACI 350 "Alternate Design Method" (Appendix I – Normal Exposure Condition).

C. Unless otherwise indicated herein, box culverts shall meet the minimum requirements of ASTM C1433.

D. Structural design calculations shall include the following loading conditions:
   1. Empty precast structure with all external loads at maximum groundwater elevation
   2. Precast structure full of liquid with no backfill (leak test condition for tanks)
   3. Lifting of precast units. Member design shall consider forces and distortions during curing, stripping, storage, transportation, and erection so that precast members are not overstressed or otherwise damaged.

E. All base sections shall be designed with the floor slabs cast as an integral placement with the bottom wall section.

F. Minimum 28 day compressive strength: $f_c' = 5{,}000$ psi.

G. Reinforcing Steel:
   1. ASTM A615/A615M grade 60 deformed bars or ASTM A1064/A1064M welded wire fabric.
   2. Minimum reinforcing steel in all concrete sections shall be no less than 0.003 times the gross area of the concrete section.

H. Concrete cover on reinforcing steel: 1½ inches minimum.

I. The interior dimensions of the precast concrete structures shall be as shown on the Drawings. Walls, top slabs and base slabs shall be a minimum of 8" thick.

J. The precast concrete structure shall be designed to support its own weight plus the following minimum superimposed vertical and lateral loads:
   1. Live load on top slab – AASHTO HS25 vehicular loading. Point loads for buried slabs may be distributed in accordance with Chapter 6 from the AASHTO Standard Specifications for Highway Bridges.
   2. Dead load of soil on top slab – 125 pounds per cubic foot (pcf) x depth of fill.
   3. Lateral soil pressure - 95 pcf/vf. The top of the pressure diagram shall be assumed to originate at finish grade as shown on the drawings.
   4. Uniform live load lateral surcharge of 125 psf applied horizontally to the sides of the precast structure for a depth of 10 feet below finish grade.
   5. Interior liquid loading (tanks) – Design for the tank to be filled to the top with no backfill in place. Liquid density shall be assumed to be 63 pcf/vf.

6. Seismic total lateral load = $0.1*S_s*F_a*\gamma*H^2$ (full height inverted triangle loading diagram):
   a. S_s = Maximum considered earthquake spectral response acceleration factor for short periods
   b. F_a = Seismic Site Coefficient for short periods
   c. γ = Unit weight of soil (assume weights of 130 pcf shall be used)
   d. H = Height of soil
7. Unless otherwise indicated on the Structural Drawings, the maximum groundwater level shall be assumed to originate at finish grade or flood elevation listed on the Structural Drawings, whichever is greater.
8. Except where higher loads are specified herein, wastewater structures shall be designed for the minimum loads prescribed in ASTM C890/C890M.
9. Except where higher loads area specified herein, utility structures shall be designed for the minimum loads prescribed in ASTM C857/C857M.

K. The precast concrete structure shall be designed to resist flotation:
1. A factor of safety of 1.15 shall be used against flotation based on weights of empty structure and soil directly over footing extensions and above the top slab (if any).
2. Unless otherwise indicated on the Structural Drawings, the maximum groundwater level shall be assumed to originate at finish grade or flood elevation listed on the Structural Drawings, whichever is greater.
3. The base slab may be extended beyond the face of the wall to provide additional resistance to flotation.
4. Unless otherwise indicated on the Drawings, additional cast-in-place concrete base slabs will not be permitted for flotation resistance.
5. Frictional resistance shall not be permitted.
6. Where the structure is composed of successive vertical segments, the weight of the segments shall be such as to provide the same factor of safety for buoyancy, or stainless steel mechanical connections shall be used to connect the segments together. The design shall also include such anchorage to the reinforced concrete anti-buoyancy slab, if such slab is indicated on the Drawings.
7. The buoyant force acting on an object is equal to the weight of the volume of water that is displaced by the object. The actual weight of the same volume determines whether or not the object is buoyant.
8. If the Engineer determines that the submitted buoyancy calculations are incorrect, the Engineer shall direct the Contractor to implement specific measures to counteract buoyancy to the Engineer's satisfaction. Any and all costs associated with such measures shall be borne entirely by the Contractor and shall be at no additional cost to the Owner.

L. Segmented structure joints:
1. Joints shall be designed to transfer shear without continuous reinforcing steel.
2. Provide mechanical connections between all vertical joints in box culvert tank structures.
3. Provide waterstop sealants and external sealing bands in all joints to create watertight joints.

1.5 SUBMITTALS

A. Manufacturer's Data:
   1. Submit manufacturer's specifications and instructions for all manufactured materials and products including hatches, sealants, sealing bands, dampproofing, pipe sleeves, flexible wall boots, anchorage hardware and other items. Include manufacturer's certifications and laboratory test reports as required.
   2. Submit the proposed erection procedure for precast units, sequence of erection, and required handling equipment.

B. Shop Drawings:
   1. Submit shop drawings showing complete information for the fabrication and installation of precast concrete units.
   2. Submit layout drawings prepared and stamped by a Professional Engineer registered in the State of [Note to Specifier: Insert State]. Drawings shall include the following information:
      a. Overall layout drawings of the assembled precast concrete tank including overall dimensions. Provide identification of each precast unit corresponding to the sequence and procedure of installation.
      b. Drawings of individual members indicating plan and cross section dimensions, locations, sizes, types and details of reinforcement.
      c. Location and details of anchorage devices that are to be embedded in the precast concrete sections.
      d. Locations and details of joints including ship laps and details of mechanical connections.
      e. Locations of wall penetrations for pipes. All openings shall be cast-in-place at the manufacturing plant. Field coring of pipe penetrations shall not be allowed.
   3. Submit structural design and buoyancy calculations demonstrating the structural integrity of all precast concrete units. Calculations and Drawings shall be prepared and stamped by a Professional Engineer registered in the State of New Hampshire.
   4. Submit Concrete Mix designs including test data that meets the criteria specified in ACI 301, Section 4. Mix design shall include:
      a. Proportions for all ingredients, 28-day design compressive strength, water to cementitious materials ratio, admixture dosages, slump, and air content.
      b. Cement Manufacturer's Certificates of conformance with ASTM C150/C150M taken during the last 90 days.
      c. Supplementary Cementitious Materials: Source and test reports with certificates of conformance with ASTM C618/C618M for fly ash and ASTM C989/C989M for ground granulated blast furnace slag for actual material to be used in the Work taken during the last 90 days
      d. Aggregate: data not older than 90 days, except test data for soundness, abrasion, alkali reactivity – not older than 12 months. Fine and coarse aggregate data shall include:
         i. Sources
         ii. Specific Gravity

iii. Sieve analyses per ASTM C33/C33M, including fineness modulus of fine aggregate
iv. Organic impurities for fine aggregate per ASTM C40/C40M
v. Potential alkali reactivity (except not required if a cement containing less than 0.60% alkalis is used, per ASTM C33/C33M), per ASTM C1260/C1260M, ASTM C1293/C1293M, or ASTM C1567/C1567M
vi. Soundness per ASTM C88/C88M
vii. Abrasion for coarse aggregate per ASTM C131/C131M and ASTM C535/C535M

e. Product data and material safety data sheets for concrete admixtures.
f. Test reports by testing agencies meeting ASTM E329/E329M:
i. Test data used to determine the standard deviation used for establishing the required average design strength, and test data documenting that the proposed concrete proportions will produce an average compressive strength equal or greater than the required average compressive strength, shall be from within the previous 12 months.
ii. Laboratory trial batch data shall be from with the previous 24 months.

5. Submit color samples for the required finish.
6. Submit 12-inch square mock up panel of the required finish. Mock up panel shall represent the general appearance of the precast finish including the required color and texture.
7. Submit past Project list with Owner contact information.
8. Submit letter from precast concrete manufacturer stating that all segmented precast concrete structures have been shop assembled prior to shipment and all fabrication and erection tolerances have been adhered to.

1.6 QUALITY ASSURANCE

A. The manufacturer shall exhibit satisfactory performance on projects of similar magnitude under similar or equal service conditions for a period not less than five (5) years.
B. Precast concrete manufacturing plant shall be certified by the Prestressed Concrete Institute (PCI) Plant Certification Program. Manufacturer shall be certified in Group C and CA products
C. The precast concrete manufacturing plant shall implement a Quality Control Plan and maintain a permanent Quality Control Manual outlining the quality control procedures used by the plant. The Quality Control Plan and Manual shall adhere to the requirements set forth in MNL-116. Engineer (or Independent Testing Laboratory) may perform a plant inspection at any time during casting of precast concrete components during the construction period. General Contractor shall notify the Engineer a minimum of 14 days prior to the availability of specific precast components for inspection. After notification, Engineer will notify the General Contractor a minimum of 72 hours prior to the inspection.

1.7 WARRANTY

A. The Precast Concrete manufacturer shall provide a one (1) year warranty (from the Date of Substantial Completion) for the following:
   1. Cracking, spalling or other surface and structural defects.
   2. Separation of joints or misalignment of adjacent units due to faulty precast concrete sections.
   3. Leakage through all joints between concrete sections due to faulty materials.

B. The manufacturer shall repair or replace all defective work at no additional cost to the Owner.

1.8 DELIVERY, STORAGE AND HANDLING

A. All materials shall be inspected at the project site by the General Contractor for surface and structural defects at the time of delivery. All damaged materials shall be replaced by the Contractor at no additional cost to the Owner.

B. Store precast concrete units at the project site to ensure against cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at the designated lift points only.

C. All precast concrete units shall be placed on supports such that they are stored off the ground.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. American Concrete (Superior Concrete, LLC), Auburn, ME
B. Unistress Corp, Pittsfield, MA
C. Oldcastle Precast, Inc., Rehoboth, MA
D. Oldcastle Precast, Inc, Avon, CT
E. Blakeslee Prestress, Inc., Branford, CT
F. United Concrete Products., Inc., Yalesville, CT
G. J.P. Carrara & Sons, Inc., Middlebury, VT
H. S.D. Ireland Concrete Construction Corp., Williston, VT
I. William E. Dailey Precast, LLC, Shaftsbury, VT
J. Olcastle Precast Building Systems, Selkirk, NY
K. Strescon Limited, Saint John, New Brunswick, Canada
L. Or equivalent

2.2 MATERIALS

A. Concrete mix design shall conform to the following:
   1. Minimum compressive strength of concrete at 28 days (f'c) = 5000 psi.
   2. Maximum water/cement ratio = 0.45
   3. Cement:
      a. Cement for all units shall be Type II Portland cement conforming to ASTM C150/C150M.
      b. Blended cements: ASTM C595/595M. Do not use blended cements conforming to ASTM C595/595M if they contain cements conforming to ASTM C1157/C1157M.
      c. Supplementary Cementitious Materials:

i. Ground Granulated Blast Furnace Slag: ASTM C989/C989M - Grade 100 or 120.
ii. Silica Fume: ASTM C1240/C1240M
iii. Fly Ash: ASTM C618/C618M - Type F

d. The proposed mix shall contain cementitious materials in the following proportions:
i. Portland Cement - No less than 75% of the total by weight.
ii. Ground Granulated Blast Furnace Slag - No greater than 50% of the total by weight.
iii. Fly Ash - No greater than 25% of the total by weight.

4. Entrained air content of concrete: 6% ± 1.5%. Air entrainment admixture shall conform to ASTM C260/C260M.
5. Admixtures:
a. Low Range Water Reducer: MasterPozzolith 210 by Master BuildersBASF; WRDA with HYCOL by W.R. Grace Construction Products Division& Company; or equivalent meeting ASTM C494/C494M Type A.
b. High Range Water Reducer (superplasticiser): Rheobuild 1000 or Glenium 3000 NS by Master BuildersBASF; Daracem 100 or ADVA 140M by W.R. Grace & CompanyW.R. Grace; or equivalent meeting ASTM C494/C494M Type F.
c. Air entraining agent: MasterAir AE 200 by Master Builders, DAREX II AEA by W.R. Grace & Company; or equivalent meeting ASTM C260/C260M.
6. Coarse aggregate shall consist of a well graded crushed stone or a washed gravel conforming to the requirements of ASTM C33/C33M and the following requirements:

	PERCENT PASSING			
SIEVE	NO. 8 (3/8")	NO. 67 (3/4")	NO. 57 (1")	NO. 467 (1 1/2")
1-½ inch	-	-	100	95-100
1 inch	-	100	95-100	
¾ inch	-	90-100	-	35-70
½ inch	100	-	25-60	
3/8 inch	85-100	20-55	-	10-30
No. 4	10-30	0-10	0-10	0-5
No. 8	0-10	0-5	0-5	
No. 16	0-5	-	-	
No. 50		-	-	

7. Fine aggregate shall consist of washed inert natural sand, free from mineral or other coatings, soft particles, clay, loam, organic or other deleterious materials conforming to the requirements of ASTM C-33/C33M and the following requirements:

SIEVE NO.	PERCENT PASSING

4	95 to 100
8	80 to 100
16	50 to 85
30	25 to 60
50	5 to 30
100	0 to 10

8. Potable water shall conform to ASTM C1602/C1602M.

B. Reinforcing steel:
   1. Bars: ASTM A615/A615M Grade 60; deformed new materials. Cold-bent in accordance with CRSI 10MSP
   2. Welded wire fabric: ASTM A185/A185M. Flat sheets are required, rolls are not permitted
   3. Tie wire: ASTM A82/A82M, annealed.

C. Plates and inserts:
   1. Plates:
      a. Provide cast-in-place plates as shown on the Drawings. Plates shall be either:
         i. ASTM A36/A36M. Hot dipped galvanized in accordance with ASTM A123/A123M or
         ii. AISI Type 316 stainless steel.
      b. Inserts:
         i. Provide AISI Type 316 stainless steel inserts as required for lifting, connections, etc.

D. Manhole Steps:
   1. Provide manhole steps as shown on the Drawings.
   2. Steps shall be constructed of steel reinforced copolymer polypropylene. Steps shall conform to ASTM C478/C478M and the polypropylene shall conform to ASTM D4101/D4101M.
   3. The top surface shall have a molded non-slip surface
   4. Step widths shall be between 13.75 inches – 14 inches. Step projects from face of concrete shall be between 5 inches – 6 inches.
   5. Steps shall be able to support the following loads in accordance with ASTM C478/C478M:
      a. Minimum pullout load of 300 pounds
      b. Minimum vertical load of 800 pounds with a maximum permanent deflection of ½ inch
   6. Thoroughly clean all surfaces to be embedded with a suitable cleaning agent to ensure that the surfaces are free from all foreign matter such as dirt, oil and grease.
   7. All steps shall be cast into walls of the precast section so as to form a continuous ladder with a distance of 12-inches between steps. Step inserts may be cast into the walls if reviewed with No Exceptions Taken by the Engineer.
   8. Acceptable products:
      a. Model ML-13-NCR by American Step Company, Inc.
      b. Model P-14938 by Parson Environmental Products, Inc.

c. Model PS2-PF by M. A. Industries, Inc.
d. Or equal

E. Pipe Openings:
1. Provide flexible rubber watertight connectors at all pipe penetrations in the precast concrete structure. Connector shall conform to ASTM C923/C923M.
2. Connectors shall either be cast into the concrete base or fastened to the structure with stainless steel expansive sleeves.
3. Pipes shall be fastened to the connector with stainless steel bands.
4. Acceptable products:
a. Kor-N-Seal (106-406 Series) by Trelleborg Pipe Seals
b. PSX: Positive Seal by Press-Seal Corporation
c. Z-Lok Connector made by A-Loc Products Inc.
d. Or equal

F. Precast section joints:
1. Provide rubber sealant and wraps at all precast concrete section joints.
2. Rubber sealants:
a. Install solid, continuous flexible butyl rubber sealants in all joints to achieve watertight joints. Install a double row of joint sealants for every manhole joint.
b. Sealant shall conform to ASTM C990/C990M.
c. Sealant shall maintain stability at all temperatures and not shrink or harden over time.
d. Acceptable products:
i. Kent Seal No. 2 by Hamilton Kent
ii. RN 101 Ram-Nek Joint Sealant by Henry
iii. EZ-STIK or PRO_STIK Butyl Sealant by Press-Seal Corporation
iv. Conseal CS-102 (CS-202 when the temperature during installation is less than 30˚F) by Concrete Sealants, Inc.
v. Or equal
3. Joint Wrap:
a. Wraps shall consist of two layers: a butyl joint wrap layer (30 mil) and an EPDM rubber backing layer (45 mil).
b. Wraps shall be 12” wide.
c. Install solid, continuous flexible butyl rubber wraps around the exterior face of all joints to achieve watertight joints.
d. Wraps shall conform to ASTM C877/C877M Type III.
e. Acceptable products:
i. EZ-WRAP by Press-Seal Corporation
ii. ConSeal CS-212
iii. Or equal

G. Liquid Asphalt Dampproofing:
1. Apply a two coat waterborne emulsified-asphalt dampproofing system for all below grade exterior wall surfaces:
2. First coat: Fiber free waterborne emulsified-asphalt dampproofing conforming to ASTM D 1187/D1187M (Type 1) and ASTM D 1227/D1227M (Type 3, Class I). Hydrocide 600 by Sonneborn Building Products - or equal.

3. Second coat: Waterborne emulsified-asphalt dampproofing reinforced by long fibers conforming to ASTM D 1187/D1187M (Type 1) and ASTM D 1227/D1227M (Type 2, Class I). Hydrocide 700 by Sonneborn Building Products or equal.
4. Hatches: Provide hatches as shown on the Drawings. Integral hatches are furnished under this Section, and specified in Specification Section 08305 "Special Doors".

H. Manhole covers and frames: Provide manhole covers and frames as shown on the Drawings. Integral manholes covers and frames are furnished under this Section, and specified in Specification Section 02601 "Manholes, Covers and Frames".

I. Concrete Repair Materials:
1. Grout Paint: Mix 1-part Type II portland cement, 1-part fine sand, and enough water to the consistency of thick paint.
2. Patching Mortar: 1-part of a mixture of white and grey Type II portland cement to 2.5 parts of damp loose sand. Cement type to match substrate.
3. Epoxy Adhesive:
   a. Two- or three-part water based epoxy bonding agent with cementitious components
   b. Acceptable products:
      i. Armatec 110 Epocem by Sika Corporation
      ii. Corr-Bond by Euclid Chemical Co.
      iii. MasterEmaco P 124 by Master Builders
      iv. Or equivalent
4. Repair of random cracks (dry – free of liquid or moisture):
   a. 2-component, 100% solids, moisture-tolerant, low-viscosity, high-strength, multipurpose, epoxy resin adhesive.
   b. Acceptable products:
      i. Sikadur 35 Hi-Mod LV by Sika Corporation
      ii. Eucopoxy Injection Resin by Euclid Chemical Co.
      iii. MasterInject 1500 by Master Builders
      iv. Or equivalent
5. Repair of random cracks (wet - presence of liquid or moisture):
   a. Low viscosity polyurethane resin that expands and forms a closed cell foam when it comes in contact with water.
   b. All cracks that are wet (either damp or leaking) at the time of repair shall be repaired with a material that is specifically intended for wet repair as recommended by the manufacturer.
   c. Acceptable products:
      i. SikaFix HH Hydrophilic by Sika Corporation
      ii. Dural Aqua-Fil by Euclid Chemical Co.
      iii. MasterInject 1210 IUG by Master Builders
      iv. Or equivalent
6. Repair of excessive cracking:
   a. Two component, 100% solids, moisture-tolerant, epoxy or urethane crack healer / penetrating sealer
   b. Acceptable products:

i. Sikadur 55 SLV by Sika Corporation
ii. Euco Qwikstitch by Euclid Chemical Co.
iii. MasterSeal 370 by Master Builders
iv. Or equivalent

7. Repair of spalls, honeycombs areas and air voids and cementitious overlays:
   a. Polymer modified, non-sag cementitious repair mortar with corrosion inhibitor.
   b. Repair material shall include peastone for repairs of greater depth as required by the manufacturer. For repair areas involving depths generally in excess of three (3) inches, utilize a repair material suitable for the depth of repair.
   c. Acceptable products:
      i. SikaTop 122 Plus or 123 Plus by Sika Corporation
      ii. Tamms Structural Mortar by Euclid Chemical Co.
      iii. MasterEmaco N 400 MasterEmaco N 400
      iv. Or equivalent

PART 3 - EXECUTION

3.1 FORMWORK

A. Forms for manufacturing precast concrete products shall be of the type and design consistent with industry standards and practices.
B. Forms shall be capable of consistently providing uniform products and dimensions.
C. Forms shall be constructed so that the forces and vibrations to which the forms will be subjected can cause no product damage

3.2 FABRICATION AND PLACING REINFORCEMENT

A. Detailing and fabrication of reinforcement shall conform to the CRSI Code of Standard Practice unless otherwise indicated on the Drawings.
B. Reinforcing steel bars shall be clean and free from loose mill scale and rust and from coatings that reduce bond.
C. Place reinforcement of structural members on accessory bolsters and chairs. Accessories shall be stainless steel or have plastic tips.
D. All reinforcing shall have adequate concrete cover as specified.
E. Do not weld reinforcement unless the Engineer takes no exceptions in writing. When permitted, welding shall be in accordance with AWS D1.4/D1.4M.

3.3 PRODUCTION, CURING, FINISHING, REPAIRS AND STORAGE

A. Production, curing and storage of the precast units shall conform to the provisions of MNL 116 Production:
   1. Each precast concrete unit shall be an integral placement without any construction or cold joints. Base slabs shall be an integral placement with the bottom wall section.
   2. Structures shall be fabricated from the minimum number of precast sections in order to minimize the number of joints. Joints shall be located penetrations do not intersect joints.

3. Tolerances: Fabricate precast units without exceeding the tolerances specified in MNL 116 unless otherwise indicated below: Box Culverts (and other similar type structures assembled horizontally):
    i. Interior width:
        (1) Less than 48": +/- 7/16"
        (2) 48" – 96": +/- 3/4"
        (3) Greater than 96": +/- 1"
    ii. Vertical wall width: -3/16", +1"
    iii. Top and bottom slab depth: -3/16", +1"
    iv. Variation in length of opposite surfaces:
        (1) Per foot of internal span: +/- 1/8"
        (2) Span = 7' or less: +/- 5/8"
        (3) Span > 7': +/- ¾"
    v. Variation From Specified Plan End Squareness or Skew: +/- ½"
    vi. Offsets in Alignment of Adjacent Members at Any Joint: +/- ¼"
    b. Round, square and rectangular vertical type manhole and vault structures:
    i. Interior width:
        (1) Less than 48": +/- 7/16"
        (2) 48" – 96": +/- 3/4"
        (3) Greater than 96": +/- 1"
    ii. Vertical wall width: -3/16", +1"
    iii. Top and bottom slab depth: -3/16", +1"
    iv. Variation in length of opposite surfaces:
        (1) Per foot of internal span: +/- 1/8"
        (2) Span = 7' or less: +/- 5/8"
        (3) Span > 7': +/- ¾"
    v. Variation From Specified Plan End Squareness or Skew: +/- ½"
    vi. Offsets in Alignment of Adjacent Members at Any Joint: +/- ¼"

C. Curing:
1. All exposed precast concrete shall be cured by either:
    a. Moist curing (steam, ponding or application of burlap kept continuously wet)
    b. Covering the exposed surface with polyethylene sheets
    c. Covering the exposed concrete with membrane curing compounds
    d. Application of steam. This method may only be used after the initial set of the concrete.
2. Alternate wetting and drying shall not be permitted

D. Finishing:
1. Unless otherwise indicated all surfaces shall be cast with an "As Cast" finish.
2. All exposed surfaces shall be free of form defects, joint marks and shall be within the color variation as defined by the submitted samples and/or mock up sample.
3. Slight color variations, small surface holes (up to ¼ inch diameter) caused by air bubbles will be accepted but no major imperfections, excessive honeycombing, sand streaks or other major defects shall be permitted.

E. Repairs of Defects at the Plant:
   1. Minor defects:
      a. Defects not impairing the functional use or expected life of a precast concrete product as determined by the Engineer of Record shall be considered minor defects.
      b. Minor defects shall be repaired by any method that does not impair the product.
      c. All repairs shall be made and identified prior to shipment to the Project site.
   2. Major defects:
      a. Defects in precast concrete products that impair the functional use or the expected life of products as determined by the Engineer of Record shall be considered major defects.
      b. All precast units with major defects shall be rejected and not delivered to the Project site
F. Storage:
   1. Areas used for storage of products shall be firm enough and level enough to avoid causing damage to stored products.
   2. Products shall be stored on level surfaces in a manner that will minimize damage caused by uneven bearing, improperly located dunnage blocks, stacking products too high or difficulty in handling.

3.4 HANDLING, AND TRANSPORTATION

A. All precast concrete units shall be lifted using designated pick points and lifting inserts. Extreme caution shall be exercised so as not to damage the units during handling.
B. Prior to shipment, all precast products shall be inspected by Plant personnel to assure design conformance, all defects have been repaired and all units have proper identification. Products not conforming to requirements shall be clearly labeled and the defects noted on the inspection report. Only products conforming to the requirements shall be shipped.
C. Transportation:
   1. Precast concrete units shall be properly supported during transportation to minimize damage.
   2. Transport units in a position consistent with their shapes in order to avoid excessive stresses that may cause damage. Unique shipping instructions or special stacking may be required for irregularly shaped pieces.
   3. Do not transport units until they have been cured for a minimum of 5 days or have reached 75% of their 28 day design strength.

3.5 REPAIR OF UNITS AT PROJECT SITE

A. Definitions:
   1. Honeycombed areas: Areas where voids are left in the concrete due to inadequate vibration and consolidation resulting in a failure of the mortar to effectively fill the spaces among coarse aggregate particles.
   2. Spalls: Concrete that has chipped, flaked, scaled or broken off from the surface of the concrete.

3. Surface Defects: Those defects that affect the appearance of the finished concrete but do not affect the structural integrity. Surface defects include
4. Structural Defects: Those defects that affect the appearance of the finished concrete and the structural integrity. Structural defects include:

B. Surface Defects:
1. Form tie holes
2. Air voids (bugholes)larger than those specified for the required surface finish
3. Honeycomb areas with a depth less than 1 inch
4. Blisters
5. Delaminations
6. Crusting
7. Visible construction joints, fins and burs
8. Non-uniform concrete color and appearance
9. Floors that are not level

C. Structural Defects:
1. Random cracks
2. Excessive cracking (crazing)
3. Spalls
4. Air voids (bugholes) and honeycombed areas with a depth greater than or equal to 1 inch

D. All repairs to precast concrete sections shall be at no additional cost to the Owner.

3.6 REPAIR OF SURFACE DEFECTS

A. Form Tie Holes: After cleaned and thoroughly dampened, apply grout paint and fill holes solid with patching mortar.

B. Air voids (bugholes): After cleaned and thoroughly dampened, apply grout paint and fill holes solid with patching mortar.

C. Honeycomb areas:
1. All honeycombed areas shall be removed to sound concrete by means of hand chisels or pneumatic chipping hammers or hydrodemolition.
2. Saw cut a 1-inch minimum square groove around the edges of the defective area perpendicular to the surfaces to serve as the boundary for concrete removal. Saw cut the edges perpendicular to the surface. No feather-edges shall be allowed.
3. Remove all loose aggregate paste and debris and scrub clean. Thoroughly wet area to be repaired. Brush and scrub grout paint into the substrate of the area to be repaired.
4. Mix patching mortar using as little water as possible. Allow to stand with frequent manipulation of trowel to achieve stiffest consistency. Blend white and gray portland cement to achieve color match with surrounding concrete.
5. Prior to the set of grout paint (but after it has cast its water sheen), apply a stiff consistency of patching mortar to the area with a trowel. Leave patched surface slightly higher than surrounding surface. Do not finish for 1 hour minimum. Cure in same manner as adjacent concrete.

D. Blisters, delaminations and crusting: Repairs shall be similar to those for honeycomb areas. Depth of saw cut shall match the depth of the defective concrete.

E. Visible construction joints, fins and burrs: Remove by grinding until a smooth

uniform surface is attained.

F. Concrete with an overall non-uniform color or appearance as determined by the Engineer shall be repaired with a complete cementitious overlay. Application of the overlay shall be in strict accordance with the manufacturer's written instructions and recommendations.

G. Finished Flatwork exceeding specified tolerances:
   1. High areas shall be repaired by grinding after the concrete has cured 14 days.
   2. Low areas shall be repaired by adding appropriate overlay material. Grind concrete if required to provide minimum overlay thickness as required by the manufacturer. Finish repair area to match adjacent concrete.

3.7 REPAIR OF STRUCTURAL DEFECTS

A. Remove and replace or repair all structural defects in precast concrete sections.

B. Unless otherwise indicated, all concrete defects shall be repaired in accordance with the specific repair material manufacturer's recommendations.

C. Random cracks:
   1. Cleaning of cracks:
      a. Dry cracks: Crack or void must be dry at time of application. Remove all dust, debris or disintegrated material from cracks or voids by the use of oil-free compressed air or vacuuming. Cracks saturated with oil or grease must be chipped out to unsaturated concrete. "Vee" out cracks in horizontal surfaces slightly.
      b. Wet cracks: Clean the crack surface so that the crack can be located. If the crack is wide or high water flows are encountered, seal the surface of the crack with a surface sealing material as recommended by the manufacturer.
   2. Where cracks extend through members and are accessible, seal bottom of crack which is to receive the repair material.
   3. Patching of vertical wall or overhead cracks shall be accomplished in the same manner using a similar epoxy material of higher viscosity as recommended by the manufacturer.
   4. Apply repair material in strict accordance with manufacturer's recommendations.

D. Excessive cracking (Crazing):
   1. Slabs containing an excessive amount of cracks as defined herein, and which will remain exposed, shall receive topping after sealing of cracks in accordance with the above paragraph.
   2. Excessive cracking shall be defined as areas containing cracks averaging 1/64th-inch wide or greater, and in excess of 15 linear feet of cracks per 100 square feet of slab. In the event that excessive cracking occurs in isolated areas of a given floor, topping shall only be applied in the area of the cracks bounded by construction, expansion, or control joints.
   3. Apply repair material in strict accordance with manufacturer's recommendations.

E. Spalls and honeycomb areas:

1. All weakened, damaged or disintegrated concrete shall be removed to sound concrete by means of hand chisels or pneumatic chipping hammers or hydrodemolition.
2. Saw cut a 1-inch minimum square groove around the edges of the defective area perpendicular to the surfaces to serve as the boundary for concrete removal. Saw cut the edges perpendicular to the surface. No feather-edges shall be allowed.
3. Remove defective concrete. If defective areas extend around reinforcing steel, chip to provide a clear space of at least 1 inch all around the bar. When pneumatic chipping hammers are used for removal of concrete around reinforcement, they shall not exceed 15 pounds.
4. Apply repair material in strict accordance with manufacturer's recommendations.

3.8 REPAIR OF PRECAST CONCRETE SECTIONS AT PROJECT SITE

A. Contractor shall repair all damaged, cracked, or chipped units in accordance with the requirements of this Section. All units that are damaged beyond repair as determined by the Engineer shall be removed from the project site and replaced at no additional cost to the Owner.

3.9 ERECTION OF PRECAST STRUCTURES

A. Install all precast structures level and plumb to the elevations and in the locations shown on the Drawings. All precast concrete units shall be lifted using designated pick points and lifting inserts in accordance with the written instructions from the Precast Concrete supplier.
B. Installation Tolerances: Install precast units without exceeding the tolerances specified in MNL 116 Attach precast concrete units to concrete foundations as indicated on the Drawings or as required by the Precast Concrete manufacturer.
D. Connect adjacent precast concrete units as required by the manufacturer. All units shall fit tight to their adjacent units.
E. Joints: All joints shall be watertight and shall be sealed as indicated below:
   1. Install butyl rubber sealants in all joints. A minimum of 2 rows of sealants shall be applied at each joint.
   2. Install butyl joint wraps around the exterior face of all horizontal and vertical joints to achieve watertight joints. For segmented box culvert type tank structures, install wrap on the interior face of joints in the base slab.
   3. All sealants and wraps shall be installed in accordance with the manufacturer’s recommendations.
F. After erection is complete, all surface damages to the precast concrete units shall be properly repaired in accordance with this Section. All lifting inserts and holes shall be patched after final installation.

3.10 LIQUID ASPHALT DAMPPROOFING APPLICATION

A. Apply dampproofing to the exterior surfaces all below grade precast concrete walls and on the top surface of below grade top slabs. For installation of concrete tanks, damproofing shall be applied after tanks have been successfully tested.
B. Apply two coats in strict accordance with manufacturer's printed instructions and as

specified herein. Clean and prepare surfaces as required.

C. Do not apply dampproofing at temperatures below 40° F or when temperature is expected to fall below 40° F within 12 hours.

D. Do not place backfill for at least 48 hours after application.

E. All damproofing materials spilled on adjacent structures shall be cleaned with a material recommended by the dampproofing manufacturer.

3.11 TESTING

A. General:

1. Perform leakage tests on all precast concrete tanks indicated below prior to application of dampproofing and installing backfill around the tank. Installing backfill at the ends of box culvert type tank structures prior to the leak test will not be permitted.
2. All testing must be performed in the presence of the Engineer.
3. Suitably plug all pipes entering precast concrete tank and brace plugs to prevent blow out.

B. Leakage Tests:

1. Fill precast concrete tank with potable water to within one foot below the underside of the top slab. Contractor shall be responsible for providing potable water for the tests.
2. A period of up to 12 hours may be permitted, if the Contractor so wishes, to allow for absorption.
3. At the end of the absorption period, refill precast concrete tank with water to to within one foot below the underside of the top slab and begin the 4-hour test period.
4. At the end of the 4-hour test period, refill precast concrete tank to the top of the precast concrete tank cover and measure the volume of water added. The test shall be considered passing if the following conditions are met:
   a. The drop in the liquid level does not exceed 1/8 inch
   b. There are no visible leaks on exterior surfaces of the tank or through joints.
5. Contractor shall repair all leaks at no additional cost to the Owner. All repair materials shall be reviewed for information only by the Engineer.
6. Precast concrete tanks shall be retested subsequent to repairs.
7. Additional tests and repairs will be performed until such time as the tanks can demonstrate compliance with the testing requirements.
8. Contractor shall dispose of water in accordance with all applicable local, State and Federal Regulations.

C. Test Schedule:

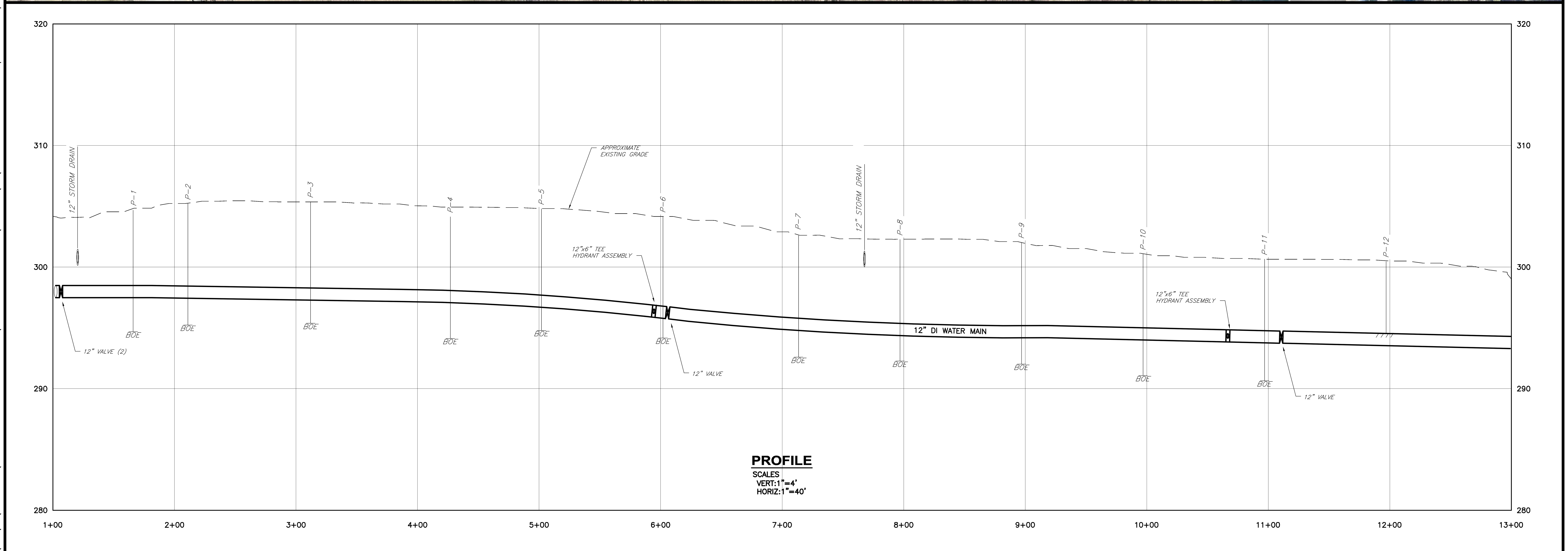
1. The following tanks shall be leak tested:

END OF SECTION

LAST SAVED BY: KARL.DUFFIELD 7/18/2019 3:12 PM

J:\ENG\NH\ROCHESTER\14113-GSBP_UTILITYIMPROVEMENTS\14113A-WATEREXTDESIGN\DRAWINGS\CIV\14113A-PLAN&PROFILE.DWG | PlanProfile1 | 1:4.56 | ---- | 7/18/2019 3:20:16 PM | KARL.DUFFIELD

CONNECT 6" TEMPORARY WATER MAIN TO EXISTING HYDRANT ACROSS FROM 168 WHITEHALL RD. FOR HYDRANT-TO-HYDRANT BYPASS CONNECTION.
STOP BAR TO BE REPLACED
12" CMP CULVERT PIPE TO BE REPLACED WITH A 15-INCH RCP
1 - 12" GATE VALVE
1- 12"x6" TEE
1 - HYDRANT ASSEMBLY
INSTALL SERVICE (TYP)
INSTALL BENDS AS NECESSARY
INTERCONNECTION:
1 - 12" TEE
2 - 12" GATE VALVES
12" DI WATER MAIN
INSTALL SILT SOCK, TYP
1 - 12" GATE VALVE
1- 12"x6" TEE
1 - HYDRANT ASSEMBLY
PROVIDE 6" TEMPORARY WATER MAIN FOR HYDRANT-TO-HYDRANT BYPASS CONNECTION.
CONNECT 6" TEMPORARY WATER MAIN TO EXISTING HYDRANT FOR HYDRANT-TO-HYDRANT BYPASS CONNECTION.
163 WHITEHALL ROAD
MARY L. KALISTA-SMALL &
ROBERT R. SMALL
TAX MAP 240, LOT 57
19 SHAW DRIVE
CHRISTOPHER D. PODUIN
TAX MAP 240, LOT 57-1
MATCH LINE
DWG. No. C-3
DWG. No. C-4
PLAN
SCALE: 1"=40'



320
310
300
290
280
12" STORM DRAIN
APPROXIMATE EXISTING GRADE
P-1
P-2
P-3
P-4
P-5
P-6
P-7
P-8
P-9
P-10
P-11
P-12
BOE
12"x6" TEE HYDRANT ASSEMBLY
12" VALVE (2)
12" VALVE
12" DI WATER MAIN
PROFILE
SCALES
VERT:1"=4'
HORIZ:1"=40'
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
12+00
13+00

NO.	SUBMISSIONS/REVISIONS	APP'D	DATE
	ISSUED FOR BID	C.BER	6-18
1	ADDENDUM NO. 1	C.BER	7-10
2	ADDENDUM NO. 2	C.BER	7-18

DESIGNED BY: W.EDG
CAD COORD: W.EDG
CAD: W.EDG
CHECKED BY: C.BER
DATE: 6-17
APPROVED BY: C.BER
DATE: 6-18
PROJECT NO: 14113A

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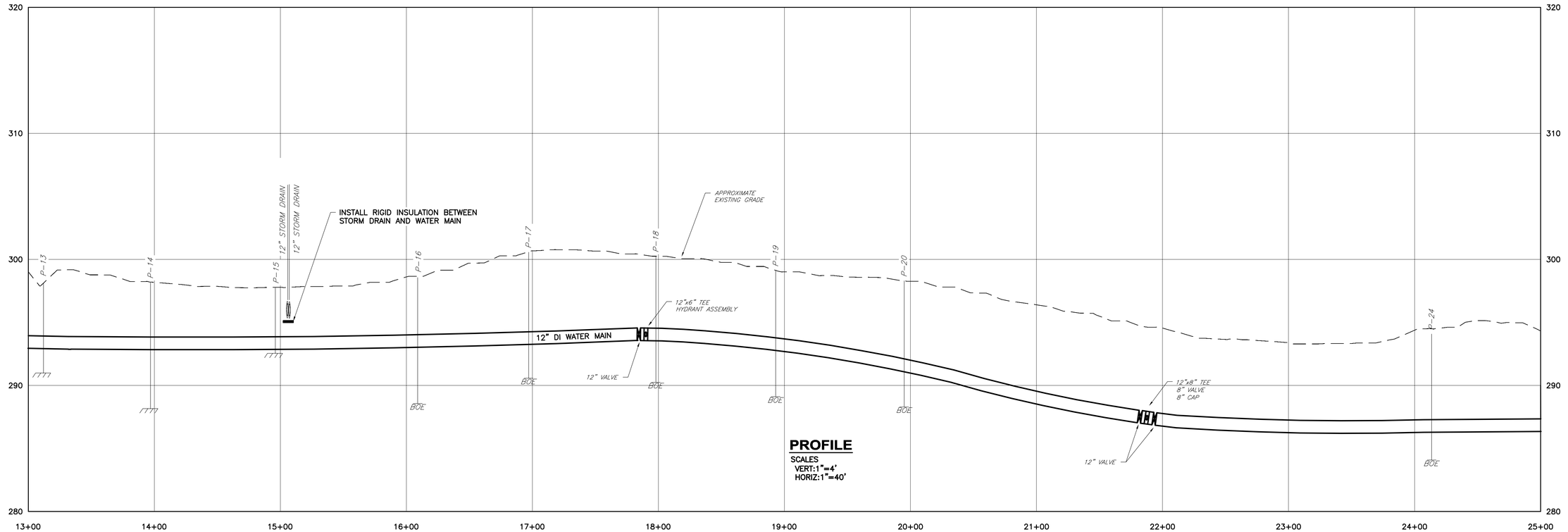
CITY OF ROCHESTER
ROCHESTER, NEW HAMPSHIRE
GRANITE STATE BUSINESS PARK
WATER MAIN EXTENSION

PLAN AND PROFILE I
STA. 1+00 TO STA. 13+00

DRAWING
C-3



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1	ISSUED FOR BID	C.BER	6-18
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DESIGNED BY: W.EDG
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PLAN AND PROFILE II
STA. 13+00 TO STA. 25+00

DRAWING
C-4

PLAN
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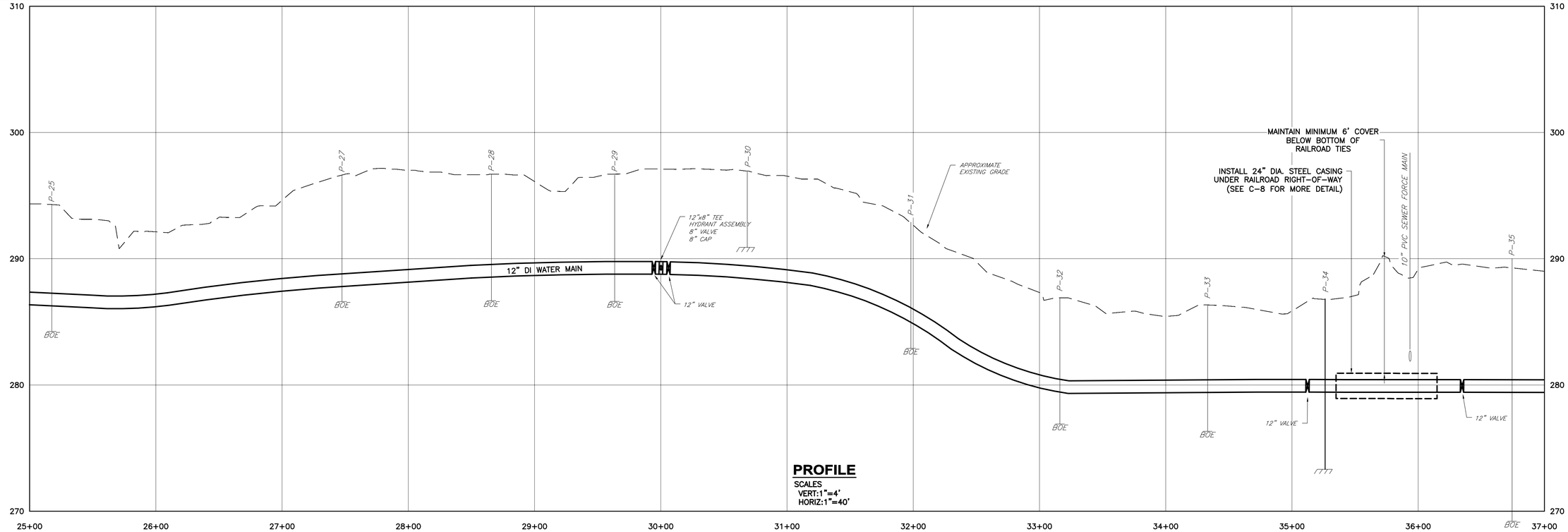

PROFILE
SCALES
VERT:1"=4'
HORIZ:1"=40'

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
	ISSUED FOR BID	C.BER	6–18
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CAD: W.EDG
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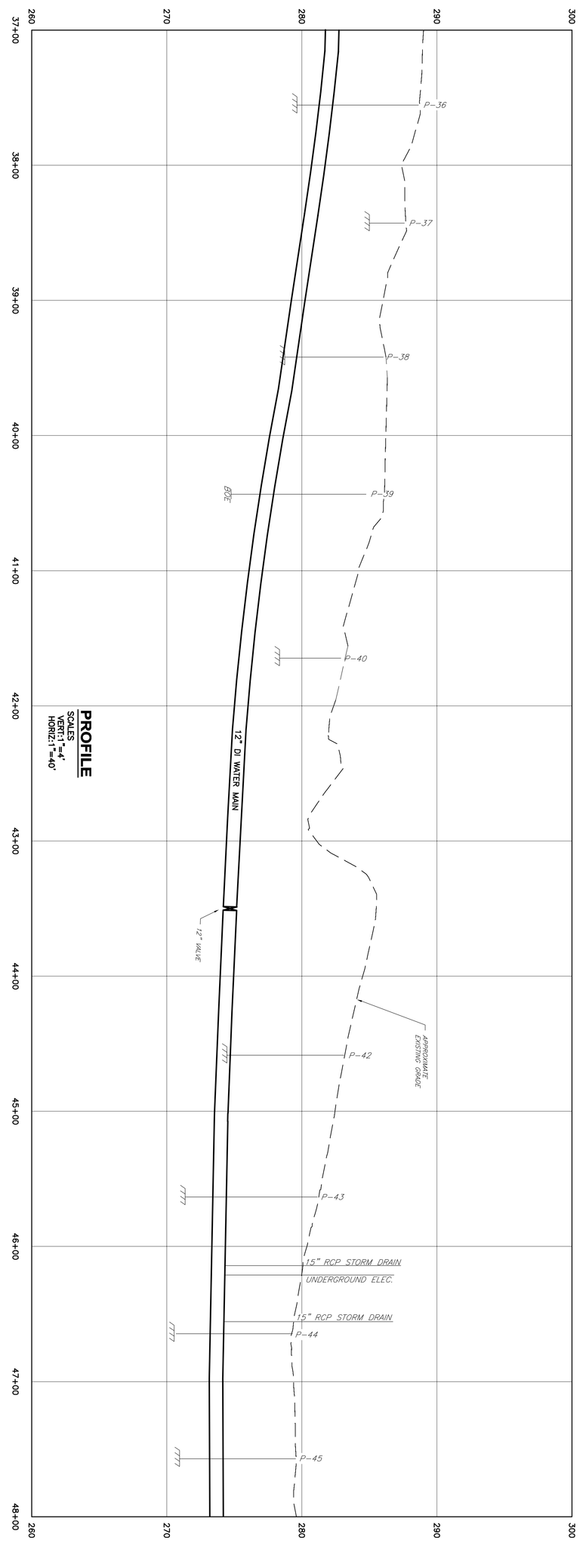
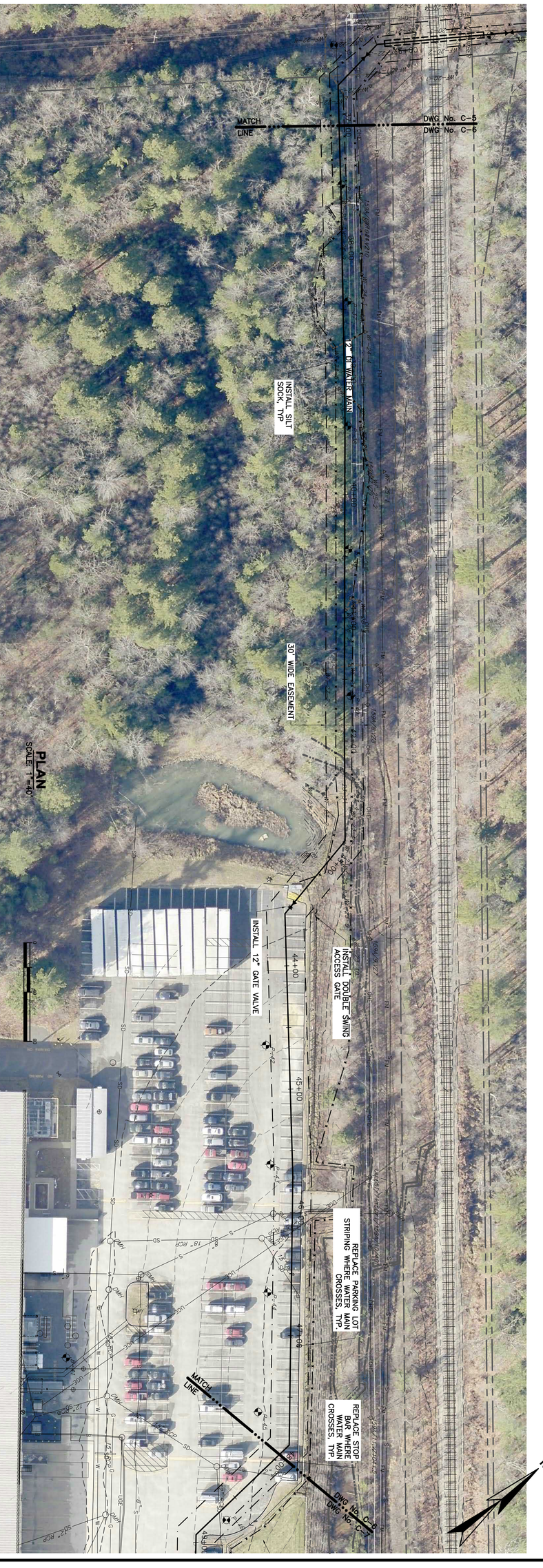
PLAN AND PROFILE III
STA. 25+00 TO STA. 37+00

DRAWING
C–5





DRAWING C-6

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PLAN AND PROFILE IV
STA. 37+00 TO 49+50

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DATE: 6-18
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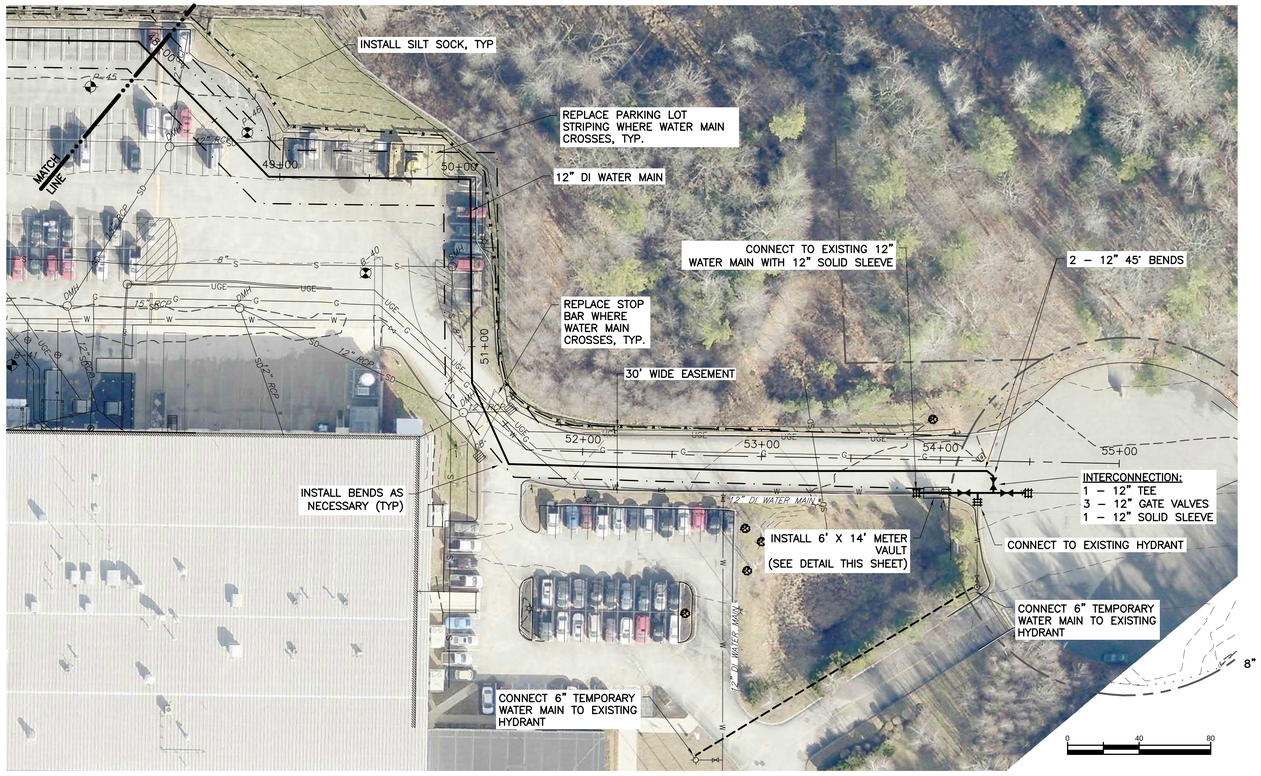
2	ADDENDUM NO. 2	C.BER	7-18
3			
4			



PLAN
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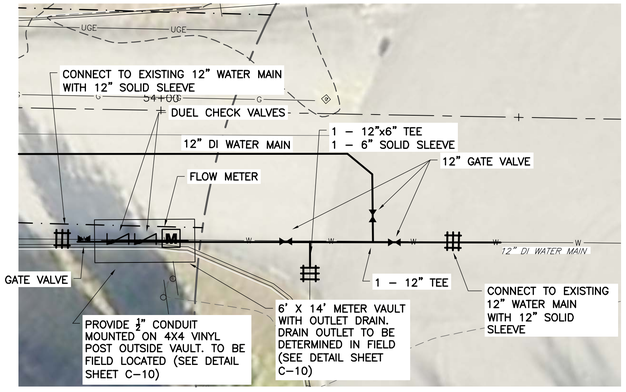
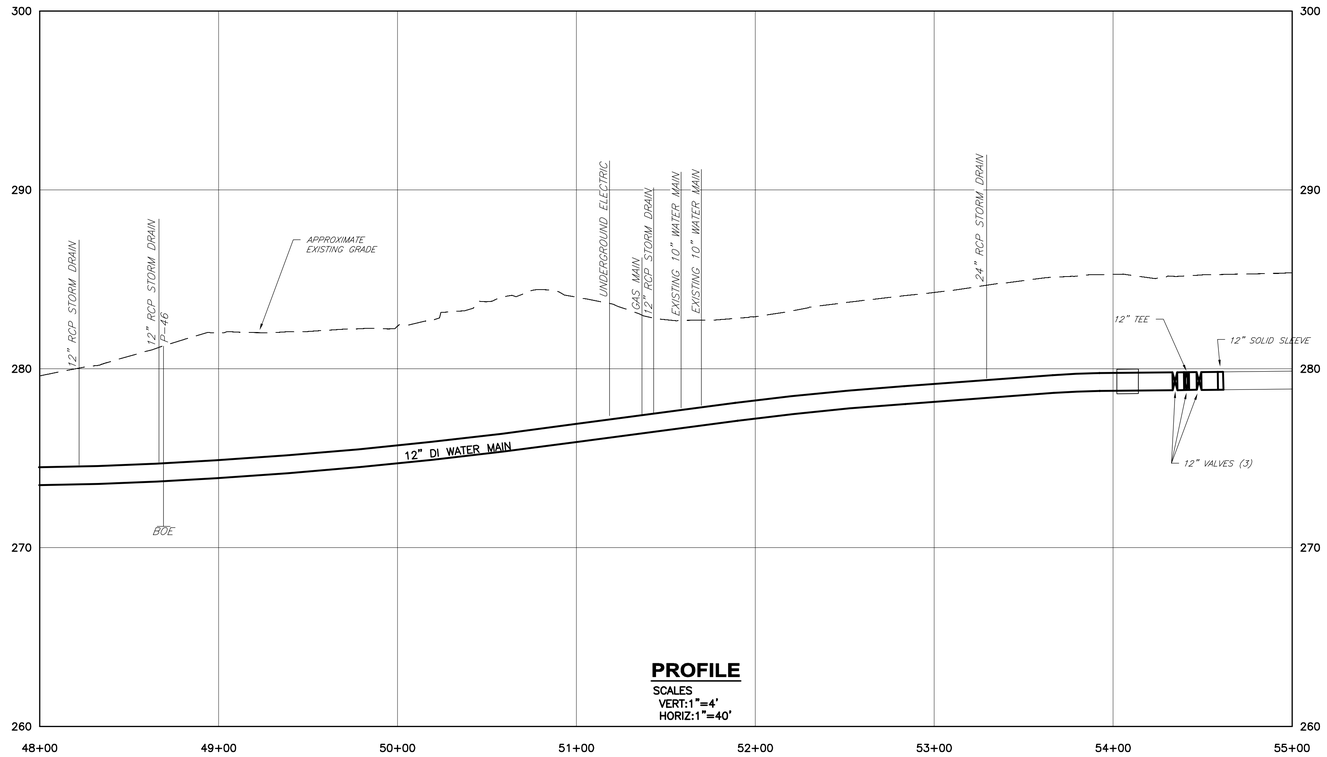


METER VAULT DETAIL
SCALE: 1"=10'



PROFILE
SCALES
VERT:1"=4'
HORIZ:1"=40'

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
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CAD: W.EDG
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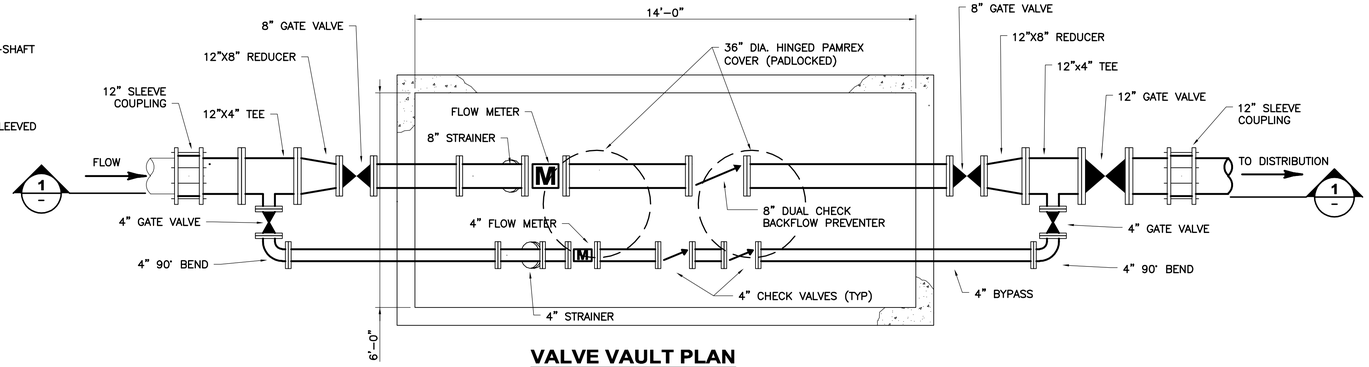
PLAN & PROFILE V
STA. 48+00 TO STA. 53+00

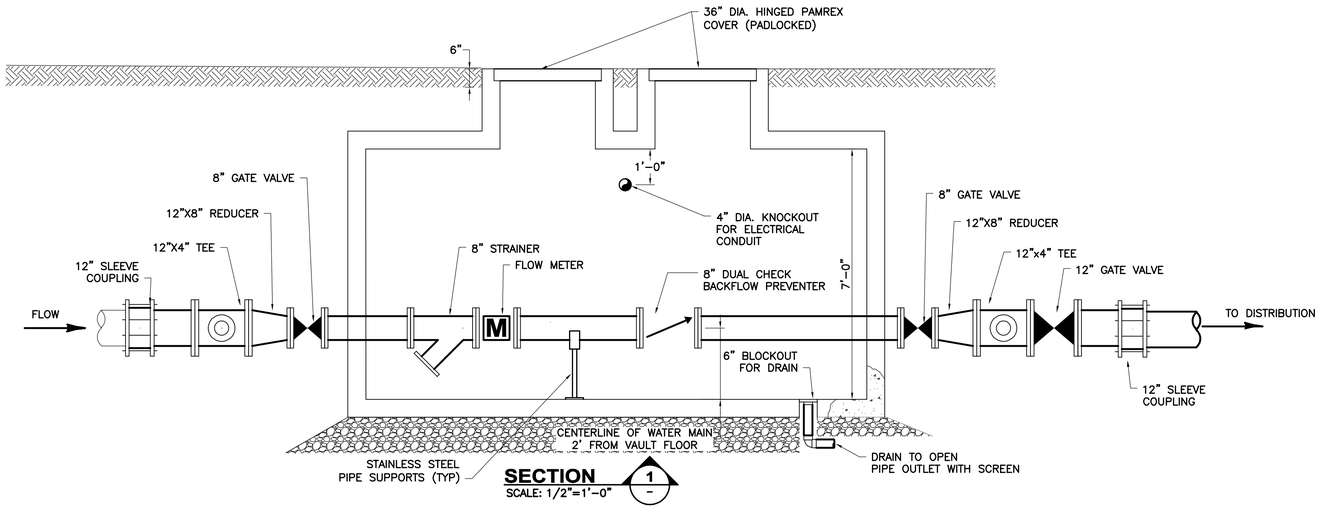
DRAWING
C–7

NOTES:

1. 8" GATE VALVE SHALL BE WITH SQUARE NUT–OPEN RIGHT.
2. 8" FLOW METER – SENSUS OMNI T2.
3. 8" BACK FLOW TO BE TESTABLE DOUBLE CHECK VALVE ASSEMBLY WITH CENTER–SHAFT OR TOP HINGE CHECK (ZURN WILKINS MODEL 350AST).
4. 4" GATE VALVE WITH SQUARE NUT–OPEN RIGHT.
5. 4" FLOW METER – SENSUS OMNI T2
6. 4" BACKFLOW TO BE TESTABLE DOUBLE CHECK VALVE ASSEMBLY WITH CENTER–SHAFT OR TOP HINGE CHECK (ZURN WILKINS MODEL 350AST).
7. VAULT COVERS TO BE STAMPED WITH "WATER" AND MATCH EXISTING CITY INFRASTRUCTURE STANDARDS.
8. PROVIDE 1" ELECTRICAL CONDUIT FROM ELECTRICAL KNOCKOUT TO 4X4 VINYL SLEEVED POST FOR MOUNTING OF METER READING EQUIPMENT. ACTUAL METER READING EQUIPMENT TO BE PROVIDED BY OTHERS (CITY).



VALVE VAULT PLAN
SCALE: 1/2"=1'–0"



SECTION
SCALE: 1/2"=1'–0"

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CAD COORD: W.EDG
CAD: W.EDG
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DATE: 6–17
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GRANITE STATE BUSINESS PARK
WATER MAIN EXTENSION

DETAILS II

DRAWING
C–10

From: Giallongo, Stefanie <Stefanie.Giallongo@des.nh.gov>
Sent: Tuesday, July 9, 2019 9:26 AM
To: Karl Duffield
Cc: Price, David
Subject: RE: City of Rochester, Shaw Drive Wetland Permit - Non-site Specific Permit 2019-00692

Good morning Karl,

Thank you for reaching out. I'll attempt to address your questions below –

1. ***Is trench dewatering prohibited in all wetland crossings, even during dry seasons and winter?***

    a. The permit requires no in-water excavation. So, depending on the time of year and site conditions, dewatering may be necessary (not prohibited?). If necessary, discharge from dewatering of work areas should be to sediment basins that are located in uplands, lined with hay bales or other acceptable sediment trapping liners or set back as far as possible from wetlands and surface waters, with a preferred undisturbed vegetated buffer of at least 50 feet and a minimum undisturbed vegetative buffer of 20 feet.

2. ***The on-site monitoring and supervision of a certified wetlands/ soil scientist appears to be a newer requirement we have not encountered before on previous alike permits. In the past we have hired the services of an experienced and qualified construction site inspector for monitoring the contractor's adherence to permit conditions. Would that be an acceptable alternate for conditions 8? And 10?***

    a. The specification for a CWS or CSS is intended to make sure that the wetland soil horizons are restored in-kind upon backfilling the trench; thereby ensuring the temporary nature of the approved 9,370 SF of impact. In my experience, this type of condition (on projects with relatively large temporary impact areas and/or large restoration aspects) has been applied to several permitted projects (specifying qualifying credentials or an individual who has significant experience and demonstrated success monitoring a particular type of project; 2017-03262, 2018-01731, 2018-02042, 2018-02836 *(pending)*, 2019-00405).

Don't hesitate to reach out again for any further clarification.

Kindly,

Stefanie

Stefanie M. Giallongo, Wetland Specialist
Wetlands Bureau, Land Resources Management
Water Division, NH Department of Environmental Services
222 International Drive, Suite 175
Portsmouth, NH 03801
Phone: (603) 559-1516
Email: Stefanie.Giallongo@des.nh.gov
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Like us on Facebook!

We greatly appreciate your feedback, please take a moment to fill out our NHDES-LRM customer satisfaction survey.

From: Karl Duffield [mailto:karl.duffield@wright-pierce.com]
Sent: Monday, July 8, 2019 2:53 PM
To: Giallongo, Stefanie <Stefanie.Giallongo@des.nh.gov>
Subject: City of Rochester, Shaw Drive Wetland Permit - Non-site Specific Permit 2019-00692

Hi Stefanie,
For the approved wetland permit (attached) issued June 12th , I had some follow up questions that arose from last weeks pre-bid meeting for the water main project.

1. Is trench dewatering prohibited in all wetland crossings, even during dry seasons and winter?
2. The on-site monitoring and supervision of a certified wetlands/ soil scientist appears to be a newer requirement we have not encountered before on previous alike permits. In the past we have hired the services of an experienced and qualified construction site inspector for monitoring the contractor's adherence to permit conditions. Would that be an acceptable alternate for conditions 8. And 10. ?

Please let me know if you need further clarification or information to my questions.
Thank you,

Karl Duffield
Wright-Pierce | Project Engineer
Direct 603.570.7108 | **Cell** 603.209.8559