



CITY OF MILFORD, CONNECTICUT  
DEPARTMENT OF PUBLIC WORKS

# CONTRACT DOCUMENTS

FOR THE

## ON-CALL STORM AND SANITARY SEWER PIPE LINING

Honorable Anthony S. Giannattasio – Mayor

Christopher Saley – Director of Public Works

April 15, 2024

W&M Project No. 24-034-10



**Westcott and Mapes, Inc.**

Consulting Engineers since 1916

142 Temple Street, New Haven, CT 06510

Telephone: (203) 789-1260

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Note – Detail drawings are attached at the end of the associated technical specification section.

END OF SECTION



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INVITATION TO BID

Legal Notice

CITY OF MILFORD  
Office of the Purchasing Agent  
70 West River Street – Milford, CT 06460  
Tel (203) 783-3225

**INVITATION TO BID**

Notice is hereby given that sealed bids for the

**On-Call Storm and Sanitary  
Sewer Pipe Lining**

will be received in the Purchasing Agent's Office until

**3:00 p.m., Thursday, May 23, 2024**

when they will be publicly opened and read aloud.

Work for this project will be on an on-call basis, and will involve the rehabilitation and repair of select storm and sanitary sewer pipelines and structures, as determined by the City of Milford. The City wishes to establish an on-call agreement with one (1) or more qualified contractors for the performance of this work.

Specifications for this project will only be available on the City of Milford website at [www.ci.milford.ct.us](http://www.ci.milford.ct.us), on or after Monday, April 15, 2024. Click on *City Departments*, select *Purchasing* then *Current Bids* to view or download the documents.

**Printed specifications will not be offered for sale for this project.**

A Bid Bond of 5% of the total bid is required and must accompany each proposal. Bids must be held firm for 365 calendar days.

The successful bidder must file a 100% Performance Bond, a 100% Labor and Materials (Payment) Bond, and Certificate of Insurance on notice of Contract award.

The Purchasing Agent reserves the right to reject any or all bids, any part thereof, waive defects in same, or accept any proposal deemed to be in the City's best interest.

A mandatory pre-bid conference will be held on Thursday, April 25, 2024 at 9:00 a.m. in Conference Room C of the Parsons Complex, 70 West River Street, Milford, Connecticut.

Bidders' attention is called to the requirements as to conditions of employment to be observed, minimum state wage rates/prevaling wages to be paid, and payroll submission requirements under the contract.

Fred Bialka  
Purchasing Agent

END OF SECTION

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INSTRUCTIONS AND INFORMATION FOR BIDDERS

- |  |                              |
|--|------------------------------|
| 1. Project Identification                      | 11. Laws and Regulations     |
| 2. Receipt of Bids                             | 12. Inspection of the Work   |
| 3. Modifications and Withdrawal of Bids        | 13. Sales Tax                |
| 4. Right to Accept/Reject Bids                 | 14. Guarantees               |
| 5. Examination of Contract Documents and Sites | 15. EEO/AA Requirements      |
| 6. Addenda and Interpretations                 | 16. Liquidated Damages       |
| 7. Bids, Bonds, and Award of Contract          | 17. Permits and Easements    |
| 8. Execution of the Agreement                  | 18. Drug and Alcohol Testing |
| 9. Notice to Proceed                           | 19. Conflict of Interest     |
| 10. Wage Rates                                 |                              |

1. PROJECT IDENTIFICATION:

- A. Owner: City of Milford, CT
- B. Awarding Authority: City of Milford  
Purchasing Agent
- C. Mailing Address: Office of the Purchasing Agent  
Second Floor  
Parsons Government Complex  
70 West River Street  
Milford, CT 06460-3317
- D. Project Name: On-Call Storm and Sanitary Sewer Pipe Lining

2. RECEIPT OF BIDS:

- A. Bids for the On-Call Storm and Sanitary Sewer Pipe Lining will be received by the Purchasing Agent for the City of Milford, Connecticut (hereinafter the City shall be called the "Owner"), at the time and location stated in the Invitation to Bid.
- B. All bids must be made on the Bid Form included in the specifications. All blank spaces for bid prices must be filled in, in ink or typewritten, and the Bid Form must be fully completed and executed when submitted. Pencil entries will not be accepted. One (1) copy of the Bid Form is required.
- C. Below is the list of required Documents to be completed for bid submission:
1. Bid Form – Section 00400
  2. Non-Collusion Affidavit of Prime Bidder – Section 00405
  3. Bid Bond (see Article 7, below) – Section 00410
  4. Statement of Bidder's Qualifications – Section 00450
  5. Drug Free Workplace Certificate – Section 00460

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INSTRUCTIONS AND INFORMATION FOR BIDDERS

- D. Bidders are advised to submit their bids using the bid insert provided that contains the required documents listed above, and shall not remove and/or submit the complete volume of contract documents.
- E. The Proposal shall be signed and sealed in envelope clearly marked on the outside in the lower left-hand corner "Bid for the On-Call Storm and Sanitary Sewer Pipe Lining, Milford, Connecticut", and the envelope should bear on the outside upper left-hand corner the name of the Bidder and his address. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope address to the Purchasing Agent at the mailing address given below:

**City of Milford Purchasing Agent  
70 West River Street  
Milford, CT 06460-3317**

- F. Mail or hand deliver bids to the above address no later than the time and date indicated in the Invitation to Bid. Bids sent by fax or e-mail are not acceptable and will not be considered.

3. MODIFICATIONS AND WITHDRAWAL OF BIDS:

- A. The Owner may waive any informalities, technical or minor defects or reject any and all bids if deemed by the Owner to be in the Owner's best interest. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof but shall not be withdrawn after the scheduled time for opening of the bids. Any bid received after the time and date specified shall not be considered. Bidders shall be bound by their bids for a period of 365 calendar days after the actual date of the opening of bids. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between Owner and the Bidder.
- B. Prior to bid opening, bids may be withdrawn upon written or telegraphic request of the Bidder provided confirmation of any telegraphic withdrawal, signed by the Bidder, is placed in the mail and postmarked prior to the time set for the bid opening. Bid documents and security of any Bidder withdrawing his bid in accordance with the foregoing conditions will be returned.

4. RIGHT TO ACCEPT/REJECT BIDS:

AFTER REVIEW OF ALL FACTORS, TERMS AND CONDITIONS, INCLUDING PRICE, THE PURCHASING AGENT OF THE CITY OF MILFORD RESERVES THE RIGHT TO REJECT ANY AND ALL BIDS, OR ANY PART THEREOF, OR WAIVE DEFECTS IN SAME, OR ACCEPT ANY PROPOSAL DEEMED TO BE IN THE BEST INTEREST OF THE CITY OF MILFORD, CONNECTICUT.

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INSTRUCTIONS AND INFORMATION FOR BIDDERS

5. EXAMINATION OF CONTRACT DOCUMENTS AND SITES:

- A. Each Bidder is solely responsible for inspecting the sites and for reading and being thoroughly familiar with the contract documents. The failure or omission of any Bidder to do any of the foregoing shall in no way relieve any Bidder from any obligation in respect to their bid and shall not expose the Owner to any liability to Bidder.
- B. The contract documents contain the provisions required for the construction of the project. Information obtained from an officer, agent, or employee of the Owner or any other person shall not affect the responsibilities, duties, risks or obligations assumed by the Contractor or relieve them from fulfilling any of the conditions of the contract.
- C. The Owner shall provide to Bidders, prior to bidding, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.
- D. No objection to or qualification concerning the validity, accuracy or appropriateness of the specifications or of the Invitation to Bid will be considered unless the Bidder submits a 'Request for Information' setting forth such objection or exception prior to the closing date for the bids. All bid proposals rendered shall be considered in strict compliance with the attached specifications unless exceptions are noted on a separate page dated and signed by the Bidder.
- E. If you believe that a possible conflict of interest may exist if you are awarded a contract, then you must disclose this potential or actual conflict in a statement attached to the back of the proposal form.

6. ADDENDA AND INTERPRETATIONS:

- A. Any request from a prospective Bidder for the interpretation of the meaning of the specifications or other contract documents, or any other question concerning the Project or bid documents, shall be made in writing to Westcott and Mapes, Inc., 142 Temple Street, New Haven, CT 06510, and to be given consideration must be received at least seven (7) days prior to the date fixed for the opening of bid proposals. Interpretations will be made by Westcott and Mapes, Inc. as requested, and all interpretations will be made in the form of written addenda to the contract documents, which addenda shall become a part of the contract. Not later than five (5) days prior to the date fixed for the opening of bid proposals, the addenda will be mailed to all persons who obtain contract documents in the manner described in the Invitation to Bid. Failure of any Bidder to acknowledge any such addenda shall not relieve any Bidder from any obligation under this bid proposal as submitted. No verbal requests or questions will be considered.
- B. Each Bidder shall be responsible for determining that they have received all addenda issued and shall acknowledge so on the Bid Form in the place provided.

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INSTRUCTIONS AND INFORMATION FOR BIDDERS

7. BIDS, BONDS, AND AWARD OF CONTRACT:

- A. Each bid must be accompanied by a bid bond, cash, certified check or a treasurer's or cashier's check issued by a responsible bank or trust company, payable to the City of Milford in the amount of five percent (5%) of the value of the bid. Once bid prices have been compared and successful Bidders are selected, the Owner will return the bid deposits.
- B. If a bid bond is used as bid security, it shall be prepared in the form of Bid Bond attached hereto, duly executed by the Bidder as principal and having as security thereon a security company approved by the Owner.
- C. Each Bidder shall sign his name in the space provided therefore. If the bid is made by a partnership, corporation, or limited liability company, the name and address of the partnership, corporation, or limited liability company shall be shown, together with the names of the partners, directors, shareholders, members, and/or the officers, as applicable. Bids shall be executed as follows:
  - 1. If by a partnership, a partner shall sign;
  - 2. If by a corporation, an officer shall sign; and/or
  - 3. If by a limited liability company, a member shall sign.
- D. A conditional or qualified Bid will not be accepted.
- E. Award will be made subject to all governmental approvals, including but not limited to Inland Wetlands and Planning & Zoning approvals, and the appropriation of necessary funding on terms acceptable to the Owner, to the responsible and qualified Bidder(s) possessing the skill, ability, and integrity necessary for the faithful and timely performance of the work.
- F. If tie bids are received which are equal as to price, quality and service, a bid received from a business which submits a 'Drug Free Workplace Certification' with the bid will be given preference in accordance with Milford's Code of Ordinances, Chapter 2, Article V, Division 2, Sec. 2-90.
- G. The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the work and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the agreement and to complete the work contemplated therein.
- H. The selected Bidder(s) shall supply the names and addresses of major material suppliers and subcontractors when required to do so by the Owner.
- I. A performance bond and a payment bond, each in the amount of 100 percent of the contract price, with a T-listed surety qualified to do business as a surety under the laws of the State of Connecticut and satisfactory to the Owner, will be required of the General Contractor for the faithful performance of the contract, and may be required

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INSTRUCTIONS AND INFORMATION FOR BIDDERS

by the General Contractor of Subcontractors. If bonds are required of subcontractors, the General Contractor shall include the cost of the premiums in its bid price. Bond amounts shall be increased if the price of work increases.

- J. Attorneys-in-fact who sign bid bonds or payment bonds and performance bonds must file with each bond a notarized and effective dated copy of their power of attorney.

8. EXECUTION OF THE AGREEMENT:

- A. The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance bond, payment bond and certificates of insurance within ten (10) calendar days from the date when notice of award is delivered to the Bidder. The notice of award shall be accompanied by the necessary agreement and bond forms. If any Bidder fails to execute the Agreement and furnish a performance bond and a labor and materials or payment bond as stated in his Bid, his bid deposit shall become the property of the Owner as liquidated damages, provided that in case of death, disability or other unforeseen circumstances affecting the Bidder, his bid deposit may be returned to him.
- B. The Owner within ten (10) calendar days of receipt of acceptable performance bond, payment bond, certificates of insurance and Agreement signed by the party to whom the contract was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the Owner not execute the Agreement within such period, the Bidder may, by written notice, withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

9. NOTICE TO PROCEED:

The Notice to Proceed shall be issued within ten (10) calendar days of the execution of the Agreement by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Owner and the Contractor. If the Notice to Proceed has not been issued within the ten (10) day period or within the period mutually agreed upon, the Contractor may terminate the Agreement without further liability on the part of either party.

10. WAGE RATES:

- A. The wages paid to mechanics, teamsters and laborers shall not be less than the customary and prevailing rate of wages for a day's work in the same trade or occupation in the locality where the work is to be done, as prescribed by the Commissioner of Labor and set forth in the Articles, and in accordance with the provisions of Section 31-53 of the General Statutes as amended. State Wage Rates will apply to the work of this contract. All construction shall be covered by heavy construction rates. Note that these wage rates are subject to annual adjustment as required by the Connecticut General Statutes. No increase in the lump sum bid for this project cost will be permitted due to these adjustments in wage rates.

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INSTRUCTIONS AND INFORMATION FOR BIDDERS

- B. It is the responsibility of the Contractor before bid opening to request, if necessary, any additional information on State Wage Rates for those tradespeople who are not covered by the applicable State Wage Determination but who may be employed for the proposed work under this contract.

11. LAWS AND REGULATIONS:

- A. The Contractor shall keep himself informed fully of, and comply with, all laws, ordinances and regulations of the Federal, State and Municipal governments which may be in force during the term of this contract, in any manner affecting Contractor's employees, subcontractors, or the conduct of the work or the materials used or employed in the work.
- B. This project is subject to all of the OSHA Safety and Health Regulations (see 29 CFR Part 1926/1910 and all subsequent amendments) as promulgated by the United States Department of Labor on June 24, 1974.

12. INSPECTION OF THE WORK:

The Contractor shall provide at all times proper facilities for access and inspection by Representatives of the Owner, Federal, State or other agency having jurisdiction over the work of this project.

13. SALES TAX:

This project is exempt from State Sales or Use Taxes of the State of Connecticut under Connecticut General Statutes Chapter 219, Section 12-412, sub-section A and from Federal excise tax. Do not include these taxes in your bid.

14. GUARANTEES:

- A. In addition to other guarantees due the Owner, the Contractor guarantees that the work and services to be performed under the contract, and all workmanship, materials and equipment performed, furnished, used or installed shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the contract documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the contract shall be fulfilled. This guarantee shall be for a period of one (1) year from and after the date of completion and acceptance of the work unless otherwise specified herein. The performance bond shall remain in full force and effect through the guarantee period.
- B. If at any time within the said period of guarantee any part of the work requires repairing, correction or replacement, the Owner may notify the Contractor in writing to make the required repairs, correction, or replacements. If the Contractor neglects to commence making such repairs, corrections, or replacements to the satisfaction of the Owner within five (5) days from the date of receipt of such notice, or having commenced fails to prosecute such work with diligence, the Owner may employ other persons to make

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- the same, and all direct and indirect costs of making said repairs, correction or replacements, including compensation for additional professional services, shall be paid by the Contractor, and/or deducted from any payments to be made by Owner to Contractor.
15. EEO/AA REQUIREMENTS:
- A. Contracts for work under this proposal will obligate the contractors and subcontractors to file a written or electronic non-discrimination certification with the Commission on Human Rights and Opportunities, that they will not discriminate in employment practices.
  - B. Bidders must, if requested, submit a compliance report concerning their employment practices and policies in order to maintain their eligibility to receive the award of the contract.
16. LIQUIDATED DAMAGES:
- TIME IS OF THE ESSENCE OF THIS CONTRACT AND WITH REGARD TO THE CONTRACTOR'S PERFORMANCE OF THE WORK. In consideration of anticipated damages that are difficult to quantify, the parties have knowingly and voluntarily agreed to an estimate of the damages to be incurred by the Owner in the event of delay. The amount specified in the Agreement Form as the liquidated damages amount and shall be paid by the Contractor to the Owner for each and every calendar day in which any work of this contract is uncompleted after the time stipulated for such completion, and the prices bid shall be fixed with regard to this provision. The parties agree that the liquidated damages sum is not a penalty, rather, is intended to represent the parties' best estimate of damages to be incurred by the Owner in the event of default by the Contractor.
17. PERMITS AND EASEMENTS:
- The Contractor will be responsible for securing all necessary permits, state and local, as required by the City of Milford.
18. DRUG AND ALCOHOL TESTING:
- Prior to award of the contract, the successful Bidder must establish compliance with the drug and alcohol testing mandated under state and federal law by providing a certificate which verifies that each of the Contractor's, or its subcontractor's, licensed CDL drivers or operators was tested and found to be alcohol and drug free at the time the license was issued or renewed.



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INSTRUCTIONS AND INFORMATION FOR BIDDERS

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19. CONFLICT OF INTEREST:

No officer or employee or member of any elective or appointive board, commission or committee of the City, whether temporary or permanent, shall have or acquire any financial interest gained from a successful Bid, direct or indirect, in any project, matter, contract or business within his jurisdiction or the jurisdiction of the board, commission or committee of which he is a member; nor shall the officer/employee/member have any financial interest, direct or indirect, in any contract or proposed contract for materials or services to be furnished or used in connection with any project, matter or thing which comes under his jurisdiction or the jurisdiction of the board, commission or committee of which he is a member.

END OF SECTION

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BID FORM

PROJECT: **On-Call Storm and Sanitary  
Sewer Pipe Lining  
Milford, CT**

BID SUBMITTED BY:

---

Company Name

---

Street Address

---

City, State and Zip Code

---

Contact

---

Telephone

Email Address

All blank spaces on the BID SCHEDULE must be filled in, in ink and in both words and figures where required. No changes shall be made in the wording or numbers on the BID SCHEDULE form. Written amounts shall govern where the amount stated in writing and the amount stated in figures does not agree.

The Bidder shall sign his BID in the blank space provided therefore. If the Bidder is a corporation, the legal name of the corporation shall be set forth in the BID SCHEDULE, together with the signature of the officer or officers authorized to sign Contracts on behalf of the corporation. If the Bidder is a partnership, the true name of the firm shall be set forth in the BID SCHEDULE, together with the signature of the partner or partners authorized to sign Contracts on behalf of the partnership. If the signature is by an agent, other than an officer of a corporation or a member of a partnership, a notarized power-of-attorney must be submitted with the BID otherwise the BID may be rejected.

A. BID SCHEDULE:

The Bidder agrees to perform all work described in the contract documents in accordance with the following bid schedule.

**(See page 2 through 26 of Bid Form for Bid Schedule)**

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BID FORM

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

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Description with Unit Price or Lump Sum Bid in Words</u>	<u>Unit Price Dollars &amp; Cents</u>	<u>Extended Total Dollars &amp; Cents</u>
<b>1. STORM SEWERS</b>				
1a.		STORM SEWER PIPE CLEANING AND TELEVISION INSPECTION		
1a-1.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 6" to 12" Diameter Mainline Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1a-2.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 14" to 18" Diameter Mainline Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1a-3.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 20" to 24" Diameter Mainline Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1a-4.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 27" to 30" Diameter Mainline Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
1a-5.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 36" Diameter Mainline Storm Sewer Pipe _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1a-6.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 42" Diameter Mainline Storm Sewer Pipe _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1a-7.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 48" Diameter Mainline Storm Sewer Pipe _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1b.		STORM SEWER PIPE LINING 0' TO 100' LENGTH		
1b-1.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 6" to 12" Diameter Mainline Storm Sewer Pipe 0' to 100' Length _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

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BID FORM

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

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
1b-2.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 14" to 18" Diameter Mainline Storm Sewer Pipe 0' to 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1b-3.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 20" to 24" Diameter Mainline Storm Sewer Pipe 0' to 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1b-4.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 27" to 30" Diameter Mainline Storm Sewer Pipe 0' to 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1b-5.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 36" Diameter Mainline Storm Sewer Pipe 0' to 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1b-6.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 42" Diameter Mainline Storm Sewer Pipe 0' to 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
1b-7.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 48" Diameter Mainline Storm Sewer Pipe 0' to 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1c.		STORM SEWER PIPE LINING > 100' LENGTH		
1c-1.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 6" to 12" Diameter Mainline Storm Sewer Pipe > 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1c-2.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 14" to 18" Diameter Mainline Storm Sewer Pipe > 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1c-3.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 20" to 24" Diameter Mainline Storm Sewer Pipe > 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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Payment will be based on actual quantities constructed.

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
1c-4.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 27" to 30" Diameter Mainline Storm Sewer Pipe > 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1c-5.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 36" Diameter Mainline Storm Sewer Pipe > 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1c-6.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 42" Diameter Mainline Storm Sewer Pipe > 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1c-7.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 48" Diameter Mainline Storm Sewer Pipe > 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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Payment will be based on actual quantities constructed.

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
1d.		STORM SEWER PIPE LINING FOR OUTFALLS		
1d-1.	*300 LF	Cured-In-Place Pipe (CIPP) Lining for 6" to 12" Diameter Outfall Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1d-2.	*300 LF	Cured-In-Place Pipe (CIPP) Lining for 14" to 18" Diameter Outfall Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1d-3.	*300 LF	Cured-In-Place Pipe (CIPP) Lining for 20" to 24" Diameter Outfall Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1d-4.	*300 LF	Cured-In-Place Pipe (CIPP) Lining for 27" to 30" Diameter Outfall Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1d-5.	*300 LF	Cured-In-Place Pipe (CIPP) Lining for 36" Diameter Outfall Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____



SECTION 00400

BID FORM

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Payment will be based on actual quantities constructed.

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
1d-6.	*300 LF	Cured-In-Place Pipe (CIPP) Lining for 42" Diameter Outfall Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1d-7.	*300 LF	Cured-In-Place Pipe (CIPP) Lining for 48" Diameter Outfall Storm Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1e.		STORM SEWER POINT REPAIRS 0' TO 12' DEEP		
1e-1.	*20 LF	HDPE Pipe Point Repair for 6" to 12" Diameter Mainline Storm Sewer Pipe 0' to 12' Deep _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1e-2.	*20 LF	HDPE Pipe Point Repair for 14" to 18" Diameter Mainline Storm Sewer Pipe 0' to 12' Deep _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1e-3.	*20 LF	HDPE Pipe Point Repair for 20" to 24" Diameter Mainline Storm Sewer Pipe 0' to 12' Deep _____dollars and _____cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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Payment will be based on actual quantities constructed.

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
1e-4.	*20 LF	HDPE Pipe Point Repair for 27" to 30" Diameter Mainline Storm Sewer Pipe 0' to 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1e-5.	*20 LF	HDPE Pipe Point Repair for 36" Diameter Mainline Storm Sewer Pipe 0' to 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1e-6.	*20 LF	HDPE Pipe Point Repair for 42" Diameter Mainline Storm Sewer Pipe 0' to 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1e-7.	*20 LF	HDPE Pipe Point Repair for 48" Diameter Mainline Storm Sewer Pipe 0' to 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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Payment will be based on actual quantities constructed.

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
1f.		STORM SEWER POINT REPAIRS > 12' DEEP		
1f-1.	*20 LF	HDPE Pipe Point Repair for 6" to 12" Diameter Mainline Storm Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1f-2.	*20 LF	HDPE Pipe Point Repair for 14" to 18" Diameter Mainline Storm Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1f-3.	*20 LF	HDPE Pipe Point Repair for 20" to 24" Diameter Mainline Storm Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
1f-4.	*20 LF	HDPE Pipe Point Repair for 27" to 30" Diameter Mainline Storm Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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Payment will be based on actual quantities constructed.

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
1f-5.	*20 LF	HDPE Pipe Point Repair for 36" Diameter Mainline Storm Sewer Pipe > 12' Deep  _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1f-6.	*20 LF	HDPE Pipe Point Repair for 42" Diameter Mainline Storm Sewer Pipe > 12' Deep  _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
1f-7.	*20 LF	HDPE Pipe Point Repair for 48" Diameter Mainline Storm Sewer Pipe > 12' Deep  _____dollars and _____cents per Linear Foot	\$ _____	\$ _____

**2. SANITARY SEWERS**

2a. SANITARY SEWER PIPE CLEANING AND TELEVISION INSPECTION

2a-1.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 6" to 12" Diameter Mainline Sanitary Sewer Pipe  _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
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SECTION 00400

BID FORM

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Payment will be based on actual quantities constructed.

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
2a-2.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 14" to 18" Diameter Mainline Sanitary Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2a-3.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 20" to 24" Diameter Mainline Sanitary Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2a-4.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 27" to 30" Diameter Mainline Sanitary Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2a-5.	*1,000 LF	Line Cleaning, Root Removal, and Television Inspection for 36" Diameter Mainline Sanitary Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2a-6.	*300 LF	Line Cleaning, Root Removal, and Television Inspection for 42" Diameter Mainline Sanitary Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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Payment will be based on actual quantities constructed.

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Description with Unit Price or Lump Sum Bid in Words</u>	<u>Unit Price Dollars &amp; Cents</u>	<u>Extended Total Dollars &amp; Cents</u>
2a-7.	*300 LF	Line Cleaning, Root Removal, and Television Inspection for 48" Diameter Mainline Sanitary Sewer Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2b.		SANITARY SEWER PIPE LINING 0' TO 100' LENGTH		
2b-1.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 6" to 12" Diameter Mainline Sanitary Sewer Pipe 0' to 100' Length _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2b-2.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 14" to 18" Diameter Mainline Sanitary Sewer Pipe 0' to 100' Length _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2b-3.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 20" to 24" Diameter Mainline Sanitary Sewer Pipe 0' to 100' Length _____dollars and _____cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
2b-4.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 27" to 30" Diameter Mainline Sanitary Sewer Pipe 0' to 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2b-5.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 36" Diameter Mainline Sanitary Sewer Pipe 0' to 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2b-6.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 42" Diameter Mainline Sanitary Sewer Pipe 0' to 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2b-7.	*100 LF	Cured-In-Place Pipe (CIPP) Lining for 48" Diameter Mainline Sanitary Sewer Pipe 0' to 100' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
2c.		SANITARY SEWER PIPE LINING 100' TO 600' LENGTH		
2c-1.	*600 LF	Cured-In-Place Pipe (CIPP) Lining for 6" to 12" Diameter Mainline Sanitary Sewer Pipe 100' to 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2c-2.	*600 LF	Cured-In-Place Pipe (CIPP) Lining for 14" to 18" Diameter Mainline Sanitary Sewer Pipe 100' to 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2c-3.	*600 LF	Cured-In-Place Pipe (CIPP) Lining for 20" to 24" Diameter Mainline Sanitary Sewer Pipe 100' to 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2c-4.	*600 LF	Cured-In-Place Pipe (CIPP) Lining for 27" to 30" Diameter Mainline Sanitary Sewer Pipe 100' to 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____



SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
2c-5.	*600 LF	Cured-In-Place Pipe (CIPP) Lining for 36" Diameter Mainline Sanitary Sewer Pipe 100' to 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2c-6.	*300 LF	Cured-In-Place Pipe (CIPP) Lining for 42" Diameter Mainline Sanitary Sewer Pipe 100' to 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2c-7.	*300 LF	Cured-In-Place Pipe (CIPP) Lining for 48" Diameter Mainline Sanitary Sewer Pipe 100' to 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2d.		SANITARY SEWER PIPE LINING > 600' LENGTH		
2d-1.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 6" to 12" Diameter Mainline Sanitary Sewer Pipe > 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
2d-2.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 14" to 18" Diameter Mainline Sanitary Sewer Pipe > 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2d-3.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 20" to 24" Diameter Mainline Sanitary Sewer Pipe > 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2d-4.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 27" to 30" Diameter Mainline Sanitary Sewer Pipe > 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2d-5.	*1,000 LF	Cured-In-Place Pipe (CIPP) Lining for 36" Diameter Mainline Sanitary Sewer Pipe > 600' Length  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
2e.		SANITARY SEWER LATERALS		
2e-1.	10 EA	Cut and Remove Protruding Service Lateral in Mainline Sanitary Sewer Pipe _____dollars and _____cents per Each	\$ _____	\$ _____
2e-2.	50 EA	Reinstate Service Lateral in Mainline Sanitary Sewer Pipe _____dollars and _____cents per Each	\$ _____	\$ _____
2e-3.	*500 LF	Line Cleaning, Root Removal, and Television Inspection for 4" to 8" Diameter Service Lateral Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2e-4.	*500 LF	Cured-In-Place Pipe (CIPP) Lining for 4" to 8" Diameter Service Lateral Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2e-5.	*500 LF	Chemical Grouting for 4" to 8" Diameter Service Lateral Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
2e-6.	*200 LF	Replace 6" Diameter PVC Service Lateral Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2e-7.	*200 LF	Replace 8" Diameter PVC Service Lateral Pipe _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2f.		SANITARY SEWER POINT REPAIRS 0' TO 12' DEEP		
2f-1.	*20 LF	PVC Pipe Point Repair for 6" to 12" Diameter Mainline Sanitary Sewer Pipe 0' to 12' Deep _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2f-2.	*20 LF	PVC Pipe Point Repair for 14" to 18" Diameter Mainline Sanitary Sewer Pipe 0' to 12' Deep _____dollars and _____cents per Linear Foot	\$ _____	\$ _____
2f-3.	*20 LF	PVC Pipe Point Repair for 20" to 24" Diameter Mainline Sanitary Sewer Pipe 0' to 12' Deep _____dollars and _____cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
2f-4.	*20 LF	PVC Pipe Point Repair for 27" to 30" Diameter Mainline Sanitary Sewer Pipe 0' to 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2f-5.	*20 LF	PVC Pipe Point Repair for 36" Diameter Mainline Sanitary Sewer Pipe 0' to 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2f-6.	*20 LF	PVC Pipe Point Repair for 42" Diameter Mainline Sanitary Sewer Pipe 0' to 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2f-7.	*20 LF	PVC Pipe Point Repair for 48" Diameter Mainline Sanitary Sewer Pipe 0' to 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
2g.		SANITARY SEWER POINT REPAIRS > 12' DEEP		
2g-1.	*20 LF	PVC Pipe Point Repair for 6" to 12" Diameter Mainline Sanitary Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2g-2.	*20 LF	PVC Pipe Point Repair for 14" to 18" Diameter Mainline Sanitary Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2g-3.	*20 LF	PVC Pipe Point Repair for 20" to 24" Diameter Mainline Sanitary Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2g-4.	*20 LF	PVC Pipe Point Repair for 27" to 30" Diameter Mainline Sanitary Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
2g-5.	*20 LF	PVC Pipe Point Repair for 36" Diameter Mainline Sanitary Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2g-6.	*20 LF	PVC Pipe Point Repair for 42" Diameter Mainline Sanitary Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
2g-7.	*20 LF	PVC Pipe Point Repair for 48" Diameter Mainline Sanitary Sewer Pipe > 12' Deep  _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____

**3. MANHOLES AND CATCH BASINS**

3a. MANHOLE REHABILITATION

3a-1.	*10 EA	Cementitious Liner for Rehabilitation of Manhole 0' to 12' Deep  _____ dollars and _____ cents per Each	\$ _____	\$ _____
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SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
3a-2.	*10 EA	Cementitious Liner for Rehabilitation of Manhole 12' to 20' Deep  _____dollars and _____cents per Each	\$ _____	\$ _____
3a-3.	*5 EA	Cementitious Liner for Rehabilitation of Manhole 20' to 30' Deep  _____dollars and _____cents per Each	\$ _____	\$ _____
3a-4.	*10 EA	Cementitious Liner with Chemical Protective Coating for Rehabilitation of Manhole 0' to 12' Deep  _____dollars and _____cents per Each	\$ _____	\$ _____
3a-5.	*10 EA	Cementitious Liner with Chemical Protective Coating for Rehabilitation of Manhole 12' to 20' Deep  _____dollars and _____cents per Each	\$ _____	\$ _____
3a-6.	*5 EA	Cementitious Liner with Chemical Protective Coating for Rehabilitation of Manhole 20' to 30' Deep  _____dollars and _____cents per Each	\$ _____	\$ _____



SECTION 00400

BID FORM

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<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
3a-7.	*20 Sets	New Standard Manhole Frame and Cover _____dollars and _____cents per Set	\$ _____	\$ _____
3a-8.	*20 Sets	New Watertight Manhole Frame and Cover _____dollars and _____cents per Set	\$ _____	\$ _____
3b.		MANHOLE AND CATCH BASIN REPLACEMENTS		
3b-1.	*2 EA	4' Diameter Manhole 0' to 12' Deep (Complete) _____dollars and _____cents per Each	\$ _____	\$ _____
3b-2.	*2 EA	4' Diameter Manhole 12' to 20' Deep (Complete) _____dollars and _____cents per Each	\$ _____	\$ _____
3b-3.	*2 EA	4' Diameter Manhole 20' to 30' Deep (Complete) _____dollars and _____cents per Each	\$ _____	\$ _____

SECTION 00400

BID FORM

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Payment will be based on actual quantities constructed.

<b><u>Item No.</u></b>	<b><u>Estimated Quantity</u></b>	<b><u>Description with Unit Price or Lump Sum Bid in Words</u></b>	<b><u>Unit Price Dollars &amp; Cents</u></b>	<b><u>Extended Total Dollars &amp; Cents</u></b>
3b-4.	*2 EA	5' Diameter Manhole 0' to 12' Deep (Complete)  _____ dollars and _____ cents per Each	\$ _____	\$ _____
3b-5.	*2 EA	5' Diameter Manhole 12' to 20' Deep (Complete)  _____ dollars and _____ cents per Each	\$ _____	\$ _____
3b-6.	*2 EA	5' Diameter Manhole 20' to 30' Deep (Complete)  _____ dollars and _____ cents per Each	\$ _____	\$ _____
3b-7.	*2 EA	Standard Catch Basin (Complete)  _____ dollars and _____ cents Per Each	\$ _____	\$ _____

**4. TRAFFIC CONTROL**

4a.	*1 LS	Services of Uniformed Special Officers Twenty Thousand _____ dollars and _____ Zero _____ cents per Linear Foot	\$ 20,000.00	\$ 20,000.00
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SECTION 00400

BID FORM

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

<u>Item No.</u>	<u>Estimated Quantity</u>	<u>Description with Unit Price or Lump Sum Bid in Words</u>	<u>Unit Price Dollars &amp; Cents</u>	<u>Extended Total Dollars &amp; Cents</u>
<b>5. SOIL EROSION AND SEDIMENT CONTROL</b>				
5a.	*100 LF	Filter Sock (Minimum bid \$3.00 per linear foot) _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
5b.	*100 LF	Silt Fence (Minimum bid \$3.00 per linear foot) _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
5c.	*100 LF	Hay Bale Barrier (Minimum bid \$3.00 per linear foot) _____ dollars and _____ cents per Linear Foot	\$ _____	\$ _____
5d.	*10 EA	Catch Basin Silt Sack (Minimum bid \$50.00 per each) _____ dollars and _____ cents per Each	\$ _____	\$ _____

TOTAL AMOUNT OF BID PROPOSAL ITEMS 1a. THROUGH 5d. ABOVE, INCLUSIVE.

Written Figures \$ \_\_\_\_\_  
Dollars and Cents

SECTION 00400

BID FORM

B. BID ITEMS, QUANTITIES, AND WORK ORDERS:

1. The Bid Schedule includes an extensive range of bid items for the potential storm and sanitary sewer system rehabilitation and repair work to be performed throughout the City of Milford. The City does not guarantee the performance of any/all items listed in the Bid Form. The work is to be performed on an as-needed basis during the contract term, as determined by the City.
2. The quantities in this Bid Form are for the purposes of obtaining and comparing Bids only. These quantities do not reflect the actual work to be performed. The final quantities will be determined by the actual work to be completed on an individual project-by-project basis.
3. The minimum dollar amount for any work order issued under this on-call contract is \$50,000.00. Work order dollar amounts shall be established using the Unit Prices listed above, for the specific work items and quantities fulfilled.

C. UNIT PRICES:

1. Due to possible changes in the scope of work during construction, the above Bids shall be subject to change as noted through Unit Prices. Each price given is the final price to the Owner and includes all overhead and profit of the Bidder.
2. The Unit Prices listed above, if accepted in the award of this Contract, shall be used in establishing the adjustment of Contract Price for additions to, or deductions from, the Work in accordance with the applicable Section of the General Conditions. The Unit Prices listed shall include all costs (material, labor, and equipment), profit and overhead; and no further surcharges are to be added to any Unit Price item for additions to, or reductions from, the Work.
3. Lack of complete Unit Price may be grounds to disqualify the Bid.
4. The Unit Prices listed are stated in summary form. See Technical Specifications for a description of all work.

D. ORDINANCE REGARDING NATURAL GAS WASTE AND OIL WASTE:

We \_\_\_\_\_ hereby submit a Bid for materials, equipment and/or labor for the City of Milford. The Bid is for bid documents titled On-Call Storm and Sanitary Sewer Pipe Lining. We hereby certify under penalty of perjury that no natural gas waste or oil waste will be used by the undersigned Bidder or any Contractor, Subcontractor, agent or vendor agent in connection with the Bid; nor will the undersigned Bidder or any Contractor, Subcontractor, agent or vendor agent thereof apply any natural gas waste or oil waste to any road or real property within the City of Milford as a result of the submittal of this Bid if selected.

SECTION 00400

BID FORM

E. ADDENDA:

The following Addenda for this Contract were received:

NUMBER

DATE

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

DATED AT \_\_\_\_\_  
(Town or City) (State)

THIS \_\_\_\_\_ OF \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_  
(Name of Bidder)

BY: \_\_\_\_\_  
(Signature)

NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

\_\_\_\_\_  
License Number (if applicable)

BUSINESS ADDRESS:

\_\_\_\_\_

\_\_\_\_\_

END OF SECTION

SECTION 00405

NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

State of \_\_\_\_\_ )  
County of \_\_\_\_\_ ) SS:

\_\_\_\_\_, being first duly sworn, deposes and says that:

- (1) He is \_\_\_\_\_ of \_\_\_\_\_  
\_\_\_\_\_, the Bidder that has submitted the attached Bid;
- (2) He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
- (3) Such Bid is genuine and is not a collusive or sham Bid;
- (4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid price of any Bidder, or to fix any overhead, profit or costs element of the Bid price or the Bid price of any Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of Milford or any person interested in the proposed Contract; and
- (5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name and Title

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

\_\_\_\_\_  
Notary Public

My Commission Expires \_\_\_\_\_

END OF SECTION



SECTION 00410

BID BOND

IN WITNESS WHEREOF, the Principal and the Surety hereunto set their hands and seals, and such of them are as corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

PRINCIPAL:

\_\_\_\_\_  
Bidder's Name (L.S.)

By: \_\_\_\_\_  
Signature and Title

SURETY:

\_\_\_\_\_  
Name of Surety (L.S.)

By: \_\_\_\_\_  
Signature and Title

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

END OF SECTION



SECTION 00450

STATEMENT OF BIDDER'S QUALIFICATIONS

THE BIDDER SHALL COMPLETE THIS STATEMENT AND SUBMIT IT WITH HIS BID.

All questions must be answered and the information given must be accurate, clear, and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information he desires.

1. Name of Bidder.

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2. Bidder's Internal Revenue Service Tax I.D. Number.

---

3. Permanent main office address and telephone number.

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4. When organized.

---

5. If an entity, what type and where organized.

---

6. How many years has your company been engaged in construction under your present firm or trade name?

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7. Describe the general character of work performed by you.

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8. Has your company ever failed to complete any work awarded to you? If so, give dates, project names and reasons therefore.

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9. Has your company ever defaulted on a contract? If so, when, where and why?

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SECTION 00450

STATEMENT OF BIDDER'S QUALIFICATIONS

10. List the construction experience of the principal individuals of your organization.

INDIVIDUAL'S NAME	YEARS OF CONSTRUCTION EXPERIENCE	PRESENT POSITION AND YEARS OF EXPERIENCE	PREVIOUS POSITION AND YEARS OF EXPERIENCE	DOLLAR VOLUME RESPONSIBILITY

SECTION 00450

STATEMENT OF BIDDER'S QUALIFICATIONS

11. Has any officer, director, stockholder, partner, or member, as applicable, of your organization ever been an officer, director, stockholder, partner, or member of some other organization that failed to complete a construction contract?

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If so, state name of individual, other organization, dates, projects, and reasons therefore.

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12. Has any officer, director, stockholder, partner, or member of your organization ever failed to complete a construction contract handled in its name?

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If so, state name of individual and reason(s) therefore.

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13. In what other business do you or your entity have a financial interest?

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SECTION 00450

STATEMENT OF BIDDER'S QUALIFICATIONS

14. List of contracts that will show the various types of work completed by your organization in the past five (5) years and/or presently under construction.

NAME AND ADDRESS* OF OWNER	NAME AND LOCATION OF PROJECT-KIND OR WORK	NAME OF PRIME CONTRACTOR, IF YOU ARE A SUBCONTRACTOR	CONTRACT PRICE	Was the contract completed on time? If NO, explain why under No. 16	Were there any penalties imposed? If YES, give amount and explain under No. 16	Were there any liens, claims, or stop notices filed against the job? If YES, explain under No. 16

\*Address must be adequate to assure reply to inquiry and verification

SECTION 00450

STATEMENT OF BIDDER'S QUALIFICATIONS

15. List equipment owned and indicate those available for this contract. Also list and indicate separately, equipment under lease or otherwise available to you, with attached explanation of the arrangements. The list of equipment should be identical with those shown in your Financial Statement, and must be shown below to be credited with the technical evaluation of your application.

QUANTITY	ITEM	SIZE OR CAPACITY	CONDITION	YEARS OF SERVICE

SECTION 00450

STATEMENT OF BIDDER'S QUALIFICATIONS

16. Explanation of details in connection with non-completion of contracts; penalties imposed; liens, claims, and stop notices filed against contracts under No. 14.

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17. If you are a parent organization and desire to do business in Connecticut through branch offices, indicate below the official name and address of each branch:

NAME

ADDRESS

<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

18. Will you, upon request, provide a detailed financial statement and furnish any other information that may be required by the Owner?

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19. Have you, in the past ten (10) years, been a party to mediation, arbitration or litigation proceedings arising out of or relating to your performance on a construction project. If so, identify the name of the proceeding, the nature of the claim against or by you, the venue of the proceeding and the outcome.

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SECTION 00450

STATEMENT OF BIDDER'S QUALIFICATIONS

20. The undersigned hereby authorizes and requests any persons, firm, or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Statement of Bidder's Qualifications.

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Name of Bidder

By: \_\_\_\_\_

Title: \_\_\_\_\_

State of \_\_\_\_\_ )  
County of \_\_\_\_\_ ) SS:

\_\_\_\_\_ being duly sworn, deposes and says

that he is \_\_\_\_\_ of \_\_\_\_\_  
and that the answers to the foregoing questions and all statements therein are true and correct and sworn under penalties of perjury.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name and Title

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Notary Public

My Commission Expires \_\_\_\_\_

END OF SECTION

SECTION 00460

DRUG FREE WORKPLACE CERTIFICATE

I hereby certify that this company:

1. Has a published statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and that this statement specifies the actions which will be taken against employees for violations of such prohibition.
2. Has a written policy informing employees about the dangers of drug abuse in the workplace, the firm's policy of maintaining a drug free workplace, any available counseling, rehabilitation, and employee assistance programs, and the penalties which may be imposed upon employees for drug use violations.
3. Has or will provide a copy of the statements specified in Paragraphs 1 and 2 above to each employee engaged in providing the commodities or contractual services which are being bid.
4. Has or will notify its employees that, as a condition of working on the commodities or contractual services which are under bid, the employee will abide by the terms of the statement, as referenced in Paragraph 1 above, and will notify the employer of any conviction of, or plea of "guilty", or of "nolo contendere" to any violation of any controlled substance law of the United States or of any state, for a violation occurring in the workplace no later than five (5) days after such conviction or plea.
5. Will impose a sanction on or require the satisfactory participation in a drug abuse assistance program or a rehabilitation program, if such are available in the employee's community, by any employee who is so convicted.
6. Will make a good faith effort to continue to maintain a drug free workplace.

As the person authorized to sign this statement, I certify that this firm fully complies with the above requirements.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

END OF SECTION



SECTION 00510

NOTICE OF AWARD

TO: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PROJECT: \_\_\_\_\_

The OWNER has considered the BID submitted by you for the above-described WORK in response to its Advertisement for Bids dated \_\_\_\_\_, 20\_\_ and its Instructions and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of:

\_\_\_\_\_ \$ \_\_\_\_\_

You are required by the Instructions and Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within ten (10) calendar days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_ (OWNER)

\_\_\_\_\_ (AUTHORIZED SIGNATURE)

\_\_\_\_\_ (NAME)

\_\_\_\_\_ (TITLE)

**ACCEPTANCE OF NOTICE:**

Receipt of the above NOTICE OF AWARD is hereby acknowledged by:

\_\_\_\_\_, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_ (SIGNATURE)

\_\_\_\_\_ (NAME)

\_\_\_\_\_ (TITLE)

END OF SECTION

SECTION 00520

AGREEMENT FORM

THIS AGREEMENT, made this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between the \_\_\_\_\_, hereinafter called the "OWNER", and \_\_\_\_\_, hereinafter called the "CONTRACTOR", doing business as a(n) \_\_\_\_\_ (corporation, partnership, limited liability company, or individual).

WITNESSETH: That for an in consideration of the payments and agreements hereinafter mentioned:

1. The Contractor will commence and complete the work for the \_\_\_\_\_.
2. The Contractor will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the Project described herein.
3. DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION:
  - 3.1. The Contractor will commence the Work required by the Contract Documents within the time specified in the Notice to Proceed issued following the execution of this Agreement, time being of the essence.
  - 3.2. The Contract Time shall be measured starting from the above Notice to Proceed date for commencement of the work.
  - 3.3. The Contractor shall achieve Substantial Completion of the entire Work not later than \_\_\_\_\_ calendar days from the date of the Notice to Proceed unless the period for Substantial Completion is extended otherwise as provided by the Contract Documents, time being of the essence, but in no event shall the Work be completed later than \_\_\_\_\_. Work performed beyond this Contract Time period for Substantial Completion will be subject to liquidated damages.

SECTION 00520

AGREEMENT FORM

4. **LIQUIDATED DAMAGES** – *It is expressly understood by the City and the Contractor that TIME IS OF THE ESSENCE WITH REGARD TO THE COMPLETION OF THE WORK since costs to the City will be increased as the time occupied by the Work is lengthened. Should the Contractor fail to complete the Work accepted by the City of Milford, or its designee, by the date of Substantial Completion as determined above and stated in the Notice to Proceed, the Contractor shall be liable for liquidated damages to the City in the amount of ONE THOUSAND FIVE HUNDRED (\$1,500.00) DOLLARS FOR EACH CALENDAR DAY BEYOND THE DATE OF SUBSTANTIAL COMPLETION until the written acceptance of the Work by the City of Milford, or its designee. The liquidated damages sum is not a penalty but rather represents the parties' reasonable estimate of damages to be incurred by the City in the event of the Contractor's schedule default. It is the parties' express intention to liquidate damages. However, if a court of competent jurisdiction holds that the liquidated damages provision is, for whatever reason, unenforceable, the City shall be entitled to recover its actual damages from the Contractor and its surety and insurers.*
5. The Contractor agrees to perform all of the work described in the Contract Documents and comply with the terms therein for the sums shown in the Bid Form.
6. The term "CONTRACT DOCUMENTS" means and includes the following:

Invitation to Bid

Instructions and Information for Bidders

Bid Form

Non-Collusion Affidavit of Prime Bidder

Bid Bond

Statement of Bidder's Qualifications

Drug Free Workplace Certificate

Notice of Award

SECTION 00520

AGREEMENT FORM

Agreement Form

Payment Bond

Performance Bond

Notice to Proceed

General Conditions

Supplementary Conditions

Change Order

Certificate of Substantial Completion

Waiver of Liens Prime Contractor

Certificate of Final Payment and Completion of Work

Technical Specifications prepared by Westcott and Mapes, Inc.

Drawings prepared by \_\_\_\_\_

Addendum No. \_\_\_\_\_, dated \_\_\_\_\_, 20

Addendum No. \_\_\_\_\_, dated \_\_\_\_\_, 20

Addendum No. \_\_\_\_\_, dated \_\_\_\_\_, 20

7. The Owner will pay to the Contractor in the manner and at such times as set forth in the General Conditions such amounts as required by the Contract Documents.
8. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

SECTION 00520

AGREEMENT FORM

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in \_\_\_\_\_ copies, each of which shall be deemed an original on the date first above written.

OWNER:

ATTEST:

\_\_\_\_\_

By: \_\_\_\_\_

By: \_\_\_\_\_

Name: \_\_\_\_\_

(Please Type)

Name: \_\_\_\_\_

(Please Type)

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Date: \_\_\_\_\_

CONTRACTOR:

ATTEST:

\_\_\_\_\_

By: \_\_\_\_\_

By: \_\_\_\_\_

Name: \_\_\_\_\_

(Please Type)

Name: \_\_\_\_\_

(Please Type)

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Date: \_\_\_\_\_

SECTION 00520

AGREEMENT FORM

APPROVED AS TO FORM:

\_\_\_\_\_  
Jonathan D. Berchem, Esquire, City Attorney

DATE: \_\_\_\_\_

APPROVED AS TO PURCHASING PROCEDURE:

\_\_\_\_\_  
Fred Bialka, Purchasing Agent

DATE: \_\_\_\_\_

*I DO HEREBY CERTIFY THAT FUNDS HAVE BEEN APPROPRIATED TO COVER THE  
LIABILITY OF THE CITY OF MILFORD, CONNECTICUT UNDER THE TERMS OF THIS  
AGREEMENT.*

\_\_\_\_\_  
Peter A. Erodici, Director of Finance

DATE: \_\_\_\_\_

END OF SECTION

SECTION 00600

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called Principal  
(Corporation, Partnership, Limited Liability Company, or Individual)

and \_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_, hereinafter called Surety  
(Address of Surety)

are held and firmly bound unto \_\_\_\_\_  
(Name of Owner)

\_\_\_\_\_  
(Address of Owner)

hereinafter called Owner, in the penal sum of \_\_\_\_\_  
Dollars, \$ (\_\_\_\_\_)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, joint and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that the Principal entered into a certain written Contract with the Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, which is hereto attached and made a part hereof for the construction of:

\_\_\_\_\_  
\_\_\_\_\_  
NOW, THEREFORE, if the Principal fails to make any payments as set forth below or as described in or related to said contract, it will be the responsibility of the said Surety, in compliance with the Little Miller Act, C.G.S. §49-41 *et seq.*, to pay for the said promptly, to the satisfaction of the Owner, and if said Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including, but not limited to, all amounts due for materials, lubricants, oil, gasoline, diesel fuel, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

SECTION 00600

PAYMENT BOND

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ (\_\_\_\_\_) counter-parts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

ATTEST:

\_\_\_\_\_  
(Principal) Secretary

\_\_\_\_\_  
Principal

BY:

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Address)



SECTION 00600

PAYMENT BOND

ATTEST:

_____	Surety
(Surety) Secretary	
	BY: _____
	Attorney-in-Fact
	_____
	(Name)
	_____
	(Address)
	_____
_____	
Witness as to Surety	
_____	
(Name)	
_____	
(Address)	
_____	

NOTE: Date of bond must not be prior to date of Contract. If Contractor is Partnership, all partners should execute bond.

IMPORTANT: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

END OF SECTION

SECTION 00610

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called Principal  
(Corporation, Partnership, Limited Liability Company, or Individual)

and \_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_, hereinafter called Surety  
(Address of Surety)

are held and firmly bound unto \_\_\_\_\_  
(Name of Owner)

\_\_\_\_\_  
(Address of Owner)

hereinafter called Owner, in the penal sum of \_\_\_\_\_  
Dollars, \$ (\_\_\_\_\_)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, joint and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that the Principal entered into a certain written Contract with the Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, which is hereto attached and made a part hereof for the construction of:

\_\_\_\_\_  
\_\_\_\_\_  
NOW, THEREFORE, if the Principal fails to complete the required work, undertakings, covenants, terms, conditions, and agreements described in the said Contract, the Surety will be responsible to promptly arrange for the completion of all the Work, as defined in said Contract, and other undertakings, covenants, terms, conditions, and agreements in the said Contract, to the satisfaction of the Owner, and if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify, defend and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then his obligation shall be void; otherwise to remain in full force and effect.

SECTION 00610

PERFORMANCE BOND

PROVIDED, FURTHER, if the Owner declares the Principal to be in default of the Contract and notifies the Surety of such default, the Surety shall, without delay and by no later than ten (10) calendar days from its receipt of the notice of default, meet with the Owner to discuss the nature of the default and promptly commence performance of its obligations under this performance bond.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ (\_\_\_\_\_) counter-parts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

ATTEST:

\_\_\_\_\_  
(Principal) Secretary

\_\_\_\_\_  
Principal

BY:

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Address)

SECTION 00610

PERFORMANCE BOND

ATTEST:

_____	Surety
(Surety) Secretary	
	BY: _____
	Attorney-in-Fact
	_____
	(Name)
	_____
	(Address)
	_____
_____	
Witness as to Surety	
_____	
(Name)	
_____	
(Address)	
_____	

NOTE: Date of bond must not be prior to date of Contract. If Contractor is Partnership, all partners should execute bond.

IMPORTANT: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

END OF SECTION

SECTION 00650

NOTICE TO PROCEED

Dated: \_\_\_\_\_, 20 \_\_\_\_

TO: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PROJECT: \_\_\_\_\_

CONTRACT FOR: \_\_\_\_\_  
\$ \_\_\_\_\_

You are hereby notified to commence WORK in accordance with the Agreement dated \_\_\_\_\_, 20\_\_\_\_ on or before \_\_\_\_\_, 20\_\_\_\_ and you are to complete the WORK within \_\_\_\_\_ consecutive calendar days thereafter. The date of completion of all WORK is therefore \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
(OWNER)

\_\_\_\_\_  
(AUTHORIZED SIGNATURE)

\_\_\_\_\_  
(NAME)

\_\_\_\_\_  
(TITLE)

**ACCEPTANCE OF NOTICE:**

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by:

\_\_\_\_\_, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
(SIGNATURE)

\_\_\_\_\_  
(NAME)

\_\_\_\_\_  
(TITLE)

END OF SECTION

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GENERAL CONDITIONS

- |  |   |
|--|---|
| 1. Definitions                                 | 19. Payments to Contractor                        |
| 2. Additional Instructions and Detail Drawings | 20. Acceptance of Final Payment as Release        |
| 3. Schedules, Reports, and Records             | 21. Insurance                                     |
| 4. Drawings and Specifications                 | 22. Contract Security                             |
| 5. Shop Drawings                               | 23. Assignments                                   |
| 6. Materials, Services, and Facilities         | 24. Indemnification                               |
| 7. Inspection and Testing                      | 25. Separate Contracts                            |
| 8. Substitutions                               | 26. Subcontracting                                |
| 9. Patents                                     | 27. Authority of the Engineer                     |
| 10. Surveys, Permits, and Regulations          | 28. Land and Rights-of-Way                        |
| 11. Protection of Work, Property, and Persons  | 29. Guaranty                                      |
| 12. Supervision by Contractor                  | 30. Claims and Disputes                           |
| 13. Changes in the Work                        | 31. Taxes   |
| 14. Changes in the Contract Price              | 32. Interpretation of Drawings and Specifications |
| 15. Time for Completion and Liquidated Damages | 33. Site Regulations                              |
| 16. Correction of Work                         | 34. Limitations of Data Presented                 |
| 17. Subsurface Conditions                      | 35. Health and Safety Equipment                   |
| 18. Suspension of Work, Termination, and Delay | 36. Municipal Set Aside Program                   |

1. DEFINITIONS:

Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

- 1.1. ADDENDA – Written or graphic instruments issued prior to the execution of the CONTRACT, which modify or interpret the CONTRACT DOCUMENTS and SPECIFICATIONS, by additions, deletion, clarifications, or corrections.
- 1.2. AWARDING AUTHORITY – The authorized agent or representative of the OWNER as defined herein for which the PROJECT shall be undertaken.
- 1.3. BID – The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.
- 1.4. BIDDER – Any person, firm, or corporation submitting a BID for the WORK.
- 1.5. BONDS – Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACT and its Surety in accordance with the CONTRACT DOCUMENTS.
- 1.6. CHANGE ORDER – A written order to the CONTRACTOR authorizing an addition, deletion, or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.
- 1.7. COMPLETION – That date, as certified by the ENGINEER, when the construction of the PROJECT (and all parts thereof) is fully completed in accordance with the CONTRACT DOCUMENTS, including but not limited to the satisfactory fulfillment

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GENERAL CONDITIONS

of, in the opinion of the ENGINEER, all punch list items, correction of any defective WORK, start-up and training, testing of equipment, submission and approval of operations and maintenance manuals, and record drawings. Should the CONTRACTOR not achieve COMPLETION within the specified time, or extension of time granted by the OWNER, then the provisions of liquidated dates shall apply.

- 1.8. CONTRACT – The CONTRACT DOCUMENTS form the CONTRACT for construction. The CONTRACT represents the entire and integrated agreement between the OWNER and the CONTRACTOR and supersedes prior negotiations, representations, or agreements, either written or oral.
- 1.9. CONTRACT DOCUMENTS – CONTRACT DOCUMENTS is defined in SECTION 00520 – AGREEMENT FORM.
- 1.10. CONTRACT PRICE – The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.
- 1.11. CONTRACT TIME – The number of calendar days stated in the CONTRACT DOCUMENTS to achieve COMPLETION of the WORK.
- 1.12. CONTRACTOR – The person, firm, or corporation with whom the OWNER has executed the CONTRACT.
- 1.13. DAYS – Days, as used in this document, shall be calendar days unless specifically noted otherwise.
- 1.14. DRAWINGS – The part of the CONTRACT DOCUMENTS that show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.
- 1.15. ENGINEER – The term ENGINEER as used in the CONTRACT DOCUMENTS shall mean Westcott and Mapes, Inc.
- 1.16. FIELD ORDER – A written order affecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.
- 1.17. NOTICE OF AWARD – The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.
- 1.18. NOTICE TO PROCEED – Written communication issued by the OWNER to the CONTRACTOR authorizing the CONTRACTOR to proceed with the WORK and establishing the date of commencement of the WORK.
- 1.19. OWNER – The term OWNER as used in the CONTRACT DOCUMENTS shall mean the City of Milford or other authorized representative.
- 1.20. PROJECT – The undertaking to be performed as provided in the CONTRACT DOCUMENTS.
- 1.21. RESIDENT PROJECT REPRESENTATIVE – The authorized representative of the OWNER who is assigned to the PROJECT site(s) or any part thereof.

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- 1.22. SHOP DRAWINGS – All drawings, diagrams, illustrations, brochures, schedules, and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER, or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.
- 1.23. SPECIFICATIONS – A part of the CONTRACT DOCUMENTS consisting of written descriptions of the technical nature of materials, equipment, construction systems, standard, and workmanship.
- 1.24. STATE – The State of Connecticut.
- 1.25. SUBCONTRACTOR – An individual, firm, or corporation having a direct contract with the CONTRACTOR, or with any other SUBCONTRACTOR, for the performance of a part of the WORK at the site(s).
- 1.26. SUBSTANTIAL COMPLETION – The date, as certified by the ENGINEER, when the construction of the PROJECT, or a specified part thereof, is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.
- 1.27. SUPPLEMENTARY CONDITIONS – Modifications to the GENERAL CONDITIONS required by an agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by the OWNER, the ENGINEER or applicable STATE laws.
- 1.28. SUPPLIER – Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site(s).
- 1.29. WORK – All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.
- 1.30. WRITTEN NOTICE – Any notice to any party to the CONTRACT relative to any part of this CONTRACT in writing and considered delivered and the service thereof completed, when posted by certified or registered mail, personally delivered or e-mailed to the said party at its last given address or number or delivered in-person to said party or its authorized representative on the WORK. Whenever the words “as directed”, “as permitted”, “as required”, or words of like effect are used, it shall be understood that the direction, permission, or requirements of the ENGINEER and/or the OWNER is intended, and similarly the words “approved”, “acceptable”, “satisfactory”, or words of like import shall mean approved or acceptable or satisfactory to the ENGINEER and/or the OWNER. Whenever the words “or equal” or words of like import are used, it shall be understood that this means equal in accordance with the following provisions; an item shall be considered equal if in the opinion of the ENGINEER and/or the OWNER; (1) it is at least equal in quality, durability, appearance, strength, and design; (2) it will perform at least equally the function imposed by the general design for the work being contracted for or the material being purchased; and (3) it conforms substantially, even with deviations, to the detailed requirements for the item. Whenever any power is possessed by, or act or thing is to be done by the OWNER under this CONTRACT, the exercise of such power or the doing of such act or thing by the AWARDING AUTHORITY shall be a sufficient compliance with the terms of this CONTRACT unless by law some other officer of the OWNER is required to act in the premises. Both the address given in the BID upon



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which this CONTRACT is founded and the CONTRACTOR'S office at or near the site(s) of the WORK are hereby designated as places to either of which notices, letters, and any other communications to the CONTRACTOR may be certified mailed or delivered. The delivering to the above-named place(s), or depositing in a post-paid wrapper directed to the first named place, in any post office box regularly maintained by the Post Office Department, of any notice, letter, or other communications to the CONTRACTOR, shall be deemed sufficient service thereof upon the CONTRACTOR, and the date of said service shall be the date of such delivery or mailing or at the time and date of the e-mail confirmation. The first named postal address and/or e-mail address may be changed at any time by an instrument in writing, executed and acknowledged by the CONTRACTOR and delivered to the ENGINEER. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon the CONTRACTOR personally.

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS:

- 2.1. The CONTRACTOR may be furnished additional instructions and detail DRAWINGS by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.
- 2.2. The additional DRAWINGS and instructions thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail DRAWINGS and instructions.

3. SCHEDULES, REPORTS, AND RECORDS:

- 3.1. Within ten (10) days after the WORK has commenced, the CONTRACTOR shall submit to the ENGINEER for approval a progress schedule in form satisfactory to the OWNER and ENGINEER, showing in detail its proposed progress for the construction of the various parts of the WORK and the proposed times for receiving the various materials required. The CONTRACTOR shall, at the end of each month or more often if required by the circumstances and actual progress of the WORK, furnish the ENGINEER two (2) copies of a chart showing actual progress of the various parts of the WORK in comparison with the originally proposed progress schedule as approved. If the progress of the WORK does not adhere to or comply with the original approved schedule, the CONTRACTOR shall submit, with its monthly report to the ENGINEER, a proposed recovery plan to achieve compliance with the original approved schedule at no additional cost to the OWNER. This is a material requirement of this CONTRACT and the failure of the CONTRACTOR to comply herewith shall be deemed a default. TIME IS OF THE ESSENCE WITH REGARD TO THE COMPLETION OF THE PROJECT AND THE DATES WITHIN THE PROGRESS SCHEDULE.
- 3.2. The CONTRACTOR shall, within five (5) days of its receipt of a Notice to Proceed, submit a schedule of payments/cash flow projection that it anticipates it will earn during the course of the WORK.
- 3.3. The WORK is to commence within ten (10) days after a date to be specified in SECTION 00650 – NOTICE TO PROCEED unless otherwise specified. WORK shall continue with dispatch to COMPLETION and no suspension of WORK will be allowed without the express written approval of the OWNER and the ENGINEER. The parties agree that there shall be no claims of so-called de facto suspension.
- 3.4. No Saturday, Sunday, holiday or WORK days longer than eight (8) hours requiring the presence of the ENGINEER or RESIDENT PROJECT REPRESENTATIVE will be permitted, without prior arrangements with the ENGINEER, except in the case of an

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emergency, and then only to the extent that is absolutely necessary, and, if practical, with the written permission of the ENGINEER. If Saturday, Sunday, holiday or WORK days longer than eight (8) hours are contemplated, the CONTRACTOR shall notify the ENGINEER not later than Friday of the previous week to allow arrangements to be made for observation. If the CONTRACTOR must work beyond the regular WORK week in order to complete the PROJECT within the CONTRACT TIME, all expenses of the ENGINEER and its personnel required for observation will be deducted monthly from any sums due or which will become due to the CONTRACTOR.

- 3.5. Prior to commencing any WORK at the site(s) requiring the presence of the ENGINEER, the CONTRACTOR shall notify the ENGINEER in writing at least twenty-four (24) hours in advance of the exact date and time on which it intends to start the WORK. In the event that the CONTRACTOR fails to meet this Schedule, the charges to the OWNER for the on-site time of the ENGINEER will be assessed to the CONTRACTOR and will be deducted from any sums due or which will become due to the CONTRACTOR.

4. DRAWINGS AND SPECIFICATIONS:

- 4.1. The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, transportation, and any other services necessary for proper and timely execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental WORK necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy, or operation by the OWNER. Any WORK shown on the DRAWINGS, though not mentioned in the SPECIFICATIONS, and any WORK mentioned in the SPECIFICATIONS, though not shown on the DRAWINGS, is to be executed by the CONTRACTOR as a part of the WORK.
- 4.2. In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over scaled dimensions, and detail DRAWINGS govern over general DRAWINGS.
- 4.3. Any discrepancies found between the DRAWINGS and SPECIFICATIONS and site conditions or any inconsistencies or ambiguities in the DRAWINGS or SPECIFICATIONS, shall be immediately reported to the ENGINEER, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. WORK done by the CONTRACTOR after discovery of such discrepancies, inconsistencies, or ambiguities shall be done at the CONTRACTOR'S risk. The CONTRACTOR shall confirm that the information included in the DRAWINGS and SPECIFICATIONS complies with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities. If the DRAWINGS and SPECIFICATIONS conflict with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the CONTRACTOR shall notify the ENGINEER of the conflict.
- 4.4. In the event of any duplication, conflict or discrepancy, the method of WORK, materials and equipment, which is in the best interest of OWNER, regardless of whether such method, materials or equipment results in additional costs for the CONTRACTOR, shall be construed as the requirement. When the WORK is shown in greater quantity on documents of lower priority than the lower priority documents shall govern. No such duplication of WORK, conflict, or discrepancy is intended by the CONTRACT DOCUMENTS, and any duplication specified shall not become a basis for a claim by the CONTRACTOR for extra cost to the OWNER.

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- 4.5. Where compliance with two (2) or more industry standards or sets of requirements is indicated, and overlapping of those different standards or requirements established two (2) different or conflicting minimums or levels of quality, or quantity, the most stringent requirement (which is generally recognized to be also the most costly) is intended and will be enforced, unless specifically detailed language written into the CONTRACT DOCUMENTS (not by way of reference to an industry standard) clearly indicated that the less stringent requirement is to be fulfilled. Refer apparently-equal-but-different requirements, and uncertainties as to which levels of quality or quantity is the more stringent, to the ENGINEER for a decision before proceeding.

5. SHOP DRAWINGS:

- 5.1. The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWINGS shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS and shall not constitute a waiver by the OWNER of the OWNER'S right to enforce the CONTRACT DOCUMENTS. A CHANGE ORDER shall be required to evidence the approval of any SHOP DRAWING, which substantially deviates from the requirements of the CONTRACT DOCUMENTS.
- 5.2. When submitted for review by the ENGINEER, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that they have reviewed, checked and approved the SHOP DRAWINGS; and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.
- 5.3. Portions of the WORK requiring SHOP DRAWING or sample submission shall not begin until the ENGINEER has approved the SHOP DRAWING or submission. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site(s) and shall be available to the ENGINEER.
- 5.4. The CONTRACTOR shall submit to the ENGINEER, before any shop work is commenced, four (4) to seven (7) prints (four (4) prints are to be used by the ENGINEER and up to three (3) prints are to be used by the CONTRACTOR) of SHOP DRAWINGS for all items so stated in the SPECIFICATIONS as requiring SHOP DRAWINGS. Additional prints for regulatory agencies shall be submitted when indicated in the SPECIFICATIONS. Standard forms for processing SHOP DRAWINGS shall be used by the CONTRACTOR and furnished to the CONTRACTOR, by the ENGINEER.
  - 5.4.1. No SHOP DRAWINGS shall be submitted directly by SUBCONTRACTORS or SUPPLIERS. All SHOP DRAWINGS shall be submitted through the CONTRACTOR who shall check and verify all field dimensions, check for compliance with the CONTRACT DOCUMENTS, stamp and endorse all SHOP DRAWINGS to indicate its approval and compliance with the above, and assign a transmittal number to each submission. Numbers shall be assigned in sequence. In the event that a SHOP DRAWING is returned marked "Amend and Resubmit" or "Rejected", subsequent resubmittals for the same item shall retain the same transmittal number, but shall have an alphabetical suffix (3a, 3b, etc.). At the time of each submission, the CONTRACTOR shall, in writing, call the attention of the ENGINEER to any deviations of the CONTRACT DOCUMENTS.

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- 5.4.2. No portion of the WORK requiring a SHOP DRAWING shall be commenced until the SHOP DRAWING has been reviewed by the ENGINEER. If the first submittal of the SHOP DRAWING is marked either "No Exceptions Taken" or "Make Corrections Noted", up to three (3) prints shall be returned to the CONTRACTOR and fabrication of the item may begin. If the SHOP DRAWINGS are marked "Amend & Resubmit" or "Rejects – See Remarks", up to two (2) prints shall be returned to the CONTRACTOR with notations thereon of corrections required. The CONTRACTOR shall cause the necessary corrections to be made and shall resubmit four (4) to seven (7) prints (four (4) prints for the ENGINEER and up to three (3) prints for the CONTRACTOR) with transmittal numbers and letters as defined above. If subsequent resubmittals are still not acceptable, resubmittals shall be made under the procedure outlined above until final acceptance is received.
- 5.4.3. The ENGINEER will review SHOP DRAWINGS with reasonable promptness, but its review shall be only for conformance with the design concept of the PROJECT and for compliance with the information given in the CONTRACT DOCUMENTS. The acceptance of the separate item as such will not indicate acceptance of the assembly in which the item functions. The CONTRACTOR shall make any corrections required by the ENGINEER and shall return the required number of corrected copies. The CONTRACTOR shall direct specific attention in writing or on resubmitted SHOP DRAWINGS to revisions other than the corrections called for by the ENGINEER on previous submissions.
- 5.4.4. The ENGINEER'S review of SHOP DRAWINGS shall not relieve the CONTRACTOR from its responsibility for strict adherence to the CONTRACT DOCUMENTS and the CONTRACTOR shall be solely responsible for any deviations from the requirements of the CONTRACT DOCUMENTS unless the CONTRACTOR has in writing called the attention of the ENGINEER to such deviations at the time of submission and the ENGINEER has given written acceptance to the specific deviation, nor shall any acceptance by the ENGINEER relieve the CONTRACTOR from responsibility for errors or omissions in the SHOP DRAWINGS. The final acceptance of SHOP DRAWINGS by the ENGINEER shall not operate to relieve the CONTRACTOR in any way of its responsibility under this CONTRACT for the satisfactory COMPLETION of the WORK, or for the accuracy of the dimensions, details, and quantities or for its CONTRACT. No change shall be made in the accepted SHOP DRAWINGS without written consent of the ENGINEER. The CONTRACT PRICE shall include the cost of furnishing all SHOP DRAWINGS and the CONTRACTOR shall be allowed no extra compensation therefor.
- 5.5. The CONTRACTOR shall submit to the ENGINEER for review, with such promptness as to expedite and not cause any delay in the WORK, all samples required by the CONTRACT DOCUMENTS. All samples shall be checked by and stamped with the approval of the CONTRACTOR, identified clearly as to material, manufacturer, any pertinent catalog numbers, the use for which intended, and the section number and paragraph of the SPECIFICATION wherein the material is specified. All samples shall be shipped post and/or freight paid.
- 5.5.1. At the time of each submission, the CONTRACTOR shall in writing, call the attention of the ENGINEER to the deviations that the samples may have from the requirements of the CONTRACT DOCUMENTS.

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- 5.5.2. The ENGINEER will review with reasonable promptness submitted samples, but its review shall be only for conformance with the information given in the CONTRACT DOCUMENTS. The acceptance of a separate item as such will not indicate acceptance of the assembly in which the item functions. In the event samples are not accepted, the CONTRACTOR shall resubmit new samples until acceptance is obtained.
- 5.5.3. No WORK requiring sample submission shall be commenced until the ENGINEER has accepted the submission.
- 5.5.4. The acceptance of the ENGINEER of sample(s) shall not relieve the CONTRACTOR from its responsibility for any deviation from the requirements of the CONTRACT DOCUMENTS unless the CONTRACTOR has in writing called the attention of the ENGINEER to such deviations at the time of submission and the ENGINEER has given written acceptance of the specific deviations.

6. MATERIALS, SERVICES, AND FACILITIES:

- 6.1. It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all labor, materials, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the CONTRACT TIME.
- 6.2. Materials and equipment shall be so stored as to insure the preservation of its quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.
- 6.3. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer.
- 6.4. Materials, supplies, and equipment shall be in accordance with the samples submitted by the CONTRACTOR and approved by the ENGINEER.
- 6.5. Materials, supplies, or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.
- 6.6. All materials are to be new, unused and the best and of finest quality of their several kinds. The CONTRACTOR shall provide facilities and handle all materials as required for the inspection by the ENGINEER. Materials which have not been accepted by the ENGINEER shall be removed from the site(s) of the WORK together with all surplus earth and materials which are unsuitable or not in conformity with the CONTRACT DOCUMENTS. Transportation and disposal of materials shall be without expense to the OWNER. The CONTRACTOR shall promptly replace any materials rejected or condemned, and shall not be allowed extra time for COMPLETION of the WORK by reason of such rejection.

7. INSPECTION AND TESTING:

- 7.1. All materials and equipment in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

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- 7.2. The OWNER shall provide all inspection and testing services not expressly required by the CONTRACT DOCUMENTS.
- 7.3. The CONTRACTOR shall provide, at its sole expense, the testing and inspection services required by the CONTRACT DOCUMENTS and shall furnish all results and findings to the ENGINEER.
- 7.4. If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR shall give the ENGINEER timely notice of readiness. The CONTRACTOR shall then furnish the ENGINEER with required certificates of inspection, testing, or approval.
- 7.5. Inspections, tests, or approvals by the ENGINEER or others shall not relieve the CONTRACTOR from the obligation to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS. Should inspections or tests reveal defective WORK, the defective WORK shall be promptly remedied by the CONTRACTOR at its own expense and unsuitable materials shall be rejected/removed notwithstanding that such WORK and materials have been previously overlooked, accepted or paid for. If the WORK or any part thereof shall be found defective at any time before the final acceptance of the whole WORK, the CONTRACTOR shall forthwith cure, remedy and make good such defect in a manner satisfactory to the ENGINEER, at the CONTRACTOR'S sole cost and expense. Nothing in this CONTRACT shall be construed as vesting in the CONTRACTOR any right or property in the materials used after they have been attached or affixed to the WORK or the soil, but all such materials shall, upon being so attached or affixed, become the property of the OWNER.
- 7.6. All portions of the WORK determined by the ENGINEER as failing to conform to the CONTRACT DOCUMENTS shall be taken down and removed and the CONTRACTOR shall promptly replace and re-execute the same in accordance therewith and without expense to the OWNER, and bear the expense of making good all WORK or property of other Contractors or of the OWNER destroyed or damaged by such removal or replacement.
- 7.7. The ENGINEER will at all times have access to the WORK. In addition, authorized representatives and agents of any participating federal or STATE agency shall be permitted to inspect all WORK, materials, payroll, records of personnel, invoices of materials, and other relevant data and records. The CONTRACTOR shall provide proper facilities for such access and observation of the WORK, and for any inspection or testing thereof.
- 7.8. If any WORK is covered contrary to the written instructions of the ENGINEER, it must, if requested by the ENGINEER, be uncovered for their observation and replaced at the CONTRACTOR'S expense.
- 7.9. If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the request of the ENGINEER, will uncover, expose, or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR shall bear all expenses of such uncovering, exposure, observation, inspection, and testing and of satisfactory reconstruction. If, however, such WORK is found not to be defective, the CONTRACTOR will be allowed an

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increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributed to such uncovering, exposure, observation, inspection, testing, and reconstruction and an appropriate CHANGE ORDER shall be issued.

8. SUBSTITUTIONS:

- 8.1. Whenever a material, article, or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalog number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered.
- 8.2. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalog number, and if, in the opinion of the ENGINEER, such material, article or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitution will be made by the CONTRACTOR without a change in CONTRACT PRICE or CONTRACT TIME.

9. PATENTS:

The CONTRACTOR shall pay all applicable royalties and license fees. The CONTRACTOR shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design or the product of a particular manufacturer or manufacturers is specified and such specification causes such loss. However, if the CONTRACTOR has reason to believe that the design, process, or the product specified is an infringement of a patent, the CONTRACTOR shall be responsible for such loss unless they promptly give such information to the ENGINEER.

10. SURVEYS, PERMITS, AND REGULATIONS:

- 10.1. The OWNER shall furnish whatever available information it has at its disposal for CONTRACTOR use. From the information provided by the OWNER, unless specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail field surveys necessary for construction such as field establishment and verification of benchmarks, field establishment of baseline layout, slope stakes, batter boards, stakes for pile locations, and other working points, lines, elevations and cut sheets. The CONTRACTOR shall employ, at its own expense, a competent surveyor, registered in the STATE wherein the WORK is to be done to perform such duties.
- 10.2. The CONTRACTOR shall carefully preserve benchmarks, reference points, and stakes and, in case of willful or careless destruction, shall be charged with the resulting expense, and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

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- 10.3. All permits, licenses, and agency approvals necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise specified. Easements for existing facilities shall be secured and paid for by the CONTRACTOR, unless otherwise specified. The CONTRACTOR shall be solely responsible for performing any necessary acts and providing any materials required in order to comply with any and all terms and conditions set forth in any permits and licenses. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, they shall promptly notify the ENGINEER in writing and any necessary changes shall be adjusted as provided in Article 13, CHANGES IN THE WORK.

11. PROTECTION OF WORK, PROPERTY, AND PERSONS:

- 11.1. The CONTRACTOR shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the WORK. The CONTRACTOR shall take all necessary precautions for the safety of, and shall provide necessary protection to prevent damage, injury or loss to all employees on the WORK, and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site(s), and other property at the site(s) or adjacent thereto, including trees, shrubs, lawns, walks, pavement, roadways, structures and utilities not designated for removal, relocation or replacement during the course of construction. The CONTRACTOR shall be responsible for and pay for all loss or damage to materials and property, whether such are incorporated in, or to be incorporated in the WORK. The CONTRACTOR shall also replace or restore to original condition man-made or natural improvements, or other things injured or interfered with by the CONTRACTOR in carrying out the WORK. Adequate weather protection of all materials and structures of this PROJECT shall be the duty of the CONTRACTOR.
- 11.2. The CONTRACTOR shall comply with all applicable laws, ordinances, rules, regulations, and orders of any public body having jurisdiction. They shall erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. They shall notify Owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR shall remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any SUBCONTRACTOR, or anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, except damage or loss attributable to fault of the CONTRACT DOCUMENTS, or to acts or omissions of the OWNER or the ENGINEER, or anyone employed by either of them or anyone for whose acts either of them may be liable and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.
- 11.3. In emergencies affecting the safety of persons or the WORK or property at the site(s) or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury, or loss. The CONTRACTOR shall give the ENGINEER prompt written notice of any significant changes in the WORK or deviation from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall be issued covering the changes and deviations involved.



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11.4. HAZARDOUS MATERIALS:

11.4.1. If at any time during construction, the presence of unanticipated hazardous materials at or proximate to a construction site(s) is detected, the CONTRACTOR shall stop WORK in the affected area and perform the following immediately:

- (1) Notify the OWNER and the ENGINEER in writing, within twenty-four (24) hours of the CONTRACTOR'S discovery of the presence of hazardous material(s), of the specific hazardous material(s) encountered and the precise location of the same. Failure to comply with this notice provision shall be deemed a waiver by the CONTRACTOR of any claim for an equitable adjustment of the CONTRACT PRICE or an extension of the CONTRACT TIME.
- (2) Take all action reasonably necessary and appropriate for the protection and safety of the public and persons at or about the site(s), including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying Owners and users of adjacent sites and utilities.
- (3) Notify the respective STATE Department of Hazardous Waste (or other Department, Bureau, or the like for such jurisdiction) and receive instructions as to the appropriate measures to be taken while working in that area.
- (4) Immediately notify the designated representative of the respective STATE Department of Energy and Environmental Protection for this PROJECT, or other appropriate STATE program director/administrator in writing following the discovery of the suspected hazardous materials.
- (5) Notify the local hazardous waste coordinator.

11.4.2. Actions at the construction site(s) following completion of these steps shall be at the direction of the Division of Hazardous Waste (or other Department, Bureau, or the like for such jurisdiction). Nothing in this Article shall be construed to require the ENGINEER and/or the CONTRACTOR to perform WORK for which adequate compensation has not been contracted for other than to ensure that basic measures necessary to protect health and welfare of workers, residents and abutters are immediately adopted. Please note that the presence of hazardous material(s) does not automatically entitle the CONTRACTOR to an adjustment of the CONTRACT PRICE or the CONTRACT TIME. If the hazardous material(s) encountered are of the same character or nature as noted in the Bid Documents or Contract Documents, the CONTRACTOR shall not be entitled to any adjustment of the CONTRACT PRICE or CONTRACT TIME. If the CONTRACTOR claims that the hazardous material constitutes a differing site condition, the CONTRACTOR shall notify the OWNER and ENGINEER in writing of such claim within seventy-two (72) hours of discovery of the hazardous materials and shall not be entitled to any adjustment of the CONTRACT PRICE or CONTRACT TIME without a written CHANGE ORDER executed by the OWNER prior to the performance of the work at issue.

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11.4.3. At construction site(s) where the presence of contaminated or hazardous materials are suspected to exist and provisions have been made in the CONTRACT DOCUMENTS for their management, the requirements of Paragraph 11.4.1 of this Article shall apply.

11.5. The CONTRACTOR acknowledges and agrees that it shall be conclusively presumed to be acquainted with all existing conditions and to guarantee that all work, materials and equipment shall, upon final COMPLETION of the WORK, be turned over to the OWNER in a complete and perfect condition. The CONTRACTOR shall be responsible for the proper care, maintenance and protection of all work, materials, and equipment, until the entire PROJECT is completed, and all work, materials, and equipment are found in good condition and accepted by the OWNER.

12. SUPERVISION BY CONTRACTOR:

12.1. The CONTRACTOR shall supervise and direct the WORK. The CONTRACTOR shall be solely responsible for the means, methods, techniques, coordination, sequences, and procedures of construction. The CONTRACTOR shall employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site(s). The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site(s) at all times as required to perform adequate supervision and coordination of the WORK.

12.2. The CONTRACTOR shall employ only competent, qualified, adequately trained workers and, whenever the ENGINEER shall notify the CONTRACTOR, in writing, that any person on the WORK is, in its opinion, incompetent, unfaithful, disorderly, or otherwise unsatisfactory or not employed in accordance with the provisions of this CONTRACT, such person shall be discharged from the WORK and shall not again be employed on it except with the consent of the ENGINEER.

13. CHANGES IN THE WORK:

13.1. The OWNER may at any time, as the need arises, order changes to the scope of the WORK without invalidating the CONTRACT. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, a CHANGE ORDER shall be issued to authorize an equitable adjustment. The OWNER must confirm in writing any explanation or interpretation of DRAWINGS or SPECIFICATIONS altering or varying the WORK, made by an employee of the OWNER, before being acted upon by the CONTRACTOR. Any and all cost, expenses or other impacts incurred or expected to be incurred by the CONTRACTOR shall be included in the CHANGE ORDER. The CONTRACTOR waives and shall be forever barred from submitting or claiming additional costs in connection with change work after execution of a CHANGE ORDER.

13.2. The ENGINEER, also, may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles the CONTRACTOR to a change in the CONTRACT PRICE or time, or both, in which the CONTRACTOR shall give the ENGINEER written notice thereof within seven (7) days after receipt of the ordered change. Thereafter, the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or time within thirty (30) days. The CONTRACTOR

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shall not execute such changes pending receipt of an executed CHANGE ORDER or further instructions from the OWNER.

14. CHANGES IN THE CONTRACT PRICE:

14.1. The CONTRACT PRICE may be changed only by a written CHANGE ORDER executed by the OWNER and CONTRACTOR. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one (1) or more of the following methods in order of precedence listed below:

14.1.1. Unit prices previously approved (for all changes in the WORK, previously approved unit prices shall prevail, when applicable);

14.1.2. An agreed lump sum; and/or

14.1.3. The actual cost of labor, direct overhead, materials, supplies, equipment and other services necessary to complete the WORK, computed as follows:

- (1) The reasonable cost of labor employed directly on the WORK at prevailing rates of wages.
- (2) The cost of Worker's Compensation Insurance, Federal Social Security and STATE Unemployment Compensation on Item (1) at established rates.
- (3) The reasonable cost of materials incorporated in the WORK.
- (4) The reasonable cost at fair market rental rates for equipment employed directly on the WORK.
- (5) Fifteen percent (15%) of Items (1), (2), (3) and (4) for overhead, superintendence and profit. On subsequent WORK, this fifteen percent (15%) will be allowed only to the SUBCONTRACTOR.
- (6) An additional five percent (5%) of Items (1), (2), (3) and (4) on WORK performed by a SUBCONTRACTOR of the CONTRACTOR. This five percent (5%) includes overhead, superintendence, profit and bonds.

14.2. The CONTRACTOR shall, at the request of the ENGINEER, furnish itemized statements and other such documentation requested by the ENGINEER substantiating the cost of the WORK ordered and give the ENGINEER access to accounts, records, bills, receipts, cancelled checks and vouchers relating thereto. If the CONTRACTOR claims compensation for extra WORK not ordered as aforesaid, or for any costs incurred, it shall, prior to beginning of any such WORK, provide to the ENGINEER a written statement of the nature of the WORK to be performed or the costs sustained, the nature and cause of such WORK or costs, the estimated costs associated with such WORK or damage and the basis for same, and shall, if such WORK is claimed by the CONTRACTOR to have been authorized by the ENGINEER or OWNER, on or before the 10<sup>th</sup> day following completion of any such WORK, file with the ENGINEER an itemized statement of the details and amount of such WORK or damage, including provision of all documents evidencing the performance of such WORK and the costs associated with same; and unless such statements shall be made and submitted as so required, the CONTRACTOR'S claim for such compensation shall be deemed forever waived, forfeited and invalid, and it shall not be entitled to payment on account of any such WORK or damage.

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15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES:

- 15.1. The date of beginning and the time for SUBSTANTIAL COMPLETION and COMPLETION of the WORK are OF THE ESSENCE TO the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.
- 15.2. The CONTRACTOR shall proceed with the WORK at such rate of progress to ensure both SUBSTANTIAL COMPLETION and full COMPLETION within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the time allowed to achieve SUBSTANTIAL COMPLETION and the CONTRACT TIME for COMPLETION of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.
- 15.3. If the CONTRACTOR fails to achieve SUBSTANTIAL COMPLETION or COMPLETION within the specified time(s) or extension of time(s) expressly granted by the OWNER, then the CONTRACTOR shall pay to the OWNER the amount for liquidated damages as specified in the CONTRACT DOCUMENTS for each calendar day and/or working day that the CONTRACTOR shall be in material default after the time(s) stipulated. The CONTRACTOR and OWNER expressly agree that the damage expected to be incurred by the OWNER as a result of the CONTRACTOR'S failure to timely achieve SUBSTANTIAL COMPLETION or COMPLETION is uncertain in amount or difficult to prove, that both parties intend and desire to liquidate damages, in advance, to be assessed against the CONTRACTOR in event the CONTRACTOR fails to timely achieve SUBSTANTIAL COMPLETION or COMPLETION, and the amount stipulated is reasonable in the sense that it is not greatly disproportionate to the amount of the damage which, as the parties look forward, seems to be the presumable loss which would be sustained by the OWNER in the event of the CONTRACTOR'S failure to achieve timely SUBSTANTIAL COMPLETION or COMPLETION.
- 15.4. The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in COMPLETION of the WORK is due to the following, if the CONTRACTOR has promptly given written notice of such delay to the OWNER or ENGINEER:
  - 15.4.1. To any preference, priority, or allocation order duly issued by the OWNER;
  - 15.4.2. To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another Contractor not in privity with the CONTRACTOR (and for whose work the CONTRACTOR is not responsible) in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and
  - 15.4.3. To any delays of SUBCONTRACTORS occasioned by any of the causes specified in Paragraphs 15.4.1. and 15.4.2. of this Article.

16. CORRECTION OF WORK:

- 16.1. The CONTRACTOR shall promptly remedy or remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the

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CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS, and without expense of the OWNER. The CONTRACTOR shall bear the expense of remedying and making good all WORK of other Contractors destroyed or damaged by such removal or replacement.

- 16.2. All removal and replacement WORK shall be done at the CONTRACTOR'S expense. If the CONTRACTOR does not take action to remove and replace such rejected WORK within five (5) days after receipt of written notice, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

17. SUBSURFACE CONDITIONS:

- 17.1. The CONTRACTOR shall promptly, and before such conditions are disturbed or any costs are incurred by the CONTRACTOR, except in the event of an emergency (defined as a condition posing an imminent risk to public health and safety), notify the OWNER and the ENGINEER by written notice of:

17.1.1. Subsurface or latent physical conditions at the site(s) differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.2. Unknown physical conditions at the site(s), of an unusual nature, differing materially from those ordinarily encountered, and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.

- 17.2. The OWNER and the ENGINEER shall promptly investigate the conditions, and if they find that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed and shall be deemed expressly waived unless the CONTRACTOR has given the required written notice within the stated time period.

18. SUSPENSION OF WORK, TERMINATION, AND DELAY:

- 18.1. The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety (90) days or such further time as agreed upon by the CONTRACTOR, by written notice to the CONTRACTOR and the ENGINEER which notice shall fix the date on which the WORK shall be resumed. The CONTRACTOR shall resume that WORK on the date so fixed. The CONTRACTOR shall be granted a proportionate extension of the CONTRACT TIME to complete the WORK. If the CONTRACTOR alleges that the cost of the WORK increased during the period when the WORK was suspended, the CONTRACTOR shall provide the ENGINEER and OWNER with all documentation and information substantiating the alleged increase in the cost of the WORK within forty eight (48) hours of receiving direction to resume the WORK and if the OWNER is satisfied that the cost of the WORK increased during or as a result of the suspension, the CONTRACTOR shall be entitled to an adjustment to its CONTRACT PRICE in such amount as the OWNER determines is equitable. If the OWNER denies the CONTRACTOR'S request for an equitable adjustment to the CONTRACT PRICE and the CONTRACTOR pursues a Claim relating to same, CONTRACTOR'S Claim shall be limited to the direct costs incurred by the CONTRACTOR and shall not, under any circumstances, include consequential or incidental damages, damages for delay, idle equipment costs, lost revenue/income or profit, borrowing costs, unabsorbed overhead or other indirect costs.

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- 18.2. If the CONTRACTOR is adjudged bankrupt or insolvent, or if the CONTRACTOR makes a general assignment for the benefit of its creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of the CONTRACTOR'S property, or if the CONTRACTOR files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if the CONTRACTOR repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if the CONTRACTOR repeatedly fails to make prompt payments to SUBCONTRACTORS, or for labor, materials, or equipment, or if the CONTRACTOR disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK, or if the CONTRACTOR disregards the authority of the ENGINEER, or if the CONTRACTOR otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and its Surety a minimum of ten (10) days from delivery of a written notice, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, tools, equipment, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method it may deem expedient. In such case, the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess shall be paid to the CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR shall pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.
- 18.3. Where the CONTRACTOR'S services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due to the CONTRACTOR shall not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.
- 18.4. After ten (10) days from delivery of a written notice to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the CONTRACT. In such case, the CONTRACTOR shall be paid for all WORK executed and direct demobilization expenses sustained plus reasonable profit for work completed up to the time of such termination but in no event shall the OWNER be liable for any other costs, expenses or damages, and the CONTRACTOR shall not be entitled to compensation for any overhead or profit on WORK not performed.
- 18.5. If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER, or awarded by arbitrators within thirty (30) days of its approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a written notice to the OWNER and the ENGINEER, terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition, and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days written notice to the OWNER and the ENGINEER stop the WORK until the CONTRACTOR has been paid all amounts then due, in which event and upon resumption of WORK, CHANGE ORDERS shall be issued extending the CONTRACT TIME proportionate to the period during which the stoppage of the WORK occurred.

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- 18.6. If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or the ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an extension of the CONTRACT TIME shall be made by a CHANGE ORDER for the period of time during which the suspension, delay or interruption occurred.
- 18.7. Notwithstanding anything to the contrary in the CONTRACT DOCUMENTS, an extension in the CONTRACT TIME to the extent permitted hereunder, shall be the sole remedy of the CONTRACTOR, in the event of extended performance or delays, except in the event of a delay caused by: (1) any act or omission by the OWNER or its employees, agents or any other person for whom it is responsible (excluding the CONTRACTOR) or (2) CHANGES IN THE WORK. Otherwise, in no event shall the OWNER be liable to the CONTRACTOR for any costs or damages incurred by the CONTRACTOR due to delays, accelerations, impact, non-performance, interference with performance, suspension or changes in performance or the sequence of performance. In the event that the CONTRACTOR'S performance is extended as a result of the act or omission of the OWNER or its agents, the CONTRACTOR'S compensation for its extended performance shall be limited to its field office personnel expenses, if any, that are directly allocable to the WORK during and resulting directly from any such delay. The CONTRACTOR waives all home office overhead damages for delays and allocated portions of indirect or general overhead expenses incurred by it or anyone claiming through it. No recovery or award of claimed extended overhead (e.g., Eichleay) or other consequential or incidental damages shall be allowed. The CONTRACTOR agrees that it accepted the risk of delays when it bid this PROJECT and executed this CONTRACT and has priced such risk into its bid and the CONTRACT PRICE.

19. PAYMENTS TO CONTRACTOR:

- 19.1. At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR shall submit to the ENGINEER a partial payment estimate completed and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site(s), the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER'S title to the material and equipment and protect its interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing its approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing its reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make necessary corrections and resubmit the partial payment estimate. The OWNER will, as soon as practicable following an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of an approved partial payment estimate. The OWNER shall retain five percent (5%) of the amount of each payment until final COMPLETION and acceptance of all WORK covered by the CONTRACT DOCUMENTS. When the WORK is substantially complete (operational or beneficial occupancy), the retained amount may be further reduced below five percent (5%) to only that amount necessary to assure COMPLETION, in the OWNER'S sole discretion. On COMPLETION and acceptance of a part of the WORK on which the price is stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less

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authorized deductions upon CONTRACTOR'S satisfaction of all contractual conditions precedent to final payment.

- 19.2. Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.
- 19.3. The OWNER shall have the right to enter the premises for the purpose of doing WORK not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.
- 19.4. The CONTRACTOR shall indemnify, defend and save the OWNER and the OWNER'S agents harmless from all claims arising out of or relating to the actions, omissions, claims or demands of design professionals and consultants engaged by the CONTRACTOR, SUBCONTRACTORS, laborers, workmen, mechanics, materialmen and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR and any other parties in privity with the CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all payment obligations of the respective parties have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR'S contract balance a sum of money deemed by the OWNER reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been discharged whereupon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the OWNER be deemed to be obligated to either the CONTRACTOR, its surety, or any third party to exercise its rights hereunder or to otherwise be financially responsible to any third parties. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR or any third party for any such payments made in good faith.
- 19.5. Upon COMPLETION and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by it under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due to the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of COMPLETION and acceptance of the WORK.

20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE:

The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically accepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for claims specifically identified as reserved by the CONTRACTOR. Final payment shall not waive or release any claims or rights of the OWNER. Any payment, final or otherwise, shall not release the CONTRACTOR or its sureties from any obligations under the CONTRACT DOCUMENTS or the Performance Bond and Payment Bond.



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21. INSURANCE:

- 21.1. The CONTRACTOR shall purchase and maintain such Insurance as will protect, indemnify, defend and hold harmless the City of Milford and/or OWNER from claims set forth below which may arise out of or result from the CONTRACTOR'S execution of the WORK, whether such execution be by the CONTRACTOR or by any SUBCONTRACTOR, or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:
  - 21.1.1. Claims under Workman's Compensation, disability benefit, and other similar employee benefit acts;
  - 21.1.2. Claims for damages because of bodily injury, occupational sickness or disease, or death of its employees;
  - 21.1.3. Claims for damages because of bodily injury, sickness or disease, or death of any persons other than its employees;
  - 21.1.4. Claims for damages insured by general liability coverage which are sustained (a) by any person as a result of an action or omission directly or indirectly related to the employment of such person by the CONTRACTOR, or (b) by any other person; and
  - 21.1.5. Claims for damages because of injury, damage to or destruction of tangible property, including loss of use resulting therefrom.
- 21.2. Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These certificates shall contain a provision that coverages afforded under the policies will not be canceled or a restrictive amendment added, unless at least thirty (30) days prior written notice has been given to the OWNER. The certificates shall name the types of policy provided, specifically state the title of this CONTRACT and state that the Insurance coverage is as required by the General Conditions and Supplementary Conditions, and that the same are "primary" and "non-contributory".
- 21.3. The CONTRACTOR shall procure and maintain, at its own expense, during the CONTRACT TIME, liability Insurance as hereinafter specified:
  - 21.3.1. General Public Liability including Contractor's Liability as applicable to the CONTRACTOR'S obligations. Completed operations and Products Liability: all on the occurrence basis with Personal Injury coverage and Broad Form Property Damage. Products and Completed Operations shall be maintained for up to three (3) years after the COMPLETION of the PROJECT.

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<b>General Liability</b>	<b>Minimum Requirements</b>
Fire Damage	100,000
Medical Expenses	5,000
Products-Completed Ops. Aggregate	2,000,000
<b>Automobile Liability</b>	
Combined Single Limit	1,000,000
<b>Workers' Compensation</b>	
Each Accident	100,000
Disease Each Employee	100,000
Disease Policy Limit	500,000
<b>Excess Liability/Umbrella</b>	
Each Occurrence	5,000,000
Aggregate	5,000,000

Personal Injury and Accidental Death – General Liability  
Each person/aggregate \$1,000,000/\$2,000,000

Property Damage – General Liability  
Each occurrence/aggregate \$1,000,000/\$2,000,000

Personal Injury – Automobile Liability  
Each person/occurrence \$1,000,000/\$2,000,000

Property Damage – Automobile Liability  
Each occurrence/aggregate \$1,000,000/\$2,000,000

Pollution Liability \$2,000,000

- 21.3.2. The CONTRACTOR'S Public Liability Insurance shall provide, by any necessary removal of exclusions or by separate policies of the same limits, coverage for all hazards inherent in the WORK of this PROJECT. Without limiting the foregoing statement, the Insurance shall cover the following hazards: Explosion, collapse, and underground damage; damage to property in the CONTRACTOR'S care, custody, or control; rigging, hoisting, and moving; and water damage, including without limitation water damage to privately owned property.
- 21.3.3. The CONTRACTOR shall acquire and maintain Fire and Extended Coverage Insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR and SUBCONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S Surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.
- 21.4. The CONTRACTOR shall procure and maintain, at its own expense, during the CONTRACT TIME, in accordance with the provisions of the laws of the STATE in which the WORK is performed, workmen's compensation Insurance and employer's liability Insurance, including occupational disease provisions for all of its employees at the site(s) of the PROJECT and in case any WORK is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen's

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- Compensation Insurance and Employer's Liability Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous WORK under this CONTRACT at the site(s) of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, and shall cause each SUBCONTRACTOR to provide adequate and suitable Insurance for the protection of its employees not otherwise protected. The limit of Employer's Liability Insurance shall not be less than required by the STATE in which the WORK is to be performed.
- 21.5. The CONTRACTOR shall secure, "Special Form" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such Insurance shall not be less than the full insurable value (completed value) of the portion of the project under construction. It should include "All Risk" insurance for physical loss or damage including theft. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, water, collapse, riot, aircraft, and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. All policies in this CONTRACT shall name as the insured the CONTRACTOR, the City of Milford and/or OWNER.
  - 21.6. The CONTRACTOR shall secure and maintain Owner's Protective Liability Insurance coverage naming the OWNER as insured with the same limits and coverages as the CONTRACTOR'S General Public Liability, Property Damage Insurance. This Insurance shall be in addition to the other required coverages, but shall not duplicate such coverage therein provided.
  - 21.7. The CONTRACTOR shall secure and maintain Umbrella or Excess Liability Insurance in the amount of not less than \$5,000,000 (Five Million) over and above primary limits required to be carried out.
  - 21.8. The City of Milford and/or OWNER and ENGINEER shall be named as an Additional Insured.
  - 21.9. The CONTRACTOR shall secure and maintain Property Coverage for materials and supplies being transported by the CONTRACTOR, as the OWNER'S Property Contract provides coverage for personal property within 1,000 feet of the premises.
  - 21.10. Insurance referred to shall be written for not less than any limits of liability required by Law, or those set forth above, whichever is greater.
  - 21.11. The OWNER reserves the right to require additional Insurance coverages or higher limits, or both provided the OWNER will pay additional premium therefore.
  - 21.12. The CONTRACTOR shall ensure that SUBCONTRACTORS follow these same guidelines with equal or greater limits. Any deviations must be approved by the City Attorney.
  - 21.13. The insurance requirements of the City of Milford and its hold harmless agreement(s) shall supersede any and all requirements and recommendations of any documents incorporated into the CONTRACT.

SECTION 00700

GENERAL CONDITIONS

22. CONTRACT SECURITY:

The CONTRACTOR shall, within ten (10) days after receipt of the NOTICE OF AWARD, furnish the OWNER with a Performance Bond and Payment Bond in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions, and agreements of the CONTRACT DOCUMENTS, and upon prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such bonds shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the STATE in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds", as published in the Treasury Department Circular Number 570. The expense of these bonds shall be borne by the CONTRACTOR. In the event any agency or department of the State of Connecticut, including but not limited to the State Department of Transportation, or of the Federal Government, shall require a bond for any part of the work, the CONTRACTOR shall be responsible of the expense of said bonds. If at any time a surety on any such bonds is declared bankrupt or loses its right to do business in the STATE in which the WORK is to be performed or is removed from the list of Surety Companies Acceptable on Federal Bonds, the CONTRACTOR shall, within ten (10) days after notice from the OWNER to do so, substitute an acceptable bond(s) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such bond(s) shall be paid by the CONTRACTOR. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable bond(s) to the OWNER. The payment bond shall comply with Connecticut General Statutes 49-41 *et seq.* and the performance bond shall be in a form acceptable to the OWNER.

23. ASSIGNMENTS:

Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign, or otherwise dispose of the CONTRACT or any portion thereof, or of its rights, title or interest therein, or its obligations thereunder, without written consent of the other party.

24. INDEMNIFICATION:

- 24.1. The CONTRACTOR shall indemnify, defend and hold harmless the OWNER and the ENGINEER and its agents and employees from and against all claims, damages, losses, and expenses, including attorney's fees, arising out of or resulting from the performance of the WORK.
- 24.2. In any and all claims against the OWNER or the ENGINEER, or any of its agents or employees by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the Indemnification obligation arising hereunder in this Article 24 shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under Workmen's Compensation Acts, Disability Benefits Acts, or other employee benefit acts or insurance policies
- 24.3. The CONTRACTOR shall not be obligated under this Article to indemnify, defend or hold the OWNER or ENGINEER harmless from or against, claims, losses, damages or actions, arising solely out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs or SPECIFICATIONS by the ENGINEER or its agents or employees.

SECTION 00700

GENERAL CONDITIONS

- 24.4. The CONTRACTOR shall indemnify, defend and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, materialmen, and furnisher of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The real property that is the subject of this project is exempt from and not subject to mechanic's liens or attachments pursuant to Connecticut Law.

25. SEPARATE CONTRACTS:

- 25.1. The OWNER reserves the right to let other contracts in connection with this PROJECT. The CONTRACTOR shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall promptly connect and coordinate WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other Contractor, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.
- 25.2. The OWNER may perform additional WORK related to the PROJECT or let other contracts containing provisions similar to these. The CONTRACTOR shall afford the other Contractors who are parties to such contracts (or the OWNER, if performing the additional WORK themselves) reasonable opportunity for the introduction and storage of materials and equipment, and the execution of WORK, and shall properly connect and coordinate WORK with theirs.
- 25.3. If the performance of additional WORK by other Contractors or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, written notice thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves the CONTRACTOR in additional expense or entitles the CONTRACTOR to an extension of the CONTRACT TIME, the CONTRACTOR may make a Claim therefor as provided in Article 14 and 15.
- 25.4. The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

26. SUBCONTRACTING:

- 26.1. The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK, which, under normal contracting practices, are performed, by specialty SUBCONTRACTORS. Such subcontracting shall not relieve the CONTRACTOR of responsibility for completing such work.
- 26.2. The CONTRACTOR shall not award WORK to SUBCONTRACTOR(S) in excess of fifty percent (50%) of the CONTRACT PRICE without prior written approval of the OWNER.
- 26.3. The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of its SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as they are for the acts and omissions of persons directly employed by them.

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GENERAL CONDITIONS

- 26.4. The CONTRACTOR shall cause appropriate provisions to be inserted in all Subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and to give the CONTRACTOR the same power as regards terminating any Subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.
- 26.5. Nothing contained in this CONTRACT shall create any contractual relation between any SUBCONTRACTOR and the OWNER or cause any SUBCONTRACTOR to be a third-party beneficiary of this CONTRACT.

27. AUTHORITY OF THE ENGINEER:

- 27.1. The ENGINEER shall decide questions, which may arise as to quality and acceptability of materials furnished and WORK performed. The ENGINEER shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site(s) and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.
- 27.2. The CONTRACTOR shall be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.
- 27.3. The ENGINEER will not be responsible for the construction means, stakeout, controls, techniques, sequences, procedures, or construction safety, all of which are the CONTRACTOR'S sole responsibility.
- 27.4. The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

28. LAND AND RIGHTS-OF-WAY:

- 28.1. Prior to issuance of the NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the COMPLETION of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.
- 28.2. The OWNER shall provide to the CONTRACTOR information, which delineates and describes the lands owned and rights-of-way acquired.
- 28.3. The CONTRACTOR shall provide at the CONTRACTOR'S expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities or for storage of materials.

29. GUARANTY:

- 29.1. The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of one (1) year from the date of SUBSTANTIAL COMPLETION. The CONTRACTOR warrants and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION of the system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections at its own expense as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The OWNER will give notice of

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GENERAL CONDITIONS

observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance Bond shall remain in full force and effect through the guarantee period and CONTRACTOR'S surety expressly agrees to this provision by issuing the Performance Bond.

- 29.2. The CONTRACTOR shall reimburse the OWNER for expenses due to additional work performed by the ENGINEER and its consultants for construction representation and administration related to the correction of defects or damage performed under guarantee.

30. CLAIMS AND DISPUTES:

- 30.1. All claims, disputes, and other matters in question, arising out of, or relating to, the CONTRACT DOCUMENTS or the breach thereof, except for claims that have been waived by the making and acceptance of final payment as provided by Article 20, shall be construed in accordance with the laws of the State of Connecticut and all disputes shall be brought in Connecticut Courts, Judicial District of Ansonia/Milford at Milford, Connecticut, or, if jurisdiction over dispute lies in the federal courts, shall be brought in the State of Connecticut.
- 30.2. The CONTRACTOR shall carry on the WORK and maintain the progress schedule during any disputes and other matters in questions arising out of, or relating to, the CONTRACT DOCUMENTS or the breach thereof, unless otherwise mutually agreed in writing.
- 30.3. The CONTRACTOR and OWNER waive CLAIMS against each other for consequential damages arising out of or relating to this CONTRACT. This mutual waiver includes, but is not limited to:
- 30.3.1. Damages incurred by the OWNER for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- 30.3.2. Damages incurred by the CONTRACTOR for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of revenue, income and profit, and damages/expenses/costs or losses due to delays.

This mutual waive is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 18. Nothing contained in this Section 30.3 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the CONTRACT DOCUMENTS.

31. TAXES:

The Contractor shall pay all sales, consumer, use and other similar taxes required by the law of the place where the WORK is performed.

32. INTERPRETATION OF DRAWINGS AND SPECIFICATIONS:

The SPECIFICATIONS and the DRAWINGS are intended to describe and provide for a completed PROJECT. They are intended to be complementary, and what is called for by either shall be complete in every detail, notwithstanding that every item

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necessarily involved is not particularly mentioned, and the CONTRACTOR shall provide all labor and materials necessary for the entire COMPLETION of the WORK intended to be described.

33. SITE REGULATIONS:

- 33.1. On or before the COMPLETION of the WORK, or as directed during the progress of WORK, the CONTRACTOR shall without charge therefor tear down and remove all buildings and other temporary structures built by the CONTRACTOR, and shall remove and legally dispose of surplus material and rubbish of all kinds from any ground which it has occupied and shall leave the WORK, grounds and surroundings in a clean and neat condition.
- 33.2. Tobacco, Drugs and Liquor Prohibited. The CONTRACTOR shall neither permit nor suffer smoking where it creates a hazard nor the introduction or use of drugs, spirituous or intoxicating liquors upon or about the WORK embraced in this CONTRACT or upon any of the ground occupied by the CONTRACTOR.
- 33.3. Posters. The CONTRACTOR shall not permit or suffer any placards, posters, or advertisements to be displayed on or about the premises unless approved by the OWNER.

34. LIMITATIONS OF DATA PRESENTED:

- 34.1. DRAWINGS, surveys, measurements, dimensions, calculations, estimates, borings, and statements as to the condition under which the WORK is to be performed are believed to be correct.
- 34.2. The BIDDER shall carefully examine the CONTRACT DOCUMENTS, including all DRAWINGS, SPECIFICATIONS, and ADDENDA, shall visit the site(s), and shall satisfy themselves as to the type and quantity of the WORK to be done. For the purposes of comparing several proposals, the BID shall be based on the data presented and the BIDDER'S examination of the site(s).
- 34.3. The locations of all utilities are obtained from the best available sources, and are to be considered as approximate insofar as size, location, and elevation are concerned. Furthermore, it is expressly understood that there may be utilities in existence other than those shown on the DRAWINGS.

35. HEALTH AND SAFETY EQUIPMENT:

- 35.1. As provided for Article 11, the CONTRACTOR is responsible for establishing and maintaining a Health and Safety program throughout the course of the PROJECT so as to meet all local, STATE, Federal, and OSHA requirements.
- 35.2. In order for the OWNER and/or ENGINEER to observe the WORK, the CONTRACTOR shall provide health and safety equipment for such purposes. Such equipment shall specifically include but not necessarily be limited thereto the following:
  - 35.2.1. Earplugs in sufficient quantities;
  - 35.2.2. Headset protective hearing devices;
  - 35.2.3. Safety glasses/goggles;



SECTION 00700

GENERAL CONDITIONS

- 35.2.4. 3-way gas detector meter with lights and alarm (hydrogen sulfide, combustible gases and oxygen deficiency);
  - 35.2.5. Tripod (mechanical crank type especially designed and equipped for lifting personnel in and out of confined spaces);
  - 35.2.6. Ropes and harnesses;
  - 35.2.7. Disposable coveralls/protective clothing/gloves in sufficient quantity and sizes;
  - 35.2.8. Ventilating equipment for confined spaces; and
  - 35.2.9. Self-contained breathing apparatus (SCBA).
- 35.3. All of the above equipment shall be continuously provided at the worksite(s) and maintained in good working order (including manufacturer's recommended maintenance and calibration of the 3-way gas detector and SBCA equipment). It is understood that such equipment shall remain the property of the CONTRACTOR and is in addition to any and all health and safety equipment that the CONTRACTOR is required to have for the CONTRACTOR'S health and safety program on-site.
- 35.4. The CONTRACTOR is advised that the OWNER has clearly established on-going Confined Space and Lock-out/Tag-out programs. Where the CONTRACTOR'S WORK requires confined space entry into existing facilities and/or lock-out/tag-out of existing equipment and electrical controls, the CONTRACTOR shall strictly abide by the OWNER'S programs if they are more stringent than the CONTRACTOR'S own procedures.

36. MUNICIPAL SET ASIDE PROGRAM:

Effective October 1, 2015, municipalities must establish a set aside program for small and minority contractors for public works projects exceeding \$50,000. Under the bill, municipalities will be required to set aside 25% of the total value of all contracts they let for construction, goods, and services each year for exclusive bidding by certified small contractors and 25% of the set-aside value (6.25% of the total) for exclusive bidding by certified minority business enterprises. In addition, a municipality that awards a municipal public works contract must state in its notice of solicitation for competitive bids, or request for proposals or qualifications, that the general or trade contractor must comply with the set-aside requirements and the law's nondiscrimination and affirmative action requirements. CONTRACTOR is solely responsible for determining the applicability of any affirmative action and set aside laws and is also solely responsible for compliance with any applicable laws.

END OF SECTION

**SECTION 00800**

**SUPPLEMENTARY CONDITIONS**

- |  |                             |
|--|-----------------------------|
| SC-1. Drawings and Specifications                | SC-8. Subcontracting        |
| SC-2. Substitutions                              | SC-9. Taxes                 |
| SC-3. Suspension of Work, Termination, and Delay | SC-10. Site Regulations     |
| SC-4. Payments to Contractor                     | SC-11. Archaeological Finds |
| SC-5. Insurance                                  | SC-12. Review of Work       |
| SC-6. Contract Security                          | SC-13. Final Inspection     |
| SC-7. Assignments                                |                             |

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**THE FOLLOWING MODIFICATIONS AND ADDITIONS ARE TO BE MADE TO THE ARTICLES OF DOCUMENT 00700 – GENERAL CONDITIONS:**

**SC-1. DRAWINGS AND SPECIFICATIONS (ARTICLE 4):**

Add the following as Paragraph 4.6:

- 4.6. Notwithstanding any other provisions hereunder, all as-built drawings, plans, reports, etc. provided by the OWNER are for convenience only. The OWNER does not warrant or promise that they are correct. The CONTRACTOR must conduct its own investigation of the field conditions and shall not rely on any drawings, plans, reports, documents, or other materials provided by OWNER.

**SC-2. SUBSTITUTIONS (ARTICLE 8):**

A. Add the following to Paragraph 8.1:

Whenever it is written that an equipment manufacturer must have a specified period of experience with his products, equipment which does not meet the experience period can be considered if the equipment supplier or manufacturer is willing to provide a bond or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure.

B. Add the following as Paragraph 8.3:

- 8.3. The CONTRACTOR shall reimburse the OWNER for expenses, fees and costs incurred by the OWNER due to additional work performed by the ENGINEER and its consultants, while reviewing and evaluating CONTRACTOR proposed substitutions (whether or not the substitutions are accepted). Additional work shall be as determined by the ENGINEER and shall be understood as work in excess of usual review of SHOP DRAWINGS and samples of products and systems specified in the CONTRACT DOCUMENTS. This additional work shall include but shall not be limited to change in product or system specified; evaluation that requires cost estimates and/or consultants; engineering, travel; and review of more than one product or system for the same work. The CONTRACTOR shall reimburse the OWNER for expenses due to additional work performed by the ENGINEER and its consultants while reviewing and evaluating CONTRACTOR proposed substitutions.

SECTION 00800

SUPPLEMENTARY CONDITIONS

**SC-3. SUSPENSION OF WORK, TERMINATION, AND DELAY (ARTICLE 18):**

Add the following as Paragraph 18.8:

- 18.8. Notwithstanding any other provisions hereunder, the OWNER may cancel the AGREEMENT, suspend WORK and/or terminate the CONTRACT for the convenience of the OWNER in the event that the CONTRACT PRICE increases by fifteen (15%) or more percent.

**SC-4. PAYMENTS TO CONTRACTOR (ARTICLE 19):**

A. Add the following as Paragraph 19.1.1:

- 19.1.1. The Contractor shall submit monthly progress payment applications to the ENGINEER for review.

B. Add the following as Paragraph 19.3.1:

- 19.3.1. The WORK of this CONTRACT is part of a Municipal System. The OWNER may enter upon and use the whole or any portion of the work, which may be in condition to use at any time previous to its final acceptance by the OWNER. Such use shall not constitute or be evidence of acceptance by the OWNER or the ENGINEER of the whole or any part of the material or equipment furnished, or WORK performed under this CONTRACT

C. Add the following to Paragraph 19.5:

- A 'Certificate of Completion' and an AIA 'Release of Surety Form' shall accompany the final payment requisition.

**SC-5. INSURANCE (ARTICLE 21):**

- A. In Paragraph 21.3.1, replace the words "shall be maintained for up to three (3) years after the COMPLETION of the PROJECT" with "shall be kept in force for at least six (6) years after the date of final completion."

B. In Paragraph 21.4, delete the last sentence and replace it with the following:

- The limit of Employer's Liability Insurance shall be not less than \$1,000,000 each accident, or shall meet the limits as required by the State of Connecticut, whichever is higher.

- C. The insurance described in Paragraph 21.5 (BUILDER'S ALL RISK INSURANCE by the Contractor, naming the City of Milford and/or OWNER, and the CONTRACTOR the insureds) is required. Builder's All Risk shall cover all materials stored within project limits but shall not duplicate other insurance coverages specified for this project.

D. Add the following as Paragraph 21.14:

- 21.14. Each of the above insurances shall contain a specific rider designating the City of Milford, Connecticut as an additional insured party to the policy.

SECTION 00800

SUPPLEMENTARY CONDITIONS

**SC-6. CONTRACT SECURITY (ARTICLE 22):**

Add the following to the end of this Article:

The OWNER shall have the authority to request that the bond amounts be adjusted to reflect the additional costs of the project due to any increase in value of the CONTRACT.

**SC-7. ASSIGNMENTS (ARTICLE 23):**

Delete Article 23 in its entirety and substitute it with the following:

The CONTRACTOR shall not assign or transfer, whether by an assignment or novation, any of its rights, duties, benefits, obligations, liabilities, claims or responsibilities under this CONTRACT without the written consent of the OWNER.

**SC-8. SUBCONTRACTING (ARTICLE 26):**

A. Add the following to the end of Paragraph 26.5:

Contracts written between the CONTRACTOR and his Subcontractors shall include language specifically disclaiming that there are any intended third-party beneficiaries.

B. Add the following as Paragraph 26.6:

26.6. The CONTRACTOR shall not execute an agreement with any SUBCONTRACTOR or permit any SUBCONTRACTOR to perform any WORK included in this CONTRACT until it has submitted a non-collusive affidavit and a Certification by a Proposed SUBCONTRACTOR regarding Equal Employment Opportunity from the subcontractor in substantially the form shown in the CONTRACT DOCUMENTS (Sections 00303 and 00305) and has received written approval of such SUBCONTRACTOR from the Local Public Agency. No proposed SUBCONTRACTOR shall be disapproved by the OWNER except for cause, which may include but not be limited to on-going contract disputes and/or litigation between the City of Milford and the proposed SUBCONTRACTOR.

**SC-9. TAXES (ARTICLE 31):**

Delete Article 31 in its entirety and substitute it with following:

The OWNER is a tax-exempt organization and, as such, is exempt from sales tax to the extent defined by Connecticut law. The CONTRACTOR shall obtain from the OWNER an exemption certificate number to be used in lieu of paying the tax on exempted items. In the event any taxes may become payable with respect to the project, the CONTRACTOR shall be responsible for same.

SECTION 00800

SUPPLEMENTARY CONDITIONS

**SC-10. SITE REGULATIONS (ARTICLE 33):**

Delete Paragraph 33.1 and replace it with the following Paragraph 33.1:

- 33.1. Removal of Rubbish and Temporary Facilities. The CONTRACTOR shall within forty-eight (48) hours or as directed during the progress of the WORK, remove and legally dispose of all surplus material and debris, and keep the job site, the project area and the public rights-of-way clear. Upon completion of the WORK, he shall remove all temporary construction facilities, debris, and unused materials provided for the WORK, and put the whole site of the WORK and public rights-of-way in a neat and clean condition. Trash may not be burned on the site or within the City limits.

**SC-11. ARCHAEOLOGICAL FINDS (NEW ARTICLE 37):**

During the life of this CONTRACT, the CONTRACTOR is herewith required to immediately notify the following organizations in the event that any articles such as "charcoal", "bone", "shell", "cultural objects - fire cracked stones or stone flaking material" or any other such related items of historical significance are discovered.

- (1) City by Title (Mayor, Director of Public Works, etc.);
- (2) Local Historical Society by Official name; and
- (3) State Historic Preservation Office  
Catherine Labadia, Deputy State Historic Preservation Officer, Staff Archaeologist  
450 Columbus Boulevard, Suite 5  
Hartford, CT 06103  
Telephone: (860) 500-2329  
Email: [Catherine.Labadia@ct.gov](mailto:Catherine.Labadia@ct.gov)

**SC-12. REVIEW OF WORK (NEW ARTICLE 38):**

The OWNER, its authorized representatives and agents, shall at all times have access to and be permitted to observe, inspect, and review all WORK, materials, equipment, payrolls, personnel records, employment conditions, material invoices, and other relevant data and records pertaining to this CONTRACT, provided, however, that all instructions and approval with respect to the WORK will be given to the CONTRACTOR only by the OWNER through its authorized representatives or agents.

**SC-13. FINAL INSPECTION (NEW ARTICLE 39):**

When the WORK covered by this CONTRACT is substantially completed, the CONTRACTOR shall notify the OWNER in writing that the WORK will be ready for final inspection on a definite date, which shall be stated in the notice. The notice will be given at least three (3) days prior to the date stated for final inspection and bear the signed concurrence of the representative of the OWNER having charge of inspection. If the OWNER determines that the status of the WORK is as represented, it will make the arrangements necessary to have final inspection commenced on the date stated in the notice, or as soon thereafter as practicable.

END OF SECTION

SECTION 00905

CHANGE ORDER

(Instructions on Page 2)

CHANGE ORDER NO. \_\_\_\_\_

DATE OF ISSUANCE: \_\_\_\_\_

PROJECT: \_\_\_\_\_

OWNER: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

ENGINEER: \_\_\_\_\_

ENGINEER'S Project No. \_\_\_\_\_

You are directed to make the following changes in the Contract Documents:

Description: \_\_\_\_\_

Purpose of Change Order: \_\_\_\_\_

Attachments: \_\_\_\_\_

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIME:
Original Contract Price \$ _____	Original Contract Time _____ Days or Date
Previous Change Order No. ____ to ____ \$ _____	Net change from previous Change Orders _____ Days
Contract Price prior to this Change Order \$ _____	Contract Time Prior to this Change Order _____ Days or Date
Net Increase (Decrease) of this Change Order \$ _____	Net Increase (Decrease) of this Change Order _____ Days
Contract Price with all approved Change Orders \$ _____	Contract Time with all approved Change Orders _____ Days or Date

**RECOMMENDED:**

**APPROVED:**

**APPROVED:**

\_\_\_\_\_  
Engineer

\_\_\_\_\_  
Owner

\_\_\_\_\_  
Contractor

SECTION 00905

CHANGE ORDER

**INSTRUCTIONS**

**A. GENERAL INFORMATION:**

1. This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Time. Changes that have been initiated by a Work Directive Change must be incorporated into a subsequent Change Order if they affect Price or Time.
2. Changes that affect Contract Price or Contract Time should be promptly covered by a Change Order. The practice of accumulating change order items to reduce the administrative burden may lead to unnecessary disputes.
3. For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Time, a Field Order may be used.

**B. COMPLETING THE CHANGE ORDER FORM:**

1. The Engineer initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by the Contractor, or requests from the Owner, or both.
2. Once the Engineer has completed and signed the form, all copies should be sent to the Contractor for approval. After approval by the Contractor, all copies should be sent to the Owner for approval. The Engineer should make distribution of executed copies after approval by the Owner.
3. If a change only applies to price or to time, cross out the part of the tabulation that does not apply.

END OF SECTION

SECTION 00945

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT: \_\_\_\_\_

ENGINEER'S Project No. \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

CONTRACT FOR: \_\_\_\_\_ CONTRACT DATE: \_\_\_\_\_

This Certificate of Substantial Completion applies to all WORK under the CONTRACT DOCUMENTS or to the following specified parts thereof:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

To \_\_\_\_\_

OWNER

And to \_\_\_\_\_

CONTRACTOR

The WORK to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR, and ENGINEER and WORK is hereby declared to be substantially complete in accordance with the CONTRACT DOCUMENTS on:

\_\_\_\_\_  
Date of Substantial Completion

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the WORK in accordance with the CONTRACT DOCUMENTS. The items in the tentative list shall be completed or corrected by CONTRACTOR within \_\_\_\_\_ days of the above date of Substantial Completion.



SECTION 00945

CERTIFICATE OF SUBSTANTIAL COMPLETION

The following documents are attached to and made a part of this Certificate:

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This Certificate does not constitute an acceptance of WORK not in accordance with the CONTRACT DOCUMENTS nor is it a release of the CONTRACTOR'S obligation to complete the WORK in accordance with the CONTRACT DOCUMENTS.

Executed by the ENGINEER on \_\_\_\_\_, 20\_\_

\_\_\_\_\_  
ENGINEER

By \_\_\_\_\_

CONTRACTOR accepts this Certificate of Substantial Completion on \_\_\_\_\_, 20\_\_

\_\_\_\_\_  
CONTRACTOR

By \_\_\_\_\_

OWNER accepts this Certificate of Substantial Completion on \_\_\_\_\_, 20\_\_

\_\_\_\_\_  
OWNER

By \_\_\_\_\_

END OF SECTION

SECTION 00950

WAIVER OF LIENS PRIME CONTRACTOR

PROJECT: \_\_\_\_\_

OWNER: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_ CONTRACT DATE: \_\_\_\_\_

The undersigned CONTRACTOR hereby swears under penalty of perjury that (1) all previous progress payments received from the OWNER on account of WORK performed under the CONTRACT referred to above have been applied by the undersigned to discharge, in full, all obligations of the undersigned incurred in connection with WORK covered by prior Pay Estimates for Partial Payment under said CONTRACT, being Pay Estimates number 1 through \_\_\_\_\_ inclusive; and (2) all labor, materials and equipment incorporated in said PROJECT or otherwise listed in or covered by these Pay Estimates for Partial Payment are free and clear of all liens, claims, bond claims, security interests and encumbrances, except those listed below by obligee, nature and amount of obligation and covered by appropriate BOND or BONDS, as listed beside each obligation and attached to and made a part of this certification.

Obligation

Bond

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Dated: \_\_\_\_\_

Signed \_\_\_\_\_

\_\_\_\_\_  
Name

\_\_\_\_\_  
Title

COUNTY OF \_\_\_\_\_

STATE OF \_\_\_\_\_

Before me on this \_\_\_\_ day of \_\_\_\_\_, 20\_\_ personally appeared \_\_\_\_\_ known to me, who being duly sworn, did depose and save that he is the \_\_\_\_\_ of the Contractor above mentioned; that he executed the above statement on behalf of said Contractor and that all of the statements contained therein are true, correct and complete.

\_\_\_\_\_  
Notary Public

My Commission Expires \_\_\_\_\_

END OF SECTION

SECTION 00960 CERTIFICATE OF FINAL PAYMENT AND COMPLETION OF WORK

PROJECT: \_\_\_\_\_

OWNER: \_\_\_\_\_

Project Description: \_\_\_\_\_

Agreement Date: \_\_\_\_\_

Completion Date: \_\_\_\_\_ (per Agreement and Change Orders)

**FINAL CERTIFICATION OF CONTRACTOR**

(Insert Name and Complete Address of Contractor)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

agrees to accept \$ \_\_\_\_\_ as full and final payment for all WORK completed under this CONTRACT dated \_\_\_\_\_, 20\_\_ with the \_\_\_\_\_ for the \_\_\_\_\_.

I certify that all construction has been carried out in substantial compliance with the CONTRACT DOCUMENTS, and that all labor, equipment, materials and Subcontractors have been or will be paid in accordance with the requirements of the General Laws of the State of Connecticut.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
Signed by Officer of Corporation

\_\_\_\_\_  
Title

END OF SECTION

SECTION 01015

SPECIAL REQUIREMENTS

- |  |   |
|--|---|
| 1. Application   | 21. Dimensions of Existing Structures             |
| 2. Specifications and Drawings                               | 22. Work to Conform                               |
| 3. Progress of Work  | 23. Pipe and Structure Location                   |
| 4. Traffic Control   | 24. NOT USED                                      |
| 5. Change in the Amount of Work                              | 25. Computation of Quantities                     |
| 6. Sequence of Construction                                  | 26. NOT USED                                      |
| 7. Visit to the Site   | 27. Reimbursement                                 |
| 8. Disposal of Excess and Unsuitable<br>Soil Materials       | 28. Bulkheads and Flushing                        |
| 9. Site Maintenance, Disposal of Debris,<br>and Dust Control | 29. Emergency Vehicles and School Buses           |
| 10. Technical Specifications                                 | 30. Permits                                       |
| 11. Utility Notification and Protection                      | 31. Storage of Materials                          |
| 12. NOT USED   | 32. Interference with Existing Works              |
| 13. Cleanup  | 33. Maintaining Sewage Flow                       |
| 14. Continuous Operating Criteria                            | 34. Photographs and Videos                        |
| 15. Limitations of Operations                                | 35. Sewer Pipe Video Inspection                   |
| 16. Special Inspections                                      | 36. Hydraulic Uplift of Structures                |
| 17. Work Area  | 37. Constructing Building Connections             |
| 18. Street Openings  | 38. Special Compaction Requirements               |
| 19. Work in State Highways                                   | 39. Disturbances of Bounds                        |
| 20. Lines, Grades, and Measurements                          | 40. NOT USED                                      |
|  | 41. Milford Inland Wetlands & Watercourses Permit |

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1. APPLICATION:

The Special Requirements under these specifications are applicable to all work performed under this Contract.

2. SPECIFICATIONS AND DRAWINGS:

All work shall conform to these specifications and the accompanying drawings, together with any changes or directions that may be furnished from time to time by the City of Milford and/or the Engineer in the manner proscribed by the Contract Documents.

3. PROGRESS OF WORK:

The Contractor shall promptly start and continue actual construction work under this contract with the necessary staff and equipment to properly execute and complete this contract in the specified time. No cessation of the Contractor's operations will be allowed without the approval of the Engineer. The rate of progress shall be satisfactory to the Owner and the Engineer. The Contractor shall furnish to the Engineer a progress schedule for the work. TIME IS OF THE ESSENCE WITH REGARD TO THE COMPLETION OF THE WORK.

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4. TRAFFIC CONTROL:

- A. The Contractor shall contact the responsible heads of the Fire, Police, and other appropriate governing bodies of the municipality and/or state in order to obtain necessary permits and determine the requirements for said departments with respect to traffic control during construction.
- B. When detours or alternate routes are permitted by the governing body, the size, construction, and location of signs shall conform to local and state requirements and/or standards. The Contractor shall coordinate with the Police and Fire Departments and the Engineer during the establishment of alternate route(s), and it shall be the Contractor's responsibility to prepare an acceptable 'Detour Plan' for submittal to the local traffic authority and the Engineer for approval prior to formal notification of the respective City of Milford agencies. Detour routes shall be adequately posted to assist the motorist to return to their route of travel. Where the roadway under construction is the only means of vehicular access to a particular area determined by the appropriate governing body, the Contractor shall provide continual access to the area for residents and emergency vehicles.
- C. For control of moderate traffic, the Contractor shall provide an adequate number of flag persons employed at the expense of the Contractor.
- D. When directed by the Owner, uniformed officers will be required to act as traffic control personnel in construction areas. An allowance has been included in the bid form for the furnishing of uniformed police for traffic control. The Contractor will pay police officers in accordance with the rates set forth in the collective bargaining agreement for special duty services on a weekly basis and will ensure at all times that the City of Milford is and remains in compliance with the Wage and Hour provisions of the State of Connecticut.
- E. The employment or presence of traffic flag persons, special officers, or police shall in no way relieve the Contractor of any responsibility or liability that is otherwise the Contractor's under the terms of the Contract.

5. CHANGE IN THE AMOUNT OF WORK:

The Owner reserves the right to increase or decrease the amount of the work as may be found desirable or necessary during the execution of this Contract, in accordance with the specifications, and the unit prices quoted in the bid proposal shall apply without change to such variation in the quantity of the items.

6. SEQUENCE OF CONSTRUCTION:

- A. For the protection of life and property, all backfill operations shall follow closely behind excavations when possible. The Contractor shall ensure that no excavation be left open, unguarded, or water filled during any period of time when work is not actually in progress. It is the purpose and intent that all excavations and backfill, including consolidation operations, the installation of service connections, and temporary surfacing within an area be accomplished expeditiously before proceeding to other work areas.

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- B. The Engineer reserves the right to schedule the Contractor to construct at any locations within the project area. At the same time the Engineer may schedule the suspension of construction at any location.
  - C. All sewer construction should begin at the downstream ends of the proposed sewers so that any pipe in place can be tested and utilized. If the Engineer waives the provision at any time, he reserves the right to order construction in any areas that have been bypassed at any time, at no additional cost to the Owner.
  - D. All pipe and structure installation and backfilling operations in any street, including building connections, and restoration of private sewer easements shall be completed before beginning work in any other street or right-of-way.
  - E. Permanent binder course and surface course pavement restoration for building connections and mainline sewers shall be placed concurrently.
7. VISIT TO THE SITE:
- A. Before submitting a bid, the Bidder shall visit the site, examine the existing conditions, and thoroughly acquaint himself with the conditions before performing the work.
  - B. The Bidder shall also study available as-built, utility, and other data and compare it with the information gathered during their site examination, as no extra compensation will be authorized for extra work caused by their unfamiliarity with the site or the conditions particular to this job.
8. DISPOSAL OF EXCESS AND UNSUITABLE SOIL MATERIALS:
- All surplus and unsuitable soil materials removed from the excavations shall become the property of the Contractor, unless called for otherwise in the specifications, and shall be removed from the site and disposed of off-site by the Contractor in accordance with all applicable laws and regulations.
9. SITE MAINTENANCE, DISPOSAL OF DEBRIS, AND DUST CONTROL:
- A. During the prosecution of work, the Contractor shall maintain the site of his operations and adjoining areas in a neat and orderly manner, and shall not allow the accumulation of construction debris or surplus excavation materials within the right-of-way or adjoining pavement areas.
  - B. The Contractor shall be responsible for controlling dust from his operations, and when ordered by the Engineer, shall use whatever means necessary for dust control, including the use of manual and powered sweeping, and the sprinkling of water, in a manner satisfactory to the Engineer, and at no additional cost.
  - C. Should the Contractor neglect or refuse to maintain the site free of accumulated debris, and provide dust control, the Owner reserves the right to have the service performed by others and the cost thereof deducted from progress payments.

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10. TECHNICAL SPECIFICATIONS:

All technical specifications referred to herein these specifications, such as AWWA, ASTM, AASHTO, and others, refer to the latest revision of such technical specifications.

11. UTILITY NOTIFICATION AND PROTECTION:

- A. The Contractor shall give written notice, in accordance with Chapter 353 of the Public Acts of 1983, to all utilities at least seventy-two (72) hours, exclusive of Saturdays, Sundays, and legal holidays, before excavation.
- B. In addition to protecting pipes, mains, conduits, and other utilities in use, excavations and all other work shall be performed in such a manner as to avoid damage to poles and other utility structures and appurtenances.
- C. Reasonable precautions, to include temporary support of the affected utility, shall be taken as necessary to avoid damage. Immediate notifications shall be given to the utility when damage occurs. The Contractor shall be liable for all damage caused by its activities hereunder, including but not limited to excavating activities.

12. NOT USED

13. CLEANUP:

- A. At the conclusion of the work, the Contractor shall remove and haul away all remaining surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining within the project limits from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.
- B. Work areas which are placed into operation prior to full project completion to facilitate the Contractor's work shall be given a thorough cleaning by the Contractor prior to final project acceptance.

14. CONTINUOUS OPERATING CRITERIA:

- A. The Contractor shall conduct his operations in such a manner and sequence, which shall neither result in a disruption of the sanitary sewerage system, nor interfere with the functional organization and workings of the sanitary sewerage system.
- B. The Contractor shall furnish, install and operate any piping, equipment and appurtenances necessary to provide the temporary services, facilities, and bypasses required during construction including, but not limited to bypass pumping, groundwater dewatering, flow barriers and diversions.
- C. The Owner will operate and maintain all existing systems and equipment, except as otherwise noted. The Contractor shall notify and coordinate with the Owner to affect all temporary modifications in collection system operation required for construction within, or interfacing with, existing facilities. The Contractor shall be responsible for operation and maintenance of all proposed facilities until accepted by the Owner.

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- D. A carefully planned and detailed construction schedule must be submitted to the Engineer for approval before any construction starts, showing the proposed sequences of operation and the methods to be used for maintaining continued operations.

15. LIMITATIONS OF OPERATIONS:

- A. The Contractor including all subcontractors, material delivery, and all others relating to the project shall conform to the following work schedule:
1. Hours of Operation: No outdoor activity will be permitted within or adjacent to the project sites located on City streets or adjacent to residential areas before 7:00 a.m. or after 3:30 p.m. It is understood that time for curing and reinstating service laterals for pipe lining work could require a longer workday, and work beyond these hours will be considered on a case-by-case basis, when requested by the Contractor.
  2. Saturday, Sunday, and Holiday Work: All outdoor activity shall be confined to Monday through Friday, except for emergency conditions which shall be reviewed and approved, in writing, by the Owner in advance. No work shall be done on Saturdays, Sundays, or holidays observed by the City of Milford without prior permission of the Owner.
  3. The following holidays are observed by the City of Milford:

New Year's Day	Fourth of July
Martin Luther King Jr. Day	Labor Day
Lincoln's Birthday	Columbus Day
President's Day	Veteran's Day
Good Friday	Thanksgiving Day
Memorial Day	Christmas Day
  4. Length of the Workday: The Owner retains the right to restrict the Contractor to an eight (8) hour workday.
- B. The Contractor shall confine his on-site operations to within the designated work area unless specifically authorized to work outside of the work area.
- C. For work in or adjoining to State Highways, the Contractor shall conform to additional restrictions specified by the State of Connecticut District Maintenance Manager.

16. SPECIAL INSPECTIONS:

Special inspections are not part of the Contractor's scope of work. The Owner shall pay the cost for such special inspections and testing by a lab. When required, the Contractor shall coordinate his work with the selected Special Inspector to ensure that inspection of the work is completed in a timely manner. The Contractor shall pay for re-inspection or re-testing required as a result of non-compliance with the Contract Documents.



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17. WORK AREA:

The Contractor shall confine his on-site operations to within the designated work area(s), unless specifically authorized by the Owner to work outside of the work area.

18. STREET OPENINGS:

- A. The City of Milford has an ordinance relating to street openings. Prior to submitting his bid, the Contractor should obtain a copy of the ordinance and become thoroughly familiar with its contents and ramifications. Chapter 20, in the City of Milford Code of Ordinances is entitled "Streets, Sidewalks, and Public Place". Article III pertains to "Openings and Excavations". Work under this contract shall conform to the requirements of the ordinance, except that the Contractor shall be responsible for furnishing, placing, and maintaining all temporary and permanent pavements in accordance with the contract plans and these specifications.
- B. Prior to commencement of work, the Contractor must obtain the license required under Article III, Division 2, of the City of Milford Code of Ordinances.
- C. Before a license is granted, every applicant shall file (at its own cost) with the Director of Public Works the required surety bond and provide the required certificate of insurance conforming to Section 20-74 and/or as otherwise required by the City or hereunder. In addition, a permit is required under Section 20-78 before starting work.
- D. Any licensee or permittee making an opening in any street pavement shall cut the surface of the road with a pavement saw. The cut is to be made in a straight line for the length, width, and depth of the surface of the proposed pavement excavation.
- E. The Contractor shall submit grade sheets as specified in the Special Requirements prior to obtaining licenses or permits for sewers and for work in sewer rights of way. Where sewers exceed 900 linear feet in any street, a separate permit will be required for each portion of the proposed sewer up to approximately 900 feet in length. A minimum of one separate permit will also be required for each street opened for the proposed work, and for sewer Rights-of-Way in which excavation occurs to construct the proposed work.

19. WORK IN STATE HIGHWAYS:

- A. All work performed in a state roadway comes under the jurisdiction of and is subject to the approval of the Connecticut Department of Transportation.
- B. The Contractor shall conform to Connecticut Department of Transportation, Bureau of Engineering and Highway Operations, "Highway Encroachment Permit Regulations", dated 1992, and any subsequent editions, revisions and addenda. The Contractor shall apply for an encroachment permit and provide the Certificate of Insurance and Permit Bond as required by the Connecticut Department of Transportation District Maintenance Manager. The Contractor shall notify the District Maintenance Manager at least 48 hours before starting work in the State Highway or Right-of-Way. The Permit Bond will be released at such time as the District Maintenance Manager is satisfied that all requirements

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have been complied with and the work done is satisfactory to the Connecticut Department of Transportation.

- C. Charges made by the Connecticut Department of Transportation because of inspection work performed under the encroachment permit or any other permit, license, or requirement shall be paid for by the Contractor.
- D. When, in the opinion of the Engineer, it becomes necessary or expedient to close any part of the State Highway to vehicular travel, due to construction work, the Contractor shall obtain such permits or authorization as are necessary from the Connecticut Department of Transportation District Maintenance Manager and arrange with local authorities for permissible detour streets.
- E. The Contractor shall obtain and keep at the work site for reference of all interested parties, a copy of the latest edition of the following documents published by the State of Connecticut Department of Transportation:
  - 1. Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818.
  - 2. Encroachment Permit Regulations.
- F. The Contractor shall comply with the section of the 'Encroachment Permit Regulations' titled, "Safety to Traffic".
- G. The Contractor is further advised that the State of Connecticut Department of Transportation will require the following submittals, for their approval, for projects within state highways, all of which shall be the responsibility of the Contractor and done at the Contractor's cost and as part of their bid:
  - 1. Detailed Maintenance and Protection of Traffic (MPT) Plan using the Manual on Uniform Traffic Control Devices (MUTCD). The MPT plan shall be prepared by or under the direction of a Professional Engineer licensed in the State of Connecticut.
  - 2. Construction phase plan, which outlines the hours, duration, work hour restrictions, and related information for the proposed work.
  - 3. All detour plans.
  - 4. Traffic loop repair and replacement schedule.
  - 5. Any and all other Department of Transportation requirements.

20. LINES, GRADES, AND MEASUREMENTS:

- A. The Contractor shall employ, at its own cost, a competent land surveyor licensed in the State of Connecticut. The Contractor shall require said surveyor to establish all lines, elevations, reference marks, batter boards, and any other items needed by the Contractor during the progress of the work, and from time to time to verify such marks by instrument or other appropriate means.

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- B. The Engineer shall be permitted at all times to check the lines, elevations, reference marks, batter boards, and any other items set by the Contractor. The Contractor, at its own cost, shall correct any errors in lines, elevations, reference marks, batter boards, and any other items disclosed by such check. Such a check shall not be construed to be an approval of the Contractor's work and shall not relieve or diminish in any way the responsibility of the Contractor for the accurate and satisfactory construction and completion of the entire work.
- C. The Contractor shall make, check, and be responsible for all measurements and dimensions necessary for the proper construction of and the prevention of errors in the work.
- D. Prior to excavating in any street or sewer right-of-way, the Contractor shall obtain a Street-opening Permit from the City Engineer's office. The Contractor, at its cost, shall obtain the services of a land surveyor, currently licensed in the State of Connecticut, to stake out and grade the various proposed gravity sewers and force mains at approximate 25-foot intervals along the entire length of the proposed work. The land surveyor shall prepare a grade sheet, based upon the actual field stakeout of the work. The grade sheet shall show the identity and elevation of the offset reference point and also the elevation of the original ground over the centerline of the proposed sewer at the staked station. The elevation of the offset reference point shall be given to the nearest one-hundredth (0.01) of a foot. The original ground elevation along the sewer centerline shall be given to the nearest one-tenth (0.1) of a foot.
- E. The grade sheet shall also show the elevation of the invert of the proposed sewer or force main at the centerline station being staked. The cut from the elevation of the reference offset point to the invert elevation of the proposed sewer or force main shall be shown on the grade sheet to the nearest one-hundredth (0.01) of a foot. The cut from the original ground elevation over the center of the sewer to the sewer or force main invert shall be shown on the grade sheet to the nearest one-tenth (0.1) of a foot. This will be used to determine the depth classification for the work.
- F. Three (3) copies of the grade sheet are to be submitted with the application for the street opening permit. Each grade sheet is to be affixed with the original seal and signature of the responsible land surveyor. Street opening permits will be issued to the Contractor based upon the grade sheets prepared by the Contractor's land surveyor.
- G. In connection with the staking and grading of sewers, the Contractor's land surveyor shall establish benchmarks at approximate intervals of 500 feet (max.) along the proposed sewer route, based upon NAVD 88 datum. The Contractor shall submit a schedule of benchmarks prior to beginning work in any contract area. The schedule of benchmarks shall clearly identify the benchmark and give the elevation of the benchmark to the nearest one-thousandth (0.001) of a foot. The schedule of benchmarks shall be affixed with the original seal and signature of the responsible land surveyor. The elevations of the benchmarks shall be certified by the surveyor to conform to closure accuracies required for a Class V-2 level run as defined in the "Minimum Standards for Surveys and Maps in the State of Connecticut" dated September 26, 1996. The starting and ending point of a closure shall be an established USGS Bench Mark with an elevation to the nearest one-hundredth (0.01) of a foot or to the nearest one-thousandth (0.001) of a foot, whichever is available. The

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schedule of benchmarks is to be provided before street opening permits will be issued in any given area of the project.

21. DIMENSIONS OF EXISTING STRUCTURES:

Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment that is dependent on the correctness and accuracy of such information.

22. WORK TO CONFORM:

- A. During its progress and on its completion, the work shall conform truly to the lines, levels, and grades indicated on the drawings, or given by the Engineer, and shall be built in a thoroughly substantial and workmanlike manner, in strict accordance with the drawings, specifications, and other Contract Documents and the directions given from time to time by the Engineer.
- B. All work performed without instructions having been given by the Engineer, without proper lines or levels, or performed during the absence of the Engineer, will not be estimated or paid for except when such work is authorized by the Engineer in writing. Work so done may be ordered to be uncovered or taken down, removed, and replaced at the Contractor's expense.

23. PIPE AND STRUCTURE LOCATION:

- A. Pipes and structures shall be located substantially as indicated on the drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures, or for other such reasons.
- B. Where fittings and any other items are noted on the drawings, such notations are for the Contractor's convenience and shall not relieve him from laying and jointing differently, or providing additional items where required.

24. NOT USED

25. COMPUTATION OF QUANTITIES:

- A. For estimating quantities in which the computation of areas by geometric methods would be comparatively laborious, it is agreed that the use of a planimeter shall be considered an instrument of precision adapted to the measurement of such areas.
- B. It is further agreed that the computation of earthwork volumes shall be performed using the method of average end areas.

26. NOT USED

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27. REIMBURSEMENT:

If the Contractor works outside the Hours of Operation specified in Paragraph 15 (above), they shall reimburse the Engineer and/or the City of Milford for their employees or staff required to remain at the work site, for all hours worked outside of the specified hours.

28. BULKHEADS AND FLUSHING:

- A. The Contractor shall build a tight bulkhead in the pipeline where new work enters an existing sewer. The bulkhead shall remain in place until the Engineer authorizes its removal.
- B. Care shall be taken to prevent earth, water, and other materials from entering the pipe, and when pipe-laying operations are suspended, the Contractor shall maintain a suitable stopper in the end of the pipe and also at the openings for manholes. As soon as possible after the pipe and manholes are completed, the Contractor shall flush out the new pipeline, using special high pressure hydraulically propelled cleaning equipment. None of the flushing water or debris shall be permitted to enter any existing sewer. Sewer flushing shall be completed prior to television inspection by the City of Milford. Additional cleaning required to enable television inspection shall be provided at no cost to the Owner.

29. EMERGENCY VEHICLES AND SCHOOL BUSES:

Provisions shall be made for the safe passage of emergency vehicles and school buses at all times.

30. PERMITS:

The Contractor shall conduct his operations in such a manner so as to conform to all requirements set forth in the required or obtained permits, licenses and/or other authorizations. If the Contractor's method of operations deviates from those indicated in the permits, licenses and/or other authorizations, the Contractor shall be responsible for all the necessary additional permits required to complete the work. Such permit revisions and delays shall be at the Contractor's own expense and will not be grounds for extension of time to complete the work. The Contractor will be responsible for obtaining or verifying applicable permits required for the work.

31. STORAGE OF MATERIALS:

- A. No stockpiling of excavated materials will be allowed within a City or State right-of-way, except under those circumstances where prior approval is provided by the Owner and Engineer.
- B. All surplus and unsuitable material shall be removed or disposed of at the Contractor's expense to an appropriate area off-site; said area to be approved by the City of Milford or other appropriate agencies.

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- C. The Contractor shall maintain suitable temporary stockpile area(s) at their own expense when necessary to facilitate the proper handling and processing of suitable excavation materials to be re-incorporated back into the work. Work may include operations such as covering, mixing, and drying out of excavation materials to adjust moisture content as required for proper compaction of backfill.

32. INTERFERENCE WITH EXISTING WORKS:

- A. The Contractor shall at all times conduct his operations so as to interfere as little as possible with existing works. The Contractor shall develop a program, in cooperation with the Engineer and interested officials, which shall provide for the construction (and putting into service) of the new works in the most orderly manner possible. This program shall be adhered to except where deviations there from are expressly permitted. All work of connecting with, cutting into, and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest possible time when the demands of the facilities best permit such interference. Before starting work which will interfere with the operation of existing facilities, the Contractor shall do all possible preparatory work and shall see that all tools, materials, and equipment are made ready and at hand.
- B. The Contractor shall make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation. The Contractor shall have no claim for additional compensation by reason of delay or inconvenience in adapting their operations to the need for continuous flow of sewage.

33. MAINTAINING SEWAGE FLOW:

- A. It is essential to the operation of the existing sewerage system that there be no interruption in the flow of sewage. To this end, the Contractor shall provide, maintain, and operate all temporary facilities such as dams, pumping equipment, conduits, and all other labor and equipment necessary to intercept the sewage flow before it reaches the points where it would interfere with his work, carry it past their work, and return it to the existing sewer below their work.
- B. Sewage will not be permitted to spill onto the ground. In the event a sewage spill should occur, the Contractor shall immediately notify the Engineer, Milford Wastewater Division, and Connecticut DEEP.

34. PHOTOGRAPHS AND VIDEOS:

- A. The Contractor shall conduct a pre-construction photograph and video survey documenting existing conditions, in accordance with Section 01310 – Schedules and Reports, and submit materials to the Engineer for review prior to the start of work.
- B. If required by the Engineer, the Contractor shall submit progress photographs documenting the work in accordance with Section 01310 – Schedules and Reports. When required, the

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Contractor shall submit such progress photographs not less often than once a month, or as directed by the Engineer.

35. SEWER PIPE VIDEO INSPECTION:

- A. Subsequent to completion of the constructed gravity sewer lines, the Contractor shall ensure that all sections are free and clear of silt and debris to allow television inspection by the Owner. Should pipe sections not be clear of silt and debris at the time of video inspection, the Contractor shall adequately clean the necessary sections. The Contractor will be charged at an hourly rate for the time necessary to complete a repeat television inspection.
- B. Should the sewer television inspection by the Owner reveal construction defects, the Contractor will be responsible for completing repairs as ordered, at no charge to the Owner, and furthermore, will be charged at an hourly rate for the time necessary to complete a repeat television inspection subsequent to repairs being made.

36. HYDRAULIC UPLIFT OF STRUCTURES:

The Contractor shall be responsible for the protection of all structures against hydraulic uplift until such structures have been finally accepted by the Owner.

37. CONSTRUCTING BUILDING CONNECTIONS:

- A. The Contractor shall use wheel-mounted machinery during all phases of constructing building connections within paved roadway areas.
- B. The use of track-mounted machinery for building connection construction will not be permitted unless approved otherwise by the Engineer.

38. SPECIAL COMPACTION REQUIREMENTS:

The Contractor will be required to backfill and compact sewer trenches in each street, install subbase immediately upon completion of backfilling operations, and install temporary pavement as directed, in accordance with these specifications. Only under extreme, unusual circumstances will a change in this procedure be allowed.

39. DISTURBANCES OF BOUNDS:

- A. The Contractor shall replace and relocate all bounds and other property line location items disturbed by his operations, at his own expense.
- B. The bounds shall be relocated and reset by a land surveyor licensed in the State of Connecticut.

40. NOT USED

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41. MILFORD INLAND WETLANDS AND WATERCOURSES PERMIT:

- A. Portions of the work may fall within the jurisdiction of the Milford Inland Wetlands Agency (MIWA). Accordingly, the Contractor shall be responsible for obtaining any and all permit requirements thereby.
- B. In addition, the Contractor shall adhere to the requirements of Section 01560 – Environmental Protection, as well as the soil erosion and sediment control measures depicted and described in the drawings, as applicable.
- C. Any visit to the site by the Milford Inlands Wetlands Agency Compliance Officer necessitated by violation of any permits shall result in a per-visit charge to the Contractor. The cumulative charges shall be deducted from the contract by change order(s) upon contract completion.

END OF SECTION



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PAYMENT ITEM INDEX

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GENERAL

- A. This section defines the measurement and payment criteria for the work to be performed under the respective payment items listed in the BID. Each unit or lump sum price stated in the BID shall constitute full compensation for the work to be completed in accordance with the drawings and these specifications.
- B. The Contractor shall carefully acquaint himself with all work associated with each payment item and shall have no claim for his unfamiliarity with the requirements of the various items.
- C. Any item not specifically identified for payment in the BID FORM shall not receive direct payment but rather shall be considered in the cost for other related items.
- D. There are no separate pay items in the BID for clearing, grubbing, site preparation and restoration work required under the drawings and these specifications within the rights-of-way or on existing properties along the sewer route(s). The Contractor shall include the cost for this work in the price bid for the pay items requiring clearing, grubbing, site preparation and restoration.
- E. There is no separate pay item in the BID for earth excavation. The price bid for those items that involve excavation shall include compensation for earth excavation, and the price submitted shall be based on performing the entire excavation in earth. Where rock is encountered, the price bid for rock therefore, shall be in addition to the cost of excavating earth, and no deduction will be made in the amount for earth excavation.
- F. The price bid for those items which involve excavation shall include compensation for disposal of surplus excavated material; dewatering; installation of soil erosion and sediment control measures specifically for dewatering operations; and installation of all necessary sheeting, shoring, and bracing.
- G. The unit and lump sum prices for all pipe items included in the BID shall constitute full compensation for site preparation; earth excavation, backfill, and compaction in accordance with the specifications; furnishing, laying, jointing and testing of the completed pipeline(s); engineering geotextile fabric; screened gravel; and site restoration and cleanup operations.
- H. In all items involving construction of pipelines, 80 percent (%) of the pipe item price will be included in progress estimates when all of the work referred to in the preceding paragraph, except testing, video inspection (by City), and cleaning up, has been completed. An additional 10 percent (%) will be included in progress estimates when a section of pipeline has satisfactorily met the test requirements and video inspection (by City), and an additional

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10 percent (%) will be included in progress estimates when paving, restoration, and cleanup of the work area along a section of the pipeline has been completed.

- I. There are no separate pay items in the BID for the cost of flow control and sewage bypass pumping. The Contractor shall include the cost for this work in the price bid for the pay items requiring flow control and sewage bypass pumping, as specified herein or as directed.
- J. There are no separate pay items in the BID for the cost of maintenance and protection of traffic. The Contractor shall include the cost for this work in the price bid for the pay items requiring maintenance and protection of traffic, as specified herein or as directed.

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PAYMENT ITEMS

1. STORM SEWERS:

a. Storm Sewer Pipe Cleaning and Television Inspection:

- 1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of storm sewer pipe (of certain diameter) cleaned and television inspected, pre-lining. The length shall be measured along the centerline of the existing storm sewer pipe.
- 2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to perform at least four (4) passes of washing with high pressure water; and collect, remove and dispose of all sediment, rocks, debris, roots, grease accumulations, scale, encrustations, loose mortar and other obstructions in the existing storm sewer line.
- 3. The unit price bid for this item shall also constitute full compensation for all labor, materials, tools, equipment, and incidentals required to perform a preliminary (pre-lining) internal color closed-circuit television (CCTV) inspection of the existing storm sewer line, including the preparation of electronic recordings and suitable documentation records for submission to the Engineer and Owner.
- 4. The post-lining television inspection shall be measured in accordance with Paragraph 1a1. (above). The actual length, in linear feet, of storm sewer lined with cured-in-place pipe shall only be measured and paid for once, and the unit price bid shall include the cost of the post-lining television inspection.
- 5. Flow control shall be considered incidental to the work and shall not be measured separately for payment.

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b. Storm Sewer Pipe Lining 0' to 100' Length:

1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of storm sewer pipe (of certain diameter) lined with cured-in-place pipe, of lengths between 0 and 100 feet (and including 100 feet). The length shall be measured along the centerline of the existing storm sewer pipe.
2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install a cured-in-place liner in the existing storm sewer pipe; including cutting and sealing the liner at the termination points, performing a post-lining television inspection, preparing electronic recordings and suitable documentation records for submission to the Engineer and Owner, and all other work incidental thereto, as applicable, in accordance with these specifications.
3. Flow control shall be considered incidental to the work and shall not be measured separately for payment.

c. Storm Sewer Pipe Lining > 100' Length:

1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of storm sewer pipe (of certain diameter) lined with cured-in-place pipe, of lengths greater than 100 feet. The length shall be measured along the centerline of the existing storm sewer pipe.
2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install a cured-in-place liner in the existing storm sewer pipe; including cutting and sealing the liner at the termination points, performing a post-lining television inspection, preparing electronic recordings and suitable documentation records for submission to the Engineer and Owner, and all other work incidental thereto, as applicable, in accordance with these specifications.
3. Flow control shall be considered incidental to the work and shall not be measured separately for payment.

d. Storm Sewer Pipe Lining for Outfalls:

1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of storm sewer outfall pipe (of certain diameter) lined with cured-in-place pipe. The length shall be measured along the centerline of the existing storm sewer outfall pipe.
2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install a cured-in-place liner in the existing storm sewer outfall pipe; including curing the liner using water inversion and heat curing methods, cutting and sealing the liner at the termination points, performing a post-lining television inspection, preparing electronic recordings and suitable documentation records for submission to the Engineer and Owner, and all other work incidental thereto, as applicable, in accordance with these specifications.

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3. Flow control shall be considered incidental to the work and shall not be measured separately for payment.
- e. Storm Sewer Point Repairs 0' to 12' Deep:
1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of storm sewer pipe removed and replaced with HDPE pipe (of certain diameter to match existing), of depths between 0 and 12 feet (and including 12 feet). The length shall be measured along the centerline of the storm sewer pipe, from the last upstream joint to the last downstream joint of the section replaced. The depth shall be measured from the existing ground surface to 6 inches below the invert of the pipe.
  2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to remove and replace a section of storm sewer pipe with HDPE pipe (of certain diameter to match existing), complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of existing pipe; installation of engineering geotextile fabric; proper haunching and consolidation of bedding material in the pipe zone; installation of HDPE pipe, fittings, couplings, and bands, as required for proper connection to the existing storm sewer pipe of similar or dissimilar material; installation of metallic warning tape approximately 12 inches above the top of the pipe along the entire replacement length; backfilling, grading and compaction; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.
  3. Flow control shall be considered incidental to the work and shall not be measured separately for payment.
- f. Storm Sewer Point Repairs > 12' Deep:
1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of storm sewer pipe removed and replaced with HDPE pipe (of certain diameter to match existing), of depths greater than 12 feet. The length shall be measured along the centerline of the storm sewer pipe, from the last upstream joint to the last downstream joint of the section replaced. The depth shall be measured from the existing ground surface to 6 inches below the invert of the pipe.
  2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to remove and replace a section of storm sewer pipe with HDPE pipe (of certain diameter to match existing), complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for

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temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of existing pipe; installation of engineering geotextile fabric; proper haunching and consolidation of bedding material in the pipe zone; installation of HDPE pipe, fittings, couplings, and bands, as required for proper connection to the existing storm sewer pipe of similar or dissimilar material; installation of metallic warning tape approximately 12 inches above the top of the pipe along the entire replacement length; backfilling, grading and compaction; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.

3. Flow control shall be considered incidental to the work and shall not be measured separately for payment.

2. SANITARY SEWERS:

a. Sanitary Sewer Pipe Cleaning and Television Inspection:

1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of sanitary sewer pipe (of certain diameter) cleaned and television inspected, pre-lining. The length shall be measured along the centerline of the existing sanitary sewer pipe.
2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to perform at least four (4) passes of washing with high pressure water; and collect, remove and dispose of all sediment, rocks, debris, roots, grease accumulations, scale, encrustations, loose mortar and other obstructions in the existing sanitary sewer line.
3. The unit price bid for this item shall also constitute full compensation for all labor, materials, tools, equipment, and incidentals required to perform a preliminary (pre-lining) internal color closed-circuit television (CCTV) inspection of the existing sanitary sewer line, including the preparation of electronic recordings and suitable documentation records for submission to the Engineer and Owner.
4. The post-lining television inspection shall be measured in accordance with Paragraph 2a1. (above). The actual length, in linear feet, of sanitary sewer lined with cured-in-place pipe shall only be measured and paid for once, and the unit price bid shall include the cost of the post-lining television inspection.
5. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.

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b. Sanitary Sewer Pipe Lining 0' to 100' Length:

1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of sanitary sewer pipe (of certain diameter) lined with cured-in-place pipe, of lengths between 0 and 100 feet (and including 100 feet). The length shall be measured along the centerline of the existing sanitary sewer pipe.
2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install a cured-in-place liner in the existing sanitary sewer pipe; including cutting and sealing the liner at the termination points, performing a post-lining television inspection, preparing electronic recordings and suitable documentation records for submission to the Engineer and Owner, and all other work incidental thereto, as applicable, in accordance with these specifications.
3. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.

c. Sanitary Sewer Pipe Lining 100' to 600' Length:

1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of sanitary sewer pipe (of certain diameter) lined with cured-in-place pipe, of lengths between 100 and 600 feet (and including 600 feet). The length shall be measured along the centerline of the existing sanitary sewer pipe.
2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install a cured-in-place liner in the existing sanitary sewer pipe; including cutting and sealing the liner at the termination points, performing a post-lining television inspection, preparing electronic recordings and suitable documentation records for submission to the Engineer and Owner, and all other work incidental thereto, as applicable, in accordance with these specifications.
3. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.

d. Sanitary Sewer Pipe Lining > 600' Length:

1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of sanitary sewer pipe (of certain diameter) lined with cured-in-place pipe, of lengths greater than 600 feet. The length shall be measured along the centerline of the existing sanitary sewer pipe.
2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install a cured-in-place liner in the existing sanitary sewer pipe; including cutting and sealing the liner at the termination points, performing a post-lining television inspection, preparing electronic recordings and suitable documentation records for submission to the Engineer and

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Owner, and all other work incidental thereto, as applicable, in accordance with these specifications.

3. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.

e. Sanitary Sewer Laterals:

1. Cut and Remove Protruding Service Lateral in Mainline Sanitary Sewer Pipe:

- i. The quantity to be measured for payment under this item shall be the actual number of protruding service laterals located, cut and removed from mainline sanitary sewer pipes, pre-lining, using a special cutting tool.
- ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to locate, cut, and remove a protruding service lateral, to allow for the proper lining of the existing mainline sanitary sewer pipe.

2. Reinstall Service Lateral in Mainline Sanitary Sewer Pipe:

- i. The quantity to be measured for payment under this item shall be the actual number of service laterals located and reinstalled in mainline sanitary sewer pipes, post-lining, using a special cutting tool.
- ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to locate and reinstall a service lateral connection to the existing mainline sanitary sewer pipe; including cutting the liner at each service connection, polishing the cut hole, and removing all debris from the pipeline.

3. Line Cleaning, Root Removal, and Television Inspection for 4" to 8" Diameter Service Lateral Pipe:

- i. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of sanitary sewer service lateral pipe cleaned and television inspected, pre-lining/grouting. The length shall be measured along the centerline of the existing sanitary sewer service lateral pipe, from the downstream termination point at the mainline to the upstream termination point within the lateral.
- ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to perform at least four (4) passes of washing with high pressure water; and collect, remove and dispose of all sediment, rocks, debris, roots, grease accumulations, scale, encrustations, loose mortar and other obstructions in the existing sanitary sewer service laterals.
- iii. The unit price bid for this item shall also constitute full compensation for all labor, materials, tools, equipment, and incidentals required to perform a preliminary (pre-lining/grouting) internal color closed-circuit television (CCTV) inspection of the existing sanitary sewer service laterals, including the preparation of electronic

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recordings and suitable documentation records for submission to the Engineer and Owner.

- iv. The post-lining/grouting television inspection shall be measured in accordance with Paragraph 3i. (above). The actual length, in linear feet, of sanitary sewer service lateral lined with cured-in-place pipe, or sanitary sewer service lateral sealed with chemical grout, shall only be measured and paid for once, and the unit price bid shall include the cost of the post-lining television inspection.
  - v. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
4. Cured-In-Place Pipe (CIPP) Lining for 4" to 8" Diameter Service Lateral Pipe:
- i. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of sanitary sewer service lateral pipe lined with cured-in-place pipe. The length shall be measured along the centerline of the existing sanitary sewer service lateral pipe, from the downstream termination point at the mainline to the upstream termination point within the lateral.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install a cured-in-place liner in the existing sanitary sewer service laterals; including installing the full-wrap sectional liner around the circumference of the mainline at each service connection; cutting and sealing the lateral liner at the termination points, performing a post-lining television inspection, preparing electronic recordings and suitable documentation records for submission to the Engineer and Owner, and all other work incidental thereto, as applicable, in accordance with these specifications.
  - iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
5. Chemical Grouting for 4" to 8" Diameter Service Lateral Pipe:
- i. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of sanitary sewer service lateral pipe sealed with chemical grout. The length shall be measured along the centerline of the existing sanitary sewer service lateral pipe, from the downstream joint sealed at the mainline connection to the furthest upstream joint sealed within the lateral.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to seal/grout the existing sanitary sewer service laterals; including testing each joint, chemical injection sealing/grouting of all joints failing the initial test, re-testing and re-grouting of all joints until satisfactory results are obtained, testing and sealing/grouting the lateral connection point at the mainline sewer, performing a post-grouting television inspection, preparing electronic recordings and suitable documentation records for submission to the Engineer and Owner, and all other work incidental thereto, as applicable, in accordance with these specifications.



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- iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
- 6. Replace 6" Diameter PVC Service Lateral Pipe:
  - i. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of 6-inch diameter PVC service lateral pipe replaced. The length shall be measured along the centerline of service lateral, from the downstream connection at the mainline to the upstream connection at the existing service lateral pipe to remain.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace a 6-inch diameter PVC service lateral, complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of existing pipe; installation of wye or tee branches, for connection (or re-connection) to the existing mainline sewer; installation of engineering geotextile fabric; proper haunching and consolidation of bedding material in the pipe zone; installation of PVC pipe, fittings, couplings, and bands, and clean-outs, as required; installation of metallic warning tape approximately 12 inches above the top of the pipe along the entire replacement length; backfilling, grading and compaction; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.
  - iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
- 7. Replace 8" Diameter PVC Service Lateral Pipe:
  - i. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of 8-inch diameter PVC service lateral pipe replaced. The length shall be measured along the centerline of service lateral, from the downstream connection at the mainline to the upstream connection at the existing service lateral pipe to remain.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace an 8-inch diameter PVC service lateral, complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of existing pipe; installation of wye or tee branches, for connection (or re-connection) to the existing mainline sewer; installation of engineering geotextile

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fabric; proper haunching and consolidation of bedding material in the pipe zone; installation of PVC pipe, fittings, couplings, and bands, and clean-outs, as required; installation of metallic warning tape approximately 12 inches above the top of the pipe along the entire replacement length; backfilling, grading and compaction; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.

- iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.

f. Sanitary Sewer Point Repairs 0' to 12' Deep:

1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of sanitary sewer pipe removed and replaced with PVC pipe (of certain diameter to match existing), of depths between 0 and 12 feet (and including 12 feet). The length shall be measured along the centerline of the sanitary sewer pipe, from the last upstream joint to the last downstream joint of the section replaced. The depth shall be measured from the existing ground surface to 6 inches below the invert of the pipe.
2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to remove and replace a section of sanitary sewer pipe with PVC pipe (of certain diameter to match existing), complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of existing pipe; installation of engineering geotextile fabric; proper haunching and consolidation of bedding material in the pipe zone; installation of PVC pipe, fittings, couplings, and bands, as required for proper connection to the existing sanitary sewer pipe of similar or dissimilar material; installation of metallic warning tape approximately 12 inches above the top of the pipe along the entire replacement length; backfilling, grading and compaction; compaction testing; low pressure air and leakage testing of gravity sewers; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.
3. Flow control shall be considered incidental to the work and shall not be measured separately for payment.

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g. Sanitary Sewer Point Repairs > 12' Deep:

1. The quantity to be measured for payment under this item shall be the actual length, in linear feet, of sanitary sewer pipe removed and replaced with PVC pipe (of certain diameter to match existing), of depths greater than 12 feet. The length shall be measured along the centerline of the sanitary sewer pipe, from the last upstream joint to the last downstream joint of the section replaced. The depth shall be measured from the existing ground surface to 6 inches below the invert of the pipe.
2. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to remove and replace a section of sanitary sewer pipe with PVC pipe (of certain diameter to match existing), complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of existing pipe; installation of engineering geotextile fabric; proper haunching and consolidation of bedding material in the pipe zone; installation of PVC pipe, fittings, couplings, and bands, as required for proper connection to the existing sanitary sewer pipe of similar or dissimilar material; installation of metallic warning tape approximately 12 inches above the top of the pipe along the entire replacement length; backfilling, grading and compaction; compaction testing; low pressure air and leakage testing of gravity sewers; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.
3. Flow control shall be considered incidental to the work and shall not be measured separately for payment.

3. MANHOLES AND CATCH BASINS:

a. Manhole Rehabilitation:

1. Cementitious Liner for Rehabilitation of Manhole 0' to 12' Deep:
  - i. The quantity to be measured for payment under this item shall be the actual number of existing sewer manholes rehabilitated using a cementitious liner system, of depths between 0 and 12 feet (and including 12 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install the cementitious liner system in an existing sewer manhole, complete; including properly cleaning the manhole interior; removing the manhole steps; collecting, removing and disposing of all manhole debris; stopping active hydrostatic infiltration; patching, filling, and

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repairing non-infiltrating holes, cracks, and breaks; preparing the interior manhole surfaces for liner application; installing the spray-on cementitious liner system to seal all interior manhole surfaces, including the bench, invert, and around all pipes, after the manhole frame and cover has been replaced (as applicable); applying the flexible coating to the chimney section of the manhole; performing all inspection(s) and cleanup operations; and all other work incidental thereto, as applicable, in accordance with these specifications.

- iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.

2. Cementitious Liner for Rehabilitation of Manhole 12' to 20' Deep:

- i. The quantity to be measured for payment under this item shall be the actual number of existing sewer manholes rehabilitated using a cementitious liner system, of depths between 12 and 20 feet (and including 20 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.
- ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install the cementitious liner system in an existing sewer manhole, complete; including properly cleaning the manhole interior; removing the manhole steps; collecting, removing and disposing of all manhole debris; stopping active hydrostatic infiltration; patching, filling, and repairing non-infiltrating holes, cracks, and breaks; preparing the interior manhole surfaces for liner application; installing the spray-on cementitious liner system to seal all interior manhole surfaces, including the bench, invert, and around all pipes, only after the manhole frame and cover has been replaced (as applicable); applying the flexible coating to the chimney section of the manhole; performing all inspection(s) and cleanup operations; and all other work incidental thereto, as applicable, in accordance with these specifications.
- iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.

3. Cementitious Liner for Rehabilitation of Manhole 20' to 30' Deep:

- i. The quantity to be measured for payment under this item shall be the actual number of existing sewer manholes rehabilitated using a cementitious liner system, of depths between 20 and 30 feet (and including 30 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.
- ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install the cementitious liner system in an existing sewer manhole, complete; including properly cleaning the manhole interior; removing the manhole steps; collecting, removing and disposing of all manhole debris; stopping active hydrostatic infiltration; patching, filling, and

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repairing non-infiltrating holes, cracks, and breaks; preparing the interior manhole surfaces for liner application; installing the spray-on cementitious liner system to seal all interior manhole surfaces, including the bench, inverts, and around all pipes, only after the manhole frame and cover has been replaced (as applicable); applying the flexible coating to the chimney section of the manhole; performing all inspection(s) and cleanup operations; and all other work incidental thereto, as applicable, in accordance with these specifications.

- iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
- 4. Cementitious Liner with Chemical Protective Coating for Rehabilitation of Manhole 0' to 12' Deep:
  - i. The quantity to be measured for payment under this item shall be the actual number of existing sewer manholes rehabilitated using a cementitious liner system with a chemical protective surface coating, of depths between 0 and 12 feet (and including 12 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install the cementitious liner system with a chemical protective surface coating in an existing sewer manhole, complete; including properly cleaning the manhole interior; removing the manhole steps; collecting, removing and disposing of all manhole debris; stopping active hydrostatic infiltration; patching, filling, and repairing non-infiltrating holes, cracks, and breaks; preparing the interior manhole surfaces for liner application; installing the spray-on cementitious liner system to seal all interior manhole surfaces, including the bench, inverts, and around all pipes, after the manhole frame and cover has been replaced (as applicable); applying the chemical protective epoxy coating to all interior manhole surfaces; applying the flexible coating to the chimney section of the manhole; performing all inspection(s) and cleanup operations; and all other work incidental thereto, as applicable, in accordance with these specifications.
  - iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
- 5. Cementitious Liner with Chemical Protective Coating for Rehabilitation of Manhole 12' to 20' Deep:
  - i. The quantity to be measured for payment under this item shall be the actual number of existing sewer manholes rehabilitated using a cementitious liner system with a chemical protective surface coating, of depths between 12 and 20 feet (and including 20 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.

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- ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install the cementitious liner system with a chemical protective surface coating in an existing sewer manhole, complete; including properly cleaning the manhole interior; removing the manhole steps; collecting, removing and disposing of all manhole debris; stopping active hydrostatic infiltration; patching, filling, and repairing non-infiltrating holes, cracks, and breaks; preparing the interior manhole surfaces for liner application; installing the spray-on cementitious liner system to seal all interior manhole surfaces, including the bench, inverts, and around all pipes, after the manhole frame and cover has been replaced (as applicable); applying the chemical protective epoxy coating to all interior manhole surfaces; applying the flexible coating to the chimney section of the manhole; performing all inspection(s) and cleanup operations; and all other work incidental thereto, as applicable, in accordance with these specifications.
  - iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
6. Cementitious Liner with Chemical Protective Coating for Rehabilitation of Manhole 20' to 30' Deep:
- i. The quantity to be measured for payment under this item shall be the actual number of existing sewer manholes rehabilitated using a cementitious liner system with a chemical protective surface coating, of depths between 20 and 30 feet (and including 30 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to install the cementitious liner system with a chemical protective surface coating in an existing sewer manhole, complete; including properly cleaning the manhole interior; removing the manhole steps; collecting, removing and disposing of all manhole debris; stopping active hydrostatic infiltration; patching, filling, and repairing non-infiltrating holes, cracks, and breaks; preparing the interior manhole surfaces for liner application; installing the spray-on cementitious liner system to seal all interior manhole surfaces, including the bench, inverts, and around all pipes, after the manhole frame and cover has been replaced (as applicable); applying the chemical protective epoxy coating to all interior manhole surfaces; applying the flexible coating to the chimney section of the manhole; performing all inspection(s) and cleanup operations; and all other work incidental thereto, as applicable, in accordance with these specifications.
  - iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.

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7. New Standard Manhole Frame and Cover:

- i. The quantity to be measured for payment under this item shall be the actual number of existing manhole frame and cover sets replaced with new standard manhole frame and cover sets.
- ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace an existing manhole frame and cover set with a new standard manhole frame and cover set, complete; including neatly sawcutting, removing, and disposing of existing bituminous concrete pavement and curbing around the existing frame and cover; removing and disposing (or salvaging) of the existing manhole frame and cover; removing and disposing of the existing defunct brick masonry courses or reinforced concrete grade rings; placing new brick masonry courses or reinforced concrete grade rings to properly adjust the new manhole frame and cover to grade, as required; installing the new standard manhole frame and cover; placing new permanent bituminous concrete pavement materials and curbing; sealing all pavement joints; installing new painted pavement markings; and all other work incidental thereto, as applicable, in accordance with these specifications.

8. New Watertight Manhole Frame and Cover:

- i. The quantity to be measured for payment under this item shall be the actual number of existing manhole frame and cover sets replaced with new watertight manhole frame and cover sets.
- ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace an existing manhole frame and cover set with a new watertight manhole frame and cover set, complete; including neatly sawcutting, removing, and disposing of existing bituminous concrete pavement and curbing around the existing frame and cover; removing and disposing (or salvaging) of the existing manhole frame and cover; removing and disposing of the existing defunct brick masonry courses or reinforced concrete grade rings; placing new brick masonry courses or reinforced concrete grade rings to properly adjust the new manhole frame and cover to grade, as required; installing the new watertight manhole frame and cover; placing new permanent bituminous concrete pavement materials and curbing; sealing all pavement joints; installing new painted pavement markings; and all other work incidental thereto, as applicable, in accordance with these specifications.

b. Manhole and Catch Basin Replacements:

1. 4' Diameter Manhole 0' to 12' Deep (Complete):

- i. The quantity to be measured for payment under this item shall be the actual number of 4-foot diameter storm and/or sanitary sewer manholes replaced, of depths between 0 and 12 feet (and including 12 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.

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- ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace a 4-foot diameter storm and/or sanitary sewer manhole, complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of all existing manhole components; installation of engineer geotextile fabric; placement and compaction of structure base material; installation of precast concrete manhole base, riser(s), cone or flat top slab, as indicated/directed; watertight connection of new and/or existing storm or sanitary sewer lines to the manhole; placement and compaction of backfill materials around the manhole; installation of manhole frame and cover, including adjustments to the appropriate grade, as required; construction of brick invert for sanitary sewer manhole; construction of drop inlet(s) for sanitary sewer manhole; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.
  - iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
2. 4' Diameter Manhole 12' to 20' Deep (Complete):
- i. The quantity to be measured for payment under this item shall be the actual number of 4-foot diameter storm and/or sanitary sewer manholes replaced, of depths between 12 and 20 feet (and including 20 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace a 4-foot diameter storm and/or sanitary sewer manhole, complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of all existing manhole components; installation of engineer geotextile fabric; placement and compaction of structure base material; installation of precast concrete manhole base, riser(s), cone or flat top slab, as indicated/directed; watertight connection of new and/or existing storm or sanitary sewer lines to the manhole; placement and compaction of backfill materials around the manhole; installation of manhole frame and cover, including adjustments to the appropriate grade, as required; construction of brick invert for sanitary sewer manhole; construction of drop inlet(s) for sanitary sewer manhole; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement



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markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.

- iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
3. 4' Diameter Manhole 20' to 30' Deep (Complete):
- i. The quantity to be measured for payment under this item shall be the actual number of 4-foot diameter storm and/or sanitary sewer manholes replaced, of depths between 20 and 30 feet (and including 30 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace a 4-foot diameter storm and/or sanitary sewer manhole, complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of all existing manhole components; installation of engineer geotextile fabric; placement and compaction of structure base material; installation of precast concrete manhole base, riser(s), cone or flat top slab, as indicated/directed; watertight connection of new and/or existing storm or sanitary sewer lines to the manhole; placement and compaction of backfill materials around the manhole; installation of manhole frame and cover, including adjustments to the appropriate grade, as required; construction of brick invert for sanitary sewer manhole; construction of drop inlet(s) for sanitary sewer manhole; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.
  - iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
4. 5' Diameter Manhole 0' to 12' Deep (Complete):
- i. The quantity to be measured for payment under this item shall be the actual number of 5-foot diameter storm and/or sanitary sewer manholes replaced, of depths between 0 and 12 feet (and including 12 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace a 5-foot diameter storm and/or sanitary sewer manhole, complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation

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shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of all existing manhole components; installation of engineer geotextile fabric; placement and compaction of structure base material; installation of precast concrete manhole base, riser(s), reducer, cone or flat top slab, as indicated/directed; watertight connection of new and/or existing storm or sanitary sewer lines to the manhole; placement and compaction of backfill materials around the manhole; installation of manhole frame and cover, including adjustments to the appropriate grade, as required; construction of brick invert for sanitary sewer manhole; construction of drop inlet(s) for sanitary sewer manhole; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.

- iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
5. 5' Diameter Manhole 12' to 20' Deep (Complete):
- i. The quantity to be measured for payment under this item shall be the actual number of 5-foot diameter storm and/or sanitary sewer manholes replaced, of depths between 12 and 20 feet (and including 20 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace a 5-foot diameter storm and/or sanitary sewer manhole, complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of all existing manhole components; installation of engineer geotextile fabric; placement and compaction of structure base material; installation of precast concrete manhole base, riser(s), reducer, cone or flat top slab, as indicated/directed; watertight connection of new and/or existing storm or sanitary sewer lines to the manhole; placement and compaction of backfill materials around the manhole; installation of manhole frame and cover, including adjustments to the appropriate grade, as required; construction of brick invert for sanitary sewer manhole; construction of drop inlet(s) for sanitary sewer manhole; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.

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- iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
- 6. 5' Diameter Manhole 20' to 30' Deep (Complete):
  - i. The quantity to be measured for payment under this item shall be the actual number of 5-foot diameter storm and/or sanitary sewer manholes replaced, of depths between 20 and 30 feet (and including 30 feet). The depth shall be measured from the invert of the outlet pipe to the geometric center of the top of the frame and cover.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace a 5-foot diameter storm and/or sanitary sewer manhole, complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of all existing manhole components; installation of engineer geotextile fabric; placement and compaction of structure base material; installation of precast concrete manhole base, riser(s), reducer, cone or flat top slab, as indicated/directed; watertight connection of new and/or existing storm or sanitary sewer lines to the manhole; placement and compaction of backfill materials around the manhole; installation of manhole frame and cover, including adjustments to the appropriate grade, as required; construction of brick invert for sanitary sewer manhole; construction of drop inlet(s) for sanitary sewer manhole; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.
  - iii. Flow control and sewage bypass pumping shall be considered incidental to the work and shall not be measured separately for payment.
- 7. Standard Catch Basin (Complete):
  - i. The quantity to be measured for payment under this item shall be the actual number of standard catch basins replaced.
  - ii. The unit price bid for this item shall constitute full compensation for all labor, materials, tools, equipment, and incidentals required to replace a standard catch basin, complete; including environmental protection; site preparation and restoration; all earth excavation; trench/excavation shielding, shoring, sheeting, and bracing systems for temporary earth support; support and protection of existing subsurface and overhead mainline utilities and structures; dewatering; removal and disposal of all existing catch basin components; placement and compaction of structure base material; installation of precast concrete catch basin base, riser(s), and reducer, as indicated/directed; watertight connection of new and/or existing storm sewer lines to the catch basin; placement and compaction of backfill

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materials around the catch basin; installation of catch basin top, including adjustments to the appropriate grade, as required; compaction testing; disposal of surplus excavated material; replacement of bituminous concrete pavement and curbing; replacement of painted pavement markings; replacement of concrete flatwork; surface restoration of non-hardscape areas; restoration of plantings; and all other work incidental thereto, as applicable, in accordance with these specifications.

- iii. Flow control shall be considered incidental to the work and shall not be measured separately for payment.

4. TRAFFIC CONTROL:

a. Services of Uniformed Special Officers:

1. Under the item included in the BID for Services of Uniformed Special Officers, the Contractor shall be reimbursed for certain charges for the services of uniformed special officers rendered in connection with traffic control, as specified under "Traffic Control" in Section 01015 – Special Requirements.
2. The lump-sum (allowance) amount included under this item in the BID is an estimated figure to facilitate comparison of the bids.
3. The actual amount to be paid under this item shall constitute full compensation for wages paid, payment on account of Social Security and other direct assessments on payroll, and all other costs incidental to the employment of such uniformed special officers.
4. If uniformed special officers are arranged to work and weather prohibits work, the Contractor must contact the City of Milford Police Department no less than one (1) hour prior to start time (8:00 a.m.), otherwise a \$40.00 appearance fee will be assessed the Contractor, which will not be reimbursed by the City of Milford. Legible records of payment to each uniformed special officer and the Contractor's time records shall accompany each request for payment.
5. If the total cost for such charges is greater or less than the allowance amount stated under this item in the BID, a debit or credit of the difference in cost shall be made to the Owner.

5. SOIL EROSION AND SEDIMENT CONTROL:

- a. The length of Filter Sock to be paid for under this item shall be measured by the linear foot, and shall be equal to the actual quantity installed where indicated or directed. The unit price bid for this item shall constitute full compensation for installing, maintaining and removing the filter sock, as indicated and as specified.

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- b. The length of Silt Fence to be paid for under this item shall be measured by the linear foot, and shall be equal to the actual quantity installed where indicated or directed. The unit price bid for this item shall constitute full compensation for installing, maintaining and removing the silt fence, as indicated and as specified.
- c. The length of Hay Bale Barrier to be paid for under this item shall be measured by the linear foot, and shall be equal to the actual quantity installed where indicated or directed. The unit price bid for this item shall constitute full compensation for installing, maintaining and removing the hay bale barrier, as indicated and as specified.
- d. The number of Catch Basin Silt Sacks to be paid for under this item shall be equal to the actual number installed where indicated or directed. The unit price for this item shall constitute full compensation for installing, maintaining and removing the catch basin silt sack, as indicated and as specified.
- e. If in the opinion of the Engineer or the Milford Inland Wetlands Agency (MIWA), that the soil erosion and sediment control measures have not been adequately installed, maintained, and/or utilized during the course of construction, they will not be included for payment.

END OF SECTION

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REFERENCE STANDARDS

**PART 1 – GENERAL**

1.01 DESCRIPTION:

- A. This section includes references to standards, specifications, manuals, or codes of any technical society, organization, or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, will mean the latest standard specification, manual, code, or laws or regulations in effect at the time of the bid opening, except as may be otherwise specifically stated.
- B. For products or workmanship specified by association, building trades, or federal standards, comply with the requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- C. Should specified reference standards conflict with the Contract Documents, request clarification from the Engineer before proceeding with the work.

1.02 SCHEDULE OF REFERENCES:

- A. Whenever used in the Contract Documents, the following abbreviations shall have the meanings listed:
  - 1. AA                Aluminum Association  
                         [www.aluminum.org](http://www.aluminum.org)
  - 2. AAR              Association of American Railroads  
                         [www.aar.org](http://www.aar.org)
  - 3. AASHTO        American Association of State Highway and Transportation Officials  
                         [www.transportation.org](http://www.transportation.org)
  - 4. ACI               American Concrete Institute  
                         [www.concrete.org](http://www.concrete.org)
  - 5. ACPA            American Concrete Pipe Association  
                         [www.concretepipe.org](http://www.concretepipe.org)
  - 6. AFA              American Fence Association  
                         [www.americanfenceassociation.com](http://www.americanfenceassociation.com)
  - 7. AGA              American Gas Association  
                         [www.aga.org](http://www.aga.org)
  - 8. AI                 Asphalt Institute  
                         [www.asphaltinstitute.org](http://www.asphaltinstitute.org)
  - 9. AIA               American Institute of Architects  
                         [www.aia.org](http://www.aia.org)

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10. AISC	American Institute of Steel Construction <a href="http://www.aisc.org">www.aisc.org</a>
11. AISI	American Iron and Steel Institute <a href="http://www.steel.org">www.steel.org</a>
12. AITC	American Institute of Timber Construction <a href="http://www.aitc-glulam.org">www.aitc-glulam.org</a>
13. ANLA	American Nursery & Landscape Association <a href="http://www.anla.org">www.anla.org</a>
14. ANSI	American National Standards Institute <a href="http://www.ansi.org">www.ansi.org</a>
15. APA	The Engineered Wood Association <a href="http://www.apawood.org">www.apawood.org</a>
16. ASCE	American Society of Civil Engineers <a href="http://www.asce.org">www.asce.org</a>
17. ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers <a href="http://www.ashrae.org">www.ashrae.org</a>
18. ASME	American Society of Mechanical Engineers <a href="http://www.asme.org">www.asme.org</a>
19. ASSE	American Society of Sanitary Engineering <a href="http://www.asse-plumbing.org">www.asse-plumbing.org</a>
20. ASTM	ASTM International <a href="http://www.astm.org">www.astm.org</a>
21. ATSSA	American Traffic Safety Services Association <a href="http://www.atssa.com">www.atssa.com</a>
22. AWS	American Welding Society <a href="http://www.aws.org">www.aws.org</a>
23. AWWA	American Water Works Association <a href="http://www.awwa.org">www.awwa.org</a>
24. BIA	Brick Industry Association <a href="http://www.gobrick.com">www.gobrick.com</a>
25. CLFMI	Chain Link Fence Manufacturers Institute <a href="http://www.chainlinkinfo.org">www.chainlinkinfo.org</a>

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26. CRSI	Concrete Reinforcing Steel Institute <a href="http://www.crsi.org">www.crsi.org</a>
27. CSI	Construction Specifications Institute <a href="http://www.csiresources.org">www.csiresources.org</a>
28. CT DEEP	State of Connecticut Department of Energy and Environmental Protection <a href="http://portal.ct.gov/DEEP">http://portal.ct.gov/DEEP</a>
29. CT DOT	State of Connecticut Department of Transportation <a href="http://portal.ct.gov/dot">http://portal.ct.gov/dot</a>
30. EJCDC	Engineers Joint Contract Documents Committee <a href="http://www.ejcdc.org">www.ejcdc.org</a>
31. EJMA	Expansion Joint Manufacturers Association <a href="http://www.ejma.org">www.ejma.org</a>
32. EPA	United States Environmental Protection Agency <a href="http://www.epa.gov">www.epa.gov</a>
33. FEDSPEC	Federal Specifications
34. FHWA	Federal Highway Administration <a href="http://highways.dot.gov">http://highways.dot.gov</a>
35. FM	Factory Mutual System <a href="http://www.fmapprovals.com">www.fmapprovals.com</a>
36. IEEE	Institute of Electrical and Electronics Engineers <a href="http://www.ieee.org">www.ieee.org</a>
37. IMI	International Masonry Institute <a href="http://www.imiweb.org">www.imiweb.org</a>
38. MILSPEC	Military Specifications
39. MUTCD	Manual on Uniform Traffic Control Devices for Streets and Highways <a href="http://www.mutcd.fhwa.dot.gov">www.mutcd.fhwa.dot.gov</a>
40. NASSCO	National Association of Sewer Service Companies <a href="http://www.nassco.org">www.nassco.org</a>
41. NCMA	National Concrete Masonry Association <a href="http://www.ncma.org">www.ncma.org</a>
42. NEBB	National Environmental Balancing Bureau <a href="http://www.nebb.org">www.nebb.org</a>



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REFERENCE STANDARDS

43. NECA	National Electrical Contractors Association <a href="http://www.necanet.org">www.necanet.org</a>
44. NEMA	National Electrical Manufacturers Association <a href="http://www.nema.org">www.nema.org</a>
45. NFPA	National Fire Protection Association <a href="http://www.nfpa.org">www.nfpa.org</a>
46. NPCA	National Precast Concrete Association <a href="http://www.precast.org">www.precast.org</a>
47. NRMCA	National Ready Mixed Concrete Association <a href="http://www.nrmca.org">www.nrmca.org</a>
48. OSHA	Occupational Safety and Health Administration <a href="http://www.osha.gov">www.osha.gov</a>
49. PCA	Portland Cement Association <a href="http://www.cement.org">www.cement.org</a>
50. PCI	Precast/Prestressed Concrete Institute <a href="http://www.pci.org">www.pci.org</a>
51. PPI	Plastics Pipe Institute <a href="http://www.plasticpipe.org">www.plasticpipe.org</a>
52. PS	Product Standard (U.S. Department of Commerce)
53. SSPC	Society for Protective Coatings <a href="http://www.sspc.org">www.sspc.org</a>
54. STI	Steel Tank Institute <a href="http://www.stispfa.org">www.stispfa.org</a>
55. SPFA	Steel Plate Fabricators Association <a href="http://www.stispfa.org">www.stispfa.org</a>
56. SWRI	Sealant, Waterproofing & Restoration Institute <a href="http://www.swrionline.org">www.swrionline.org</a>
57. TPI	Turfgrass Producers International <a href="http://www.turfgrasssod.org">www.turfgrasssod.org</a>
58. UL	Underwriters Laboratories <a href="http://www.ul.com">www.ul.com</a>
59. UNI	Uni-Bell PVC Pipe Association <a href="http://www.uni-bell.org">www.uni-bell.org</a>

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REFERENCE STANDARDS

- |           |  |
|-----------|--|
| 60. USACE | United States Army Corps of Engineers<br><a href="http://www.usace.army.mil">www.usace.army.mil</a>              |
| 61. USDA  | United States Department of Agriculture<br><a href="http://www.usda.gov">www.usda.gov</a>                        |
| 62. USDOT | United States Department of Transportation<br><a href="http://www.transportation.gov">www.transportation.gov</a> |
| 63. WWPA  | Western Wood Products Association<br><a href="http://www.wwpa.org">www.wwpa.org</a>                              |

END OF SECTION

**SECTION 01310**

**SCHEDULES AND REPORTS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to review existing documentation, and to prepare and provide schedules, reports, and other documentation required for the work, by regulatory agencies, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.

**1.02 PROGRESS SCHEDULE:**

- A. The Contractor shall graphically show the order and interdependence of activities, sequence of work, how the start of a given activity depends on completion of preceding activities, and how the completion of a given activity may restrain the start of subsequent activities.
- B. The work shall be planned by the Contractor and his project field superintendent in coordination with all Subcontractors and Suppliers whose work is shown on the progress schedule.
- C. Include, at a minimum, the following activities on the progress schedule:
  - 1. Submittal and approval of shop drawings;
  - 2. Procurement of equipment and/or critical materials;
  - 3. Site mobilization;
  - 4. Installation of equipment and/or critical materials;
  - 5. Final inspection and testing;
  - 6. Punchlist items;
  - 7. Final cleanup and site restoration;
  - 8. Other activities which may be critical to the Progress Schedule; and
  - 9. All activities of the Owner and/or the Engineer which affect progress and/or affect required dates for completion of the work.
- D. The progress schedule shall take into account shop drawing submittal and approval time, the delivery times of equipment and materials, Subcontractors' work, availability and abilities of workmen, weather conditions, any restrictions in operations at the work site(s), and all other items that may affect completion of the work within the contract time period.
- E. The progress schedule shall include a description and duration (in calendar days) for each activity.

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SCHEDULES AND REPORTS

1.03 PROGRESS REPORTS:

- A. At least monthly, provide a progress report to the Engineer and/or Owner which details the work performed during the preceding month, or since the last progress report. The Contractor shall prepare and submit more frequent reports (i.e., weekly or bi-weekly) at the request of the Engineer and/or Owner.
- B. At a minimum, the progress report shall include the following:
  - 1. Actual progress of the work (update the progress schedule accordingly).
  - 2. The progress schedule, or revised progress schedule, showing the portions of the progress schedule impacted by the work progress (i.e., activities entirely completed, partially completed, and/or yet to be completed).
  - 3. The percentage (%) of the work actually completed and scheduled as of the report date, and the progress along the critical path in terms of days ahead of or behind the dates outlined in the progress schedule.
  - 4. If the work is behind the dates set forth in the progress schedule, explain reasoning for such and provide practical strategies to get back on schedule, or limit further schedule delays.

1.04 LABORATORY AND FIELD TESTS:

- A. Laboratory and field testing of soil materials, concrete, or other materials shall be made by laboratories or agencies approved by the Owner. Copies of all test reports shall be submitted, in duplicate, by the laboratory or agency directly to the Owner and the Engineer. The cost of all testing shall be paid for by the Contractor.
- B. The Contractor shall furnish all sample materials required for these tests and shall deliver the same without charge to the testing laboratory or other designated agency when directed by the Engineer.
- C. The Engineer may order additional tests beyond those required under these specifications, to settle disagreements with the Contractor regarding the quality of work performed. If the work is defective, the Contractor shall pay all costs for the extra tests and shall correct the work. If the work is satisfactory, the Owner shall pay for the additional tests.

1.05 RECORD DRAWINGS:

- A. The Contractor and applicable subcontractor(s) shall continually maintain a set of legibly marked-up prints, drawings, and sketches showing any changes made during the construction progress. Following substantial completion, or when directed by the Engineer, the Contractor shall submit the marked-up prints, drawings, and sketches (or a copy thereof) to the Engineer for review. The Contractor shall make the corrections or revisions required by the Engineer in order to make the drawings complete. The

SECTION 01310

SCHEDULES AND REPORTS

- completed drawings shall be submitted to the Engineer as record drawings prior to final acceptance of the project.
- B. Record drawings shall be complete and show the full extent of the executed work. Special attention shall be given to concealed work, which would be difficult to measure at a later date. Change orders, addenda items, and field changes shall be noted where applicable.

1.06 PRE-CONSTRUCTION AND PROGRESS PHOTOGRAPHS:

- A. The Contractor shall submit pre-construction photographs and video recordings of the existing conditions, and, when required, progress photographs of the work within the project area, to the Engineer. The existing conditions photographs shall be submitted prior to the start of construction, and the progress photographs shall be submitted not less often than once a month, or as directed by the Engineer. Photographs and video recordings shall be taken with a professional quality camera, and shall be submitted on a compatible thumb drive, or approved equivalent method.
- B. Sufficient photographs and video recordings shall be taken to show pre-construction, existing conditions in the proposed work areas. If in the opinion of the Engineer, sufficient documentation has not been provided, or the overall quality of the documentation is inadequate (e.g., poor quality), the Engineer may order additional photographs and video recordings be taken at no expense to the Owner.

END OF SECTION

**SECTION 01500**

**TEMPORARY FACILITIES**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to provide temporary facilities at the work site(s), as indicated on the drawings and/or specified herein, in conformity with these specifications.

**1.02 TEMPORARY BUILDINGS:**

The Contractor shall furnish for himself, such temporary offices, storage sheds, and fabrication facilities as he may require for his own use and shall obtain all necessary applicable permits and/or approvals required for their use. The locations of such buildings shall be acceptable to the Owner. If the Contractor is required to relocate such temporary buildings, he shall do so promptly at no increase in contract price or contract time. All temporary buildings shall be completely removed at the completion of the work.

**1.03 TEMPORARY SANITARY FACILITIES:**

Necessary sanitary conveniences for the use of persons employed on the work, properly screened from public observation, shall be provided in sufficient numbers, in such a manner and at locations acceptable to the Owner. The contents shall be removed and disposed of in a manner and at a frequency acceptable to the public health agency having jurisdiction. The proper maintenance of sanitary conveniences shall be the obligation and responsibility of the Contractor until the completion of the work.

**1.04 BARRICADES AND GUARD LIGHTS:**

- A. Barricades, signs, fences, and similar safety and warning devices shall be provided as required to ensure the protection of the public, as well as employees of the Contractor, Owner, and Engineer.
- B. Guard lights shall be furnished and installed at all barricades, obstructions in streets and sidewalks, and all trenches and pits adjacent to a public road.
- C. All directional and/or warning devices furnished shall conform with the Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways, published by the Federal Highway Administration (FHWA).

**1.05 WEATHER PROTECTION:**

The Contractor shall at all times provide protection against rain, wind, snow, frost and/or heat so as to maintain all work, materials, apparatus, and fixtures free from injury or damage. At the end of the day's work, all new work likely to be damaged shall be covered and sufficiently protected from the elements.

SECTION 01500

TEMPORARY FACILITIES

1.06 SHELTER AND PROTECTION OF MATERIALS:

The Contractor shall be responsible for providing adequate storage facilities for all materials required for the work. The facilities shall be enclosed, heated, and provided with moisture control, as required, to provide adequate protection and shall be satisfactory to the Engineer and/or Owner.

END OF SECTION

SECTION 01550

MAINTENANCE AND PROTECTION OF TRAFFIC

**PART 1 – GENERAL**

1.01 DESCRIPTION:

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to maintain and protect both vehicular and pedestrian traffic throughout the entire duration of construction, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. The Contractor shall keep the roadway and existing sidewalks open to vehicular and pedestrian traffic for the full length and duration of the referenced project unless other provisions are made for alternate routes.
- C. The Contractor shall provide a sufficient number of travel lanes and pedestrian passageways for the amount of traffic normally using the roadway. The sections of roadway used to maintain traffic shall be kept in good working order such that traffic can be safely and adequately accommodated.
- D. Suitable ingress and egress shall be provided at all times where required for all intersecting streets and for all abutting residential and commercial properties.
- E. For work in state roads, the Contractor is advised that additional specific traffic control requirements may apply and shall be as stated in the Contractor's Encroachment Permit, and approved and issued by the State of Connecticut Department of Transportation (CT DOT).

1.02 RELATED SECTIONS:

- A. Section 02315 – Excavation and Trenching
- B. Section 02320 – Backfilling, Grading and Compaction
- C. Section 02510 – Bituminous Concrete Paving
- D. Section 02580 – Pavement Markings

1.03 REFERENCE STANDARDS:

- A. State of Connecticut Department of Transportation, Bureau of Engineering & Construction, Construction Traffic Control Plans (see attached).
- B. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).
- C. U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices for Street and Highways, 2009 Edition, as amended (hereafter referred to as *MUTCD*).



SECTION 01550

MAINTENANCE AND PROTECTION OF TRAFFIC

1.04 SUBMITTALS:

- A. Submit proposed 'Maintenance and Protection of Traffic (MPT) Plan', in accordance with Part 6 of the *MUTCD*, including proposed detour(s) and/or alternate route plans to the local traffic authority, the Engineer, and the CT DOT, as applicable.
- B. Submit complete description of all barriers, cones, construction signage, flashers, temporary precast concrete barriers, temporary pavement markings, and any/all other traffic control devices.

1.05 QUALITY ASSURANCE:

- A. Work shall be performed in accordance with *CT DOT Form 818* and the *MUTCD*.
- B. Work shall conform to the CT DOT Construction Traffic Control Plans attached herein for the Contractor's reference, as applicable.

1.06 GENERAL REQUIREMENTS:

- A. The Contractor shall maintain and protect traffic as called for in these specifications, in accordance with the approved 'Maintenance and Protection of Traffic (MPT) Plan', and as required.
- B. Signing Patterns: The Contractor shall furnish, erect, maintain, and remove all temporary construction signing patterns as called for or required in the vicinity of the work.
- C. The Contractor shall maintain and protect one (1) lane of through traffic in each direction, and turning lanes, each lane on a paved travel path of not less than 11 feet in width, unless otherwise directed.
- D. Commercial and Residential Driveways: The Contractor shall maintain access to and egress from all commercial and residential driveways throughout the contract limits. The Contractor shall be allowed to close said driveways to perform required work during those periods when the businesses are closed unless permission is granted from the business owner to close the driveway during business hours. If a temporary closure of a driveway is necessary, the Contractor shall coordinate with the Owner and the Engineer to determine the time period of said closure.

**PART 2 – PRODUCTS**

2.01 MATERIALS:

The materials furnished for this work shall conform to the requirements of *CT DOT Form 818*.

SECTION 01550

MAINTENANCE AND PROTECTION OF TRAFFIC

**PART 3 – EXECUTION**

3.01 CONSTRUCTION METHODS:

- A. Furnish, erect, and maintain a sufficient number of signs, barricades, drums, traffic cones, flashers, and delineators to forewarn traffic of the construction, as called for in these specifications or as directed by the Engineer, prior to commencing any work at the site.
- B. Provide such safety measures, pavement markings, warning devices, and signs as deemed necessary to safeguard and guide the traveling public through the alternate routes or detours, as called for in these specifications or included in the Contractor's approved MPT.
- C. The use of unauthorized or unapproved signs, barricades, drums, traffic cones, or delineators will not be permitted.
- D. The Contractor shall keep all signs in proper position, clean and legible at all times. Signs that do not apply to existing conditions shall be removed or adjusted such that the legend is not visible to approaching traffic.
- E. In the event that the traffic control, warning, and/or safety devices are deemed inadequate, in the opinion of the Engineer, the Contractor shall provide additional or replacement devices as may be necessary, at no further cost to the Owner.

3.02 CT DOT CONSTRUCTION TRAFFIC CONTROL PLANS:

*(See Attached)*

SECTION 01550

MAINTENANCE AND PROTECTION OF TRAFFIC

### SERIES 16 SIGNS

		W	H
16-E	80-1605	84" x 60"	
16-H	80-1608	60" x 42"	
16-M	80-1613	30" x 24"	

		W	H
16-S	80-1619	48" x 30"	

SIGN 16-S SHALL BE USED ON ALL PROJECTS THAT REQUIRE SIDEWALK RECONSTRUCTION OR RESTRICT PEDESTRIAN TRAVEL ON AN EXISTING SIDEWALK.

SERIES 16 SIGNS SHALL BE INSTALLED IN ADVANCE OF THE TRAFFIC CONTROL PATTERNS. SERIES 16 SIGNS SHOULD BE LOCATED TO ALLOW MOTORISTS THE OPPORTUNITY TO AVOID A WORK ZONE. SERIES 16 SIGNS SHOULD BE INSTALLED ON MAJOR INTERSECTING ROADWAYS THAT APPROACH THE WORK ZONE. ON LIMITED-ACCESS HIGHWAYS, THESE SIGNS SHOULD BE LOCATED IN ADVANCE OF THE NEAREST UPSTREAM EXIT RAMP AND ON ANY ENTRANCE RAMP PRIOR TO OR WITHIN THE WORK ZONE LIMITS.

SIGNS 16-E AND 16-H SHALL BE POST-MOUNTED.

SIGN 16-E SHALL BE USED ON ALL FREEWAYS AND EXPRESSWAYS.

SIGN 16-H SHALL BE USED ON ALL RAMPS, OTHER STATE ROADWAYS AND MAJOR TOWN/CITY ROADWAYS.

SIGN 16-M SHALL BE USED ON OTHER TOWN ROADWAYS.

CONSTRUCTION TRAFFIC CONTROL PLAN  
**SERIES 16 SIGNS**

SCALE: NONE

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

*Tracy L. Fagarty*  
PRINCIPAL ENGINEER

Tracy L. Fagarty, P.E.  
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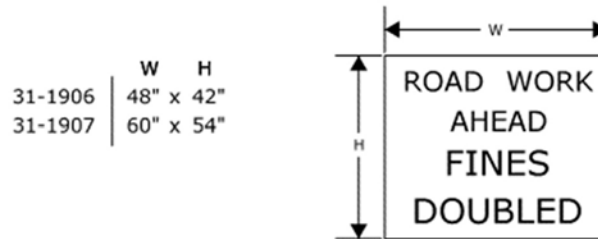
SECTION 01550

MAINTENANCE AND PROTECTION OF TRAFFIC

REGULATORY SIGN "ROAD WORK AHEAD, FINES DOUBLED"

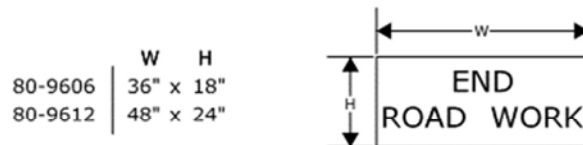
THE REGULATORY SIGN "ROAD WORK AHEAD FINES DOUBLED" SHALL BE INSTALLED FOR ALL WORK ZONES THAT OCCUR ON ANY STATE HIGHWAY AND MUNICIPAL ROAD IN CONNECTICUT WHERE THERE ARE WORKERS PRESENT ON THE HIGHWAY.

THE "ROAD WORK AHEAD FINES DOUBLED" REGULATORY SIGN SHALL BE PLACED AFTER THE SERIES 16 SIGN AND IN ADVANCE OF THE "ROAD WORK AHEAD" SIGN.



"END ROAD WORK" SIGN

THE LAST SIGN IN THE PATTERN SHALL BE THE "END ROAD WORK" SIGN.



CONSTRUCTION TRAFFIC CONTROL PLAN  
ROAD WORK AHEAD  
SIGNS

SCALE: NONE

CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

*Tony L. Fogarty*  
PRINCIPAL ENGINEER

Tony L. Fogarty, P.E.  
2018 04 12 15:58:44 04027

SECTION 01550

MAINTENANCE AND PROTECTION OF TRAFFIC

NOTES FOR TRAFFIC CONTROL PLANS

1. IF A TRAFFIC STOPPAGE OCCURS IN ADVANCE OF SIGN (A), THEN AN ADDITIONAL SIGN (A) SHALL BE INSTALLED IN ADVANCE OF THE STOPPAGE.
2. SIGNS (AA), (A), AND (D) SHOULD BE OMITTED WHEN THESE SIGNS HAVE ALREADY BEEN INSTALLED IN ADVANCE TO DESIGNATE A LARGER WORK ZONE THAN THE WORK ZONE THAT IS ENCOMPASSED ON THIS PLAN.
3. SEE TABLE 1 FOR ADJUSTMENT OF TAPERS IF NECESSARY.
4. TRAFFIC CONES AND PORTABLE CONSTRUCTION SIGNS SHALL NOT BE LEFT UNATTENDED.
5. ALL CONFLICTING SIGNS WITHIN THE LIMITS OF A ROADWAY / LANE CLOSURE AREA SHALL BE COVERED WITH AN OPAQUE MATERIAL WHILE THE CLOSURE IS IN EFFECT, AND UNCOVERED WHEN THE ROADWAY / LANE CLOSURE IS RE-OPENED TO ALL LANES OF TRAFFIC.
6. IF THIS PLAN REMAINS IN CONTINUOUS OPERATION FOR MORE THAN 48 HOURS, THEN ANY EXISTING CONFLICTING PAVEMENT MARKINGS SHALL BE ERADICATED OR COVERED, AND TEMPORARY PAVEMENT MARKINGS THAT DELINEATE THE PROPER TRAVELPATHS SHALL BE INSTALLED.
7. DISTANCES BETWEEN SIGNS IN THE ADVANCE WARNING AREA MAY BE REDUCED TO 100' ON LOW-SPEED URBAN ROADS (SPEED LIMIT  $\leq$  40 MPH).
8. IF THIS PLAN IS TO REMAIN IN OPERATION FROM SUNSET TO SUNRISE, INSTALL BARRICADE WARNING LIGHTS - HIGH INTENSITY ON ALL POST-MOUNTED DIAMOND SIGNS IN THE ADVANCE WARNING AREA.
9. A PORTABLE CHANGEABLE MESSAGE SIGN SHALL BE INSTALLED ONE HALF MILE TO ONE MILE IN ADVANCE OF THE LANE CLOSURE TAPER.
- 10 SIGN (P) SHALL BE MOUNTED A MINIMUM OF 7 FEET FROM THE PAVEMENT SURFACE TO THE BOTTOM OF THE SIGN.

TABLE 1 - MINIMUM TAPER LENGTHS

POSTED SPEED LIMIT (MILES PER HOUR)	MINIMUM TAPER LENGTH FOR A SINGLE LANE CLOSURE
30 OR LESS	180'
35	245'
40	320'
45	540'
50	600'
55	660'
65	780'

CONSTRUCTION TRAFFIC CONTROL PLAN

NOTES

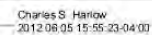
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CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED







*Tracy L. Fogarty*  
PRINCIPAL ENGINEER

Tracy L. Fogarty, P.E.  
2018-09-13 08:47:47-0400



SECTION 01550

MAINTENANCE AND PROTECTION OF TRAFFIC

WORK IN TRAVEL LANE AND SHOULDER TWO LANE HIGHWAY ALTERNATING ONE-WAY TRAFFIC OPERATIONS		SIGN FACE 108 SQ. FT (MIN.)			
<p><b>HAND SIGNAL METHODS TO BE USED BY UNIFORMED FLAGGERS</b></p> <p>THE FOLLOWING METHODS FROM SECTION 6E.07, FLAGGER PROCEDURES, IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES," SHALL BE USED BY UNIFORMED FLAGGERS WHEN DIRECTING TRAFFIC THROUGH A WORK AREA. THE STOP/SLOW SIGN PADDLE (SIGN NO. 80-9950) SHOWN ON THE TRAFFIC STANDARD SHEET TR-1220 01 ENTITLED, "SIGNS FOR CONSTRUCTION AND PERMIT OPERATIONS" SHALL BE USED.</p>					
<p><b>A. TO STOP TRAFFIC</b></p> <p>TO STOP ROAD USERS, THE FLAGGER SHALL FACE ROAD USERS AND AIM THE STOP PADDLE FACE TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. THE FREE ARM SHALL BE HELD WITH THE PALM OF THE HAND ABOVE SHOULDER LEVEL TOWARD APPROACHING TRAFFIC.</p>					
<p><b>B. TO DIRECT TRAFFIC TO PROCEED</b></p> <p>TO DIRECT STOPPED ROAD USERS TO PROCEED, THE FLAGGER SHALL FACE ROAD USERS WITH THE SLOW PADDLE FACE AIMED TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. THE FLAGGER SHALL MOTION WITH THE FREE HAND FOR ROAD USERS TO PROCEED.</p>					
<p><b>C. TO ALERT OR SLOW TRAFFIC</b></p> <p>TO ALERT OR SLOW TRAFFIC, THE FLAGGER SHALL FACE ROAD USERS WITH THE SLOW PADDLE FACE AIMED TOWARD ROAD USERS IN A STATIONARY POSITION WITH THE ARM EXTENDED HORIZONTALLY AWAY FROM THE BODY. TO FURTHER ALERT OR SLOW TRAFFIC, THE FLAGGER HOLDING THE SLOW PADDLE FACE TOWARD ROAD USERS MAY MOTION UP AND DOWN WITH THE FREE HAND, PALM DOWN.</p>					
<table border="0"><tr><td><p>○ TRAFFIC CONE <b>OR</b> TRAFFIC DRUM</p><p>* OPTIONAL ⊗ TRAFFIC DRUM — PORTABLE SIGN SUPPORT</p><p>◀ HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW</p></td><td><p>SCALE: NONE</p></td><td><p>CONSTRUCTION TRAFFIC CONTROL PLAN</p><p><b>PLAN 13 - SHEET 2 OF 2</b></p><p>SEE NOTES 1, 2, 4, 6, 7, 8</p></td></tr></table>			<p>○ TRAFFIC CONE <b>OR</b> TRAFFIC DRUM</p> <p>* OPTIONAL ⊗ TRAFFIC DRUM — PORTABLE SIGN SUPPORT</p> <p>◀ HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW</p>	 <p>SCALE: NONE</p>	<p>CONSTRUCTION TRAFFIC CONTROL PLAN</p> <p><b>PLAN 13 - SHEET 2 OF 2</b></p> <p>SEE NOTES 1, 2, 4, 6, 7, 8</p>
<p>○ TRAFFIC CONE <b>OR</b> TRAFFIC DRUM</p> <p>* OPTIONAL ⊗ TRAFFIC DRUM — PORTABLE SIGN SUPPORT</p> <p>◀ HIGH MOUNTED INTERNALLY ILLUMINATED FLASHING ARROW</p>	 <p>SCALE: NONE</p>	<p>CONSTRUCTION TRAFFIC CONTROL PLAN</p> <p><b>PLAN 13 - SHEET 2 OF 2</b></p> <p>SEE NOTES 1, 2, 4, 6, 7, 8</p>			

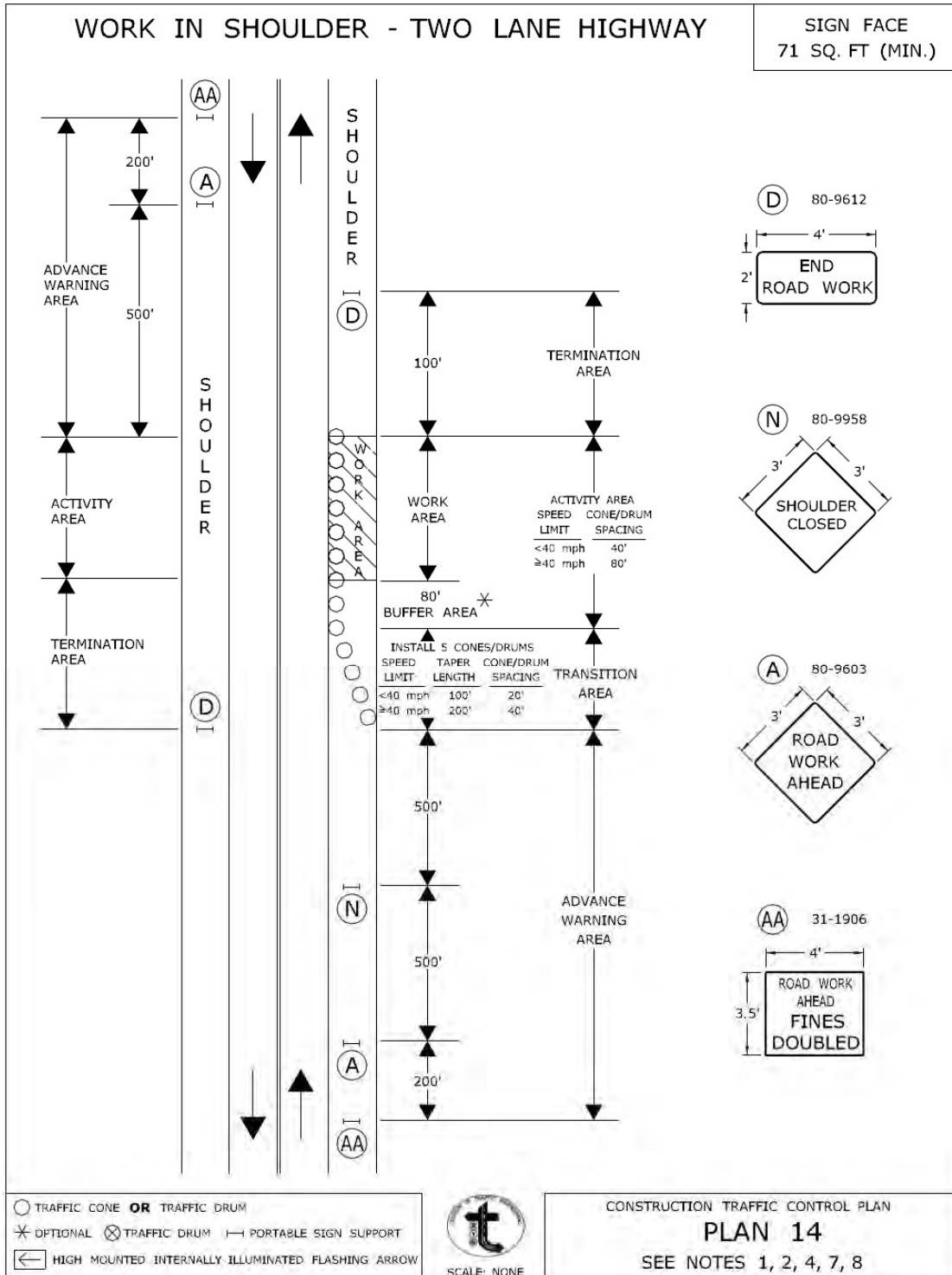
CONNECTICUT DEPARTMENT OF TRANSPORTATION  
BUREAU OF ENGINEERING & CONSTRUCTION

APPROVED

Charles S. Harlow  
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PRINCIPAL ENGINEER

SECTION 01550

MAINTENANCE AND PROTECTION OF TRAFFIC



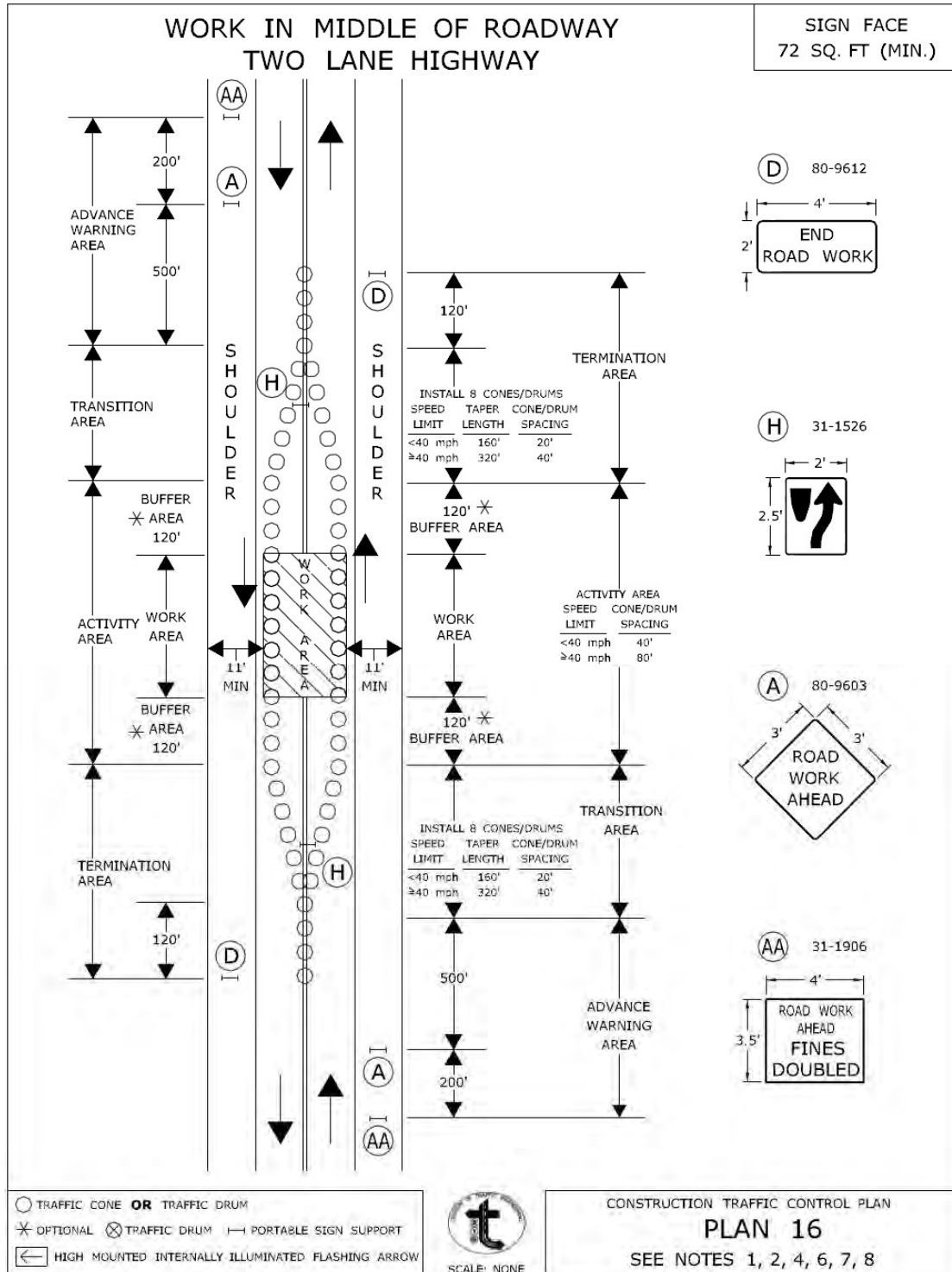
CONNECTICUT DEPARTMENT OF TRANSPORTATION  
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SECTION 01550

MAINTENANCE AND PROTECTION OF TRAFFIC



END OF SECTION

SECTION 01560

ENVIRONMENTAL PROTECTION

**PART 1 – GENERAL**

1.01 DESCRIPTION:

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to prevent environmental damage and/or pollution to environmentally sensitive areas during and as a result of construction operations associated with this contract, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. The Contractor shall take all measures necessary to control soil erosion resulting from construction operations, prevent flow of sediment from the construction site(s), and contain construction materials (including excavation and backfill) within the protected working area(s) to prevent damage to any wetlands and/or watercourses, in accordance with the Milford Inland Wetlands Agency (MIWA) and the State of Connecticut Department of Energy and Environmental Protection (CT DEEP).
- C. The Contractor shall comply with all laws, regulations, and requirements including but not limited to those specifically set forth in these specifications.
- D. The Contractor shall utilize accepted CT DEEP and CT DOT best management practices, as required throughout the duration of the contract, to control and abate siltation, sedimentation, and the pollution of wetlands and watercourses during construction operations.

1.02 RELATED SECTIONS:

- A. Section 01740 – Site Maintenance and Cleanup
- B. Section 02100 – Site Preparation and Restoration
- C. Section 02315 – Excavation and Trenching
- D. Section 02320 – Backfilling, Grading and Compaction
- E. Section 02480 – Landscaping

1.03 REFERENCE STANDARDS:

- A. State of Connecticut Department of Energy and Environmental Protection, Connecticut Guidelines for Soil Erosion & Sediment Control, as amended (hereafter referred to as *CT E&S Guidelines*).
- B. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

SECTION 01560

ENVIRONMENTAL PROTECTION

1.04 SUBMITTALS:

- A. Submit the 'Soil Erosion and Sediment Control Plan' to the Engineer, to the MIWA, and to any other appropriate regulatory agencies, at the pre-construction meeting for review and approval. The plan shall include the Contractor's proposed locations for stockpile areas, proposed dewatering pump locations, proposed portable sediment tank(s) and/or geotextile bag(s) locations, and discharge locations for dewatering operations. Include detailed sketches showing the proposed methods for controlling soil erosion and sediment during construction.
- B. Submit the MIWA Construction Bond, if/as required. The Contractor shall coordinate with the MIWA for the required bond amount.
- C. Submit weekly soil erosion and sediment control inspection reports, if/as required, to the MIWA and to any other local, state, or federal agencies having jurisdiction.

1.05 QUALITY ASSURANCE:

- A. All work shall be performed so as to comply with the highest quality assurance standards and best management practices, including but not limited to the following:
  - 1. All construction procedures and preventative measures as directed by the Engineer, the City Engineer, and the MIWA Compliance Officer.
  - 2. Best management practices and procedures outlined in the *CT E&S Guidelines*.
  - 3. Best management practices and procedures outlined in Section 1.10 (*Environmental Compliance*) of *CT DOT Form 818*.
- B. If construction materials are washed away during construction, the Contractor shall notify the MIWA Compliance Officer immediately and remove the materials from fouled areas, as directed by the Engineer and/or the MIWA Compliance Officer.
- C. The Engineer has the authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, and fill operations, and to direct the immediate installation of permanent or temporary pollution control measures to prevent contamination of any wetlands or watercourse including the construction of temporary berms, dikes, dams, sediment tanks, sediment traps, slope drains, and the use of temporary mulches, mats, or other control devices or methods as necessary to control erosion.
- D. Silt fence, hay bale barriers, and catch basin sedimentation control measures (such as silt sacks) shall be maintained and kept in good working order throughout the duration of the work. When, in the opinion of the Engineer and the MIWA Compliance Officer, the silt fence, hay bale barriers, or catch basin sedimentation control measures have not been adequately maintained to control sedimentation and erosion, the control measures will not be included for payment.

SECTION 01560

ENVIRONMENTAL PROTECTION

1.06 AREAS OF WORK:

- A. The Contractor shall confine his construction operations, insofar as possible, to those areas designated or defined on the drawings or in these specifications.
- B. The Contractor shall not occupy adjacent public or private property without the express written approval of the City of Milford, property owners, abutters, and/or the appropriate regulatory agencies having jurisdiction.

1.07 LOCATION AND STORAGE OF MATERIALS:

- A. No materials shall be dispersed or stockpiled in any wetland areas.
- B. No excavated materials or backfill materials shall be deposited within 100 feet of any watercourse, wetland area, or drainage facility without the express written approval of the MIWA.
- C. Materials rejected for use in backfilling operations shall be removed and disposed of as soon as it is practical to do so. Adequate protective measures shall be taken to prevent the erosion of stockpiled materials and resultant sedimentation of adjacent watercourses, wetland areas, or drainage facilities, during the course of construction.

1.08 PROTECTION OF WATER RESOURCES:

- A. The Contractor shall adhere to all legal standards not to pollute streams, lakes, reservoirs, groundwater supplies, or wetland areas with fuel oil sewage, septic waste, or other deleterious substances. The storage of fuel oil and refueling of equipment shall be restricted to designated areas approved by the Engineer, City of Milford, and appropriate regulatory agencies having jurisdiction. Any spillage of fuel oil shall be reported immediately and appropriate measures shall be taken to contain and clean up the affected areas, all at the Contractor's cost.
- B. When dewatering is necessary, the Contractor shall utilize "clean water" methods whenever possible, such as standpipes equipped with a tip screen imbedded in a granular filter, or a well point system suitably spaced along the trench excavation and sufficient for the conditions encountered.
- C. Pumps shall not discharge directly into any wetland or watercourse. Water pumped and/or bailed from excavations shall be conveyed by conduit or hose to a temporary sedimentation bowl or portable sedimentation tank at approved points of discharge and/or filtered through approved sedimentation barriers, constructed in such a manner so as to minimize velocities of discharge and to contain silt, subject to the Engineer's oversight. Sedimentation systems shall be cleaned and/or replaced periodically to ensure effective control and protection of wetlands and water resource areas.
- D. Sewage, septic waste or other pollutants shall be pumped to suitable points of discharge with bypass pumps and piping systems. If, in the opinion of the Engineer and regulatory agencies, the discharge wastes or other pollutants will have an adverse effect on the environment, the Contractor shall employ whatever methods available to convey

SECTION 01560

ENVIRONMENTAL PROTECTION

such substances out of the wetland and/or water resource area. This may include, but not be limited to, extended conduit systems, tank trucks or other approved methods of removal.

1.09 WATER QUALITY STANDARDS:

- A. Should any phase of construction directly or indirectly cause the turbidity levels of any wetland, watercourse, or water resource area to increase, work shall cease and desist until such time as the turbidity levels are lowered to pre-construction levels. Corrective measures shall be implemented to ensure that this problem does not reoccur. Particular attention shall be made to areas, within drainage areas, where trenching has taken place and the possibility of trench surface erosion may occur.
- B. Outlets for existing drainage systems, which discharge into wetlands, watercourses, or resource areas shall be properly protected, as called for on the drawings and in these specifications, prior to the start of construction.
- C. Should the Contractor's dewatering operations increase turbidity levels in a wetland or watercourse, the Engineer may direct samples be taken, at no cost to the Owner, for determination of turbidity levels immediately upstream and downstream of the location impacted.

1.10 EXTENDED PERFORMANCE:

- A. The requirements specified hereinbefore, shall be considered as minimum, and may be supplemented, altered or deleted in whole or in part by the appropriate regulatory agencies, the Engineer, and/or the City of Milford.
- B. The Contractor is advised that control measures/devices may be required outside of the limits of designated buffer zones to protect wetlands and/or watercourses, if the proposed construction will tend to alter or be detrimental to these areas.

1.11 COMPLIANCE:

- A. All work shall be done in compliance with the *CT E&S Guidelines*, necessary permits, and the requirements of all local, state, and federal agencies, or the Engineer.
- B. The Contractor must submit any request for authorization of methods not specifically called for by the contract, in writing, to the Engineer.

1.12 NON-CONFORMANCE:

- A. Any work conducted in violation of the Wetlands Protection Act, local bylaws, or local, state, or federal agencies shall cease upon receipt of an enforcement order issued by the relevant local, state, or federal agency, or upon direction of the Engineer.
- B. In the case of failure by the Contractor to comply with the environmental provisions of the contract, the Contractor shall be penalized as provided in the contract.

SECTION 01560

ENVIRONMENTAL PROTECTION

1.13 OTHER REQUIREMENTS:

- A. The work may be subject to other requirements under separate permits or licenses issued by other regulatory agencies. If a conflict exists in the requirements issued by the regulatory agencies, the more stringent requirements shall be adhered to.
- B. The Contractor shall conduct all of his operations in such a manner so as to minimize the impact on the environment. Such items shall include, but not be limited to, noise, vehicle emissions, and dust. All vehicles disposing of construction debris and excess materials shall be covered. All activities shall be in accordance with local, state, and federal rules and regulations.

**PART 2 – PRODUCTS**

2.01 SILT FENCE:

- A. Silt fence geotextile shall conform to the material requirements specified in Section M.08.01-19 of *CT DOT Form 818*.
- B. The Engineer reserves the right to reject any geotextile deemed unsatisfactory for such use.
- C. Silt fence installation shall conform to Chapter 5 of the *CT E&S Guidelines*, and to the details shown on the drawings.
- D. Supporting posts for silt fence shall be at least 42 inches long made of 1-1/2-inch square hardwood stakes.

2.02 HAY BALE BARRIERS:

- A. Hay bale barriers shall be made of hay or straw with 40 lb. minimum weight and 120 lb. maximum weight, held together by twine or wire.
- B. Hay bale barrier installation shall conform to Chapter 5 of the *CT E&S Guidelines*, and to the details shown on the drawings.
- C. Hay bale barriers shall be anchored using hardwood stakes at least 36 inches long and at least 1-1/2 inches square.

2.03 SILT SACKS:

- A. Silt sacks shall be installed in existing and proposed catch basins and drainage inlet structures, as indicated on the drawings or as directed by the Engineer.
- B. Silt sacks shall be as manufactured by ACF Environmental, or approved equal.

SECTION 01560

ENVIRONMENTAL PROTECTION

2.04 FILTREXX EROSION CONTROL PRODUCTS:

A. Filtrexx SiltSoxx® Compost Filter Sock:

1. Shall be used for silt fence replacement/backing, perimeter control, ditch checks, and other uses approved by the Engineer.
2. For perimeter control, hardwood stakes should be installed through the middle of the filter sock using hardwood stakes at least 36 inches long and at least 1-1/2 inches square, at 10-foot maximum intervals. For ditch checks, hardwood stakes should be installed at 5-foot maximum intervals.
3. In the event staking is not possible, i.e., when using on highly compacted soils or impervious surfaces, sand bags (or equivalent) may be used for stabilization of the filter sock.
4. Refer to the manufacturer's instructions and specifications for all product installation and maintenance procedures.

B. Filtrexx SiltSoxx® Compost Erosion Control Blanket (CECB):

1. Shall be used for slope stabilization, erosion control, and vegetation establishment.
2. For CECB installed on slopes:
  - a. Greater than or equal to 4H:1V, slopes shall be tracked to increase soil roughness prior to placement.
  - b. Greater than or equal to 2H:1V, slopes shall be tracked and LockDown Netting used. LockDown Netting is a single net erosion control blanket stapled to the slope prior to placement of the CECB. Netting shall be anchored to the soil using 6- to 8-inch sod staples, to be driven along the entire perimeter of the net and netting area.
3. Refer to the manufacturer's instructions and specifications for all product installation and maintenance procedures.

C. Company Information:

Filtrexx International / MKB Company, LLC  
Telephone: (888) 578-0777  
Fax: (724) 304-4555  
Email: [info@filtrexx.com](mailto:info@filtrexx.com)  
Website: [www.filtrexx.com](http://www.filtrexx.com)

2.05 DEWATERING SEDIMENT TRAPS:

- A. Dewatering sediment traps shall be high-strength, suitably sized dewatering bags. Dewatering bags shall have sufficient capacity, as dictated by field conditions, to remove silt, sand, and other debris from dewatering pumps.



**SECTION 01560**

**ENVIRONMENTAL PROTECTION**

- B. Dewatering sediment traps shall be the Dirtbag® Dewatering Bag, as manufactured by ACF Environmental, or approved equal.

**2.06 PORTABLE SEDIMENT TANKS:**

- A. Portable sediment tanks shall be suitably equipped BakerCorp (25 cubic yard minimum) roll-off dewatering boxes, or approved equal.
- B. The tanks shall have baffles and other features/equipment explicitly designed for the removal of sediment.
- C. The Contractor shall use sufficiently sized or multiple tanks with the required cubic feet of storage necessary to provide a minimum two (2) hour detention time.

**PART 3 – EXECUTION**

**3.01 GENERAL:**

- A. Do not discharge chemicals, fuels, lubricants, bitumen, raw sewage, or other harmful water into or alongside any body of water, wetland, or into any natural or manmade channels, including catch basins.
- B. Soil erosion and sediment control measures shall be installed prior to any construction at the site(s), with the exception of tree clearing as directed by the Engineer and the MIWA. Prior to the start of work, soil erosion and sediment control measures are to be inspected by the Engineer. Additional control measures shall be installed as construction progresses, or at the direction of the Engineer and/or of the MIWA Compliance Officer.
- C. As construction begins in an area, it shall continue expeditiously to completion. Disturbance of land shall be kept to a minimum. Disturbed areas shall be stabilized as work in these areas is completed.
- D. All soil erosion and sediment control measures shall be maintained in effective condition throughout the duration of the construction period. Control measures shall be maintained until permanent vegetative cover is established and the area is stabilized. Control measures shall be removed only at the direction of the Engineer, in consultation with the MIWA Compliance Officer.
- E. Sediment shall be periodically removed from all silt fencing, hay bale barriers, silt sacks, and other control measures. If the sediment does not contain any chemicals, oils, foreign debris, or other deleterious materials, it shall be mixed with clean material and used for backfill and other construction purposes. If the sediment does contain any of the above-described materials, it shall be properly disposed of off-site, following all local, state, and federal laws.
- F. Install “water-stop” breaks in screened stone bedding materials at regular intervals along the sewer installation in high groundwater and wetland areas, to minimize groundwater movement along the pipeline and minimize pumping requirements.

SECTION 01560

ENVIRONMENTAL PROTECTION

Water-stops shall be constructed using “tight” soil materials from the excavation and encapsulated in geotextile filter fabric to prevent migration into the screened stone bedding material. Place water-stops on the upstream and downstream side of manholes, and along the pipeline as called for on the plans and in these specifications, or as directed by the Engineer.

- G. Silt sacks are considered full and should be emptied when the restraint cord is no longer visible. To remove the silt sack, take two (2) pieces of 1-inch rebar and place them through the lifting loops on each side. Remove the grate and lift the silt sack out of the structure. To empty the silt sack, place it where the contents will be collected. Place rebar through the dump strap (connected to the bottom of the sack) and lift. This will turn the silt sack inside out and empty the contents. Clean out the silt sack with a shovel and rinse thoroughly. Restore the silt sack to its original shape, and place it back into the catch basin or drainage structure. Verify that the silt sack is fully intact and in good working condition.

3.02 INSTALLATION:

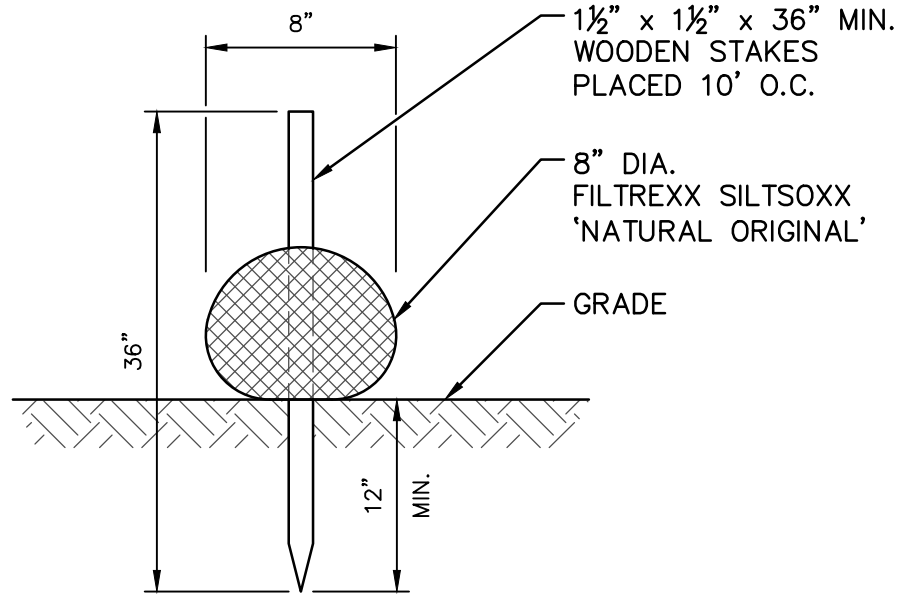
- A. All work shall be done in accordance with the directions of the Engineer.
- B. Install baled hay or straw erosion checks in all locations as directed, surrounding the base of all deposits of stored excavated material outside of the disturbed area, and where directed by the Engineer and the MIWA Compliance Officer.
  - 1. Locate checks, surrounding stored material, approximately 6 feet from the base of material.
  - 2. Hold bales in place with two (2) 1-1/2-inch square by 36-inch-long hardwood stakes such that each bale is butted tightly against the adjoining bale(s) thereby precluding short-circuiting of the erosion check.
- C. Silt fence shall be placed where indicated on the drawings and/or where directed by the Engineer and MIWA Compliance Officer. Also, all existing and proposed culvert entrances and discharge points shall be similarly protected.
  - 1. All silt fences shall be installed according to the drawings and the manufacturer's specifications.
  - 2. Silt fence shall be installed at the base of all temporary stockpile areas, as required.
- D. Construct earth berms or diversions to intercept and divert runoff from critical areas.
- E. Silt-laden water from excavations shall be discharged to approved sediment traps, basins, portable tanks and/or other approved devices and methods as called for and/or directed, and as necessary, to ensure that only sediment-free water is returned to watercourses, wetlands, or drainage facilities.
- F. Do not place excavated soil material adjacent to watercourses in such a manner that will cause the material to wash away by high water or runoff.

SECTION 01560

ENVIRONMENTAL PROTECTION

- G. Prevent damage to vegetation by excessive watering or silt accumulation in the discharge area.
- H. Do not dump spoiled material into any watercourses, wetlands, and/or unspecified locations.
- I. Prevent indiscriminate, arbitrary, or capricious operation of equipment in watercourses and/or wetlands, or natural or man-made channels leading thereto.
- J. Prevent damage to vegetation adjacent to or outside of construction area limits. Provide tree protection as necessary and as directed by the Engineer and the MIWA Compliance Officer.
- K. Do not dispose of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, wash water from concrete trucks or hydro seeders, or any other pollutants in any watercourses, wetlands, any natural or man-made channels leading thereto, or unspecified locations.
- L. Do not alter the flow line of any stream unless indicated/specified, or as directed by the Engineer and MIWA Compliance Officer.
- M. Soil erosion and sediment control measures will be inspected by the Engineer during all site visits. The Contractor shall address and correct any deficiencies observed by the Engineer immediately.
- N. The Contractor shall designate an on-site employee as the person responsible for soil erosion and sediment control measures.
- O. If all else fails, best management practices shall prevail during the entire duration of construction.
- P. All Filtrexx erosion control products shall be installed and maintained in accordance with the manufacturer's instructions and specifications.
- Q. Temporary Seeding shall be applied by any agronomically acceptable procedure. The rate of application shall be no less than 220 pounds per acre. Fertilizer conforming to Section M.13.03 of *CT DOT Form 818* shall be applied at a rate of 320 pounds per acre during seeding, unless otherwise specified.

END OF SECTION



**INSTALLATION NOTES:**

1. FILTER SOCKS (FILTREXX SILTSOXX) SHALL BE PLACED AT THE LOCATIONS SPECIFIED AND IN A MANNER AS DIRECTED BY THE ENGINEER AND MANUFACTURER.
2. STAKES SHALL BE INSTALLED THROUGH THE MIDDLE OF THE FILTER SOCKS AT 10' ON CENTER.
3. ADJACENT FILTER SOCKS SHALL BE OVERLAPPED 18" MINIMUM AT SECTION ENDS, AND PROPERLY STAKED.
4. STRAIGHTEN AND POSITION THE FILTER SOCKS ON THE GROUND, ENSURING THERE IS GOOD GROUND CONTACT AND NO VOID SPACES BENEATH THE FILTER SOCKS.
5. LOOSE COMPOST MAY BE BACKFILLED ALONG THE UPSLOPE SIDE OF THE FILTER SOCK TO FILL THE SEAM BETWEEN THE SOIL SURFACE AND THE DEVICE.
6. REFER TO THE MANUFACTURER'S (FILTREXX) INSTRUCTIONS FOR ALL OTHER INSTALLATION, MAINTENANCE AND DISPOSAL PROCEDURES.

## **FILTER SOCK - FILTREXX SILTSOXX**

N.T.S.



**Westcott and Mapes, Inc.**

Consulting Engineers since 1916

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New Haven, CT 06510  
Telephone: (203) 789-1260  
E-mail: info@westcottandmapes.com

ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE

DWG. TITLE

FILTER SOCK

SCALE

AS NOTED

DRAWN BY

NWE

DESIGN BY

—

DWG. NO.

01560-1

DATE

02/06/2024

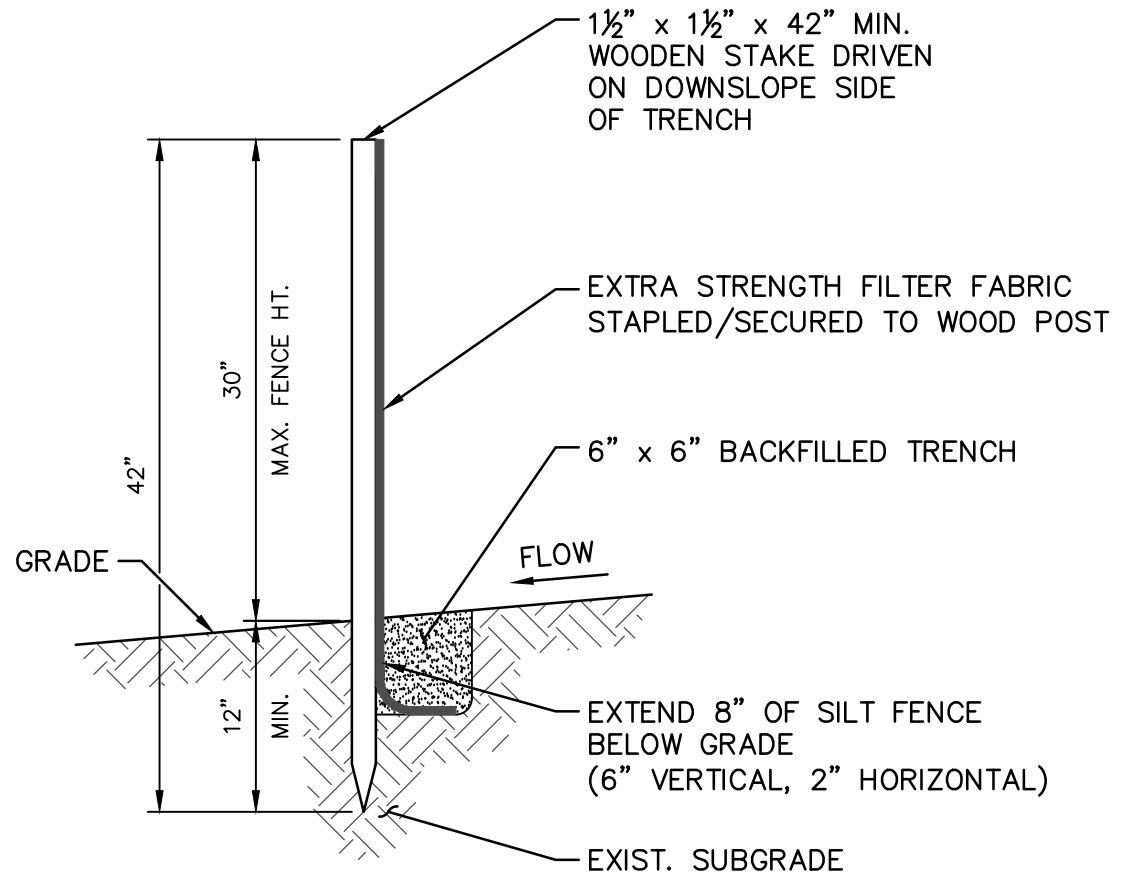
PROJECT NO.

24-034-10

FILE NAME: L:\PROJECTS-2024\24-034-00 CITY OF MILFORD ON-CALL PIPE LINING SPECIFICATIONS\DRAWINGS\24-034-10 DETAILS.DWG

#### INSTALLATION NOTES:

1. LOCATE AS NECESSARY FOR APPLICATION.
2. EXCAVATE TRENCH A MINIMUM 6" DEEP BY 6" WIDE ON UPSLOPE SIDE OF FENCE. FOR SLOPES, EXTEND TRENCH UPSLOPE AT BOTH ENDS OF THE FENCE TO PREVENT WATER FROM RUNNING AROUND. ENCIRCLE CATCH BASINS IN DEPRESSIONS, CUTTING FABRIC ON THE BOTTOM CORNERS 4"± TO ALLOW FABRIC TO LAY FLAT AROUND CORNER.
3. DRIVE HARDWOOD STAKES (1½" x 1½" x 42" MIN.) ON DOWNSLOPE SIDE OF TRENCH AT A MAXIMUM SPACING OF 10', OR CLOSER WHEN CONCENTRATED FLOWS ARE ANTICIPATED.
4. STAPLE OR SECURE FENCE TO STAKES PER MANUFACTURER'S INSTRUCTIONS SUCH THAT AT LEAST 8" OF FABRIC LAYS WITHIN TRENCH. IN THE ABSENCE OF MANUFACTURER'S INSTRUCTION'S, SPACE WIRE STAPLES 4" APART ALTERING PARALLEL AND PERPENDICULAR TO THE AXIS OF THE STAPLE.
5. PLACE FABRIC JOINTS AT STAKES WITH A 6" OVERLAP OF FABRIC.
6. BACKFILL AND COMPACT TRENCH.



## SILT FENCE

N.T.S.



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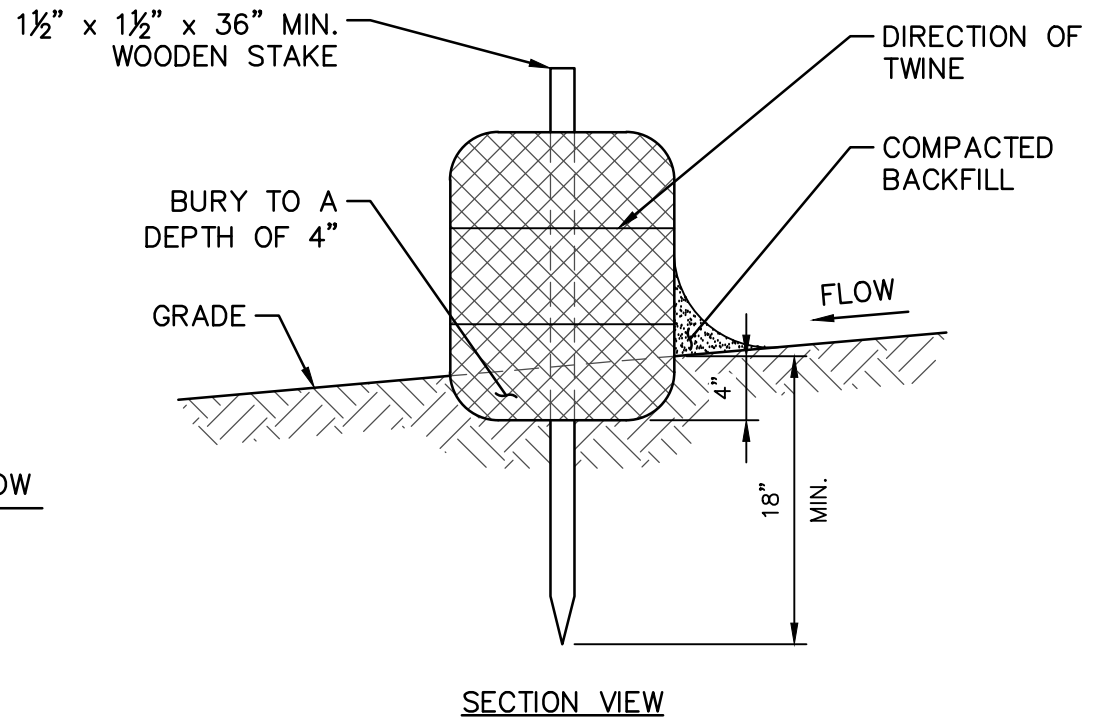
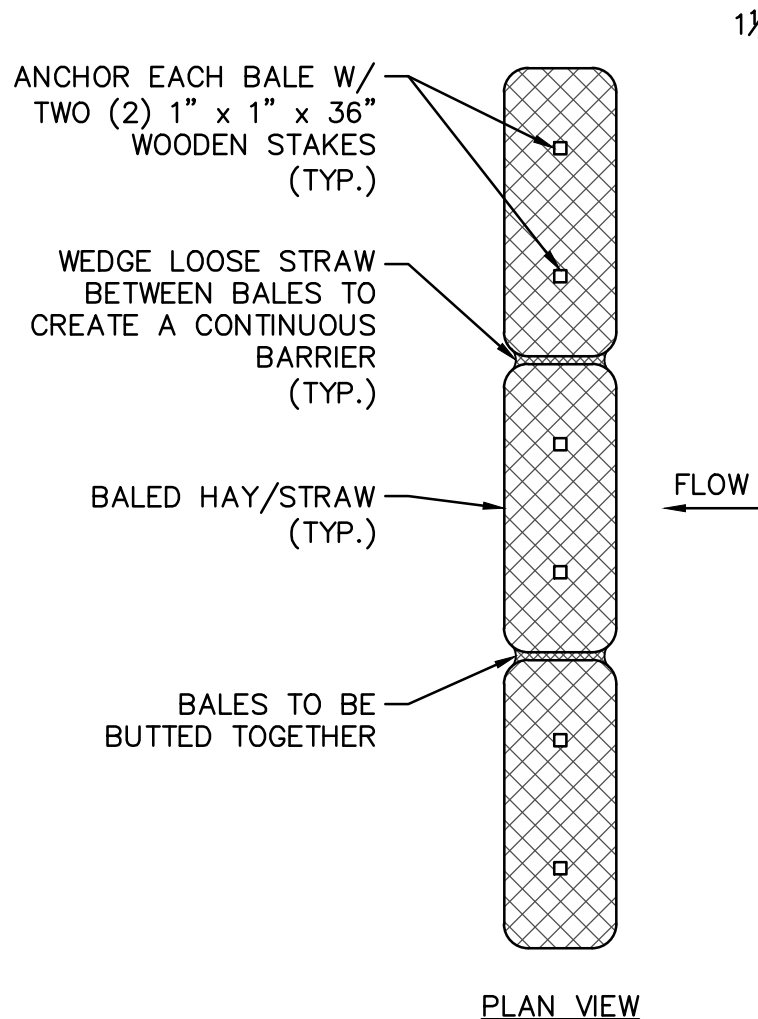
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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING

PROJ. TITLE MILFORD, CT

DWG. TITLE	SILT FENCE	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	01560-2
		PROJECT NO.	24-034-10



INSTALLATION NOTES:

1. EXCAVATE TRENCH, ON CONTOUR, TO WIDTH OF BALE AND DEPTH OF 4".
2. LOCATE BALES AS REQUIRED, TIGHTLY ABUTTING ONE ANOTHER.
3. EXTEND ENDS OF TRENCH UPSLOPE IN EACH DIRECTION SO THAT THE BOTTOM END OF BALES WILL BE HIGHER THAN THE TOP OF THE LOWEST BALES TO FORCE WATER OVER THE TOP OF THE STRUCTURE.
4. DRIVE AT LEAST TWO (2) HARDWOOD STAKES (1½" X 1½" X 36") TO ANCHOR EACH BALE TO THE GROUND, TO MINIMUM DEPTH OF 18".
5. BACKFILL ON UPSLOPE SIDE OF BALE AND COMPACT TRENCH WITH A MINIMUM OF 4" OF SOIL.

## HAY BALE BARRIER

N.T.S.



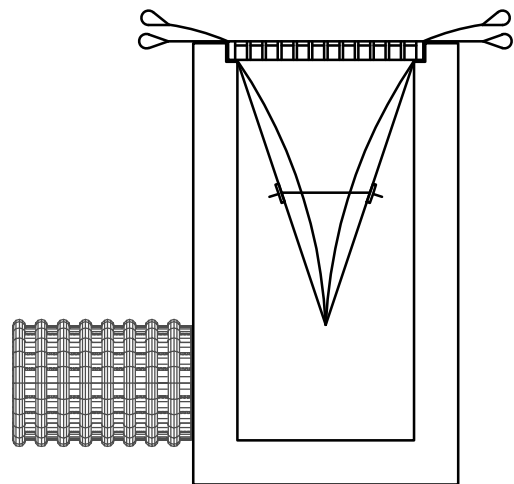
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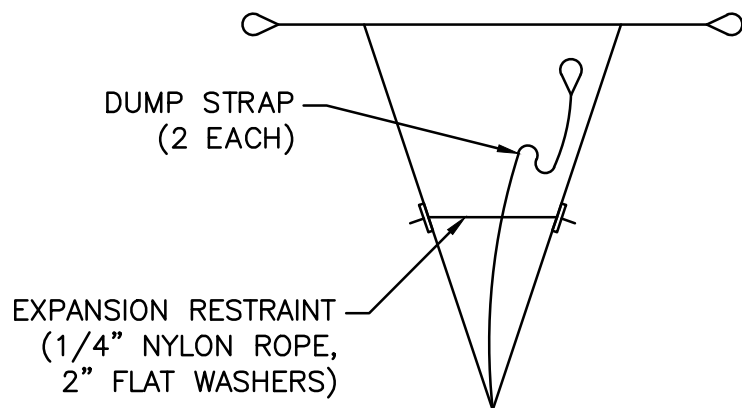
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SEWER PIPE LINING  
MILFORD, CT

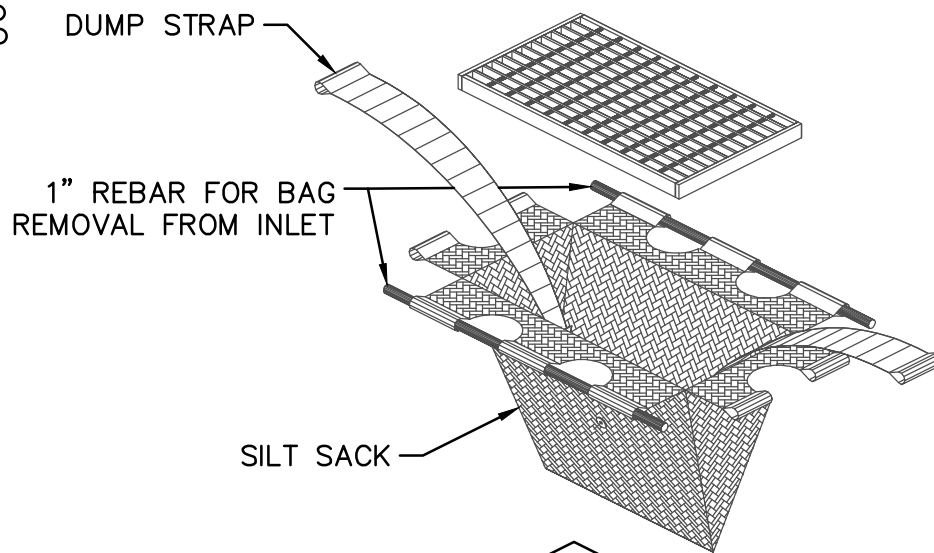
PROJ. TITLE	MILFORD, CT		
DWG. TITLE	HAY BALE BARRIER	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	01560-3
		PROJECT NO.	24-034-10



INSTALLATION DETAIL

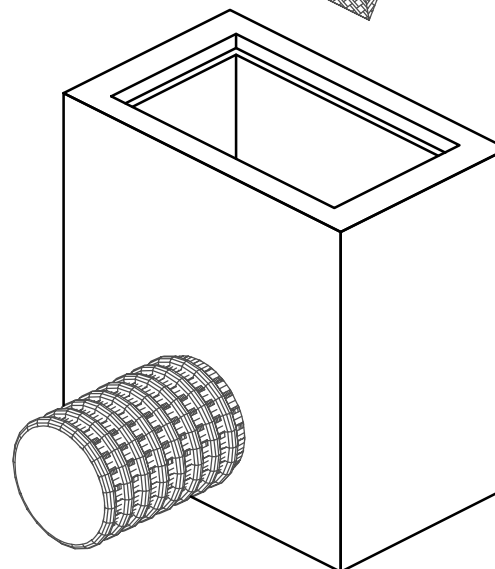


BAG DETAIL



## SILT SACK

N.T.S.



**Westcott and Mapes, Inc.**

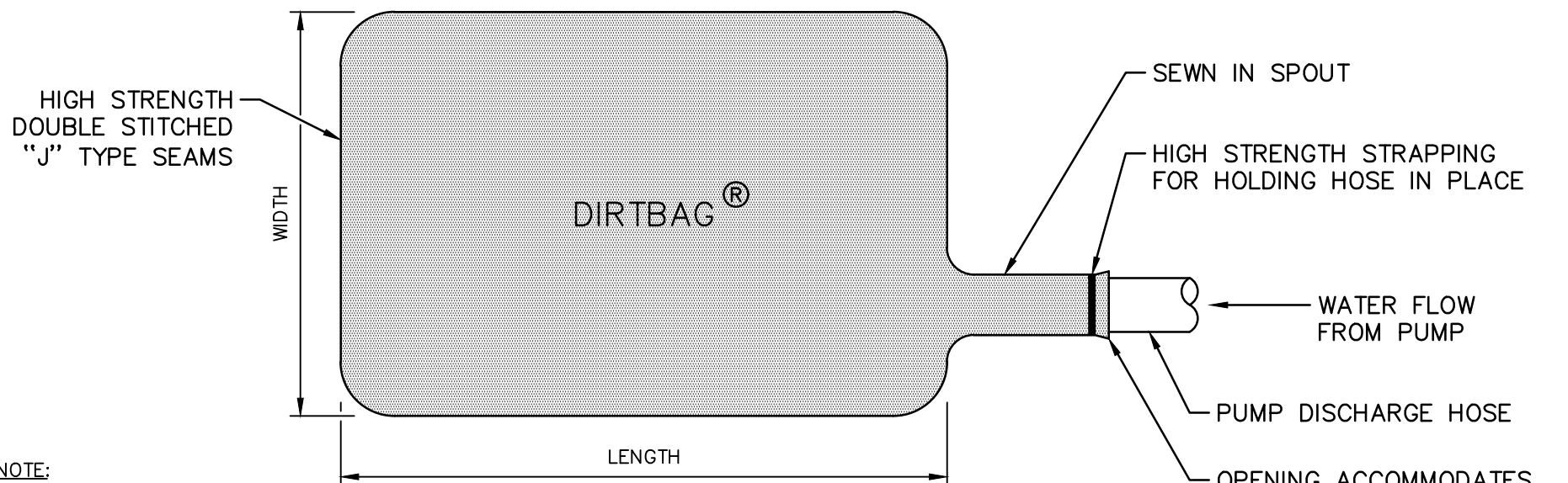
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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE	ON-CALL STORM AND SANITARY SEWER PIPE LINING MILFORD, CT		
DWG. TITLE	SILT SACK	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	01560-4
		PROJECT NO.	24-034-10

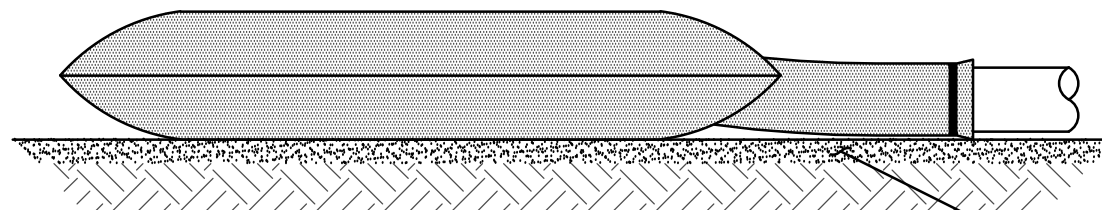
# PLAN VIEW



## NOTE:

SEDIMENT TRAP SHALL BE SIZED PER REQUIRED DISCHARGE. COORDINATE W/ THE MANUFACTURER.

# SECTION VIEW



BAG PLACE ON AGGREGATE OR STRAW UNDERLAYMENT

## DEWATERING SEDIMENT TRAP "DIRTBAG"

N.T.S.



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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE	ON-CALL STORM AND SANITARY SEWER PIPE LINING MILFORD, CT		
DWG. TITLE	DEWATERING SEDIMENT TRAP "DIRTBAG"	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	01560-5
		PROJECT NO.	24-034-10



SECTION 01740

SITE MAINTENANCE AND CLEANUP

**PART 1 – GENERAL**

**1.01 REQUIREMENTS**

- A. During execution of the work, the project site and the adjacent areas affected thereby shall be kept clean, all rubbish, surplus materials, and unnecessary construction equipment shall be removed, and all damages shall be repaired so that the public and private property owners will be inconvenienced as little as possible.
- B. In the event that material or debris have washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes, structures, or work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, etc., shall, upon completion of the work, be left in a clean and neat condition.
- C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent properties affected by his operations in a neat and satisfactory condition.
- D. The Contractor shall restore or replace at the Contractor's cost, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required for all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as work progresses and shall not be left until the end of the contract period.

END OF SECTION

**SECTION 02100**

**SITE PREPARATION AND RESTORATION**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to perform all site preparation and restoration work, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. Clear the ground within private easements and rights-of-way of trees, stumps, brush, rubbish, and all objectionable material, in accordance with the drawings and these specifications, as required for construction of the proposed work and/or temporary stockpile areas approved by the Owner. This work shall include the protection of existing trees and ornamentals within private easements and rights-of-way that are designated to remain.
- C. Grade, stabilize, and maintain temporary access roads through private easements and rights-of-way as necessary for installation of the new work and/or approved temporary stockpile areas, and restore surfaces following construction in accordance with the drawings and these specifications.
- D. Remove, store, preserve, and re-install or replace with new, existing fences, guide rails, plantings, ornamental trees or shrubs, granite curbs, curb boxes, walks, driveways, walls, signs and other miscellaneous appurtenances removed or disturbed during the construction. Install new plantings if/as called for on the drawings, and in accordance with Section 02480 – Landscaping
- E. Coordinate all work within private easements with the private property owners and the Engineer.
- F. Temporarily seed or stabilize disturbed areas during “out of season” time periods, as called for or directed.
- G. Topsoil, fertilize, seed, and mulch all areas disturbed by Contractor’s operations, both on and off the site, in accordance with the drawings and these specifications.

**1.02 RELATED SECTIONS:**

- A. Section 01560 – Environmental Protection
- B. Section 01740 – Site Maintenance and Clean Up
- C. Section 02315 – Excavation and Trenching
- D. Section 02320 – Backfilling, Grading and Compaction
- E. Section 02480 – Landscaping

SECTION 02100

SITE PREPARATION AND RESTORATION

1.03 REFERENCE STANDARDS:

- A. State of Connecticut Department of Energy and Environmental Protection, Connecticut Guidelines for Soil Erosion & Sediment Control, as amended (hereafter referred to as *CT E&S Guidelines*).
- B. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

1.04 SUBMITTALS:

- A. Submit source and data for all topsoil, fertilizer, seed mixtures, mulching products, and other materials to be used for temporary and/or permanent site restoration.
- B. Provide and submit certificates from seed shipments concerning seed mixture, purity, germinating value, and crop year identification.
- C. Submit other information requested by the Engineer.

1.05 QUALITY ASSURANCE:

- A. All work shall be in accordance with all applicable municipal and state permits.
- B. Stockpiling of material and equipment within 150 feet of a wetland or watercourse is not permitted, except as approved in writing by the Engineer and the Milford Inland Wetlands Agency (MIWA).
- C. Prior to the start of work, the Contractor and the Engineer shall meet on-site with each private property easement owner to review the scope of work, the extent of potential tree removal, and all the preparation and restoration requirements, as applicable.

**PART 2 – PRODUCTS**

2.01 TOPSOIL:

- A. Topsoil shall be fertile, friable, natural material, typical of locality, without admixture of subsoil, refuse, or other foreign materials, and obtained from a well-drained, arable site.
- B. Topsoil shall contain a mixture of sand, silt, and clay particles, in equal proportions.
- C. Topsoil shall be free of stumps, roots, heavy or stiff clay, stones larger than 1 inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush, or other deleterious matter.

2.02 WOOD CHIPS:

- A. Provide new material obtained from sound green wood.

SECTION 02100

SITE PREPARATION AND RESTORATION

- B. The materials shall be free from rot, leaves, twigs, shavings, debris, or other objectionable material.

2.03 FERTILIZING:

- A. Ground limestone: 200 pounds per 1,000 square feet.  
B. Complete commercial fertilizer of approved analysis: 25 pounds per 1,000 square feet.

2.04 SEED MIXTURES:

- A. Provide appropriate seed mixtures as called for or indicated on the drawings and these specifications from a reliable seed company consisting of fresh, clean, new crop seed of good quality, and high in germinating value.  
B. Seed shall not contain more than 0.25 percent weed seed, nor more than 3 percent inert matter or other crop seed.  
C. When not specified elsewhere, seed mixtures shall be as follows:

Species	Minimum Proportion by Weight
Chewings Fescue	35%
Hard Fescue	30%
Colonial Bentgrass	5%
Birdsfoot Trefoil	10%
Perennial Ryegrass	20%

- D. Temporary grass shall be an approved perennial ryegrass having a minimum purity of 98 percent, and a minimum germination of 90 percent.  
E. Recommended planting seasons for permanent grass are as follows:  
1. Spring: April 1 – June 15.  
2. Fall: August 15 – October 1.  
F. Perform actual planting only when weather and soil conditions are suitable, in accordance with locally accepted practice.  
G. Protect seeded and planted areas from damage by trespass and/or other causes until work is accepted.  
H. Replace, repair, or replant, as directed by the Engineer, and at the Contractor's own expense, seeding or planting that is damaged.

**SECTION 02100**

**SITE PREPARATION AND RESTORATION**

**2.05 WATER:**

Water shall be clean, fresh, and free of substances that could inhibit the vigorous growth of grass. The Contractor shall distribute all water required for seeding and maintenance by whatever means necessary, at no additional cost to the Owner.

**2.06 TREE PROTECTION:**

- A. Install tree protection using orange vinyl construction fencing at least 4 feet high around the tree or group of trees requiring protection, where called for on the drawings or directed by the Engineer.
- B. Place sufficient wood chips of type, quality, and quantity satisfactory to the Engineer, around the base(s) of the tree(s) to protect the area of the root zone.

**PART 3 – EXECUTION**

**3.01 EXISTING TREES AND VEGETATION:**

- A. Avoid cutting or injuring trees and vegetation outside of the easement lines and outside of areas to be cleared as indicated, without the permission of the Engineer.
- B. Accept responsibility for damages outside of these lines.
- C. Mark or flag all trees, shrubs, and plants to be removed within permanent or temporary easement areas, and rights-of-way, as required to construct the proposed work. The Engineer shall have seven (7) days to field review the markings prior to the start of clearing operations.
- D. Do not excavate within tree protection zones, unless otherwise indicated.
- E. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to the excavation as possible.
  - 1. Cover exposed roots with burlap and water regularly.
  - 2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
  - 3. Coat cut faces of roots more than 1-1/2 inches in diameter within an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
  - 4. Backfill with soil as soil as possible.
- F. Repair or replace trees and vegetation intended to remain that are damaged by construction operations, in a manner approved by the Engineer.
  - 1. Employ an arborist, licensed in jurisdiction where the project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.

SECTION 02100

SITE PREPARATION AND RESTORATION

2. Replace trees and shrubs that cannot be repaired and restored to full-growth status, as determined by the Engineer.

3.02 EXISTING STRUCTURES AND PROPERTY:

- A. Remove existing signs, posts, catch basin frames and grates, manhole frames and covers, granite curbing, and other such items within the construction path, unless otherwise directed.
- B. Such items in reusable condition (as determined by the Engineer) shall be stored at a site designated by the Owner.
- C. For work in loamed areas, strip all loam to one side to avoid mixing with subgrade excavation materials. Do not take loam from the site.

3.03 CLEARING:

- A. Cut or remove trees, brush, and other vegetable matter such as snags, bark, and refuse from the areas to be cleared.
- B. Cut trees, stumps, and stubs to be cleared, except where clearing is done by machinery, as close to the ground surface as practicable, but no more than 6 inches above the ground surface for small trees and 12 inches above the ground surface for larger trees.
- C. Bury elm balk at least 1 foot deep, or burn in incinerators off-site with anti-pollution and fire prevention controls, to prevent the spread of Dutch elm disease as required by applicable laws.
- D. Cut limbs and branches of trees to be preserved along the limits of work, but only to the extent necessary for construction.
- E. Trim neatly and clean so that the remaining parts of the tree will not be damaged, and so that healing will be facilitated. Give thorough application of approved tree-healing paint to the newly cut area(s) of the tree, when limbs and branches over 1 inch in diameter have been cut.
- F. All logs and other wood to be removed in the course of clearing shall become the property of the Contractor, unless otherwise specified.

3.04 GRUBBING, STRIPPING, AND DISPOSAL:

- A. Remove stumps and roots larger than 3 inches in diameter to a depth of 12 inches, and roots larger than  $\frac{1}{2}$  inches in diameter to a depth of 6 inches. Measure depths from the existing ground surface or from the proposed finished grade, whichever is lower.
- B. Strip stumps, roots, foreign matter, topsoil, loam, and unsuitable earth material from the ground surface. Utilize topsoil and loam insofar as possible for finished surfacing. Do not take loam from the site.
- C. Promptly dispose off-site, material from clearing and grubbing not reused or stockpiled. In doing so, observe all applicable laws, ordinances, rules, and regulations. Do not

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SITE PREPARATION AND RESTORATION

consider work completed until final cleaning has been performed, unless otherwise directed.

D. Burning is not permitted.

3.05 CARE OF LOAM:

Scrape all loam to one side so that will not become mixed with the excavation materials. After construction work is completed, re-spread loam upon land. Do not take away any loam from the site, and if existing loam is of an insufficient amount, furnish loam, at no additional cost, and spread to a minimum compacted thickness of 6 inches.

3.06 WORK IN IMPROVED PROPERTY:

- A. Protect or dig up trees, cultivated hedges, lawns, shrubs, and plants that may be damaged by the Contractor's operations, and temporarily replant and maintain. After construction operations have been substantially completed, replant in the original locations and maintain until growth is re-established. If trees, cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, replace at no additional cost, with items at least equal to that existing at the start of the work. Seed lawns damaged by the Contractor's operation, as specified.
- B. Do such handwork as may be required to prevent damage to buildings or trees for all work in improved property.
- C. Protect all public or private monuments, iron pipes, rebar, and all other types of property boundary and geodetic markers from damage while construction is ongoing. Any markers disturbed, removed, or damaged shall be replaced, as applicable, and reset. This work shall be performed by a licensed land surveyor or other authorized agent, approved by the Engineer, at no additional cost to the Owner.
- D. Repair, reset, or replace, as directed by the Engineer, all walks, driveways, curbs, pipes, walls, utilities, fences, railings, etc., and ornamental or utilitarian domestic accessories, such as but not limited to arbors, fireplaces, sheds, or other surfaces, structures, or property which may have been damaged, either directly or indirectly by the Contractor's operations.
- E. Sidewalks and driveways shall be equivalent to that removed, but in no case shall concrete or bituminous concrete walks and driveways be of less quality than that shown on the drawings.

3.07 STONE WALLS AND FENCES:

Restore or repair stone walls or fences that were removed to provide access to the work, or if stone walls or fences are damaged during progress of the work, to the condition as existed prior to the start of construction.

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3.08 PLACEMENT OF TOPSOIL:

- A. Place and spread a minimum of 6 inches of topsoil in the areas to be seeded. Do not spread topsoil which is in a wet or frozen state.
- B. Fine grade the topsoil and compact. The topsoil shall be smoothly blended to match the proposed grades once compacted.

3.09 FERTILIZING:

Apply conditioning and fertilizing materials to the topsoil using. Cultivate the topsoil to its full depth by scarifying or other disking methods to thoroughly incorporate amendments into the topsoil.

3.10 SEEDING:

- A. Sow areas to be seeded with an approved mixture of non-wetland fresh grass seed after the commercial fertilizer has been applied.
- B. Sowing is to be done on a calm day, preferably by machine, but if by hand, only by experienced workmen. Hydroseeding is not permitted, unless otherwise approved or directed.
- C. Sow one half of the seed in one direction, and the other half at right angles, if practicable.
- D. Lightly rake seed into soil to a depth of not over  $\frac{1}{4}$  of an inch, and rolled with a hand roller weighing not more than 100 pounds per foot of length. Surface shall be kept watered, using a fine spray, until the grass is well started.
- E. Seed during the approximate time periods of April 1<sup>st</sup> to June 15<sup>th</sup>, and/or August 15<sup>th</sup> to October 1<sup>st</sup>, when weather and soil conditions are suitable for such work, unless otherwise directed.
- F. Replace topsoil and reseed if soil is washed off. Similarly, re-loam and reseed any areas that are not satisfactorily covered with grass at any time prior to the expiration of the guarantee period of this contract.

END OF SECTION



SECTION 02250

TEMPORARY EARTH SUPPORT AND DEWATERING

**PART 1 – GENERAL**

1.01 DESCRIPTION:

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to provide safe, dry, and stable excavations throughout the construction period, meeting all codes, regulations, and requirements of agencies having jurisdiction over the work, including Federal and State OSHA and other local agencies.
- B. The Contractor shall design, furnish, install, maintain, and remove temporary sheeting, shoring, and bracing systems to provide temporary earth support of excavations as required to prevent injury to persons, to support adjacent surcharge loads, to prevent collapse of the sides of the excavation, and to prevent any damage, disturbance, or settlement of adjacent roadway pavement, subsurface municipal and private utility structures, and property.
- C. Temporary earth support systems shall consist of an approved interlocking steel sheet pile wall, or steel soldier pile wall with lagging, or proprietary interconnected “slide-rail” system of sufficient capacity, or similar approved system designed to fully contain and support the soil conditions encountered.
- D. The Contractor shall evaluate the impact of soil and groundwater conditions on his proposed methods of excavation support, dewatering, and other operations. If subsurface conditions so require, the Contractor shall provide sufficient wells, well-points, vertical stand pipes, pumps, or other facilities necessary to control groundwater and surface water, in order to permit construction activities to be performed under dry and stable conditions.

1.02 RELATED SECTIONS:

- A. Section 01015 – Special Requirements
- B. Section 01560 – Environmental Protection
- C. Section 02315 – Excavation and Trenching
- D. Section 02320 – Backfilling, Grading and Compaction

1.03 REFERENCE STANDARDS:

- A. Occupational Safety and Health Administration (OSHA), OSHA Safety and Health Regulations, 29 CFR Part 1926 – Safety and Health Regulations for Construction, as amended.
- B. State of Connecticut Department of Energy and Environmental Protection, Connecticut Guidelines for Soil Erosion & Sediment Control, as amended (hereafter referred to as *CT E&S Guidelines*).

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TEMPORARY EARTH SUPPORT AND DEWATERING

- C. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

1.04 SUBMITTALS:

- A. General: Submit to the Engineer an outline of intended excavation support system(s), including installation and removal procedures for proposed cofferdam(s), temporary earth support systems, and dewatering plans and methods. This submittal is for the Engineer's general information and in no way relieves the Contractor of complete responsibility for the successful performance of his excavation methods. Include manufacturer's catalog cuts, shop drawings, and specifications with submittal.
- B. Sheeting and Shoring Drawings: Submit plan views of proposed shoring locations, including typical sections, details of structural members, connections, and embedment depths. The Contractor shall engage an independent Professional Engineer licensed in the State of Connecticut and with experience in the design of temporary earth support systems, to evaluate his proposed excavation methods, prepare drawings for the submittal, and provide guidance for the design and installation of temporary earth support systems used during construction. The Contractor shall submit a notarized letter to the Engineer certifying conformance to the above requirements, before the start of any construction.
- C. Design Calculations: Submit to the Engineer design calculations as required for sheeting, shoring, and other excavation support systems, including all excavations over 20 feet in depth. Design the excavation support in accordance with AASHTO requirements to support all applicable loads including earth and ground water pressures, AASHTO HS20 traffic loading, utility loads, adjacent structures, and construction loads.
- D. Dewatering: The Contractor shall engage an independent Professional Engineer licensed in the State of Connecticut and with experience in the design of temporary dewatering systems to evaluate his methods for control of water, and to design dewatering systems or provide guidance during construction. The Contractor shall submit a notarized letter to the Engineer certifying conformance to the above requirements before the start of any construction (refer to attached sample form).

1.05 QUALITY ASSURANCE:

- A. Installation of well points, deep wells, and pumps shall be performed under the supervision of a competent representative of the manufacturer.
- B. Temporary earth support systems shall be driven to true alignment in a workmanlike manner, with sufficient tightness to contain flowing soil conditions encountered, and to provide continuous support of adjacent utilities and structures.

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- C. Support systems for trenches 20 feet deep or greater shall be designed by a registered Professional Engineer, or be based on tabulated data prepared and/or approved by a registered Professional Engineer licensed in the State of Connecticut.
- D. Impervious sheet pile walls, installed for temporary earth support in the vicinity of existing vulnerable structures and utilities, shall be driven using a low impact hammer.
- E. Pumping systems shall be equipped with sound attenuation to meet the noise requirement limits of 68 dBA at 30 feet. Each pump and/or electric generator unit shall have a sound attenuated enclosure mounted as an integral part of the assembly. Separate structures, housing, or curtains are not acceptable.
- F. The Contractor shall check noise levels using an approved calibrated decibel meter at pump startup with the Engineer present. Measured levels shall not exceed the above noise requirement, both horizontally and vertically from all sides of the pump unit.
- G. Contaminated water from dewatering operations shall be discharged into the municipal sanitary sewer system, in accordance with the requirements of the State of Connecticut DEEP *General Permit for the Discharge of Groundwater Remediation Wastewater to a Sanitary Sewer*.

**PART 2 – PRODUCTS**

**2.01 MATERIALS:**

- A. Temporary steel sheet piling for cofferdam work shall have a minimum thickness of  $\frac{3}{8}$  inches, with a sufficient section modulus for the use intended, and shall conform to the requirements of Section 7.14 of *CT DOT Form 818* (ASTM A328).
- B. Well points, deep wells, or sump pumps shall be designed specially to drain soil, lower the water table, and prevent saturated soil from flowing into the excavation.
- C. Pumping unit(s) shall be designed for use with deep wells and well points.
- D. Sediment Control Geotextile Bag – Dirtbag®, by ACF Environmental, or approved equal. Water from sumps and/or excavations may be pumped into a sediment control geotextile bag to remove silt, sand, and other debris.
- E. Portable Sediment Tank – Dewatering Roll-Off Box (25 cubic yards), by BakerCorp, or approved equal. Water from sumps and/or excavations may be pumped into a portable sediment basin to remove, silt, sand, and other debris.

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TEMPORARY EARTH SUPPORT AND DEWATERING

**PART 3 – EXECUTION**

**3.01 GENERAL:**

Work may only begin after acceptance by the Engineer of pre-construction submittal requirements including proposed 'Cofferdam, Excavation and Temporary Earth Support Plan', 'Water Handling and Dewatering Plan', 'Temporary Earth Support Certification', 'Control of Water Certification', and 'Construction Schedule and Sequencing Plan'.

**3.02 EXCAVATION SUPPORT SYSTEMS:**

- A. Furnish, install, and properly maintain excavation support systems, bracing, and related items as necessary to support sides of excavation and to prevent any movement of earth which could cause injury to persons, diminish the width of the excavation to less than that necessary for proper construction, or could otherwise damage or delay work, or endanger adjacent structures.
- B. Install excavation support systems ahead of excavation to avoid loss of material and maintain support for sides of excavation. Avoid trimming behind face where support system will be installed if excavating below support system. Prevent voids, where possible, outside of the excavation support and immediately fill any remaining voids with sand, and compact.
- C. Leave in place, as indicated, excavation support systems and bracing that is to be embedded in backfill or concrete.
- D. Cut off excavation support systems and bracing at specified elevations when directed by the Engineer.
- E. Carefully remove excavation support systems and bracing not to be left in place as not to endanger construction or other structures. Immediately backfill all voids left or caused by withdrawal of excavation support system(s). Use suitable materials and compacting methods.

**3.03 COFFERDAMS:**

- A. Cofferdams shall be designed and constructed to sufficient depth as a partial or total enclosure, safe and watertight, as necessary, that will permit construction of the substructure in the dry without damage to the work.
- B. The cofferdam work shall include a program of dewatering, tight sheeting, shoring, and bracing installed in such manner as to eliminate all possibility of undermining or disturbing the foundations of existing adjacent structures and utilities, or of work previously completed under this contract.
- C. Excavate to widths that give suitable room for constructing structures or laying and jointing piping; furnish and place all sheeting, bracing, and supports; do all coffer damming, pumping, and draining; and render bottom of excavations firm, dry and acceptable in all respects.

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- D. All parts of the cofferdam structure shall be removed following completion of the work, unless directed otherwise by the Engineer, and shall be done in such a manner so as not to disturb or damage the work.

3.04 DEWATERING:

- A. A construction-sequencing plan and a water-handling plan, including a contingency plan for flood events, must be submitted by the Contractor in writing to the Engineer, and approved by the Engineer, prior to the commencement of any construction.
- B. Dewatering operations shall be such that all excavations are kept free from water at all times so that construction may be performed in the dry.
- C. When dewatering, pumping shall be done using a suitable pump from standpipe(s), sump(s), deep well(s), or wellpoints located outside the horizontal limits and below the elevation of the work being placed. All dewatering must be executed in accordance with the regulations and requirements of the Milford Inland Wetlands Agency and with Section 5-13 of the *CT E&S Guidelines*. Dewatering shall continue until all work below groundwater and surface water level has been completed or otherwise stabilized against uplift or other disturbance. Pumping shall be continuous where required to protect the work and to maintain satisfactory progress.
- D. Filter dewatering wastewater discharge through a properly sized pumped sediment control geotextile, portable sediment basin, sedimentation trap, or other suitable receiving device before discharge to the approved outfall location. Dewatering shall not be discharged directly into a wetland or watercourse.
- E. Provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) to intercept and/or remove promptly and dispose properly of all water entering trenches and other excavations. Keep such excavations dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged.
- F. Sumps for the pump intakes shall be excavated 2 feet or more below the grade of the proposed work.
- G. Provide pump intake protection against the pumping of bottom sediments through the suction hose.
- H. All trench water shall be discharged into sediment traps as detailed on drawings. Outlet protection shall adequately dissipate the energy of discharge so as to prevent erosion and the resuspension of sediments at the point of discharge.
- I. Dispose of all pumped or drained water without undue interference to other work, damage to pavements, other surfaces, or property. Provide suitable temporary pipes, flumes, or channels for water that may flow along or across the site of work.
  - 1. Temporary Underdrain: Lay temporary underdrain, when used, in trenches beneath grade of structure. Provide trenches to accommodate underdrain and surrounding

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TEMPORARY EARTH SUPPORT AND DEWATERING

gravel. Lay underdrain at suitable distance below bottom of normal excavation with open joints wrapped in geotextile, and entirely surrounded by graded gravel, or crushed stone to prevent the admission of sand or other soil into the underdrain. Distance between bottom of pipe or structure and top of bell of underdrain pipe at least 3 inches, unless otherwise permitted. Space between underdrain and pipe or structure filled with screened gravel or crushed stone, rammed if necessary, and left with a surface suitable for laying pipe or building structure.

2. Drainage System: Dewater excavations, if necessary, by deep wells, sump pumps, or a combination of both, which will drain soil and prevent saturated soil from flowing into excavation.
- J. Pumped groundwater collected during the dewatering operation shall be discharged to a portable sediment tank, and all sediments removed from trench water shall be disposed of properly at locations acceptable to the Connecticut Department of Energy and Environmental Protection (CT DEEP), and the City of Milford.
- K. Inspect the pumping system, including intake protection and discharge conditions, frequently during dewatering operations for proper functioning of equipment.
- L. All dewatering must be executed in accordance with the requirements of the City of Milford Inland Wetlands Agency and CT DEEP.

SEE ATTACHED FORMS

1. Temporary Earth Support Certification
2. Control of Water Certification

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TEMPORARY EARTH SUPPORT AND DEWATERING

Date: \_\_\_\_\_

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Subject: **Owner Name:** \_\_\_\_\_  
**Project Name:** \_\_\_\_\_  
**Project Number:** \_\_\_\_\_  
**Temporary Earth Support Certification**

Dear \_\_\_\_\_:

I hereby certify that I have reviewed the methods for temporary earth support proposed by the following Contractor for the above-referenced project:

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I have experience in the design of temporary earth support, have evaluated the proposed methods of excavation, and have provided guidance regarding proper slopes. The following is a description of the proposed methods to be used during construction:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If you have any questions or comments concerning the information provided, please contact our office.

Very truly yours,

\_\_\_\_\_  
Signature of Registered Professional Engineer

\_\_\_\_\_  
Name of Registered Professional Engineer

\_\_\_\_\_  
Engineer's Stamp (Signed and Dated)

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TEMPORARY EARTH SUPPORT AND DEWATERING

Date: \_\_\_\_\_

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Subject:     **Owner Name:** \_\_\_\_\_  
              **Project Name:** \_\_\_\_\_  
              **Project Number:** \_\_\_\_\_  
              **Control of Water Certification**

Dear \_\_\_\_\_:

I hereby certify that I have reviewed the methods for control of water and temporary dewatering systems proposed by the following Contractor for the above-referenced project:

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I have experience in the design of temporary dewatering systems and have evaluated the proposed methods for control of water. I shall design the dewatering systems and/or shall provide guidance during construction. The following is a description of the proposed methods to be used during construction:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If you have any questions or comments concerning the information provided, please contact our office.

Very truly yours,

\_\_\_\_\_  
Signature of Registered Professional Engineer

\_\_\_\_\_  
Name of Registered Professional Engineer

\_\_\_\_\_  
Engineer's Stamp (Signed and Dated)

END OF SECTION



**SECTION 02260**

**TEMPORARY SUPPORT AND PROTECTION OF UTILITIES**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to design, install, maintain, and remove temporary systems and construction methods for the support and protection of existing subsurface and overhead mainline public utilities, service connections, and structures, in the immediate vicinity of the work that would be otherwise damaged or impacted by construction operations.
- B. In the performance of the work, the Contractor shall obtain all required permits and comply with the requirements of all impacted utilities and City of Milford Authorities.

**1.02 RELATED SECTIONS:**

- A. Section 02250 – Temporary Earth Support and Dewatering
- B. Section 02315 – Excavation and Trenching
- C. Section 02320 – Backfilling, Grading and Compaction

**1.03 SUBMITTALS:**

- A. Submit working drawings and computations, prepared by a qualified Professional Engineer licensed to practice in the State of Connecticut, showing the method for support and protection to be provided for each mainline utility and service connection.
- B. The shop drawings shall include a utility relocation plan if such work is anticipated, and shall be signed, sealed, and dated by the Contractor's Engineer.
- C. Utility supports shall safely carry all dead loads and any imposed loadings under all possible construction conditions. Utility protection shields and temporary shoring systems shall safely carry any imposed loading under all possible construction conditions. Supports and protections shall be constructed in a manner that will not interfere with the removal of the existing or installation of the proposed work.
- D. The Contractor's design and construction methods shall be submitted to the utility representatives for review prior to being submitted to the Engineer for approval at least three (3) weeks prior to the beginning of construction. No work will be allowed in the vicinity of any utility until the Contractor receives approval of his proposed support and protection methods from the utility representative and the Engineer.

**1.04 QUALITY ASSURANCE:**

- A. No service interruption resulting from construction operations will be allowed, except as otherwise provided for.
- B. The Contractor shall notify the Engineer and the affected utilities prior to the start of his work, and shall be responsible for all coordination with the Engineer.

**SECTION 02260**

**TEMPORARY SUPPORT AND PROTECTION OF UTILITIES**

- C. The Contractor shall comply with utility requirements for providing an adequate method to support and protect existing mainlines, service connections, and appurtenant utility structures prior to the start of construction.
- D. The Contractor shall use every effort to protect all utilities from damaged of any nature that might result from carelessness or negligence in his operations. He shall be held solely and strictly responsible for damage resulting from such carelessness and negligence.

**PART 2 – PRODUCTS**

**2.01 MATERIALS:**

- A. The materials for this work shall be of satisfactory quality for the purpose intended and shall be approved by the utility representative and the Engineer.
- B. Structural support and shoring systems shall be sound and capable of safely carrying the specified loads.

**PART 3 – EXECUTION**

**3.01 GENERAL:**

- A. If the Contractor desires to make a permanent or temporary relocation of any utility or utility structure, for its convenience or any reason whatsoever, the Contractor shall make its own request to the utility company, pipe owner, or other affected party, and such relocation work shall be made solely at the Contractor's expense.
- B. The Contractor shall satisfy the Owner's Representative for any proposed relocation of water lines, gas lines, sewer lines, overhead service lines, service connections, water and gas meter boxes, valve boxes, or any other utility, that the relocation will not interfere with the work or cause an obstruction or hazard.
- C. The Contractor shall maintain support and protection of impacted utilities until such time as the work has been installed and all trenches have been backfilled to grade above the utilities.
- D. When the temporary utility support and protection systems are no longer required, the Contractor shall remove them from the site.

END OF SECTION

SECTION 02270

SEWAGE BYPASS PUMPING

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to design, install, monitor, maintain, and remove temporary bypass pumping system(s) as required to intercept and divert wastewater flows in existing sanitary sewers around the area of work, at all times during construction of the work, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. Bypass pumping locations are to be set by the Contractor and reviewed by the Engineer.
- C. The design, installation and operation of the temporary bypass pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a bypass pumping subcontractor who specializes in the design and operation of temporary bypass pumping systems, unless the Contractor is capable of providing such services in-house. The bypass systems shall meet the requirements of all codes and regulatory agencies having jurisdiction.
- D. Provide continuous 24-hour automated wireless monitoring for bypass pumping systems requiring overnight and weekend operation. Assign "on-call" personnel responsible for on-site and remote monitoring, and maintenance of the system.
- E. Overflows from bypass operations will not be permitted to enter into any streams or bodies of water. The Contractor will be solely responsible for fines, costs, or legal actions, and any associated legal costs, including attorney's fees, incurred by the Owner with respect thereto, taken by the state, federal, or other regulatory agencies if such overflows occur during or on account of construction.

**1.02 SEWAGE BYPASS PUMPING REQUIREMENTS:**

- A. The bypass pumping subcontractor, or the Contractor, shall demonstrate the bypass pumping equipment is automated and is capable of functioning without the assistance of an operator. The bypass pumping subcontractor, or the Contractor, shall have a minimum experience of ten (10) years designing and supplying wastewater bypass systems.
- B. The subcontractor or Contractor shall demonstrate the pumping equipment can operate for an extended period of time running dry. After this period of time, the pump shall have the capability of pulling a 25-inch Hg vacuum without adjustment or repair.
- C. The subcontractor or Contractor shall demonstrate sufficient inventory to perform normal rentals (including this project) and maintain at least 100 percent reserve equipment for this project on-site or available for immediate delivery.
- D. The subcontractor or Contractor shall demonstrate sufficient service and repair parts in stock to fulfill any service or repair of all rental equipment within three (3) hours of any service call.

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SEWAGE BYPASS PUMPING

- E. The subcontractor or Contractor shall demonstrate sufficient service staff and trucks to mobilize to repair or service equipment within one (1) hour of a service call, twenty-four (24) hours per day, seven (7) days per week.
- F. The Contractor shall provide a list of phone numbers to call for twenty-four (24) hour service.
- G. The bypass system(s) including all pumps, pipe, hose, valves, and fittings shall be provided by the same bypass pumping subcontractor, or the Contractor. The fusion of any pipe for the bypass system(s) shall be provided by the subcontractor or Contractor. All hydraulic calculations and drawings required by the submittals shall be provided by the bypass pumping subcontractor, or the Contractor.
- H. The bypass pumping subcontractor, or the Contractor, shall provide at least five (5) references of successful projects that they operated of similar size and complexity in wastewater applications performed by their firm within the past three (3) years within New England. All projects must be operated and be of similar size and complexity.

1.03 RELATED SECTIONS:

- A. Section 01015 – Special Requirements
- B. Section 01560 – Environmental Protection
- C. Section 02315 – Excavation and Trenching
- D. Section 02950 – Flow Control
- E. Section 02951 – Sewer Cleaning
- F. Section 02952 – Sewer Television Inspection
- G. Section 02953 – Storm and Sanitary Sewer Point Repairs
- H. Section 02955 – Cured-In-Place Pipe (CIPP) Lining for Mainline Sewers
- I. Section 02956 – Cured-In-Place Pipe (CIPP) Lining for Service Laterals
- J. Section 02957 – Service Lateral Grouting
- K. Section 02960 – Cementitious Liner Manhole Rehabilitation

1.04 SUBMITTALS:

- A. The Contractor shall submit the name of the proposed bypass pumping subcontractor, including references, to the Engineer at the time of the bid, as applicable.
- B. The Contractor and his bypass pumping subcontractor (as applicable) shall prepare a site-specific “Sewage Bypass Pumping Plan”, which describes all bypass pumping system(s) proposed for the project, and shall submit it to the Engineer for review two (2) weeks prior to the start of construction. The plan shall outline all provisions and precautions to be taken regarding the handling of existing wastewater flows. It must be specific and complete, including such items as hydraulic calculations,

SECTION 02270

SEWAGE BYPASS PUMPING

schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to ensure proper operation of equipment and protection of the wastewater facilities and collection systems involved. The plan shall provide for protection of the existing wastewater collection system structures from damage due to the bypass pumping flows; and show compliance with the hydraulic flow and velocity requirements and other such conditions, as specified in the contract documents. No construction shall begin until the Engineer has reviewed the "Sewage Bypass Pumping Plan", and all provisions and requirements have been met.

- C. The plan shall include, but not be limited to, the following information:
1. Staging areas for proposed bypass pumps.
  2. Sewer plugging method and types of plugs.
  3. Number, size, material, method of installation, and location of suction piping. The maximum wastewater flow velocity in the suction piping shall not exceed 10 feet per second (fps) at maximum wet weather flow.
  4. Number, size, material, method of installation and location of discharge piping. The maximum discharge flow velocity in the discharge piping shall not exceed 12 fps at maximum wet weather flow.
  5. Bypass pump sizes, capacities, number of each size to be on-site, and power requirements.
  6. Calculations of static lift, friction losses, and flow velocity; pump curves showing pump operating range; and system curves with suction lift performance including suction and discharge line velocity at peak flow.
  7. Standby power generator size, operating data, and location, if used.
  8. Downstream discharge plan (i.e., the location and methods for discharge of diverted wastewater back into the existing sewer system).
  9. Method of protecting discharge manholes or structures from erosion and damage.
  10. If buried, sections showing suction and discharge piping depth and embedment, and select fill and special backfill to be used.
  11. Method of noise control for each pump and/or generator shall be in accordance with the City of Milford standards.
  12. Any temporary pipe supports and anchoring, as required.
  13. Calculations for selection of bypass pumping pipe size; including velocities at maximum wet weather flow.
  14. Schedule for the installation of and maintenance of bypass pumping lines.
  15. Plan indicating location of bypass pumping lines. A plan drawing, to scale, and/or suitable aerial map shall show the location of the equipment and confirm the data used for hydraulic calculations.

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16. The pumps shall not be lowered into the ground to make the suction lift required without specific approval of the Engineer.
17. Monitoring plan including schedule of personnel assigned for on-site inspection and monitoring of the bypass pumping system(s), and a description of the remote monitoring plan and equipment.

**1.05 COORDINATION:**

- A. All pumping and bypass work, including layout of the pumping system equipment, shall be approved by the Engineer prior to the start of any pumping and bypass work.
- B. Bypass pumps shall be located in areas that do not disturb nearby homeowners and/or businesses.
- C. Bypass pumping equipment under operation of the Contractor shall be monitored by the Contractor and his employed personnel at all times. If pumping operation continues past normal working hours, the pumps shall be monitored 24 hours a day on-site as long as the operation is in place.
- D. In addition to 24-hour on-site monitoring, the Contractor shall provide remote monitoring capabilities for long-term bypass pumping operations and pumping operations scheduled outside of the normal work week (i.e., on Saturdays, Sundays, and holidays).
- E. The Contractor shall coordinate the required testing and placement of new sewer work into operation with the Engineer and the Milford Wastewater Division.

**PART 2 – PRODUCTS**

**2.01 PUMPING EQUIPMENT:**

- A. Pumping equipment shall have the capacity to convey 100 percent peak flows around the construction area. Flows shall be intercepted at the upstream side of the construction area, and shall be pumped through temporary piping of adequate size. The flow shall be discharged on the downstream side of the construction area, so as to bypass the sewer segment(s) under construction.
- B. All pumps furnished and used by the Contractor shall be centrifugal, end suction, fully automatic, self-priming pumps that do not require the use of foot valves, vacuum pumps, diaphragm pumps, or isolation valves in the priming system. All pumps furnished and used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows, and shall immediately develop a 25-inch Hg vacuum without adjustment or repair, or employ level control devices to regulate on/off or variable speed of the pump. Pumps shall be critically silenced and fully-enclosed, low noise units.
- C. The pumping system shall be equipped with the necessary float switches or level monitoring devices required for starting and stopping the pump(s). Float switches shall

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SEWAGE BYPASS PUMPING

- be provided to sound an alarm if the water level in the wetwell manhole reaches a critical depth.
- D. Seals shall be high pressure, mechanical, self-adjusting type with silicon carbide faces capable of withstanding suction pressures to 100 psi running. The mechanical seal shall be cooled and lubricated in an oil bath reservoir, requiring no maintenance or adjustment. Pumps shall be capable of running dry, with no damage, for extended periods of time. All metal parts shall be of stainless steel. Elastomers shall be as manufactured by Viton<sup>TM</sup>. Pump ends shall be manufactured to meet ISO 9002 certifications.
  - E. The pumps may be electric, hydraulic, or diesel powered.
  - F. The Contractor shall provide the necessary start/stop controls for each pump.
  - G. The Contractor shall include one (1) standby pump of each size to be maintained on-site and installed with suction and discharge piping, capable of operating immediately.
  - H. Back-up pumps shall be on-line isolated from the primary system by a valve.

2.02 SYSTEM DESCRIPTION:

A. Design Requirements:

1. Bypass pumping systems shall have sufficient capacity to pump the sanitary sewer peak wastewater flows. The Contractor shall provide all pipeline plugs, pumps of adequate size to handle peak flow, and temporary discharge piping to ensure that the total flow of the sewer main can be safely diverted around the section to be replaced and/or lined. Bypass pumping systems will be required to be operated 24 hours per day, if necessary, in accordance with Section 01015 – Special Requirements, Paragraph 14. Continuous Operating Criteria.
2. The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One (1) standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.
3. Bypass pumping system shall be capable of bypassing the flow around the work area and of releasing any amount of flow up to full available flow into the work area, as necessary for satisfactory performances of work.
4. The Contractor shall make all arrangements for bypass pumping during the time when the mainline is shut down for any reason. The system must overcome any existing force main pressure on the discharge.

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SEWAGE BYPASS PUMPING

B. Performance Requirements:

1. It is essential to the operation of the existing sewerage system that there be no interruption in the flow of sewage throughout the duration of the project. To this end, the Contractor shall provide, maintain and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the sewage flow before it reaches the point where it would interfere with his work, carry it past his work and return it to the existing sewer downstream of his work.
2. The Contractor shall provide all necessary means to safely convey the sewage past the work area. The Contractor will not be permitted to stop or impede the mainline flows under any circumstances.
3. The Contractor shall maintain sewer flow around the work area in a manner that will not cause surcharging of sewers or damage to sewers, and that will protect public and private property from damage and/or flooding.
4. The bypass pumping system shall not require excavation to reduce the suction lift without the specific approval of the Engineer prior to the bid.
5. The Contractor shall protect water resources, wetlands, and other natural resources.
6. The Contractor shall be responsible to meet noise requirements (68 dbA at 30 feet). All diesel driven primary and standby pumps shall be sound attenuated. Each pump unit shall have a sound attenuated enclosure mounted as an integral part of the pump assembly. Separate structures, housing, or curtains are not acceptable. Noise levels of each pump shall not exceed the noise requirement, both horizontally and vertically from the pump unit. Noise levels for the pump models provided shall be submitted at all five (5) sides of the pump.
7. Pumps may not be benched down to make the suctions lift unless approved by the Engineer.
8. The suction side of the pumping system shall not exceed velocities of 10 fps.
9. The discharge side of the pumping system shall not exceed velocities of 12 fps.

2.03 FIELD QUALITY CONTROL AND MAINTENANCE:

A. Testing:

1. The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The Engineer will be given a 24-hour notice prior to such testing.
2. The bypass system shall operate without leaks for 24 hours before beginning work on the existing sewer.



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**SEWAGE BYPASS PUMPING**

**B. Inspection:**

1. The Contractor shall inspect the bypass pumping system every two (2) hours to ensure that the system is working correctly.

**C. Maintenance Service:**

1. The Contractor shall ensure that the temporary pumping system is properly maintained and a responsible operator shall be on hand at all times when pumps are operating.

**D. Extra Materials:**

1. Spare parts for pumps and piping shall be kept on-site, as required.
2. Adequate hoisting equipment for each pump and accessories shall be maintained on-site, as required.

**PART 3 – EXECUTION**

**3.01 PREPARATION:**

- A. The Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipelines. The Contractor shall locate his bypass pipelines in such a manner to minimize any disturbances to existing utilities, and shall obtain approval of the pipeline locations from the City and the Engineer prior to execution/installation. All costs associated with relocating utilities and obtaining all approvals shall be paid for by the Contractor.
- B. During all bypass pumping operations, the Contractor shall protect the existing pump station(s), gravity and force main sanitary (mainline) sewers, and local sewer lines from damage inflicted by any equipment. The Contractor shall be responsible for all physical damage to the pump station(s), mainline sewers, and local sewer lines caused by human and/or mechanical failure.

**3.02 INSTALLATION AND REMOVAL:**

- A. The Contractor shall remove sections or make connections to existing sewer system structures for temporary bypass pumping only at the locations approved by the Engineer.
- B. Plugging or blocking of sewage flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for bypass work, it shall be removed in such a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.
- C. The Contractor shall exercise caution and comply with OSHA requirements when working in the presence of sewer gases, combustible or oxygen-deficient atmospheres, and confined spaces.

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SEWAGE BYPASS PUMPING

- D. The pipelines must be located off all travel lane areas and sidewalks, and on the shoulders of the roads, unless otherwise approved. When bypass pipelines cross local streets and access driveways, the Contractor must place the bypass pipelines in trenches and cover with temporary pavement. Upon completion of the bypass pumping operations, and after the receipt of written permission from the Engineer, the Contractor shall remove all pipelines, restore all property to pre-construction condition, and restore all pavement. The Contractor is responsible for obtaining any approvals for the placement of temporary pipelines within public ways from the City of Milford. The installation of bypass pipelines in regulated/wetland areas is allowed only as permitted from the authorities having jurisdiction.

END OF SECTION

**SECTION 02315**

**EXCAVATION AND TRENCHING**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to excavate pipeline trenches, structures, and miscellaneous earth excavations, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. The work includes the removal and disposal of all excess excavated materials, waste, unsuitable materials, and debris necessary to permit construction of the various items in the contract and all miscellaneous incidental work required.

**1.02 RELATED SECTIONS:**

- A. Section 01015 – Special Requirements
- B. Section 01560 – Environmental Protection
- C. Section 02100 – Site Preparation and Restoration
- D. Section 02250 – Temporary Earth Support and Dewatering
- E. Section 02260 – Temporary Support and Protection of Utilities
- F. Section 02320 – Backfilling, Grading and Compaction
- G. Section 02510 – Bituminous Concrete Paving

**1.03 SUBMITTALS:**

- A. The ‘Dewatering Plan’ and ‘Soil Erosion and Sediment Control Plan’ submittals shall be made at the time of the pre-construction meeting.
- B. Submittals required prior to the start of excavation include, but are not limited to: the name of the Contractor’s licensed land surveyor, copy of municipal permits, copy of State of Connecticut permits and bonds, and gradation reports for proposed bedding materials, as applicable.

**1.04 QUALITY ASSURANCE:**

- A. The length of trench open at any one time shall be controlled by the existing conditions and subject to any limits that may be prescribed by the Engineer.
- B. The installation of well points, deep wells, and pumps shall be done under the supervision of a competent representative of the manufacturer.
- C. There are pipes, drains, and other utilities in certain locations that are not indicated on the drawings. No attempt has been made to show all services, and completeness or accuracy of information given is not guaranteed.

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- D. When test pits are considered as incidental to other excavation, the Contractor shall receive no additional compensation for work being understood to be included as a part of excavation.
- E. All existing pipes, poles, wires, fences, curbing, property line markers, and other structures, which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the Contractor. Should such items be damaged, the Contractor, without compensation, shall restore them to at least as good condition as that in which they were found immediately before the work was begun.
- F. Whenever the Contractor encounters certain existing structures as described below and is so ordered in writing, he shall do the whole or such portions of the work as he may be directed to change the location of, remove and later restore, or replace such structures, or to assist the Owner thereof in so doing.
- G. The structures to which the provisions of the preceding paragraph shall apply include pipes, wires, and other structures which meet all of the following: (a) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (b) in the opinion of the Engineer will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.
- H. Branches, limbs, and roots shall not be cut except by permission of the Engineer.
- I. Restoration of existing property or structures shall be done as promptly as practicable and not left until the end of the construction period.
- J. If material unsuitable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with these specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted, screened gravel, bank-run gravel, fine aggregate or concrete, as directed.
- K. No excavation materials shall be removed from the site of the work or disposed of by the Contractor except as direct or permitted.
- L. Surplus excavated materials not needed as specified above, and not classified as a "controlled material", shall be hauled away and dumped by the Contractor at his own expense, at appropriate locations, and in accordance with arrangements made by him.
- M. Materials identified or suspected of being contaminated or hazardous, shall be treated as a "controlled material", and handled or disposed of in conformity with all local, state, and federal laws and procedures.
- N. During the progress of work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets with water as necessary, so as to minimize the creation and dispersion of dust. If the Engineer decides

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- that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread material, as directed.
- O. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings where required for accommodation of travel, and to provide access to private property during construction, and shall remove said structures thereafter.

**PART 2 – PRODUCTS:**

**2.01 SCREENED GRAVEL:**

Screened gravel shall be in accordance with Section 02320 – Backfilling, Grading and Compaction.

**2.02 BANK RUN GRAVEL:**

Bank run gravel shall be in accordance with Section 02320 – Backfilling, Grading and Compaction.

**2.03 OTHER:**

- A. Temporary trench underdrain piping shall be acceptable PVC pipe of standard thickness. Sewer pipe of quality known as “seconds” will be acceptable for underdrain pipe only.
- B. Well points, deep wells, or sump pumps designed specially to drain soil and prevent saturated soil from flowing into excavation. Pumping unit(s) designed for use with deep wells and well points.
- C. Sediment Control Geotextile Bag – Dirtbag®, by ACF Environmental, or approved equal. Water from sumps and/or excavations may be pumped into a sediment control geotextile bag to remove silt, sand, and other debris.
- D. Portable Sediment Tank – Dewatering Roll-Off Box (25 cubic yards), by BakerCorp, or approved equal. Water from sumps and/or excavations may be pumped into a portable sediment tank to remove, silt, sand, and other debris.

**PART 3 – EXECUTION**

**3.01 GENERAL:**

- A. Carry out program for excavation, dewatering, sheeting, and bracing in such a manner as to eliminate all possibility of undermining or disturbing foundations of existing structures or of work previously completed under this contract.
- B. The trench shall be straight and uniform so as to permit laying pipe to the lines and grades indicated, and shall be excavated only so far in advance of the pipe laying crew as necessary to maintain continuous work through the work day. Open trench ahead of the pipe laying shall be kept to a minimum, and shall not be in excess of 25 feet at the

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- end of the workday or at time of ceasing work due to weather or unforeseeable circumstances. All open trenches shall be plated over at the end of the workday in accordance with City of Milford ordinance requirements.
- C. Make all excavations by open cut methods, except as otherwise specified or permitted, to widths that give suitable room for constructing structures, or laying and joining pipe. Furnish and install all sheeting, bracing, and supports required for a safe and secure shoring system. Install all groundwater pumping and drainage systems required to perform work in suitable, dry conditions. Render bottom of excavations firm, dry, and acceptable in all respects.
  - D. Unless otherwise indicated or specified, do no plow, scrape, or dig by machinery, earth that is near to finished subgrade; which may result in disturbance of material below the subgrade. Remove material to be excavated by hand, with pick and shovel, just before placing pipe, masonry, or other structure.
  - E. Excavated material suitable for backfill shall be stockpiled near the site. Materials undesirable for backfill shall be legally disposed of off-site.
  - F. During the progress of the work, the Contractor shall conduct the work so as not to interfere with public travel. Sidewalks, crossings, and driveways shall be kept open for the passage of pedestrians and vehicles, and bridging shall be provided as necessary for access to public or private property. Permission shall be obtained for partial or complete closing of a street, driveway, or crossing.
  - G. All excavated materials shall be placed a minimum of 2 feet back from the edge of the trench.

3.02 SEPARATION OF SURFACE MATERIAL:

- A. Remove only existing pavement that is necessary for the prosecution of the work.
- B. Carefully remove loam and topsoil from the excavated areas. Store separately for further use, or furnish equivalent loam and topsoil, as directed.

3.03 EXCAVATION SUPPORT SYSTEMS:

- A. Furnish, install, and maintain all shoring, bracing, and blocking, in accordance with Section 02250 – Temporary Earth Support and Dewatering, and Section 02260 – Temporary Support and Protection of Utilities, as may be necessary to support the sides of excavations, protect existing pipelines and utilities and adjacent structures, and to prevent any movement of earth which could diminish the width of the excavation to less than that necessary for proper construction, or could otherwise damage or delay work, or endanger adjacent structures.
- B. Install excavation support systems ahead of excavation, whenever possible, to avoid loss of material and maintain support for sides of excavation.
- C. Progressively remove all items of shoring and bracing as backfilling proceeds.

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3.04 DEWATERING:

- A. Dewater trenches and other excavations in accordance with Section 02250 – Temporary Earth Support and Dewatering.
- B. Keep such excavations dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged.

3.05 TRENCH EXCAVATION:

- A. Excavate trench by machinery to, or just below, the designated subgrade, when pipe is to be laid in gravel bedding or concrete cradle, provided that material remaining at bottom of trench is only slightly disturbed.
- B. Do not excavate the lower part of trenches by machinery to subgrade when pipe is to be laid directly on bottom of trench. Remove last of material to be excavated by use of hand tools, just before placing of pipe. Form a flat or shaped bottom, true to grade, such that pipe will have a uniform and continuous bearing. Provide bell holes, or support on firm and undisturbed material between joints, except for limited areas where use of pipe slings has disturbed the bottom.

3.06 DEPTH OF TRENCH:

Excavate trenches to required depths as to permit pipe to be laid at elevations, slopes, or depths of cover indicated on the drawings, and at uniform slopes between indicated elevations.

3.07 WIDTH OF TRENCH:

- A. Make pipe trenches as narrow as practicable to permit pipe to be laid and joined properly, and the backfill to be placed and compacted as specified. Do not widen trench by scraping or loosening materials from the sides. Make every effort to keep sides of trenches firm and undisturbed until backfilling has been completed and consolidated.
- B. Excavate trenches with approximately vertical sides between the elevation of the center of the pipe and the elevation 1 foot above the top of the pipe.

3.08 TRENCH EXCAVATION IN FILL:

Place material to top of fill or to a minimum height of 1 foot above the top of the pipe, whichever is less, when the pipe is to be laid in an embankment or other recently filled material. Take particular care to ensure maximum consolidation of material under pipe location. Excavate pipe trench as through in undisturbed material.

3.09 EXCAVATION IN POOR SOIL CONDITIONS:

- A. If unsuitable materials determined to be unstable (in the opinion of the Engineer) are found at or below the grade to which excavation would normally be carried as called

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for on the drawings, or to include ashes, cinders, refuse, vegetative, or organic material, or other material that in the judgement of the Engineer should be removed, the Contractor shall excavate, remove, and dispose of such unsuitable materials to the width and depth ordered by the Engineer.

- B. The excavated unsuitable materials shall be replaced with thoroughly compacted, screened gravel, bank run gravel, or controlled density fill, as directed, in accordance with Section 02320 – Backfilling, Grading and Compaction.

3.10 EXCAVATION NEAR EXISTING STRUCTURES:

- A. Discontinue digging, by machinery, when excavation approaches pipes, conduits, or other underground utilities or structures. Continue excavation by use of hand tools. Include such manual excavation, in work to be done, when incidental to normal excavation and under items involving normal excavation.
- B. Excavate test pits, when determination of exact location of pipes or other underground utility or structure is necessary for doing work properly.

3.11 CARE AND RESTORATION OF PROPERTY:

- A. Enclose uncut tree trunks adjacent to work, in wooden boxes of such height as may be necessary for protection from injury from piled material, equipment, operations, or otherwise due to construction operations. Excavating machinery, cranes, and other equipment shall be operated with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.
- B. All branch, limb, and root cuttings shall be smoothly and neatly done without splitting or crushing. Cut or injured portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint, as directed, when unavoidable injury or cutting of branches is unavoidable.
- C. Protect cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations by suitable means, or dig up and temporarily replant and maintain. After construction operations have been substantially completed, replant in original positions and care for until growth is re-established. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish in their beauty or usefulness, replace with items equal of the kind and quality existing at the start of the work.
- D. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when treads or wheels of which are so shaped as to cut or otherwise damage such surfaces.
- E. Restore all surfaces that have been injured by the Contractor's operations to a condition at least equal to that in which they were found immediately before work commenced. Suitable materials and methods shall be used for such restoration work.



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3.12 UNAUTHORIZED EXCAVATION:

Backfill, when the bottom of any excavation is taken out beyond limits indicated or prescribed and without additional compensation, with thoroughly compacted, screened gravel, if the excavation was for a pipeline, or with Class "C" Concrete (PCC03360), if the excavation was for a masonry structure.

3.13 DISPOSAL OF SURPLUS EXCAVATED MATERIALS:

All surplus and unsuitable materials shall remain the property of the Contractor. The Contractor shall remove all surplus materials, and dispose of them in an appropriate manner at his own expense.

END OF SECTION

**SECTION 02320**

**BACKFILLING, GRADING AND COMPACTION**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to backfill, grade, and compact trenches and excavations, as indicated on the drawings, using suitable materials of quality approved by the Engineer and removed in making the excavations or furnished, in conformity with these specifications.
- B. All backfill for trenches and excavations shall be placed in uniform layers and compacted to achieve the specified density and moisture content.
- C. Provide testing of trench backfill material, as called for or directed, using the services of an independent testing laboratory approved by the Engineer.
- D. Construct embankments and fills, and perform miscellaneous surface grading, as called for or directed by the Engineer.

**1.02 RELATED SECTIONS:**

- A. Section 01015 – Special Requirements
- B. Section 01560 – Environmental Protection
- C. Section 02100 – Site Preparation and Restoration
- D. Section 02250 – Temporary Earth Support and Dewatering
- E. Section 02260 – Temporary Support and Protection of Utilities
- F. Section 02315 – Excavation and Trenching
- G. Section 02510 – Bituminous Concrete Paving

**1.03 REFERENCE STANDARDS:**

- A. American Association of State Highway and Transportation Officials (AASHTO) Publications and Standards (latest revision):
  - 1. T 99 – Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop.
  - 2. T 104 – Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.
  - 3. T 180 – Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
  - 4. T 291 – Standard Method of Test for Determining Water-Soluble Chloride Ion Content in Soil.

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- B. American Society for Testing and Materials (ASTM) Publications and Standards (latest revision):
  - 1. C29 – Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate.
  - 2. C330 – Standard Specification for Lightweight Aggregates for Structural Concrete.
  - 3. D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  - 4. D1157 – Standard Test Method for Total Inhibitor Content (TBC) of Light Hydrocarbons.
  - 5. D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  - 6. D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- C. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

1.04 SUBMITTALS:

- A. The Contractor shall submit the name of his proposed independent testing laboratory at the time of the pre-construction meeting, for approval.
- B. Two (2) weeks prior to the start of excavation work, the Contractor shall submit his proposed sources(s) for screened gravel bedding, bank run gravel, and backfill materials, including gradation and resistance to abrasion testing reports, for approval.
- C. Submit the proposed geotextile filter fabric for the stone pipe bedding, as applicable, in accordance with the drawings.
- D. Submit lab density (proctor) and field density testing reports, as called for or required by the Engineer, for quality assurance.

1.05 QUALITY ASSURANCE:

- A. Wherever a percentage of compaction is indicated or specified, determine moisture-density relationships of trench backfill materials using AASHTO T 99 / ASTM D69, or using AASHTO T 180 / ASTM D1557.
- B. Perform at least one (1) proctor test for each type of soil backfill material encountered and utilized, as determined by the Engineer.
- C. Check in-place density and moisture content of compacted backfill materials using a properly calibrated nuclear density gauge in accordance with ASTM D6938.

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**BACKFILLING, GRADING AND COMPACTION**

- D. Perform one (1) in-place nuclear density test of compacted backfill material for each 100 linear feet of trench length per lift, or as directed by the Engineer. Tests shall be conducted when and where directed by the Engineer, following the completion of compaction for each intermediate backfill lift. When a failing test occurs, the Contractor shall re-compact the failed area and re-test until the test passes, at no additional cost to the Owner.
- E. The Contractor's testing laboratory shall submit certified compaction testing reports directly to the Engineer on a weekly basis or as directed.
- F. The nature of the materials will govern both their acceptability for use as backfill and methods best suited for their placement and compaction.
- G. Do not place frozen materials in backfill or place backfill upon frozen material. Remove previously frozen material or treat as required before new backfill is placed.

**PART 2 – PRODUCTS**

**2.01 GENERAL:**

- A. Unless otherwise specified, material used for backfilling trenches and excavations around structures and utilities shall, in general, be suitable material which has been removed in the course of making the construction excavations and temporarily stockpiled by the Contractor. If sufficient suitable material is not available from the excavations, the backfill material for support of utilities shall be screened gravel or bank run gravel, as directed.
- B. All material whether from excavations or from borrow, after being placed and properly compacted, shall make a dense stable fill and contain no vegetation, masses of roots, individual roots more than 18 inches long, or more than  $\frac{1}{2}$  inches in diameter, stones over 4 inches in diameter, or porous matter.
- C. Organic matter, if present in backfill materials, shall be well distributed and not exceed minor quantities, as determined by the Engineer.

**2.02 SCREENED GRAVEL:**

- A. Screened gravel shall be well-graded, crushed stone material ranging in size from  $\frac{3}{8}$  inches to  $\frac{3}{4}$  inches, or such sizes as may be approved by the Engineer, and consisting of clean, hard, and durable particles or fragments free from dirt, vegetation, or other objectionable matter, and free from an excess of soft, thin, elongated, laminated, or disintegrated pieces.
- B. Screened gravel shall meet the gradation requirements for No. 6 coarse aggregate stone, as specified in Section M.01.02 of *CT DOT Form 818*, or a gradation otherwise approved by the Engineer.
- C. Crusher-run stone or rock of suitable size and gradation may be used in place of screened gravel, when approved by the Engineer.

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BACKFILLING, GRADING AND COMPACTION

- D. Screened gravel shall conform to the resistance to abrasion and soundness requirements outlined in Section M.02.06 of *CT DOT Form 818*.

2.03 BANK RUN GRAVEL:

- A. Bank run gravel shall consist of sound, tough, durable granular fill material, well graded from fine to coarse with a maximum size of 4 inches, obtained from approved natural deposits and unprocessed except for the removal of unacceptable material and stones larger than the maximum size permitted.
- B. Bank run gravel shall meet the gradation requirements of Grading “B” and conform to the resistance to abrasion and soundness requirements outlined in Section M.02.06 of *CT DOT Form 818*.
- C. Vegetation, masses of roots, or individual roots more than 18 inches long or more than  $\frac{1}{2}$  inches in diameter are not permitted. Material shall be substantially free of loam, organic matter, clay, and other fine or harmful substances.

2.04 COMMON FILL:

- A. Common fill shall consist of clean, inorganic, imported granular backfill material, obtained from approved sources, containing no stones larger than 3 inches, nor recycled material, and free of trash, frozen lumps, vegetation, stumps, roots, clay, or other organic matter.
- B. Common fill shall meet the gradation requirements of Grading “B” and conform to the resistance to abrasion and soundness requirements outlined in Section M.02.06 of *CT DOT Form 818*.

2.05 COMPACTED GRANULAR FILL:

- A. Compacted granular fill shall consist of broken or crushed stone, gravel, or a mixture thereof, and shall conform to the material requirements specified in Section M.02.01 of *CT DOT Form 818*.
- B. Granular fill shall meet the gradation requirements of Grading “A”, as specified in Section M.02.06 of *CT DOT Form 818*.

2.06 LIGHTWEIGHT AGGREGATE FILL:

- A. Lightweight aggregate fill shall be expanded slate, or approved equal, produced by the rotary kiln method process, and shall conform to the requirements of ASTM C330.
- B. Lightweight aggregate shall have a proven record of durability, be non-corrosive, and have the following properties:
  - 1. The soundness loss shall not exceed 10 percent after five (5) cycles of sodium sulfate, per AASHTO T 104.

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2. The chloride content shall not exceed 100 parts per million (ppm), per AASHTO T 291.
3. The aggregate shall conform to course aggregate gradation  $3/4$ -inch x #4 sieve.
4. The aggregate loose bulk density shall not exceed 50 lbs. per cubic foot when tested in accordance with ASTM C29.
5. The aggregate in-place compacted dry density shall not exceed 60 lbs. per cubic foot when tested in accordance with ASTM D1557.
6. The angle of internal friction ( $\phi$ ) shall not be less than 40 degrees.

**2.07 OTHER:**

- A. Filter Fabric: Non-woven, 6-ounce per square yard (minimum), medium survivability, separation type geotextile, Mirafi® 160N by TenCate Mirafi, or approved equal.
- B. Class "C" Concrete (PCC03360): Conform to Section M.03.01 of *CT DOT Form 818*.

**PART 3 – EXECUTION**

**3.01 GENERAL:**

- A. Backfill all pipe trenches and excavations in accordance with these specifications, using suitable materials and methods that fully support the pipe or structure, and completely fill the voids beneath the pipe springline or structure base.
- B. A minimum of 6 inches of screened gravel or approved bedding material shall be placed beneath the bottom of any pipe, and a minimum of 8 inches of screened gravel shall be placed beneath any structure. Prior to placing screened gravel in trenches and excavations, the approved non-woven filter fabric shall be placed on a dry subgrade, and held in position up the sides of the excavation. Sufficient fabric shall be installed to cover the top of the sewer bedding stone with a minimum overlap of 12 inches, after the stone is placed over the installed sewer.

**3.02 FILL AND BACKFILL UNDER STRUCTURES:**

- A. Compact all fill and backfill under structures with select gravel material, as indicated on the drawings or directed by the Engineer, and in conformity with these specifications.
- B. Place fill and backfill materials in layers not exceeding 8 inches in loose thickness. Unless otherwise indicated or specified, each layer shall be compacted to 95 percent.

**3.03 BACKFILLING AROUND STRUCTURES:**

- A. Do not place backfill against or over structures until they have attained sufficient strength to support all loads (including construction loads) to which they will be subjected to. Provide special leak testing, if required, as soon as practicable after

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structures are structurally adequate and other necessary work has been completed. Start backfilling promptly after completion of tests. Use best of excavated materials for backfilling within 2 feet of the structure. Avoid unequal soil pressure by depositing material evenly around the structure.

- B. Backfill around structures using select pervious structure backfill or bank run gravel materials.
- C. Place fill and backfill materials in layers not exceeding 12 inches in loose thickness and compact materials to 90 percent, unless otherwise indicated or specified.

3.04 BACKFILLING UTILITY, STORM, AND SANITARY SEWER PIPE TRENCHES:

- A. Following preparation of the trench bottom, placement of bedding material, and installation of the pipe, backfilling may be started as soon as practicable after the pipe(s) have been properly haunched and fully supported with screened gravel from the top of the bedding to the springline of the pipe. Structures shall be completed sufficiently to support all loads, including construction loads to which they will be subjected to.
- B. Do not backfill at pipe joints until after section of pipeline has successfully passed any specified testing required, or as directed by the Engineer. Should the Contractor wish to minimize maintenance of lights and barricades and obstruction of traffic he may, at his own risk, backfill the entire trench as soon as practicable, omitting or including backfill at joints. Should piping be determined to be leaking or defective, the Contractor shall remove and later replace such backfill, at his own expense, in order to locate and repair the defective pipe joints.
- C. Perform bedding and backfill of pipe trenches as follows:
  - 1. Pipe Zone: The areas around the pipe within the limits called for on the drawings or City of Milford standard details shall be consolidated and thoroughly compacted using approved mechanical or hand tamping procedures. Bedding material shall be accurately placed beneath the bottom of any pipe or structure to bring the trench bottom up to grade as called for on the drawings. Provide firm, stable, and uniform support along the entire bottom of the pipe, in the haunching area. For earth trench conditions, the materials in this zone shall be enveloped in the approved filter fabric, as indicated on the drawings.
  - 2. Trench Backfill Procedure:
    - a. Screened gravel or select backfill material shall be placed around and over the pipe, as called for on the drawings, and carefully tamped in 6-inch layers. The maximum size of stone in select material shall not exceed 1 inch in diameter. A minimum of 2 feet of backfill material shall be carefully placed and compacted over the pipeline before heavy powered rollers or vibratory tamping equipment is allowed for compaction work.

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- b. In local roadway areas where paving is to be placed over the backfilled trench, the trench backfill from the top of the pipe zone to within 4 feet of finish grade pavement shall be deposited in uniform lifts 8 to 12 inches in depth and thoroughly tamped or compacted using approved mechanical equipment to between 95 percent and 100 percent of standard proctor density.
  - c. When backfilling those areas less than 4 feet below finish pavement, do not place stone or rock fragments larger than 4 inches into the backfill and deposit material in uniform lifts not exceeding 6 to 8 inches in depth.
  - d. In yards and non-paved areas, the trench backfill shall be placed as described above in uniform lifts 12 inches in depth and compacted to between 85 percent and 90 percent standard proctor density.
  - e. If material excavated from the trench excavation is unsuitable for backfill as determined by the Engineer, then the Contractor shall use suitable material from other excavation areas of the contract, which was in excess of backfill requirements from those areas, or import suitable backfill material in conformity with these specifications.
  - f. The Contractor shall furnish and utilize sufficient men and equipment to achieve specified compaction requirements, including vibratory plate compactors, mechanical tampers, and rollers. Alternate methods including water jetting, or puddling, may be used when approved provided satisfactory backfill and drainage conditions exist as determined or directed by the Engineer. Compaction of mainline trench backfill shall be completed prior to the installation of building laterals at sewer chimneys to preclude settlement. Special attention is required while compacting backfill in the vicinity of structures.
- 3. Compaction Testing: Conduct compaction testing at locations approved by the Engineer during backfilling operations.
  - 4. Placement of Backfill Materials: Do not place stone or rock fragments larger than 12 inches into the backfill where allowed within the specified trench limits, nor drop large masses of backfill material into trench from a height of more than 5 feet or in such a manner as to endanger the pipeline. If necessary, use approved methods to break the fall of material dropped. Exclude pieces of bituminous pavement from the backfill unless use is expressly permitted, in which case break as directed.
  - 5. Common Fill: Additional backfill material required to be placed in excess of the computed quantity available from the project limits minus documented unsuitable materials shall be furnished by the Contractor.
  - 6. Tamping (or Rolling):
    - a. By Hand – Deposit and spread material in uniform parallel layers not exceeding 8 inches thick before compaction. Before next layer is placed, tamp each layer as required to obtain a thoroughly compacted mass. Take care to ensure



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material close to bank, as well as in all other portions of the trench, is thoroughly compacted. Maintain trench shield as necessary for worker protection.

- b. Using Powered Equipment – When the trench width and the depth to which backfill has been placed make it feasible, and it can be done effectively without damage to the pipe or structure in compliance with trench compaction and OSHA safety requirements, backfill may be compacted, upon approval by the Engineer, by the use of suitable powered static or vibratory rollers, tractors, plate compactors, or similar man operated or remote-controlled equipment, instead of by tamping. The rate at which backfill material is deposited into the trench shall not to exceed the capabilities of the means employed by the Contractor for spreading, leveling, and compacting it in accordance with these specifications.
- c. Compaction – Wet material by sprinkling with water when necessary to maintain optimum moisture content and ensure proper compaction. However, no compaction by tamping (or rolling) shall be done when backfill material is too wet either from rain or from too great an application of water to be compacted properly. At such times, suspend work until previously placed and new materials have dried out sufficiently to permit proper compacting, or such other precautions taken as may be necessary to obtain proper compaction.

7. Miscellaneous Requirements:

- a. Ensure that stones and lumps do not become nested and that all voids between stones are completely filled with fine material regardless of compaction method.
- b. Place excavated material, when acceptable to the Engineer, at the top of the backfill for surfacing or pavement subbase, and to such depths as may be specified elsewhere or as directed. Bring surface to required grade with stones raked out and removed.

3.05 LIGHTWEIGHT AGGREGATE FILL:

Lightweight aggregate fill shall be placed in uniform lifts. The lift thickness and number of passes by equipment used will be determined by the Engineer depending on project requirements. Conventional placement and compaction methods may be used when constructing fill using lightweight aggregate fill.

3.06 EXCAVATION SUPPORT SYSTEMS:

- A. Leave in place, as indicated, excavation support systems and bracing that is to be embedded in backfill or concrete, as applicable.
- B. Cut off excavation support systems and bracing at specified elevations prior to backfill, when directed by the Engineer, as applicable.

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- C. Carefully remove excavation support systems and bracing so as to not endanger the work or adjacent utilities and structures. Immediately backfill and compact all voids in accordance with these specifications.

END OF SECTION

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LANDSCAPING

**PART 1 – GENERAL**

1.01 DESCRIPTION:

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to perform all loaming, fertilizing, seeding, planting, and other landscaping related work, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. Work shall consist of furnishing, planting, and mulching trees, shrubs, and grass within the public R.O.W. or private property easements, and planting areas, as indicated on the drawings or as specified herein.
- C. Work shall also consist of excavating, storing, protecting, replanting, and/or mulching existing shrubs, ground cover plants, and trees, as required and/or specified. This work shall also include the care and watering of living plants, and the replacement of dead and unsatisfactory materials before final acceptance of the contract, and specified warrantee period.

1.02 RELATED SECTIONS:

- A. Section 01560 – Environmental Protection
- B. Section 01740 – Site Maintenance and Cleanup
- C. Section 02100 – Site Preparation and Restoration

1.03 REFERENCES:

- A. American National Standards Institute (ANSI) Publications and Standards (latest revision):
  - 1. ANSI Z60.1 – American Standard for Nursery Stock
- B. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

1.04 SUBMITTALS:

- A. Submit product certifications, source information, and materials lists for all plants, shrubs, trees, seed, soil materials, fertilizers, and other products to be used or installed as part of this contract. The Engineer may require further information for approval and acceptance of the specific product, if/as necessary.
- B. For seed, submit certificate(s) concerning seed mixture, purity, germinating value, and crop year identification.

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LANDSCAPING

1.05 QUALITY ASSURANCE:

A. Ability to Deliver:

1. Investigate sources of supply to assure that plants will be supplied in the required sizes, types, and quality, as necessary, before submitting the bid.
2. Failure to take this precaution shall not relieve the Contractor of responsibility for furnishing and installing plant material in accordance with the contract and without additional expense to the Owner.

B. Inspection:

1. Upon delivery to the site, and before planting, the Engineer will inspect the plants.
2. Inspection and approval by the Engineer of plants is for quality, size, and variety only, and in no way impairs the right of rejection for failure to meet other requirements during the progress of work.

C. General:

1. Provide only nursery grown plants having been transplanted at least once and growing in a nursery for at least two (2) years.
2. Allow the Engineer to determine the fitness of any plant.
3. Provide container-grown stock in containers long enough for the root system to develop sufficiently to hold soil together firm and whole when removed from the container. Do not use plants that are loose in the container.
4. Check plant material prior to commencement of planting operations. Plant no material prior to inspection and approval by the Engineer. Notify the Engineer at least 48 hours in advance of all planned planting operations, and identify the specific material and its location(s).
5. Furnish suitable quantities of water, hose, and appurtenances.
6. Use loam with prior vegetative growth that did not contain toxic amounts of acid and/or alkaline elements.
7. Begin maintenance immediately after each portion of lawn is seeded and continue for, at minimum, 45 days.
8. Repair or replace seeded areas, plants, shrubs, and trees which, in the judgement of the Engineer, have not survived and grown in a satisfactory manner, for a period of one (1) year after acceptance.
9. Provide seedling or planting replacements of the same type and size, as specified.

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1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Preparation for Delivery:

1. Balled and Burlapped (B&B) Plants:

- a. Dig and prepare for shipment B&B plants in a manner that will not damage roots, branches, shape, and future development of the plant.
- b. B&B plants shall originate from soil which hold a good ball, and shall be wrapped with burlap or a similar approved material and bound with twine or cord in such a manner to hold root balls firm and intact.

B. Delivery:

1. Deliver fertilizer to the site in original, unopened containers bearing the manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to state law.
2. Deliver plants with legible identification labels. The label shall have the correct plant name and size as indicated on the drawings.
3. Protect plants during delivery to prevent damage to roots or desiccation of leaves.
4. Notify the Engineer of delivery schedule in advance so plant material may be inspected at the site.

C. Storage:

1. Store plants in ground or other acceptable media if not to be planted within 4 hours.
2. Protect the roots of plant material from drying or other potential injury.
3. Water plants as necessary until planted.

D. Handling:

1. Do not drop plants.
2. Do not pick up container or B&B plants by stems or trunks; carefully handle by their root balls or containers.

1.07 JOB CONDITIONS:

- A. Existing trees within the work limits, not required to be disturbed by construction, shall be saved and protected at all costs, except where specified for removal. Clear trees required to be removed only after approval by the Engineer. Generally, no trees are to be cleared outside the permanent sewer easements. Trees beyond 10 ft. of the proposed centerline of sewer are to be protected and are not to be cut unless it is agreed by the Engineer that removal is required in order to construct the proposed sewer.

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B. Planting Seasons:

1. Recommended Spring Planting Season: From time soil can be satisfactorily worked until following dates at end of planting season:
  - a. Deciduous Plants – March 1 to May 1
  - b. Evergreen Material – March 1 to June 1
  - c. Grass – April 1 to June 15
2. Recommended Fall Planting Season: Commence and terminate at the dates listed below:
  - a. Deciduous Plants – August 15 until ground freezes
  - b. Evergreen Material – August 15 to October 1
  - c. Grass – August 15 to October 1

C. Perform actual planting only when weather and soil conditions are suitable, in accordance with locally accepted practices.

D. Protection:

1. Protect seeded and planted areas against damage by trespass and other causes.
2. Protect work until accepted.
3. Repair, repair, re-stake, or replant, as directed by the Engineer and without additional compensation from the Owner, any seeding or planting that is damaged.
4. If planting is done after lawn preparation, protect lawn areas and repair any damage resulting from the planting operations.

E. Wherever landscaping work must be executed in conjunction with construction of other work, the Contractor shall arrange a schedule of procedure that will permit execution of the landscaping work as specified.

1.08 GUARANTEE:

- A. Guarantee new plant materials through one (1) full growing season after plants are installed.
  1. Guarantee plants replaced under this for one (1) full growing season from the date of replacement.
  2. Repair damage to plants or lawns during plant replacement.
- B. Guarantee lawn areas for a duration of one (1) full year after seeding to be alive and in satisfactory growth at the end of the guarantee period.
  1. For purpose of establishing an acceptable standard, scattered bare spots, none of which are larger than 1 square foot, will be allowed up to a maximum of 3 percent of the entire lawn area.

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**PART 2 – PRODUCTS**

**2.01 GENERAL:**

- A. Provide plants in accordance with ANSI Standard for Nursery Stock, Z60.1 (latest revision).
- B. Plant material shall be vigorous and healthy, with well-formed upper growth and a dense, fibrous and large root system, free of insect or mechanical damage. Plant materials shall be grown under climatic conditions similar to those of the project locality.
- C. Plants, except those specified as container grown, shall be balled in burlap with the root ball formed of firm earth from original, undisturbed soil.
- D. Ball width and depth shall be as specified on the drawings, as applicable. Do not accept balled and burlapped plants with broken or loose root balls, or of “manufactured” earth or peat humus.

**2.02 BONE MEAL:**

Provide commercial raw bone meal, finely ground, containing a minimum of 1 percent nitrogen and 18 percent phosphoric acid.

**2.03 ANTI-DESICCANT:**

- A. Provide an acceptable anti-desiccant emulsion which provides a film over plant surfaces permeable enough to permit transpiration.
- B. Apply anti-desiccant to all deciduous plant material. Application shall be made prior to transportation from nursery if deciduous trees are leafed out at time of digging. The rate and method of application shall be in accordance with the manufacturer’s recommendations.

**2.04 MULCH:**

Mulch shall be comprised of shredded pine bark free of wood chips, stones, branches, or other deleterious material. Bark shall be shredded in strips not larger than 3 inches in any dimension and aged for a period of not less than six (6) months after removal from original logs.

**2.05 LOAM:**

- A. Loam shall be fertile, friable, natural topsoil typical of locality, without admixture of subsoil, refuse, or other foreign materials, and obtained from a well-drained, arable site. Mixture of sand, silt, and clay particles shall be in equal proportions.

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- B. Loam shall be free of stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush, or other deleterious material.
- C. Loam shall consist of not less than 4 percent nor more than 20 percent organic matter, as determined by loss on ignition of oven-dried samples.

2.06 LIME AND FERTILIZER:

- A. Lime shall be an approved ground agricultural limestone containing no less than 85 percent of total carbonates.
- B. Fertilizer shall be of commercial grade, uniform in composition, free-flowing, and in conformance with all state and federal laws. Fertilizer shall contain no less than 50 percent of nitrogen derived from natural organic sources of urea-formaldehyde, and the following percentages by weight: nitrogen 10 percent, phosphorous 10 percent, potash 10 percent.

2.07 SEED MIXTURES:

- A. Seed shall be fresh, clean, new-crop seed, complying with the tolerances for purity and germination established by the Association of Official Seed Analysts (AOSA).
- B. Seed shall have a germination rate of no less than 90 percent. Seed shall contain no more than 0.25 percent weed seed.
- C. Seed mixtures for roadside turf areas within the City right-of-way shall be proportioned, by weight, as follows:

Species	Minimum Proportion by Weight
Chewings Fescue	35%
Hard Fescue	30%
Colonial Bentgrass	5%
Birdsfoot Trefoil	10%
Perennial Ryegrass	20%

- D. Seed mixtures for restoration of homeowner maintained residential lawn areas within the limits of work, or within easement areas, shall be an approved high quality, commercially available seed mixture, or other appropriate mixture satisfactory to the Engineer, as/if directed.



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2.08 WATER:

- A. Water shall be clean, fresh, and free of substances that could inhibit the vigorous growth of grass. The Contractor shall distribute all water required for seeding and maintenance by whatever means necessary, at no additional cost to the Owner.

**PART 3 – EXECUTION**

3.01 PLANTING PITS:

- A. Excavate planting pits with vertical sides in accordance with the following requirements:
  - 1. Plant shrubs in pits 12 inches greater in width than the diameter of the root ball or container, and a minimum of 18 inches deep below finished grade, or as necessary to properly set the plant at finished grade.
  - 2. For installation of trees, refer to the City of Milford standard details or to the Engineer for such directions.
- B. Adjust the depth of planting beds and pits to provide a minimum of 8 inches of planting soil mixtures under roots of all shrubs and 12 inches under roots of trees.
- C. Set plants in center of pits, plumb and straight, and at such a level that the top of the root ball is 1 inch lower than the surrounding finished grade after settlement.
- D. Compact topsoil mixture thoroughly around the base of the root ball to fill all voids, when plant material is set. Cut all burlap and lacing, and remove from the top  $\frac{1}{3}$  of the root ball. Do not pull burlap from under any root ball. Backfill tree and shrub pits halfway with planting soil mixture and thoroughly puddle before backfilling. Water each tree or shrub, again, when backfilling to finished grade is complete.

3.02 PLANTING SOIL MIXTURE:

- A. Thoroughly mix all loam used in the backfilling of planting pits with peat moss at a rate of 2 parts loam to 1 part peat moss.
- B. For shrubs, add  $\frac{3}{4}$  of a pound of bone meal to the planting soil mixture used for backfilling.

3.03 PLANTING:

- A. Thoroughly compact topsoil-planting mixture around root balls and water thoroughly. Immediately after plant pit is backfilled, form a shallow saucer slightly larger than the pit with a ridge of soil to facilitate and contain water.
- B. After planting, cultivate soil in all shrub beds between shrub pits. Grub out sod or other vegetative growth and remove from the bed area. Rake the bed area smooth and neat.
- C. Mulch all tree pits and shrub beds with a minimum of 3 inches of shredded pine bark mulch.

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- D. Apply antidesiccant to all deciduous plant materials that are leafed out at the time of planting. Follow the manufacturer's recommendations for the rate and method(s) of application.

3.04 PRUNING:

- A. Plants and trees shall not be heavily pruned at the time of planting. Pruning is required at planting to correct defects in the plant/tree structure, including the removal of dead, dying, or injured branches. Do not prune for shape.
- B. Pruning shall be performed using clean, sharp tools by workmen experienced with this type of work. All cuts shall be clean and smooth, with no rough edges or tears.

3.05 MULCH SURFACES:

- A. Mulch, with shredded pine bark, all shrub pits and beds, and all areas planted with ground cover, immediately after planting operations are completed.
- B. For shrub pits and beds, provide a minimum 3 inches of mulch.
- C. Limit mulching for individual shrubs to pit area inside of saucer and for shrub,

3.06 LOAM:

- A. Place and spread a minimum of 6 inches of loam on all areas to be seeded. Do not spread loam which is in a wet or frozen state.
- B. Fine grade the loam to achieve the required grades. The entire area shall present an even grade with no depressions where water will stand. Grade shall be within  $\frac{1}{2}$  inch of the designated elevations.
- C. Loam shall be smoothly blended to adjacent existing conditions, to maintain existing surface drainage patterns.

3.07 APPLICATION OF LIME AND FERTILIZER:

- A. Apply lime using mechanical means at a rate of 50 pounds per 1,000 square feet, or using the manufacturer's recommended methods and rates.
- B. Apply fertilizer using mechanical means at a rate of 50 pounds per 1,000 square feet, or using the manufacturer's recommended methods and rates.

3.08 SEEDING:

- A. If there are any delays in seeding lawn areas and weeds grow on the surface, or loam is washed out prior to sowing seed, remove weeds or replace loam and re-establish finish grades without additional compensation.
- B. On a calm day, sow seed using mechanical means at a rate of 4 pounds per 1,000 square feet. Sow one-half of seed in one direction, and the other half of seed at right angles to the original direction. Rake seed lightly into the loam to a depth no more than  $\frac{1}{4}$  of an

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- inch, and compact by means of an acceptable lawn roller weighing 100 to 150 pounds per linear foot of width.
- C. Do not "Hydro-Seed" unless otherwise permitted or required by the Engineer.
  - D. Water lawn areas adequately at the time of sowing seed and daily thereafter with fine spray. Continue throughout the maintenance and protection period.
- 3.09 CLEANUP:
- A. Remove soil or similar materials that have been brought onto paved areas.
  - B. Upon completion of planting, remove excess soil, stones and debris which have not previously been cleaned up, and properly dispose of such materials off-site.
  - C. Prepare lawns and planting areas for final inspection by the Engineer.
  - D. Protect slopes and embankments against erosion until work is accepted. Repair eroded portions of areas seeded or sodded by re-filling, re-sodding, re-mulching, and re-seeding, as required by project conditions and to the satisfaction of the Engineer. The installation of sod/compost blankets, or other methods approved by the Engineer, may be used for protection of slopes and embankments.
- 3.10 MAINTENANCE:
- A. Maintain lawn areas at a maximum height of 2- $\frac{1}{2}$  inches by mowing at least three (3) times. Weed thoroughly one (1) time and maintain until the time of final acceptance. Re-seed and re-fertilize with original mixtures, water, and perform whatever else may be necessary to establish, over the entire lawn area(s), a close stand of specified grasses and reasonably free of weeds and undesirable coarse native grasses.
  - B. Begin maintenance immediately after each planting and continue until final acceptance of the work. Water, mulch, weed, prune, spray, fertilize, cultivate, and otherwise maintain and protect all plants.
  - C. Reset settled plants to proper grades and positions, restore planting saucers, and remove dead material. Correct all defective work as soon as possible within the guarantee period.

END OF SECTION

SECTION 02510

BITUMINOUS CONCRETE PAVING

**PART 1 – GENERAL**

1.01 DESCRIPTION:

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to perform all operations in connection with the placement of bituminous concrete pavement, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. The Contractor shall furnish and place gravel borrow and dense-graded crushed stone for the subbase and base courses, as specified herein.
- C. The Contractor shall construct temporary and/or permanent bituminous concrete pavement on the prepared subgrade, or subbase/base course, as specified herein.
- D. The Contractor shall replace all bituminous concrete roadways, driveways, sidewalks, and curbing damaged during construction operations.
- E. The Contractor shall replace or repair existing traffic signs and appurtenances, damaged during construction operations, where required to properly maintain traffic during construction and following pavement restoration, or as otherwise directed by the Engineer.

1.02 RELATED SECTIONS:

- A. Section 02100 – Site Preparation and Restoration
- B. Section 02315 – Excavation and Trenching
- C. Section 02320 – Backfilling, Grading and Compaction
- D. Section 02580 – Pavement Markings

1.03 REFERENCE STANDARDS:

- A. American Society for Testing and Materials (ASTM) Publications and Standards (latest revision):
  - 1. D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  - 2. D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- B. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

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BITUMINOUS CONCRETE PAVING

1.04 SUBMITTALS:

- A. Submit certification that the proposed bituminous concrete materials, to be used at the site, conform to Section M.04 of *CT DOT Form 818*.
- B. Submit certification that the proposed subbase materials, to be used at the site, conform to Section M.02.02 of *CT DOT Form 818*.
- C. Submit certification that the proposed processed aggregate base materials, to be used at the site, conform to Section M.05.01 of *CT DOT Form 818*.
- D. Provide copies of delivery tickets for each truckload of bituminous concrete delivered and installed at the site. Tickets shall include the following: plant name and location, date and time of day, pavement class, and net material weight.

1.05 QUALITY ASSURANCE:

- A. Pavement shall not be placed when weather conditions of fog or rain prevail, nor when the base course materials show signs of any moisture. Pavement shall only be placed when the air temperature is above 40° F.
- B. Prior to excavation in paved areas, cut the surface of existing pavement with a masonry saw. Cut the pavement in a straight line on all sides of the proposed trench and/or excavation, as applicable. The initial saw cuts around the proposed trench and/or excavation shall be beyond the limits of paved surface that the Contractor anticipates will be disturbed during his excavation operations. The Contractor shall remove the pavement within the limits of the saw cuts prior to any excavation. The Contractor shall dispose of the pavement pieces that are removed separately. No pavement pieces shall be placed in the backfill of the trench and/or excavation. Where pavement is disturbed beyond the original saw cut lines, the Contractor shall saw cut new, neat lines beyond the disturbed area and remove the existing pavement back to the new cut lines, prior to placement new pavement.
- C. Where the Contractor's operations result in removal of or damage to paved roadways, driveways, sidewalks or curbing, the affected portions shall be removed and replaced, as directed by the Engineer.
- D. Until expiration of the guarantee period, the Contractor shall maintain all surfacing under this contract, and fill depressions and holes with materials as specified.
- E. Feathering edges between new and existing pavement is not allowed when replacing pavement. Mill or cut a keyway across the existing pavement to transition the top course of the new pavement to the existing pavement surface, as indicated on the City of Milford Standard Details or specified herein.
- F. The asphalt plant used for the preparation of the bituminous concrete materials shall be acceptable to the Engineer, who shall have the right to inspect the plant and material preparation.

SECTION 02510

BITUMINOUS CONCRETE PAVING

- G. Work shall be performed in accordance with *CT DOT Form 818*. Compaction of materials shall conform to the requirements of *CT DOT Form 818*.
- H. If binder course permanent pavement is not installed within 30 days of completing work in roadways and streets, place temporary pavement conforming to the requirements of *CT DOT Form 818*, Section 4.06 – Bituminous Concrete, and as directed by the Engineer.
- I. Coordinate all work affecting traffic signals and/or loop detectors with the City of Milford Police Department, Traffic Division.

**PART 2 – PRODUCTS**

2.01 SUBBASE:

- A. Subbase for bituminous concrete pavement shall consist of bank run gravel, or gravel mixed with acceptable binding material.
- B. Materials and methods of construction, for the subbase, shall conform to Section M.02.02 of *CT DOT Form 818*, and shall meet the gradation shown below:

*Bottom 8 inches of subbase for  
streets and bottom 4 inches  
of subbase for driveways*      *Top 4 inches of subbase for  
streets and driveways*

Square Mesh Sieves	Grading “B” Percent Passing by Weight	Grading “C” Percent Passing by Weight
Pass 5 inch	100	---
Pass 3 ½ inch	90-100	---
Pass 1 ½ inch	55-95	100
Pass ¾ inch	---	45-80
Pass ¼ inch	25-60	25-60
Pass No. 10	15-45	15-45
Pass No. 40	5-25	5-25
Pass No. 100	0-10	0-10
Pass No. 200	0-5	0-5

- C. Plasticity and resistance to abrasion, for the subbase, shall conform to Section M.02.06 of *CT DOT Form 818*.

**SECTION 02510**

**BITUMINOUS CONCRETE PAVING**

**2.02 PROCESSED AGGREGATE:**

Processed aggregate shall consist of broken stone (coarse aggregate), stone sand or screenings (fine aggregate), or a combination thereof, and shall conform to the material and gradation requirements specified in Section M.05.01 of *CT DOT Form 818*.

**2.03 COMPACTED GRANULAR FILL:**

- A. Compacted granular fill shall consist of broken or crushed stone, gravel, or a mixture thereof, and shall conform to the material requirements specified in Section M.02.01 of *CT DOT Form 818*.
- B. Granular fill shall meet the gradation requirements of Grading "A", as specified in Section M.02.06 of *CT DOT Form 818*.

**2.04 BITUMINOUS CONCRETE:**

- A. Materials and methods of construction for bituminous concrete pavement shall conform to Section M.04 and Section 4.06 of *CT DOT Form 818*.
- B. Materials and methods of construction for bituminous concrete curbing shall conform to Section M.04 and Section 8.15 of *CT DOT Form 818*.

**2.05 TACK COAT:**

Tack coat shall conform to Section M.04.01 of *CT DOT Form 818* for emulsified asphalts.

**2.06 JOINT SEAL MATERIAL:**

Joint seal material shall be hot-poured rubber compound, and shall conform to Section M.04.01 of *CT DOT Form 818*.

**PART 3 – EXECUTION**

**3.01 GENERAL:**

- A. The Contractor shall furnish, install, maintain, and later remove all devices necessary to ensure public safety as required and as directed.
- B. Pavement, base, and subbase thicknesses shall be as indicated on the drawings, as specified herein, or as directed by the Engineer. Where compaction is required, the thickness shall be measured after compaction has been satisfactorily completed.
- C. Base and subbase courses, of specified types, are part of the pavement repair/reconstruction.
- D. All backfill and fill material is to be compacted in accordance with Section 02320 – Backfilling, Grading and Compaction, prior to placing pavement over it.
- E. The Contractor shall remove and dispose of all surplus and unsuitable material.

SECTION 02510

BITUMINOUS CONCRETE PAVING

- F. Manhole covers, catch basin tops and grates, curbs, walks, walls, and other such features shall be adequately protected and left in an acceptable, clean condition to the satisfaction of the Engineer. Such features damaged during the construction of the work shall be repaired or replaced by the Contractor, at no additional cost to the Owner.
- G. Manhole covers, catch basin tops and grates, valves boxes, and other such features shall be adjusted to conform with the new pavement grade, or as directed by the Engineer.
- H. Maintain surfaces of subbase and/or base courses until new pavement is placed.
- I. Disturbed or eroded subbase and/or base courses shall be restored, as required, prior to placing new pavement.
- J. Surfaces of existing pavement on which new pavement is to be placed shall be swept clean to the satisfaction of the Engineer prior to placing new pavement.
- K. Until the expiration of the guarantee period, the Contractor shall maintain any/all surfacing placed as part of this contract, and promptly correct any defects such as cracks, depressions, and holes that may occur. Surfacing shall be kept in a safe and satisfactory condition for traffic. If defects occur in the surfacing constructed by the Contractor, he shall remove and replace the bituminous concrete pavement, base, and subbase courses, as necessary, to properly correct such defect.
- L. Pavement requirements for state roadways shall be in accordance with the applicable sections of *CT DOT Form 818*, and with CT DOT Standard Details. In case of conflicting requirements between this specification and the above-referenced documents, CT DOT standards shall govern.

3.02 PAVEMENT THICKNESSES:

A. Temporary Cold Mix Pavement:

- 1. For city streets, 2 inches (minimum) of an approved cold mix bituminous concrete pavement, or as directed by the Engineer.

B. Temporary Hot Mix Pavement:

- 1. For city streets, 2 inches (minimum) of Class 1 (binder course) bituminous concrete pavement, or as directed by the Engineer.
- 2. For state roadways, 4 inches (minimum) of Hot Mix Asphalt (HMA) S0.5, Traffic Level 2, placed in two (2) equal lifts.

C. Permanent Pavement:

- 1. For city streets, 3 inches of Class 1 (binder course) bituminous concrete pavement placed in two (2) equal lifts, and 1- $\frac{1}{2}$  inches of Class 2 (wearing course) bituminous concrete pavement; total pavement depth – 4- $\frac{1}{2}$  inches.
- 2. For state roadways, 6 inches of HMA S1.0 (base course), Traffic Level 2, placed in two (2) equal lifts; and 3 inches of HMA S0.5 (surface course), Traffic Level 2, placed in two (2) equal lifts; total pavement depth – 9 inches.



SECTION 02510

BITUMINOUS CONCRETE PAVING

D. Driveways and Sidewalks:

1. For residential driveways, 2 inches of Class 2 (wearing course) bituminous concrete pavement.
2. For commercial driveways, 1- $\frac{1}{2}$  inches of Class 1 (binder course) bituminous concrete pavement, and 1- $\frac{1}{2}$  inches of Class 2 (wearing course) bituminous concrete pavement; total pavement depth – 3 inches.
3. For sidewalks, 2 inches of Class 2 (wearing course) bituminous concrete pavement, or as directed by the Engineer.

3.03 SUBBASE COURSE:

- A. If the Engineer considers the material at the top of the backfilled trenches and/or excavation unsatisfactory for use under pavement, the Contractor shall remove and replace such material, to a depth determined by the Engineer, with acceptable bank run gravel or gravel mixed with acceptable binding material, or processed aggregate, as follows:
  1. For local residential streets, replace with 12 inches of subbase material in two (2) equal lifts.
  2. For local collector streets, replace with 12 inches of subbase material in two (2) equal lifts, and 4 inches of processed aggregate atop the subbase.
  3. For sidewalks, replace with 8 inches of subbase material in two (2) equal lifts.
- B. Subbase course shall be placed and prepared prior to the placement of temporary or permanent pavement.
- C. In-place density shall be determined in accordance with ASTM D1557, Method C.

3.04 TEMPORARY PAVEMENT:

- A. Prior to placing pavement, backfill shall be compacted as required under Section 02320 – Backfilling, Grading and Compaction, to eliminate settling of backfill. No pavement shall be placed over poorly compacted backfill.
- B. Backfill and base course shall be compacted, brought to proper elevation, and dressed so that new pavement construction is at the required grade. The Contractor shall maintain surfaces of excavated and disturbed areas until pavement is placed. If there is a time lapse of more than 24 hours between completion of subbase or placing of base course and placing of paving, or if subbase or base course has been eroded or disturbed by traffic, restore to acceptable condition before placing paving.
- C. Place subbase course under temporary pavement, as indicated on the drawings or as specified herein.

SECTION 02510

BITUMINOUS CONCRETE PAVING

- D. Place and maintain temporary pavement for city streets and state roadways to the minimum compacted thicknesses specified in Paragraph 3.02 (above), or as directed, in a safe and reasonably smooth condition until permanent pavement is placed. Temporary pavement shall be placed where directed by the Engineer at the end of each day's activities, unless otherwise directed or specified.
- E. Backfill at the top of the trench shall be removed to allow for placing temporary surfacing and for placement of the minimum 12-inch depth subbase course beneath the binder course. After the required settlement period has passed, any areas of temporary pavement which have exhibited excessive settlement (greater than 2 inches), or which have otherwise exhibited failure by cracking or resulting in open joints along the edges of the patch, shall be removed, the subbase recompact and restored to proper grade, and the binder course replaced to the original surface elevation of the roadway, all at no cost to the City. Where settlement has occurred to a depth of less than 2 inches, additional binder material may be placed over the original binder course, after cleaning the pavement surface and applying tack coat material. Additional binder material required to bring the trench patch up to the original road surface grade shall be placed at no cost to the City.

3.05 HOT MIX ASPHALT (HMA) BASE COURSE IN STATE HIGHWAYS:

- A. Cut existing concrete or bituminous concrete pavement as neatly as possible with a masonry saw before the start of excavation within these areas. Cut existing reinforcements using mechanical methods; do not burn.
- B. Remove material used for temporary pavement and subbase course, prior to placing the pre-mix bituminous concrete base course, to a depth of at least 19 inches below existing finished grade (17 inches below cold-milled grade where applicable) and to a width as detailed. Use subbase course as base course for pre-mix bituminous concrete base course, and place to within 9 inches of existing finished grade. Remove all loose or damaged material in existing pavement and existing surface course, trimmed square and straight as directed, so that new binder course is placed on undisturbed bituminous base course with a depth of at least 6 inches.
- C. Place 6 inches of pre-mix bituminous concrete base course in trenches adjacent to existing bituminous concrete base. For trench restoration work adjacent to existing reinforced concrete pavement removal areas, match existing concrete depth up to 8 inches (maximum) with pre-mix bituminous concrete base, as directed by the Engineer.
- D. Clean edges of adjoining pavement and new concrete surfaces of all dust and dirt, and paint sufficiently with cutback asphalt to form a tight bond between old and new pavement, after the base has set and before application of appropriate permanent bituminous pavement.

SECTION 02510

BITUMINOUS CONCRETE PAVING

3.06 PREPARATION FOR PERMANENT RESURFACING:

- A. Permanent curb-to-curb paving shall be laid not less than 180 days after binder course or temporary pavement is laid or after one (1) winter season, whichever is a greater time period, unless permitted otherwise by the Engineer.
- B. In preparation for curb-to-curb permanent paving, the Contractor shall remove any hot or cold temporary paving if installed, restore subbase course to grade and place binder course. In preparation for curb-to-curb permanent pavement, the Contractor shall restore binder course paving as required, and prepare existing permanent pavement for bonding with the new permanent pavement. Any trench pavement which has settled more than 2 inches during the settlement period, or any trench pavement which has cracked, broken, or separated from the adjacent original pavement sections shall be considered temporary pavement.
- C. Wherever the road surface beyond the sewer trench limits requires reshaping, or filling of cracks and depressions to prepare for curb-to-curb paving, as determined by the Engineer, the Contractor shall clean the area, apply tack coat, and furnish and place leveling course material as directed.
- D. Surfaces of existing pavement to which new pavement is to bond, where the Engineer deems necessary, shall be treated with RC-70 cutback asphalt, or RS-1 or RS-2 emulsified asphalt, applied at rate between 0.05 and 0.15 gallons per square yard.
- E. Existing Portland cement concrete pavement in streets, driveways and sidewalks with a control joint within 6 inches of the edge cut for permanent pavement replacement shall be completely removed and replaced to the control joint, unless the Engineer instructs otherwise.

3.07 BINDER COURSE PERMANENT PAVEMENT:

- A. Binder course permanent pavement shall be placed over trenches as soon as practical, after completion of pipe laying operations in each roadway or as directed by the Engineer.
- B. Binder course permanent pavement shall be placed on the previously prepared subbase course, recompact as necessary.
- C. Binder course permanent pavement shall be placed to the minimum compacted thicknesses specified in Paragraph 3.02 (above), or as detailed on the drawings.
- D. Binder course permanent pavement shall be kept in safe and reasonably smooth condition until permanent pavement is placed. Manhole rims shall be flush with binder course permanent pavement grade until curb-to-curb pavement is placed. Just prior to placing the final curb-to-curb pavement course, the manhole frames and covers are to be raised to the final pavement grade.
- E. Where original pavement breaks back beyond the original saw cut line(s), additional saw cutting will be required to provide a neat vertical surface to adjoin.

SECTION 02510

BITUMINOUS CONCRETE PAVING

3.08 WEARING COURSE PERMANENT PAVEMENT:

- A. Wearing course permanent pavement shall be placed and compacted on the prepared surfaces in accordance with Section 4.06 of *CT DOT Form 818*.
- B. Binder course, existing, and cold-milled pavements shall be treated with cutback asphalt or emulsified asphalt. Contract surfaces of curbing, gutters, manhole frames and covers, vertical saw cut surfaces, etc. shall be painted with a thin uniform tack coat.
- C. Wearing (surface) course permanent pavement shall be placed to the minimum compacted thicknesses specified in Paragraph 3.02 (above), or as detailed on the drawings.
- D. Permanent pavement shall be spread evenly with an acceptable mechanical spreader (paver machine), to uniform grade and cross section.
- E. Prior to placing the top course for curb-to-curb permanent pavement, mill tapered keyways across the width of the existing roadway pavement at the construction project limits. Keyways across roadways and intersecting streets shall be 8 feet wide and 1-1/2 inches deep at the match lines.

3.09 SIDEWALKS, DRIVEWAYS, AND CURBING:

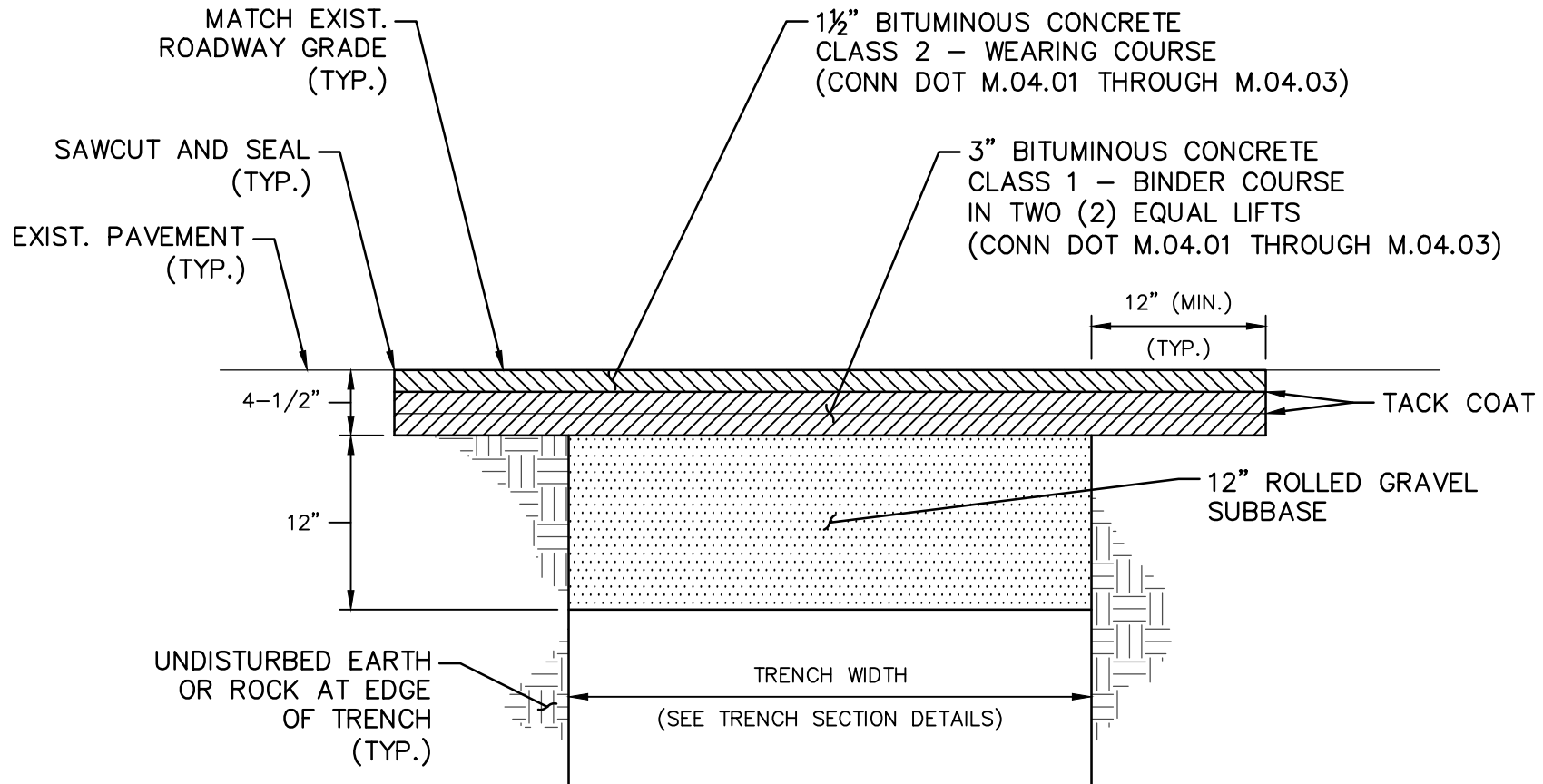
- A. Restore sidewalks, driveways, and curbing removed or damaged by Contractor's operations to a condition at least equal to that immediately prior to start of construction. Suitable materials and methods shall be used for such restoration and shall be satisfactory to the Engineer. Such restoration work shall be at no cost to the City.
- B. Where the trench location is within a sidewalk, replace the whole width of sidewalk with new paving.
- C. Where the trench location is within a driveway, replace the driveway across the entire width with even edges.
- D. Bituminous concrete sidewalks and driveways shall be placed and compacted in accordance with Section 9.22 of *CT DOT Form 818*.
- E. Bituminous concrete curbing shall be placed and compacted in accordance with Section 8.15 of *CT DOT Form 818*.
- F. The pavement surface to which the new curbing is to be laid atop shall be cleaned of loose and foreign material. The surface shall be perfectly clean and dry, and shall be coated with an approved tack coat prior to laying the curb.
- G. Bituminous concrete curbing shall be placed and compacted in accordance with Section 8.15 of *CT DOT Form 818*.
- H. Bituminous concrete driveway approach aprons shall conform to City of Milford standards.

SECTION 02510

BITUMINOUS CONCRETE PAVING

- I. Bituminous concrete driveway apron caps shall have a thickness as indicated on the drawings, as specified herein, or as directed by the Engineer. The surfaces of the existing driveway to which new pavement is to bond shall be treated with RC-70 cutback asphalt, or RS-1 or RS-2 emulsified asphalt, applied at rate between 0.05 and 0.15 gallons per square yard.

END OF SECTION



## PERMANENT PAVEMENT REPAIR (CITY STREETS)

N.T.S.



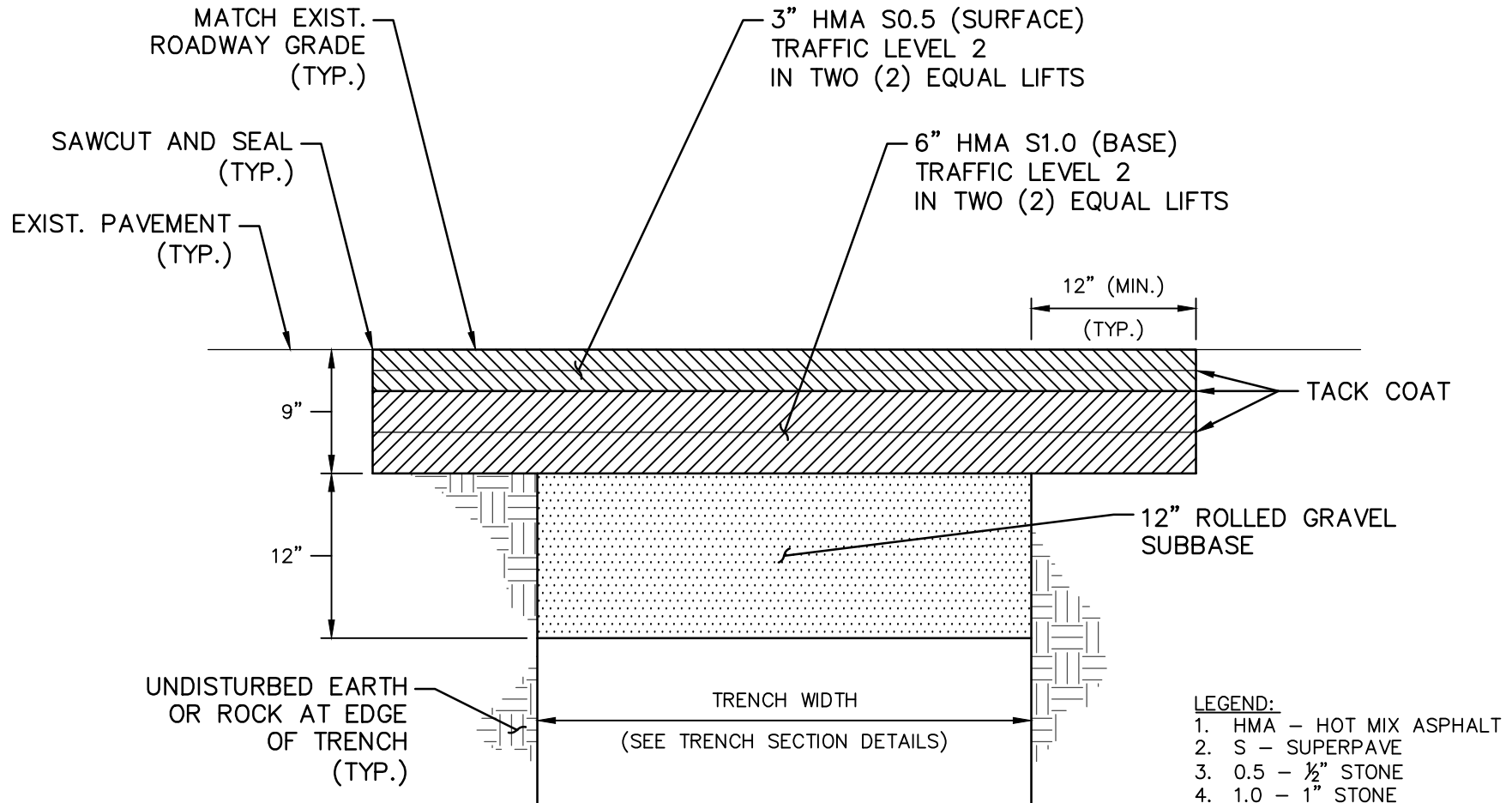
**Westcott and Mapes, Inc.**

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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE	ON-CALL STORM AND SANITARY SEWER PIPE LINING MILFORD, CT		
DWG. TITLE	PAVEMENT REPAIR (CITY)	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	02510-1
		PROJECT NO.	24-034-10



## PERMANENT PAVEMENT REPAIR (STATE ROADWAYS)

N.T.S.



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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE	MILFORD, CT		
DWG. TITLE	PAVEMENT REPAIR (STATE)	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	02510-2
		PROJECT NO.	24-034-10

SECTION 02511

SITE CONCRETE WORK

**PART 1 – GENERAL**

1.01 DESCRIPTION:

Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to construct new, or replace, concrete sidewalks, concrete ramps, concrete driveway aprons, concrete curbing, and other site concrete features, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.

1.02 RELATED SECTIONS:

- A. Section 02315 – Excavation and Trenching
- B. Section 02320 – Backfilling, Grading and Compaction
- C. Section 02510 – Bituminous Concrete Paving

1.03 REFERENCE STANDARDS:

- A. American Concrete Institute (ACI) Construction Publications and Standards (latest revision):
  - 1. 301 – Specifications for Structural Concrete.
  - 2. 305R – Guide to Hot Weather Concreting.
  - 3. 306R – Guide to Cold Weather Concreting.
  - 4. 347 – Guide to Formwork for Concrete.
- B. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

1.04 SUBMITTALS:

- A. Submit certification that concrete materials to be used conform to Section M.03.01 of *CT DOT Form 818*.
- B. Submit certification that steel reinforcements to be used conform to Section M.06.01 of *CT DOT Form 818*.

1.05 QUALITY ASSURANCE:

- A. Acquire cement and aggregates from the same sources for all work.
- B. Conform to ACI 305R when placing concrete during hot weather.
- C. Conform to ACI 306R when placing concrete during cold weather.
- D. Work shall be performed in accordance with *CT DOT Form 818*.



SECTION 02511

SITE CONCRETE WORK

**PART 2 – PRODUCTS**

**2.01 CONCRETE FOR SIDEWALKS AND RAMPS:**

- A. Concrete for sidewalks and ramps shall be Class “C” Concrete, conforming to Section M.03.01 of *CT DOT Form 818*, with 5 to 7 percent air entrainment and a minimum 28-day compressive strength of 3,000 psi.
- B. Concrete sidewalks and ramps shall be constructed in accordance with Section 9.21 of *CT DOT Form 818*.

**2.02 CONCRETE FOR DRIVEWAY APRONS:**

- A. Concrete for driveway aprons shall be Class “C” Concrete, conforming to Section M.03.01 of *CT DOT Form 818*, with 5 to 7 percent air entrainment and a minimum 28-day compressive strength of 4,000 psi.
- B. Concrete driveway aprons shall be constructed in accordance with the City of Milford standard details and requirements.

**2.03 CONCRETE FOR CURBING:**

- A. Concrete for cast-in-place curbing shall be Class “C” Concrete, conforming to Section M.03.01 of *CT DOT Form 818*, with 5 to 7 percent air entrainment and a minimum 28-day compressive strength of 4,000 psi.
- B. Concrete curbing shall be constructed in accordance with Section 8.11 of *CT DOT Form 818*.
- C. All concrete curb that is replaced shall be formed to the full depth of the curb for both the front and rear faces of the curb, and shall conform in all respects to the City of Milford standard details and requirements.

**2.04 MISCELLANEOUS CONCRETE:**

Concrete for utility encasements and other approved uses shall be Class “C” Concrete, conforming to Section M.03.01 of *CT DOT Form 818*, unless otherwise noted.

**2.05 FORMWORK:**

- A. Forms shall be metal or wood, straight, free from warp and of sufficient strength to resist springing from the pressure of concrete.
- B. Formwork for exposed-to-view surfaces shall be in good condition to provide a clean, uniform finish. Do not use delaminated formwork materials. The Contractor is responsible for designing the formwork system(s).
- C. Formwork construction shall be in accordance with ACI 347, and as specified.

SECTION 02511

SITE CONCRETE WORK

2.06 REINFORCEMENTS:

- A. Concrete reinforcements for all site concrete flatwork (sidewalks, pads, aprons, etc.) shall be welded wire fabric, unless otherwise noted. Concrete flatwork to experience larger loads may utilize steel reinforcing bars of sufficient size, quantity, and orientation, as directed by the Engineer.
- B. Welded wire fabric shall conform to Section M.06.01 of *CT DOT Form 818*.

**PART 3 – EXECUTION**

3.01 EXAMINATION:

- A. Verify that the requirement for concrete cover over reinforcements has been achieved.
- B. Verify that reinforcements and other items to be cast into the concrete are accurately placed, positioned securely, and will not cause hardship while placing concrete.

3.02 PLACING, FINISHING, AND CURING CONCRETE:

- A. Ensure reinforcements and other items to be cast into the concrete are not disturbed during concrete placement.
- B. Install expansion joints as indicated on the drawings or as directed by the Engineer.
- C. Place concrete continuously between predetermined expansion, control, and construction joints.
- D. Do not interrupt successive placement.
- E. Methods for construction shall be in accordance with *CT DOT Form 818*, and with the applicable ACI Construction Specifications.

3.03 CONCRETE SIDEWALKS, RAMPS, DRIVEWAY APRONS, AND CURBING:

- A. Restore concrete sidewalks, ramps, driveway aprons, and curbing removed or damaged by the Contractor's operations to a condition at least equal to that immediately prior to the start of construction. Suitable materials and methods shall be used for such restoration work and shall be satisfactory to the Engineer. Restoration shall be at no cost to the City.
- B. Where a trench location is in a sidewalk, replace the whole width of the sidewalk to the nearest expansion, control, or construction joints, or as directed by the Engineer. Side forms shall be set to obtain and preserve a straight edge along both sides of the sidewalk.
- C. Where a trench location is in a driveway apron, replace the driveway apron across the entire width with even edges. The driveway apron shall conform to City standards.

SECTION 02511

SITE CONCRETE WORK

3.04 FIELD QUALITY CONTROL:

- A. Field inspection and testing shall be performed by a certified testing laboratory.
- B. Tests of cement and aggregates may be performed to ensure conformance with specification requirements.
- C. Concrete test cylinders will be taken when deemed necessary to ensure the properties of the concrete.
- D. One (1) slump and air content test will be taken for each set of test cylinders taken.
- E. Inspect placement of reinforcements for conformance with the detailed drawings and/or City standards.

3.05 PROTECTION OF WORK:

Do not permit traffic over concrete sidewalks, driveway aprons, curbing, or any other concrete features until concrete has completely cured.

3.06 PATCHING:

- A. Inspect concrete surfaces immediately upon removal of formwork.
- B. Honeycombs or embedded debris in concrete will not be acceptable.
- C. Patch imperfections as directed, and in accordance with ACI 301.

3.07 DEFECTIVE CONCRETE:

Concrete not conforming to the specified requirements shall be repaired or replaced, as appropriate, at no additional cost to the City.

END OF SECTION

SECTION 02580

PAVEMENT MARKINGS

**PART 1 – GENERAL**

1.01 DESCRIPTION:

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to remove, install new, and/or replace painted pavement markings of certain type and color, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. The Contractor shall furnish and install painted pavement markings; fast-drying painted pavement markings; and painted legends, arrows, and other such markings, of the type and color specified at the locations indicated on the drawings or as directed by the Engineer, following permanent pavement restorations within the construction limits.
- C. The Contractor shall remove existing pavement markings and install temporary pavement markings as required to maintain and protect traffic in accordance with the Contractor's approved 'Maintenance and Protection of Traffic (MPT) Plan' and State of Connecticut Department of Transportation (CT DOT) Encroachment Permit requirements. The Contractor shall remove existing pavement markings which conflict with the proposed pavement markings using any method that does not materially damage the surface or texture of the pavement, such as sand blasting.
- D. The Contractor shall install reflectorized white and yellow, two-component epoxy resin to be used for pavement markings on both asphaltic and Portland cement concrete pavement surfaces. It is to be used in conjunction with a surface application of glass beads, in accordance with the requirements herein listed and/or referenced. Upon curing, it shall produce an adherent reflectorized stripe of specified thickness and width capable of resisting wear from traffic.

1.02 RELATED SECTIONS:

- A. Section 01550 – Maintenance and Protection of Traffic
- B. Section 02510 – Bituminous Concrete Paving

1.03 REFERENCE STANDARDS:

- A. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).
- B. U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices for Street and Highways, 2009 Edition, as amended (hereafter referred to as *MUTCD*).

SECTION 02580

PAVEMENT MARKINGS

1.04 QUALITY ASSURANCE:

- A. All work shall be performed in accordance with *CT DOT Form 818*.
- B. Application work shall be performed by skilled workmen having a minimum two (2) years of experience on projects requiring similar pavement marking work.
- C. Painting shall not be conducted when conditions of snow, rain, fog, mist, or humidity in excess of 85 percent persist, nor shall paint be applied to wet or damp surfaces.
- D. Materials not in actual use shall be stored in tightly covered containers and shall be protected from freezing.

**PART 2 – PRODUCTS**

2.01 PAVEMENT MARKING PAINT:

- A. Materials for this work shall conform to the following sections of *CT DOT Form 818*:
  - 1. Section M.07.20 – Waterborne Pavement Marking Paint;
  - 2. Section M.07.21 – Hot-Applied Waterborne Pavement Marking Paint;
  - 3. Section M.07.22 – Epoxy Resin Pavement Markings;
  - 4. Section M.07.24 – Preformed Black Line Mask Pavement Marking Tape; and
  - 5. Section M.07.30 – Glass Beads

**PART 3 – EXECUTION**

3.01 GENERAL:

- A. Provide temporary fast-drying painted pavement markings following installation of temporary pavement or binder course, as required to maintain and protect traffic during construction or in preparation for winter shutdown.
- B. Remove or obliterate existing pavement markings, as required.
- C. Install permanent painted pavement markings to restore or replace all existing painted pavement markings within the project limits following permanent pavement restoration.
- D. Ensure pavement areas to be painted are dry and sufficiently cleaned of sand and debris so as to provide an acceptable bond between the painted and the pavement.

3.02 APPLICATION:

- A. Application of paint shall be at a rate of 100 square feet to 115 square feet per gallon with glass beads applied at a rate of six (6) pounds per gallon of paint for painted pavement markings and painted legend, arrows, and markings; and eight (8) pounds per gallon of paint for fast-drying painted pavement markings.

SECTION 02580

PAVEMENT MARKINGS

- B. Fast-drying paint shall be applied at a temperature of 40° F to 110° F at the spray gun. Apply paint according to the manufacturer's recommendations using proper masking, stencils, and application equipment.
- C. Painting shall be performed in a neat workmanlike manner. The lines shall be sharp and clear with no feathered edging or fogging. Precautions shall be taken to prevent tracking by tires of the application equipment.
- D. Traffic cones, barricades, and other measures shall be provided as necessary to protect the painted surfaces until sufficiently dry to withstand traffic.
- E. Apply painted pavement markings in accordance with applicable local and state standard details.
- F. The following items shall be painted in colors noted below:
  - 1. Pedestrian Crosswalks: White
  - 2. Fire Lanes: Yellow or per local code
  - 3. Lane Striping where separating traffic moving in opposite directions: Yellow
  - 4. Lane Striping where separating traffic moving in the same direction: White
  - 5. Handicap Symbols: Blue or per local code
  - 6. Parking Stall Striping: White or per local code

3.03 CLEANUP:

- A. After the paint is thoroughly dry, visually inspect the entire application and touch up as needed to provide clean, straight lines and surfaces throughout.
- B. Using a permanent opaque paint, identical in color to the pavement surface, block out and eliminate all traces of splashed, tracked, or spilled paint.

END OF SECTION

SECTION 02601

MANHOLES

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to construct storm and sanitary sewer manholes, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. Manholes shall consist of the following components, as applicable:
  - 1. Precast Concrete Base: Tops accurately shaped by ring forms to suit riser sections.
  - 2. Brick Invert: Form sanitary gravity sewer invert channels using brick masonry. Conform to adjoining pipe size(s). Curve side inverts and lay out main inverts (where direction changes) in smooth curves of longest possible radius tangent to adjoining pipe centerlines.
  - 3. Precast Concrete Walls: Risers, reducers and/or transitions.
  - 4. Precast Concrete Top: Cone or flat-top slab.
  - 5. Brickwork or Reinforced Concrete Grade Rings: Placed at top of cone or flat-top slab for adjusting frame and cover to desired elevation (not to exceed 11 inches of total adjustment height).
  - 6. Cast Iron Frame and Cover: Standard or watertight, as indicated/directed.

**1.02 RELATED SECTIONS:**

- A. Section 02315 – Excavation and Trenching
- B. Section 02320 – Backfilling, Grading and Compaction
- C. Section 02510 – Bituminous Concrete Paving
- D. Section 02622 – Polyvinyl Chloride (PVC) Pipe and Fittings
- E. Section 02623 – High Density Polyethylene (HDPE) Pipe and Fittings
- F. Section 02956 – Cementitious Liner Manhole Rehabilitation

**1.03 REFERENCE STANDARDS:**

- A. American Society for Testing and Materials (ASTM) Publications and Standards (latest revision):
  - 1. A48 – Standard Specification for Gray Iron Castings.
  - 2. C32 – Standard Specification for Sewer and Manhole Brick.
  - 3. C150 – Standard Specification for Portland Cement.
  - 4. C207 – Standard Specification for Hydrated Lime for Masonry Purposes.

SECTION 02601

MANHOLES

5. C270 – Standard Specification for Mortar for Unit Masonry.
  6. C478 – Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
  7. C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
  8. C990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
  9. D3034 – Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  10. D4101 – Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials.
- B. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

1.04 SUBMITTALS:

- A. Submit shop drawings showing all details of construction, including, but not limited to, structure dimensions, reinforcements, joints, and pipe connections to structures.
- B. Submit material certifications for all precast concrete units, manhole frames and covers, surface coatings, brick masonry, grade rings, mortar, non-shrink waterproof grout, manhole steps, resilient pipe connectors, and other miscellaneous appurtenances.
- C. Submit design calculations including verification of adequate anti-floatation features and lateral earth pressures. Calculations shall verify that the structures have been designed to withstand the burial depth, submergence due to flooding, flotation and buoyant uplift, and dead and live loads.

1.05 QUALITY ASSURANCE:

- A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representative of the Owner. Such inspection may be made at the place of manufacture, or at the project site after delivery, or at both places, and the materials shall be subject to rejection at any time on account of failure to meet any of the drawing and/or specification requirements; even if samples have been previously accepted as satisfactory at the place of manufacture. Materials rejected after delivery to the project site shall be marked for identification and shall be removed from the site at once. Materials which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired (if permitted by the Engineer), or removed and replaced, at no additional cost to the Owner.



**SECTION 02601**

**MANHOLES**

- B. At the time of inspection, the materials will be carefully examined for compliance with the drawings and these specifications, and with the approved shop drawings. Precast sections will be inspected for general appearance, dimension, scratch strength, blisters, cracks, other such impurities, roughness, and soundness. The precast concrete surfaces shall be dense and close-textured.
- C. Imperfections in manhole sections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs can be performed. Repairs will be carefully inspected by the Engineer before final approval. Cement mortar used for such repairs shall have a minimum compressive strength of 4,000 psi at 7 days, and 5,000 psi at 28 days, when tested using 3-inch by 6-inch cylinders stored in the standard manner. Epoxy mortar may also be utilized for such repairs, subject to approval by the Engineer.
- D. All personnel working in confined spaces shall have the appropriate confined space entry training, as appropriate. Precautions shall be taken by the Contractor to ensure the health and safety of his workers, the public, the Engineer and the Owner during construction, as may be required.
- E. Manholes shall be adequately designed for lateral earth pressures and to resist floatation.

**PART 2 – PRODUCTS**

**2.01 PRECAST CONCRETE MANHOLES:**

- A. Precast concrete manhole sections shall conform to ASTM C478 and the following requirements:
  - 1. Wall thickness shall be as indicated on the drawings, or as required by the applicable reference standards, whichever is greater. In general, the minimum wall thickness shall be 5 inches for 48-inch diameter manholes, 6 inches for 60-inch diameter manholes, and 7 inches for 72-inch diameter manholes.
  - 2. Cement shall conform to ASTM C150, and be Type II, unless otherwise directed by the Engineer.
  - 3. Joint sealant between precast sections shall be butyl rubber type.
  - 4. Precast sections shall have tongue and groove interlocking joints.
  - 5. Flexible resilient connectors for pipe connections, and/or holes for future pipe connections, shall be cast and built into manhole bases and riser sections, as applicable.
  - 6. Pre-fabricated pipe openings and sleeves shall accommodate the outside diameter of the pipe(s) to be connected.
  - 7. Top sections shall be eccentric cones, except where concentric cones or flat top slabs are indicated and/or required.

SECTION 02601

MANHOLES

8. Cure by subjecting sections to saturated steam, at a temperature between 100° F and 130° F, for 12 hours or more, or by another approved method. Sections shall not be shipped nor subjected to loading until the concrete compressive strength has attained 3,000 psi, and not before 5 days after fabrication and/or repair, whichever is greater.
  9. Precast manholes shall be designed for AASHTO HS-20 loading, plus the weight of soil above the structure using a standard unit weight of 120 lbs. per cubic foot.
  10. The date of manufacture and the name and trademark of the manufacturer shall be clearly marked on each precast section.
- B. Inside drop inlets, for sanitary sewer manholes, shall be constructed using Polyvinyl Chloride (PVC) pipe and fittings, SDR 35, conforming to ASTM D3034 and Section 02622 – Polyvinyl Chloride (PVC) Pipe and Fittings of these specifications.

2.02 MANHOLE STEPS:

- A. Manhole steps shall be PS2-PFSL-DF Steel-Reinforced Plastic Manhole Steps, as manufactured by M.A. Industries, Inc. or approved equal.
- B. The copolymer polypropylene plastic shall conform to ASTM D4101 with a minimum carbon black content of  $\frac{1}{2}$  percent by weight, or other demonstrated equivalent sunlight protection system.
- C. All manhole steps shall be capable of resisting the following loads without loosening or damaging:
  1. Minimum horizontal pull-out load of 1,600 lbs. (800 lbs. per leg); and
  2. Minimum vertical load of 800 lbs.

2.03 MANHOLE FRAMES AND COVERS:

- A. Manhole frames and covers shall be of good quality, strong, tough, even-grained cast iron, smooth and free from scale, lumps, blisters, sand holes, and defects of any kind.
- B. Cast iron shall be Class 30, at a minimum, conforming to ASTM A48.
- C. Manhole covers and frame seats shall be machined to a true surface, to prevent rocking.
- D. Castings shall be thoroughly cleaned and subject to hammer inspection.
- E. Manhole covers shall have a diamond pattern, pick holes, and the word “STORM” for storm sewer manholes or “SEWER” for sanitary sewer manholes, as appropriate, or an approved pattern of the City of Milford.
- F. Manhole frames and covers shall have a minimum weight of 415 lbs.
- G. Manhole frames and covers shall be approved for use by the City of Milford prior to installation.

SECTION 02601

MANHOLES

- H. Manhole frames and covers shall be designed for AASHTO HS-20 loading, at a minimum.

2.04 MANHOLE SURFACE COATINGS:

A. Exterior Coatings:

1. Exterior coatings shall be provided for all manholes, unless otherwise directed.
2. Apply a coal-tar bituminous coating to the exterior walls of all sanitary sewer manholes, and other manholes as indicated or directed. Apply coating in two (2) coats to a minimum 0.3 millimeters (12 mil) dry-film thickness.
3. Coal tar bituminous shall be Bitumastic 300 M, as manufactured by Carboline, or an approved equal.

B. Interior Coatings or Linings:

1. Interior coatings or linings shall be provided for all sanitary sewer force main discharge manholes, and other manholes as indicated or directed.
2. Apply a 2-component cycloaliphatic amine epoxy resin coating system to the interior walls of all sanitary sewer force main discharge manholes, and other manholes as indicated or directed. Apply coating system in two (2) coats, each coat with a maximum 4 to 10 mil thickness, and in accordance with the manufacturer's recommendations.
3. Epoxy resin coating system shall be Carboguard 891, as manufactured by Carboline, or an approved equal.

2.05 STRUCTURE JOINTS AND PIPE CONNECTIONS:

- A. Butyl rubber-based sealants shall be used between precast sections. Sealants shall conform to AASHTO M 198, Type B, and/or ASTM C990 (but no bitumen content).
- B. Resilient connectors for pipes to precast sections shall be provided per ASTM C923, and conform to the manufacturer's standards. Connectors using castings and bolts with non-resilient bearing are not acceptable.
- C. Rubber ring water-stops for use in pipe-to-structure joints shall be provided where indicated and/or directed. Rings shall be of resilient material that will fit snugly over pipes, and held firmly against pipe surfaces by means of a mechanical take-up device which when tightened will compress resilient material, or by a stretch fit. Water-stops shall be designed and installed so that leakage between the pipes and manhole is minimized. Materials and manufacture of water-stops shall conform to ASTM C923.
- D. For pipe connections to existing manholes, cutting into existing manholes shall be performed by coring. The use of pneumatic tools for this work is not permitted. Flexible pipe-to-structure connectors shall be KOR-N-SEAL, or an approved equal.

SECTION 02601

MANHOLES

- E. Where flexible pipe-to-structure connectors cannot be used, as determined by the Engineer, non-shrink mortar shall be used for pipe connections to existing manholes, of type and quality similar to the following:
  - 1. MasterFlow 713 Cement-Based Grout; and
  - 2. Five Star Cementitious Grout.

2.06 BRICK:

- A. Bricks shall be good, sound, hard and uniformly burned, regular and uniform in shape and size, of compact texture. Underburned or salmon brick will not be acceptable and only whole brick shall be used unless otherwise permitted. If bricks are rejected by the Engineer, they shall be immediately removed from the project site and satisfactory brick substituted, at no additional cost to the Owner.
- B. Bricks for the channels and shelves of manhole inverts shall be Grade SS, in accordance with ASTM C32. The mean of five (5) tests for absorption shall not exceed 8 percent by weight.
- C. Bricks for building up and leveling manhole frames and covers shall be Grade MS, in accordance with ASTM C32.
- D. Bricks are to be red, unless otherwise noted.
- E. Poured concrete inverts will not be allowed.

2.07 MIXES:

- A. Concrete:
  - 1. Cast-in-place concrete shall be Class "A" Concrete (PCC03340) or Class "C" Concrete (PCC03360), as indicated or directed by the Engineer, in accordance with Section M.03 of *CT DOT Form 818*.
  - 2. Precast concrete shall be in accordance with ASTM C478.
- B. Mortar:
  - 1. Type S Mortar (ASTM C270): Composed of 1 part Portland cement,  $\frac{1}{2}$ -part hydrated lime, and  $3\frac{1}{2}$  to  $4\frac{1}{2}$  parts sand, by volume, with sufficient water to form a workable mixture.
  - 2. Mortar for Brick Inverts (Section M.11.04 of *CT DOT Form 818*): Composed of 1 part Portland cement and 2 parts surface dry fine aggregate, by volume. Hydrated lime, in an amount not to exceed 4 lbs. of lime to each bag of cement, may be added at the option of the Engineer.
  - 3. Mortar for Plugging Lift Holes: Composed of 1 part Portland cement and  $1\frac{1}{2}$  parts sand, by volume, with sufficient water to form a workable mixture.

SECTION 02601

MANHOLES

2.08 MISCELLANEOUS MATERIALS:

- A. Portland Cement: ASTM C150, Type II.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Sand: Fine aggregate, for mortar, conforming to Section M.11.04, Grading "B", of *CT DOT Form 818*.
- D. Filter Fabric: Non-woven, 6-ounce per square yard (minimum), medium survivability, separation type geotextile, Mirafi® 160N by TenCate Mirafi, or approved equal.

**PART 3 – EXECUTION**

3.01 GENERAL:

- 1. Excavation and backfilling for installation of manholes shall conform to the requirements of Section 02315 – Excavation and Trenching, and Section 02320 – Backfilling, Grading and Compaction.
- 2. Manholes shall be set atop 8 inches (minimum) of compacted granular fill or screened gravel, as indicated on the drawings or as directed by the Engineer, unless otherwise noted. For more information, refer to Section 02320 – Backfilling, Grading and Compaction.
- 3. Construct manholes to the dimensions shown on the drawings, as specified herein, or as directed by the Engineer. Protect all work against flooding and floatation.
- 4. Steel-reinforced plastic manhole steps shall be installed by the precast concrete manufacturer, and shall be in place at the time the precast concrete manhole sections are delivered to the project site(s). The Engineer shall inspect the steps on-site prior to placement and installation of the manhole sections.

3.02 SETTING PRECAST SECTIONS:

- A. Set vertical with sections and steps in alignment. Set bases true to line and elevation.
- B. Install butyl rubber-based sealants in joints between precast sections, conforming to manufacturer's standards.
- C. Plug holes for the handling of precast sections with mortar. Hammer mortar into holes until dense and excess of paste appears, then smooth flush with adjoining surface.

3.03 LAYING BRICKWORK AND GRADE RINGS:

- A. Moisten bricks before laying. Moistening of grade rings is not permitted.
- B. Lay bricks and/or grade rings in full bed of mortar without subsequent grouting, flushing, or filling; and bond thoroughly.

SECTION 02601

MANHOLES

3.04 PLASTERING AND CURING BRICK MASONRY:

- A. Plaster outside faces with mortar for brick,  $\frac{1}{4}$  inch to  $\frac{3}{8}$  inch thick.
- B. Moisten brick masonry before application of mortar.
- C. Spread and trowel plaster carefully.
- D. Check after hardening by tapping for bond and soundness.
- E. Remove and replace unbonded and unsound plaster.
- F. Protect from too rapid drying using moist burlap, or as approved by the Engineer.
- G. Protect from weather and frost, as required.

3.05 JOINTING AND CONNECTIONS:

- A. Joints between precast sections, and between pipes and precast sections, shall conform to the related standards and manufacturer's instructions.
- B. Rubber ring water-stops for pipe-to-structure connections: Hold firmly against pipe surface by mechanical take-up device to compress resilient material when tightened. Install to minimize leakage.
- C. Apply non-shrink mortar according to manufacturer's instructions.
- D. Close openings for future connections with brick masonry bulkhead, as indicated.

3.06 SETTING FRAMES AND COVERS:

- A. Set frames with top conforming to finished ground or pavement surface, as indicated and directed.
- B. The top uppermost precast manhole section shall be set at a grade that will allow a minimum of two (2) courses and a maximum of 11 inches of brick masonry, or reinforced precast concrete grade rings, and mortar before setting the cast iron frame and cover.
- C. Set circular frames concentric with top of masonry (brick or grade rings)
- D. Set frames in a full bed of mortar to ensure the space between the masonry top and the bottom flange of the frame is filled and watertight.
- E. Place thick ring of mortar extending to outer edge of masonry, around bottom flange of the frame. Finish mortar smoothly and give a slight slope to shed water away from the frame.
- F. Place covers in frames upon completion of the work.

SECTION 02601

MANHOLES

3.07 LEAKAGE TESTS:

- A. Inspect for visible leakage after backfill has been placed and compacted to finished grade, with groundwater at normal level.
- B. Locate and repair any/all visible leakage inside the structures.

3.08 DROP CONNECTIONS FOR SANITARY SEWER MANHOLES:

- A. Drop connections for sewer manholes shall be constructed utilizing Polyvinyl Chloride (PVC) pipe, non-shrink mortar grout or elastomeric sealed joints, and cast-in-place concrete.
- B. All fastening hardware shall be stainless steel.
- C. Drop connections shall be constructed in accordance with the City of Milford standard details.

3.09 CONNECTION TO EXISTING MANHOLES:

- A. Where required, and as directed by the Engineer, the Contractor shall make all necessary adjustments to existing manholes to connect newly constructed storm and sanitary sewers to the existing system, including, but not limited to removing existing stubs, modification of existing steps, coring new openings, reforming the entire disturbed bench and channel (invert), and all appurtenant work needed to make a secure and watertight connection.
- B. Where possible, existing stubs may be used to avoid disturbances to existing manhole bases. Couplings shall be approved stainless steel "shear ring" type couplings, as called for in Section 02622 – Polyvinyl Chloride (PVC) Pipe and Fittings, or approved by the Engineer.
- C. Manholes Over Existing Sewers: Where proposed manholes are to be constructed over existing sewers, the existing sewer pipe shall be left undisturbed and the flow maintained through it until the manhole has been completed and accepted. Unless otherwise specified, required or ordered, the Contractor shall carefully excavate around and properly support the existing sewer pipe. The base section of the manhole shall be cast-in-place and shall have a ring-formed joint cast or formed in the base section which shall be compatible with the corresponding precast manhole riser sections. On completion and acceptance of the manhole, the top portion of the existing sewer pipe shall carefully be removed and the bench formed to the limits and in accordance with the City of Milford standard details, or as directed by the Engineer. Reinforced concrete pipe shall have the reinforcement cut off and mortared over with a minimum of  $\frac{1}{2}$  inch of mortar.

SECTION 02601

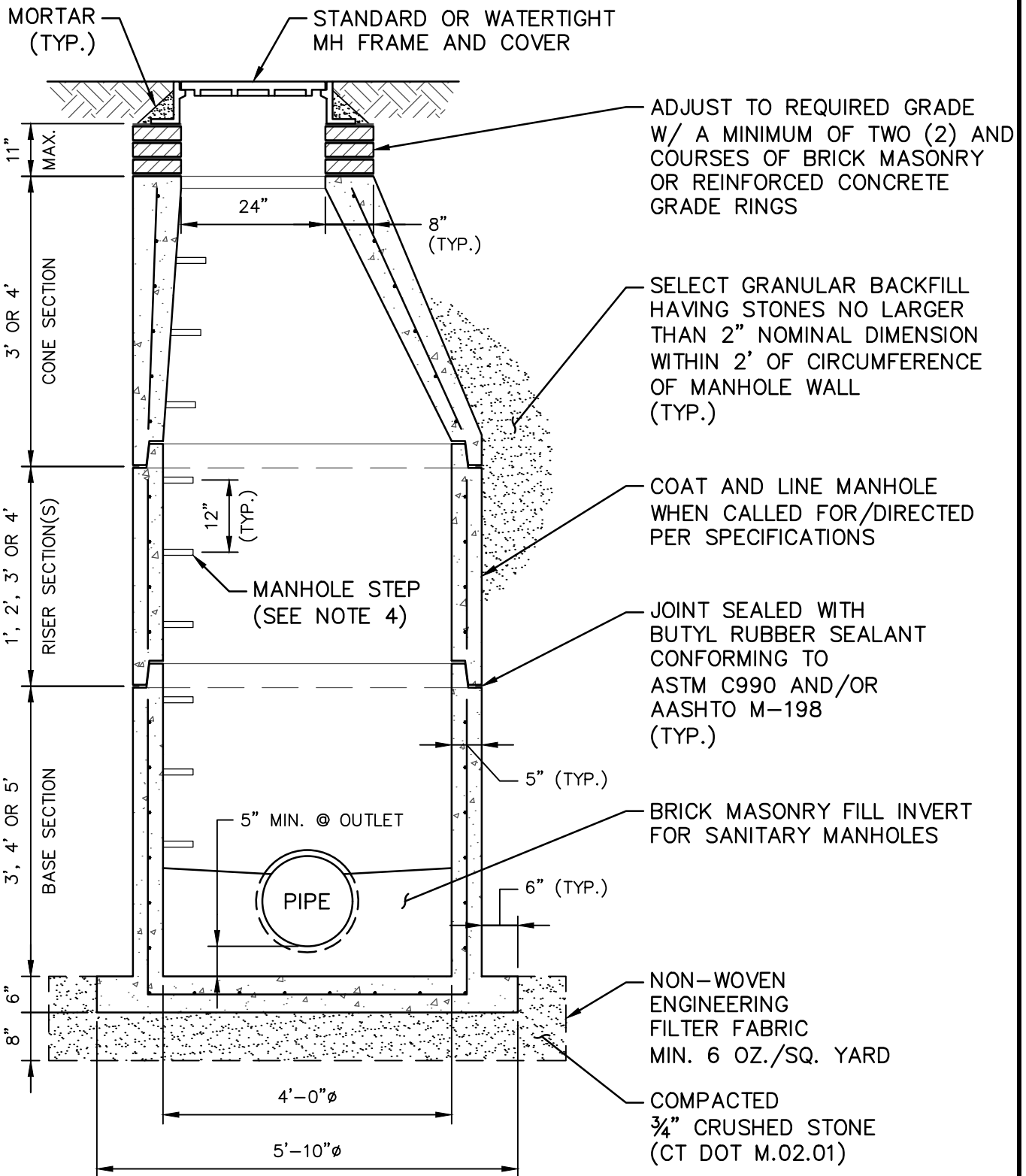
MANHOLES

3.10 CLEANING:

- A. The Contractor shall clean new manholes, and existing disturbed and/or modified manholes, of all silt, debris, and other foreign matter of any kind, prior to final inspection.
- B. If said cleaning is not satisfactory for the Engineer's final review and inspection, the Contractor shall perform additional cleaning at no additional cost to the Owner.

END OF SECTION





4' DIA. MANHOLE

N.T.S.

ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT



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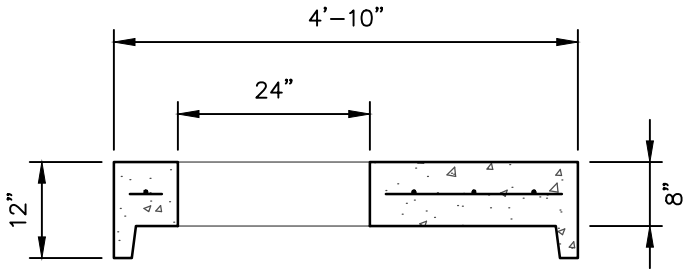
142 Temple Street, Suite 202

New Haven, CT 06510

Telephone: (203) 789-1260

E-mail: [info@westcottandmapes.com](mailto:info@westcottandmapes.com)

PROJ. TITLE	MILFORD, CT		
DWG. TITLE	4' DIA. MANHOLE	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	—
DATE	02/06/2024	DWG. NO.	02601-1A
		PROJECT NO.	24-034-10



### ALTERNATE FLAT TOP SLAB FOR 4'Ø SECTION

#### MANHOLE NOTES:

1. ALL PRECAST MANHOLE SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
2. CONCRETE COMPRESSIVE STRENGTH SHALL BE 5,000 PSI AT 28 DAYS.
3. MANHOLES SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C478, LATEST EDITION.
4. MANHOLE STEPS SHALL BE COPOLYMER POLYPROPYLENE COATED STEEL CORE. STEPS SHALL BE LOCATED 12" O.C. (AS INDICATED) AND IN VERTICAL ALIGNMENT.
5. INSTALL MANHOLE BASE ON 8" THICK BASE OF ¾" CRUSHED STONE.
6. REINFORCING STEEL SHALL CONFORM TO ASTM A185, A615 AND A706, LATEST EDITIONS, AS APPLICABLE.
7. APPLY MANHOLE PROTECTIVE COATING/LINING SYSTEM WHEN CALLED FOR OR DIRECTED, PER SPECIFICATIONS.
8. PROVIDE ANTI-FLOATATION COLLAR OR STAINLESS STEEL HOLD-DOWN BRACKETS TO CAST-IN-PLACE CONCRETE SUB-SLAB. MINIMUM UPLIFT FACTOR OF SAFETY SHALL BE 1.15. ASSUME GROUND WATER ELEVATION IS AT SURFACE; NEGLECT SOIL FRICTION.
9. PRECAST MANHOLES SHALL BE AS MANUFACTURED BY CONNECTICUT PRECAST CORPORATION (MONROE, CT), UNITED CONCRETE PRODUCTS, INC. (YALESVILLE, CT), OR APPROVED EQUAL.

## 4' DIA. MANHOLE

N.T.S.



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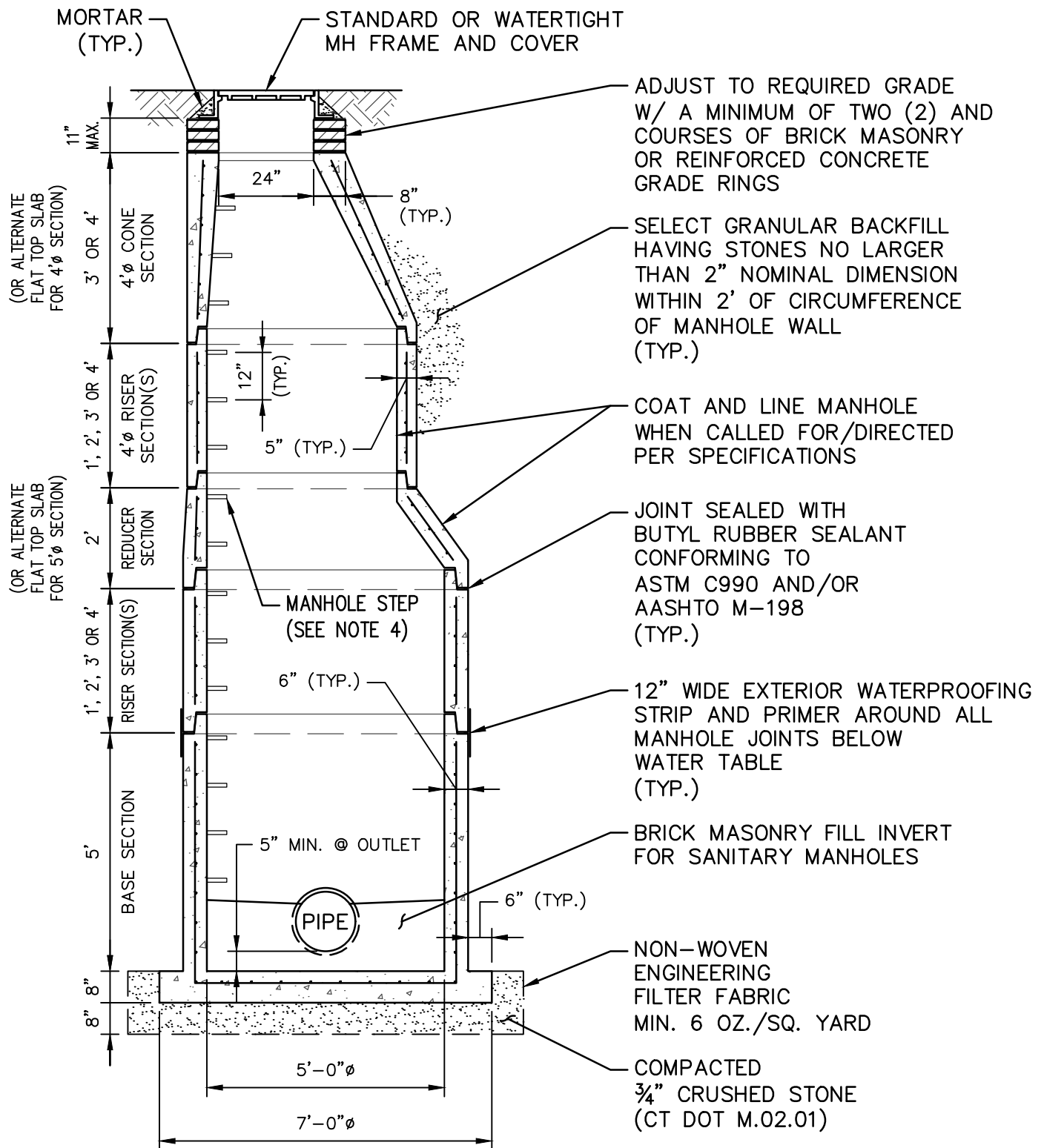
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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE

DWG. TITLE	4' DIA. MANHOLE	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	02601-1B
		PROJECT NO.	24-034-10



**Westcott and Mapes, Inc.**

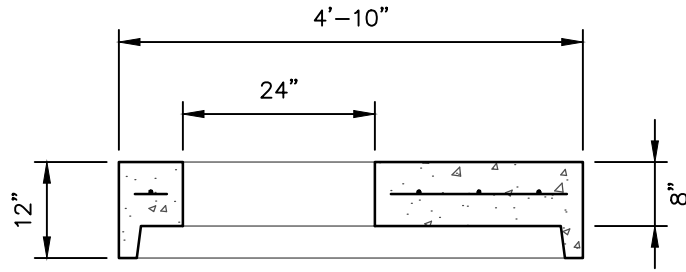
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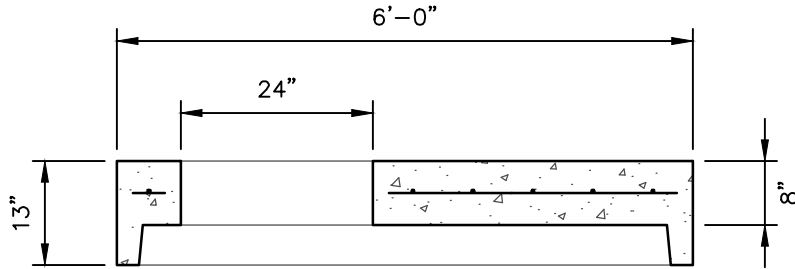
New Haven, CT 06510

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ALTERNATE FLAT TOP SLAB FOR 4'Ø SECTION



ALTERNATE FLAT TOP SLAB FOR 5'Ø SECTION

MANHOLE NOTES:

1. ALL PRECAST MANHOLE SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
2. CONCRETE COMPRESSIVE STRENGTH SHALL BE 5,000 PSI AT 28 DAYS.
3. MANHOLES SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C478, LATEST EDITION.
4. MANHOLE STEPS SHALL BE COPOLYMER POLYPROPYLENE COATED STEEL CORE. STEPS SHALL BE LOCATED 12" O.C. (AS INDICATED) AND IN VERTICAL ALIGNMENT.
5. INSTALL MANHOLE BASE ON 8" THICK BASE OF ¾" CRUSHED STONE.
6. REINFORCING STEEL SHALL CONFORM TO ASTM A185, A615 AND A706, LATEST EDITIONS, AS APPLICABLE.
7. APPLY MANHOLE PROTECTIVE COATING/LINING SYSTEM WHEN CALLED FOR OR DIRECTED, PER SPECIFICATIONS.
8. PROVIDE ANTI-FLOATATION COLLAR OR STAINLESS STEEL HOLD-DOWN BRACKETS TO CAST-IN-PLACE CONCRETE SUB-SLAB. MINIMUM UPLIFT FACTOR OF SAFETY SHALL BE 1.15. ASSUME GROUND WATER ELEVATION IS AT SURFACE; NEGLECT SOIL FRICTION.
9. PRECAST MANHOLES SHALL BE AS MANUFACTURED BY CONNECTICUT PRECAST CORPORATION (MONROE, CT), UNITED CONCRETE PRODUCTS, INC. (YALESVILLE, CT), OR APPROVED EQUAL.

## 5' DIA. MANHOLE

N.T.S.



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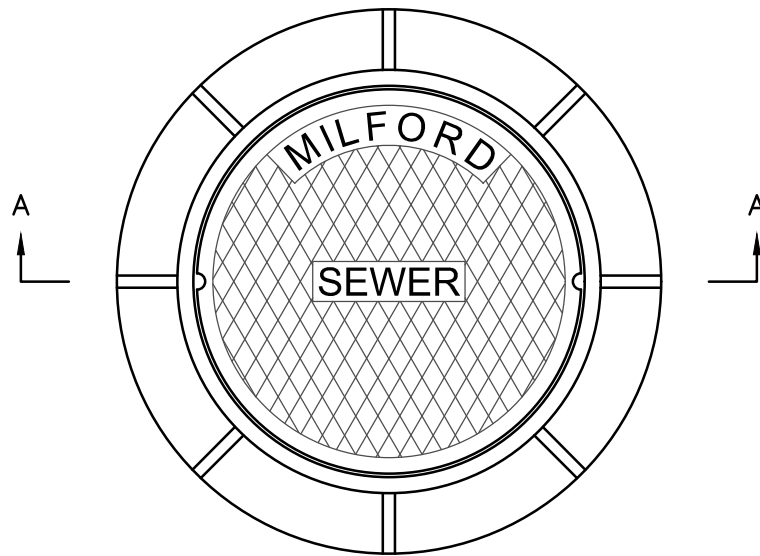
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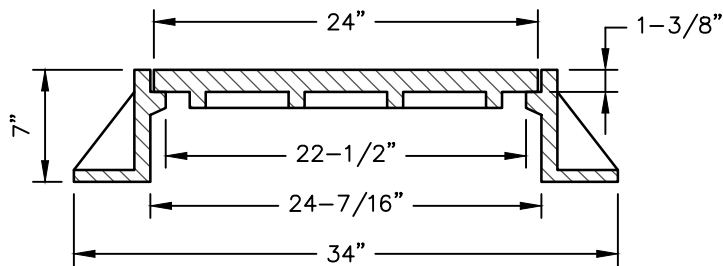
ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE

DWG. TITLE	5' DIA. MANHOLE	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	02601-2B
		PROJECT NO.	24-034-10



PLAN VIEW



SECTION A-A

NOTE:

MANHOLE FRAME AND COVER SHALL BE CAMPBELL  
FOUNDRY PATTERN 1032, OR APPROVED EQUAL.

## STANDARD SANITARY SEWER MANHOLE FRAME AND COVER

N.T.S.



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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE

DWG. TITLE STANDARD SAN. SEWER  
MH FRAME AND COVER

SCALE

AS NOTED

DRAWN BY

NWE DESIGN BY -

DWG. NO.

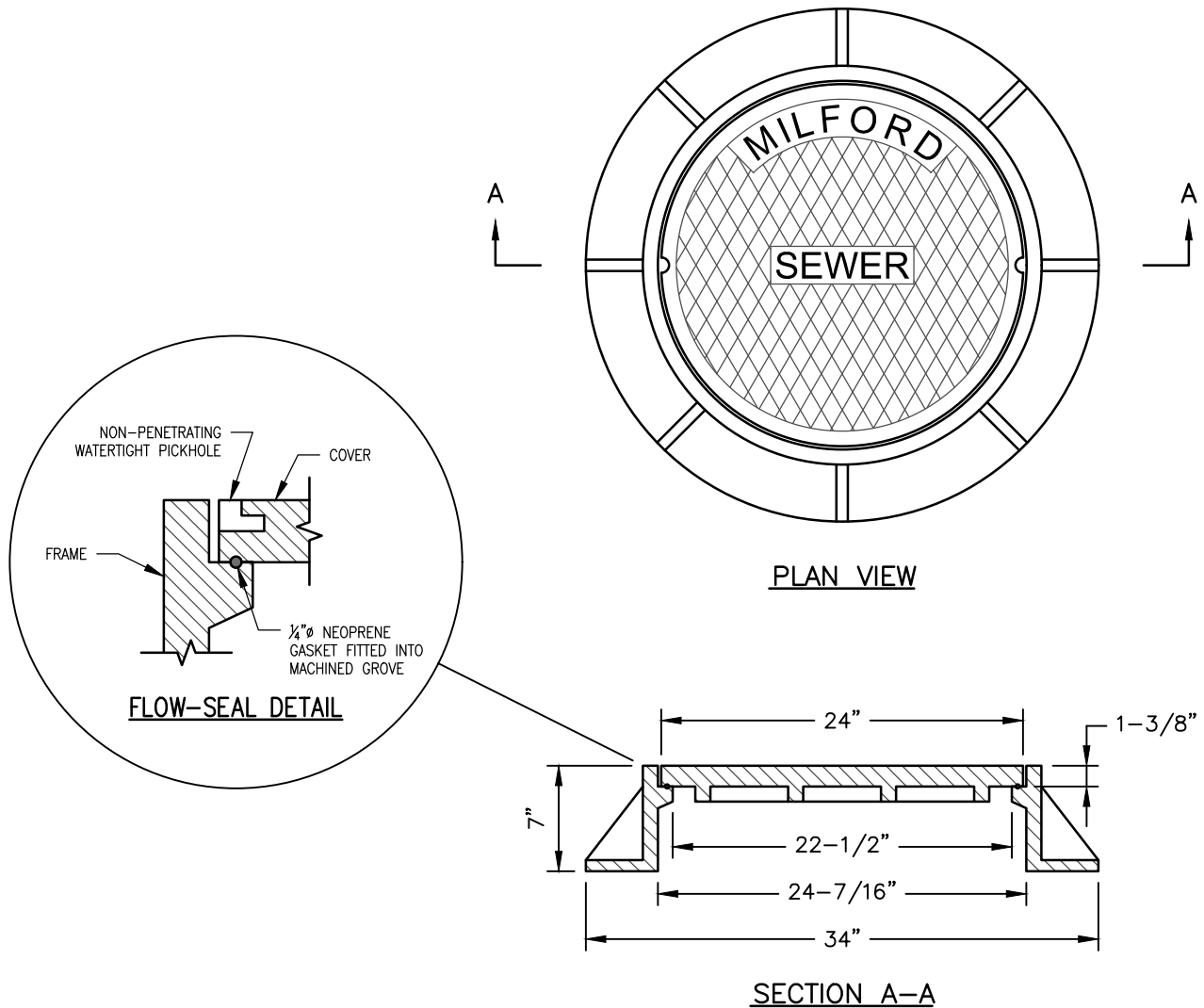
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DATE

02/06/2024

PROJECT NO. 24-034-10

FILE NAME: L:\PROJECTS-2024\24-034-00 CITY OF MILFORD ON-CALL PIPE LINING SPECIFICATIONS\DRAWINGS\24-034-10 DETAILS.DWG



**NOTE:**

MANHOLE FRAME AND COVER SHALL BE CAMPBELL  
FOUNDRY PATTERN 1032, OR APPROVED EQUAL.

# WATERTIGHT SANITARY SEWER MANHOLE FRAME AND COVER

N.T.S.



**Westcott and Mapes, Inc.**

Consulting Engineers since 1916

142 Temple Street, Suite 202  
New Haven, CT 06510  
Telephone: (203) 789-1260  
E-mail: info@westcottandmapes.com

ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE

WATERTIGHT SAN. SEWER  
MH FRAME AND COVER

DWG. TITLE

SCALE

AS NOTED

DRAWN BY

NWE

DESIGN BY

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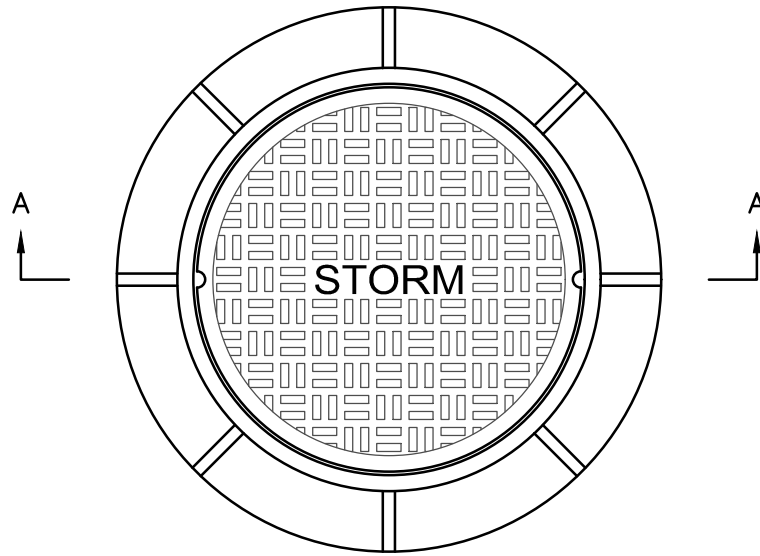
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02601-4

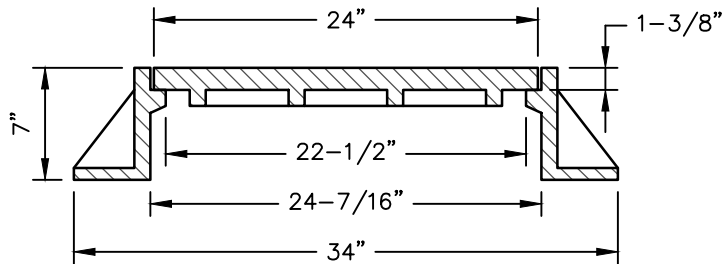
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02/06/2024

PROJECT NO. 24-034-10



PLAN VIEW



SECTION A-A

NOTE:

MANHOLE FRAME AND COVER SHALL BE CAMPBELL  
FOUNDRY PATTERN 1032, OR APPROVED EQUAL.

# STANDARD STORM SEWER MANHOLE FRAME AND COVER

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SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE

DWG. TITLE STANDARD STORM SEWER  
MH FRAME AND COVER

SCALE

AS NOTED

DRAWN BY

NWE DESIGN BY -

DWG. NO.

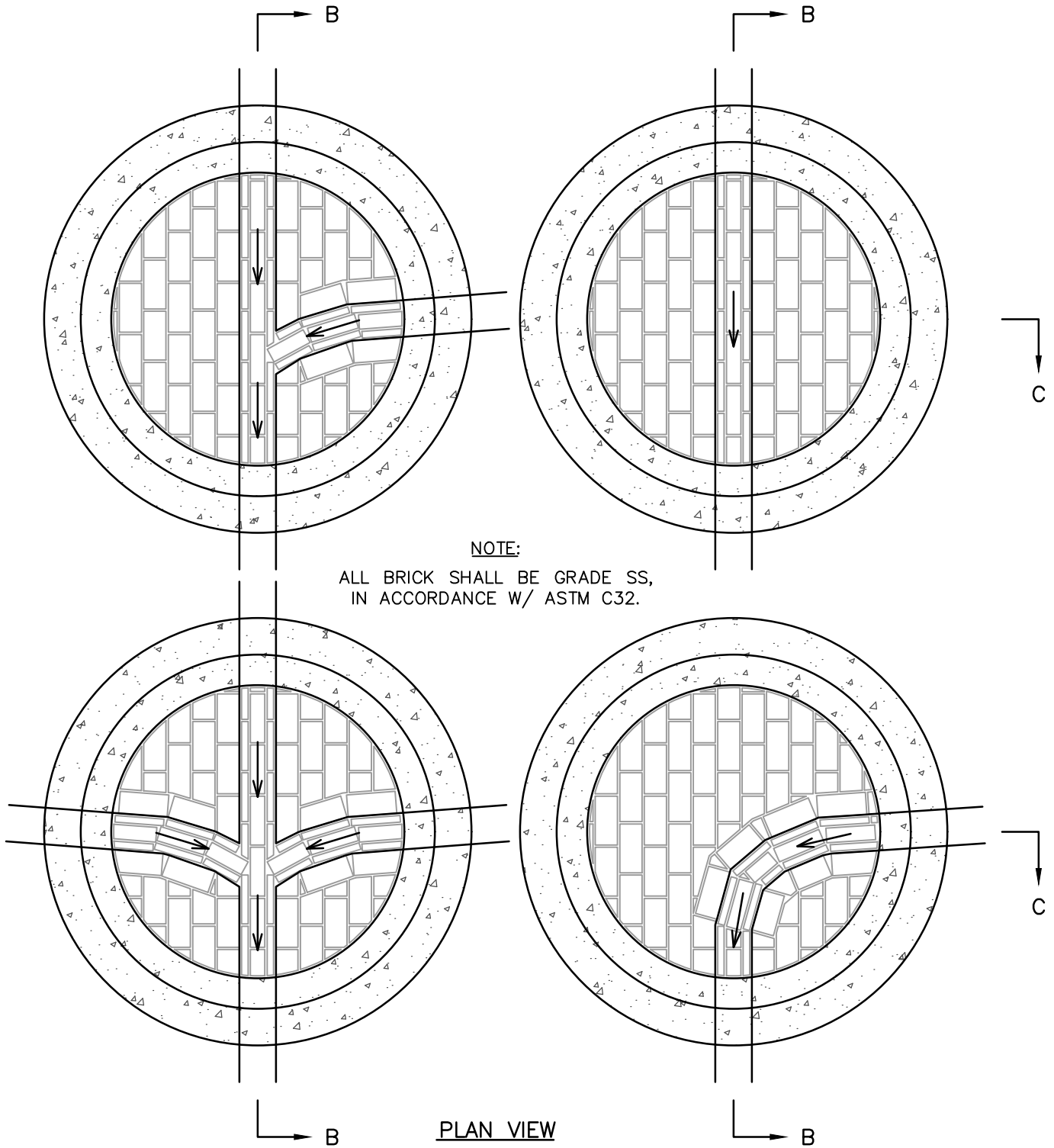
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DATE

02/06/2024

PROJECT NO.

24-034-10



## MANHOLE INVERT

N.T.S.



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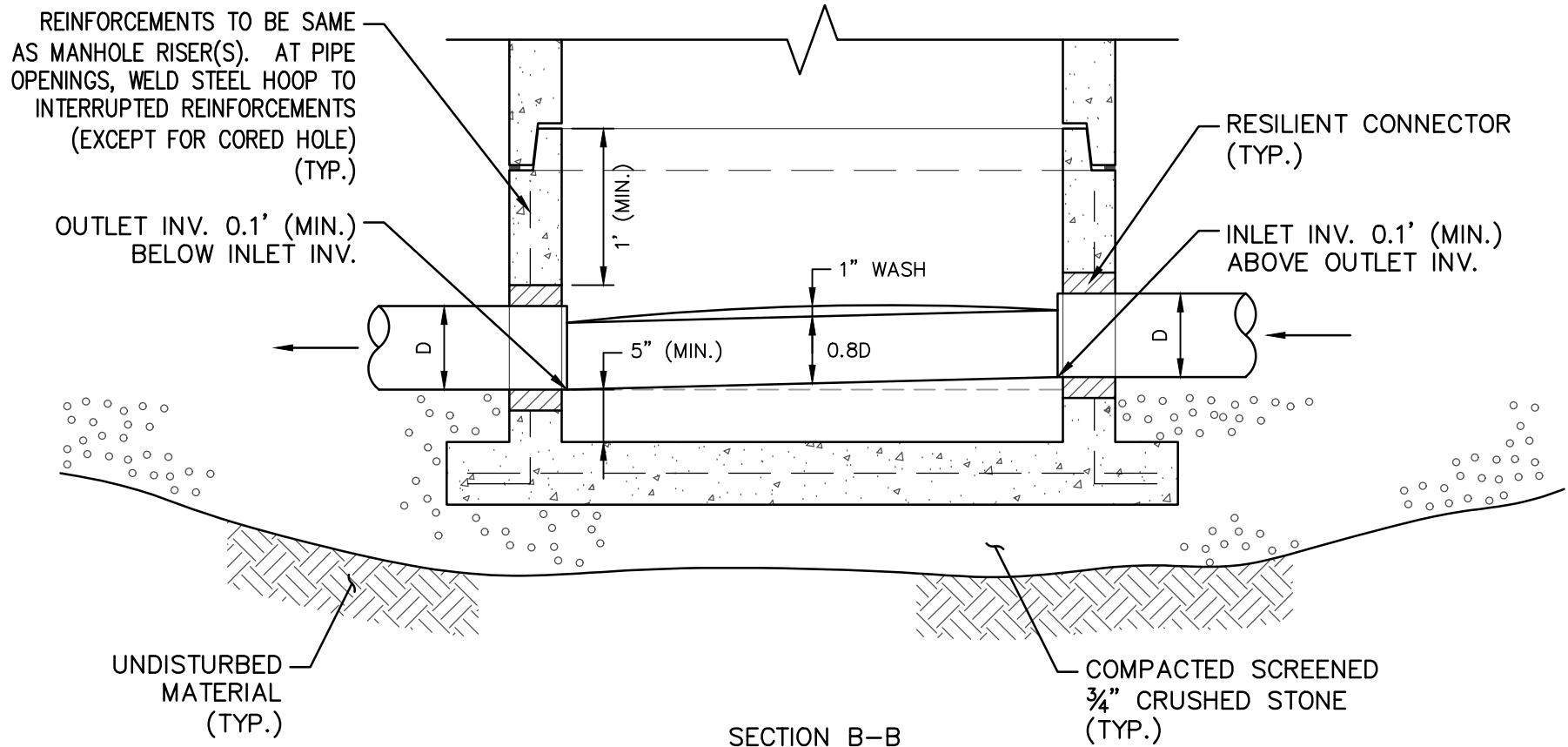
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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE	ON-CALL STORM AND SANITARY SEWER PIPE LINING MILFORD, CT		
DWG. TITLE	MANHOLE INVERT	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	02601-6A
		PROJECT NO.	24-034-10





SECTION B-B

# MANHOLE INVERT

N.T.S.



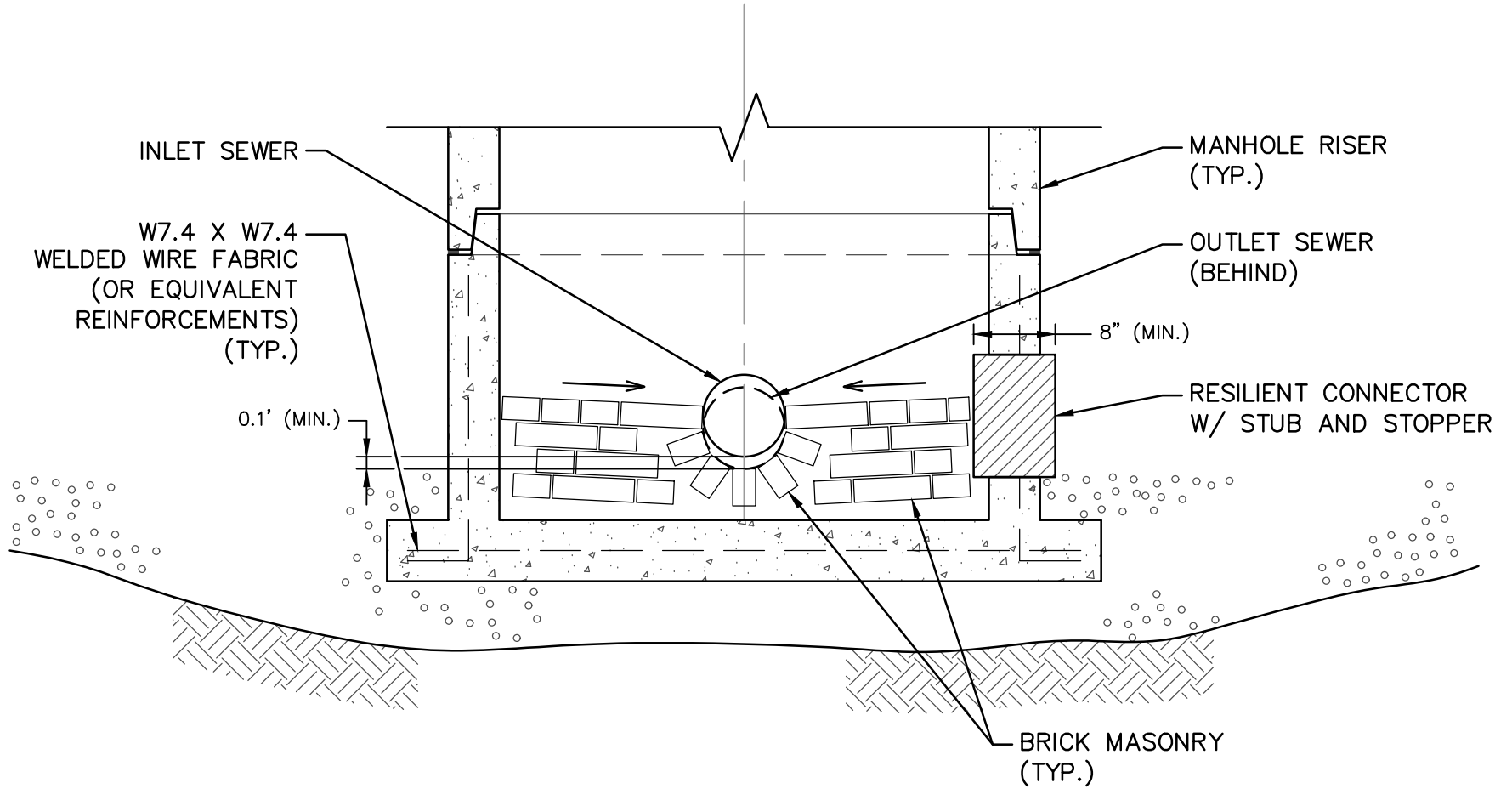
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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE	ON-CALL STORM AND SANITARY SEWER PIPE LINING MILFORD, CT		
DWG. TITLE	MANHOLE INVERT	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	02601-6B
		PROJECT NO.	24-034-10



SECTION C-C

# MANHOLE INVERT

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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE

DWG. TITLE

MANHOLE INVERT

SCALE

AS NOTED

DRAWN BY

NWE

DESIGN BY

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DWG. NO.

02601-6C

DATE

02/06/2024

PROJECT NO.

24-034-10

**SECTION 02602**

**CATCH BASINS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to construct storm sewer catch basins, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. Catch basins shall consist of the following components, as applicable.
  - 1. Precast Concrete Base (Sump) Section.
  - 2. Precast Concrete Walls: Risers and reducers.
  - 3. Brickwork or Reinforced Concrete Grade Rings (Spacers): Placed at top of reducer section for adjusting catch basin top to desired elevation (not to exceed 11 inches of total adjustment height).
  - 4. Precast Concrete Catch Basin Top: Type 'C' or Type 'C-L' top, as indicated/directed, with integral frame cast into structure. Frames shall be galvanized steel, unless otherwise directed.
  - 5. Galvanized Steel Grate: Type 'A' grate, unless otherwise directed.

**1.02 RELATED SECTIONS:**

- A. Section 02315 – Excavation and Trenching
- B. Section 02320 – Backfilling, Grading and Compaction
- C. Section 02510 – Bituminous Concrete Paving
- D. Section 02622 – Polyvinyl Chloride (PVC) Pipe and Fittings
- E. Section 02623 – High Density Polyethylene (HDPE) Pipe and Fittings

**1.03 REFERENCE STANDARDS:**

- A. American Society for Testing and Materials (ASTM) Publications and Standards (latest revision):
  - 1. C32 – Standard Specification for Sewer and Manhole Brick.
  - 2. C150 – Standard Specification for Portland Cement.
  - 3. C207 – Standard Specification for Hydrated Lime for Masonry Purposes.
  - 4. C270 – Standard Specification for Mortar for Unit Masonry.
  - 5. C478 – Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
  - 6. C913 – Standard Specification for Precast Concrete Water and Wastewater Structures.

SECTION 02602

CATCH BASINS

7. C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
8. C990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
- B. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

1.04 SUBMITTALS:

- A. Submit shop drawings showing all details of construction, including, but not limited to, structure dimensions, reinforcements, joints, and pipe connections to structures.
- B. Submit material certifications for all precast concrete units, catch basin frames and grates, brick masonry, grade rings, mortar, non-shrink waterproof grout, resilient pipe connectors, and other miscellaneous appurtenances.
- C. Submit design calculations including verification of adequate anti-floatation features and lateral earth pressures. Calculations shall verify that the structures have been designed to withstand the burial depth, submergence due to flooding, flotation and buoyant uplift, and dead and live loads.

1.05 QUALITY ASSURANCE:

- A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representative of the Owner. Such inspection may be made at the place of manufacture, or at the project site after delivery, or at both places, and the materials shall be subject to rejection at any time on account of failure to meet any of the drawing and/or specification requirements; even if samples have been previously accepted as satisfactory at the place of manufacture. Materials rejected after delivery to the project site shall be marked for identification and shall be removed from the site at once. Materials which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired (if permitted by the Engineer), or removed and replaced, at no additional cost to the Owner.
- B. At the time of inspection, the materials will be carefully examined for compliance with the drawings and these specifications, and with the approved shop drawings. Precast sections will be inspected for general appearance, dimension, scratch strength, blisters, cracks, other such impurities, roughness, and soundness. The precast concrete surfaces shall be dense and close-textured.
- C. Imperfections in catch basin sections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs can be performed. Repairs will be carefully inspected by the Engineer before final

**SECTION 02602**

**CATCH BASINS**

- approval. Cement mortar used for such repairs shall have a minimum compressive strength of 4,000 psi at 7 days, and 5,000 psi at 28 days, when tested using 3-inch by 6-inch cylinders stored in the standard manner. Epoxy mortar may also be utilized for such repairs, subject to approval by the Engineer.
- D. All personnel working in confined spaces shall have the appropriate confined space entry training, as appropriate. Precautions shall be taken by the Contractor to ensure the health and safety of his workers, the public, the Engineer and the Owner during construction, as may be required.
- E. Catch basins shall be adequately designed for lateral earth pressures and to resist floatation.

**PART 2 – PRODUCTS**

**2.01 PRECAST CONCRETE CATCH BASINS:**

- A. Precast concrete catch basin sections shall conform to ASTM C478, ASTM C913, and Section M.08.02 of *CT DOT Form 818*, and the following requirements:
1. Wall thickness shall be as indicated on the drawings, or as required by the applicable reference standards, whichever is greater. In general, the minimum wall thickness shall be 8 inches for all catch basins 10 feet deep or less, and 12 inches for all catch basins greater than 10 feet deep and less than 20 feet deep.
  2. Cement shall conform to ASTM C150, and be Type II, unless otherwise directed by the Engineer.
  3. Joint sealant between precast sections shall be butyl rubber type, unless otherwise indicated or directed.
  4. Knockouts for pipe connections shall be placed at the required locations and heights.
  5. Precast catch basins shall be designed for AASHTO HS-20 loading.
  6. The date of manufacture and the name and trademark of the manufacturer shall be clearly marked on each precast section.

**2.02 CATCH BASIN TOPS:**

- A. Catch basin tops shall be approved, factory-manufactured precast concrete units, and shall conform to Section M.08.02 of *CT DOT Form 818*.
- B. Frames and grates shall be galvanized steel, unless otherwise directed.
- C. Catch basin grates shall be Type 'A', unless otherwise directed.

SECTION 02602

CATCH BASINS

2.03 STRUCTURE JOINTS AND PIPE CONNECTIONS:

- A. Butyl rubber-based sealants shall be used between precast sections. Sealants shall conform to AASHTO M 198, Type B, and/or ASTM C990 (but no bitumen content).
- B. Resilient connectors for pipes to precast sections shall be provided per ASTM C923, and conform to the manufacturer's standards. Connectors using castings and bolts with non-resilient bearing are not acceptable.
- C. Rubber ring water-stops for use in pipe-to-structure joints shall be provided where indicated and/or directed. Rings shall be of resilient material that will fit snugly over pipes, and held firmly against pipe surfaces by means of a mechanical take-up device which when tightened will compress resilient material, or by a stretch fit. Water-stops shall be designed and installed so that leakage between the pipes and catch basin is minimized. Materials and manufacture of water-stops shall conform to ASTM C923.
- D. For pipe connections to existing catch basins, cutting into existing catch basins shall be performed by coring, or by mechanical means. Flexible pipe-to-structure connectors shall be KOR-N-SEAL, or an approved equal.
- E. Where flexible pipe-to-structure connectors cannot be used, as determined by the Engineer, non-shrink mortar shall be used for pipe connections to existing catch basins, of type and quality similar to the following:
  - 1. MasterFlow 713 Cement-Based Grout; and
  - 2. Five Star Cementitious Grout.

2.04 BRICK:

- A. Bricks shall be good, sound, hard and uniformly burned, regular and uniform in shape and size, of compact texture. Underburned or salmon brick will not be acceptable and only whole brick shall be used unless otherwise permitted. If bricks are rejected by the Engineer, they shall be immediately removed from the project site and satisfactory brick substituted, at no additional cost to the Owner.
- B. Bricks for building up and leveling precast catch basin tops, shall be Grade MS, in accordance with ASTM C32.
- C. Bricks are to be red, unless otherwise noted.

2.05 MIXES:

- A. Concrete:
  - 1. Cast-in-place concrete shall be Class "A" Concrete (PCC03340) or Class "C" Concrete (PCC03360), as indicated or directed by the Engineer, in accordance with Section M.03 of *CT DOT Form 818*.
  - 2. Precast concrete shall be in accordance with ASTM C478.

**SECTION 02602**

**CATCH BASINS**

**B. Mortar:**

1. Type S Mortar (ASTM C270): Composed of 1 part Portland cement,  $\frac{1}{2}$ -part hydrated lime, and  $3\frac{1}{2}$  to  $4\frac{1}{2}$  parts sand, by volume, with sufficient water to form a workable mixture.
2. Mortar for Plugging Lift Holes: Composed of 1 part Portland cement and  $1\frac{1}{2}$  parts sand, by volume, with sufficient water to form a workable mixture.

**2.06 MISCELLANEOUS MATERIALS:**

- A. Portland Cement: ASTM C150, Type II.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Sand: Fine aggregate, for mortar, conforming to Section M.11.04, Grading "B", of *CT DOT Form 818*.
- D. Filter Fabric: Non-woven, 6-ounce per square yard (minimum), medium survivability, separation type geotextile, Mirafi® 160N by TenCate Mirafi, or approved equal.

**PART 3 – EXECUTION**

**3.01 GENERAL:**

1. Excavation and backfilling for installation of catch basins shall conform to the requirements of Section 02315 – Excavation and Trenching, and Section 02320 – Backfilling, Grading and Compaction.
2. Catch basins shall be set atop 8 inches (minimum) of compacted granular fill or screened gravel, as indicated on the drawings or as directed by the Engineer, unless otherwise noted. For more information, refer to Section 02320 – Backfilling, Grading and Compaction.
3. Construct catch basins to the dimensions shown on the drawings, as specified herein, or as directed by the Engineer. Protect all work against flooding and floatation.

**3.02 SETTING PRECAST SECTIONS:**

- A. Set vertical with sections in alignment. Set bases true to line and elevation.
- B. Install butyl rubber-based sealants in joints between precast sections, conforming to manufacturer's standards.
- C. Plug holes for the handling of precast sections with mortar. Hammer mortar into holes until dense and excess of paste appears, then smooth flush with adjoining surface.

**3.03 LAYING BRICKWORK AND GRADE RINGS:**

- A. Moisten bricks before laying. Moistening of grade rings is not permitted.

SECTION 02602

CATCH BASINS

- B. Lay bricks and grade rings in full bed of mortar without subsequent grouting, flushing, or filling; and bond thoroughly.

3.04 PLASTERING AND CURING BRICK MASONRY:

- A. Plaster outside faces with mortar for brick,  $\frac{1}{4}$  inch to  $\frac{3}{8}$  inch thick.
- B. Moisten brick masonry before application of mortar.
- C. Spread and trowel plaster carefully.
- D. Check after hardening by tapping for bond and soundness.
- E. Remove and replace unbonded and unsound plaster.
- F. Protect from too rapid drying using moist burlap, or as approved by the Engineer.
- G. Protect from weather and frost, as required.

3.05 JOINTING AND CONNECTIONS:

- A. Joints between precast sections, and between pipes and precast sections, shall conform to the related standards and manufacturer's instructions.
- B. Rubber ring water-stops for pipe-to-structure connections: Hold firmly against pipe surface by mechanical take-up device to compress resilient material when tightened. Install to minimize leakage.
- C. Apply non-shrink mortar according to manufacturer's instructions.
- D. Close openings for future connections with brick masonry bulkhead, as indicated.

3.06 SETTING CATCH BASIN TOPS:

- A. Set catch basin tops conforming to finished ground or pavement surface, as indicated and directed.
- B. The top uppermost precast catch basin section shall be set at a grade that will allow a minimum of two (2) courses and a maximum of 11 inches of brick masonry, or reinforced precast concrete grade rings, and mortar before setting the precast concrete catch basin top.
- C. Unless otherwise noted, catch basin tops shall be set in alignment with the longitudinal slope of the gutter. Catch basin tops shall be positioned (both vertical and horizontal) in such a manner that provides for the adequate collection of surface runoff and/or gutter flow.
- D. Top of frame elevations for curbed catch basins (Type 'C') shall be measured at the center of the grate at the gutter line. Top of frame elevations for curb-less catch basins (Type 'C-L') shall be measured at the center of the grate.
- E. Place grates in frames (integral with catch basin top) upon completion of the work.



SECTION 02602

CATCH BASINS

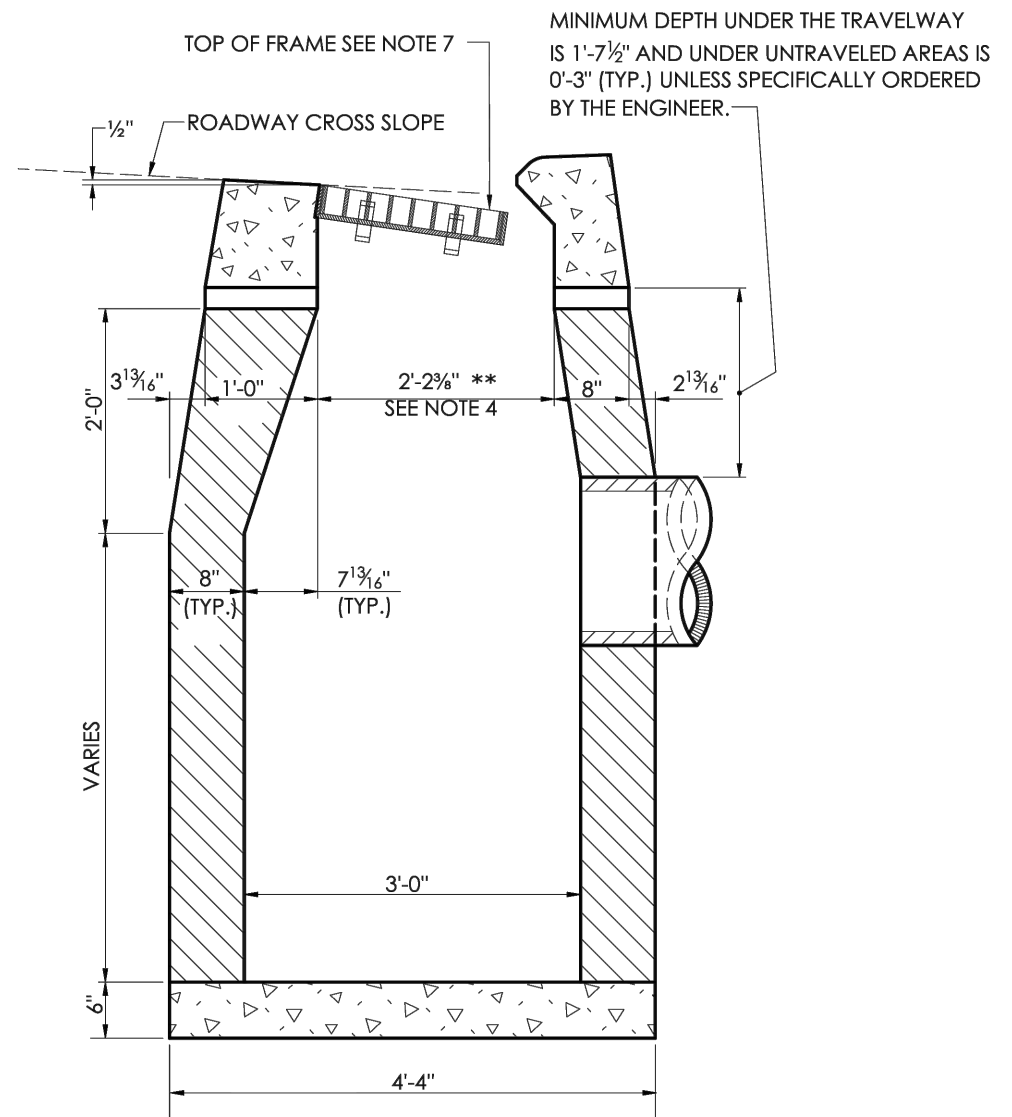
3.07 LEAKAGE TESTS:

- A. Inspect for visible leakage after backfill has been placed and compacted to finished grade, with groundwater at normal level.
- B. Locate and repair any/all visible leakage inside the structures.

3.08 CLEANING:

- A. The Contractor shall clean new catch basins, and existing disturbed and/or modified catch basins, of all silt, debris, and other foreign matter of any kind, prior to final inspection.
- B. If said cleaning is not satisfactory for the Engineer's final review and inspection, the Contractor shall perform additional cleaning at no additional cost to the Owner.

END OF SECTION



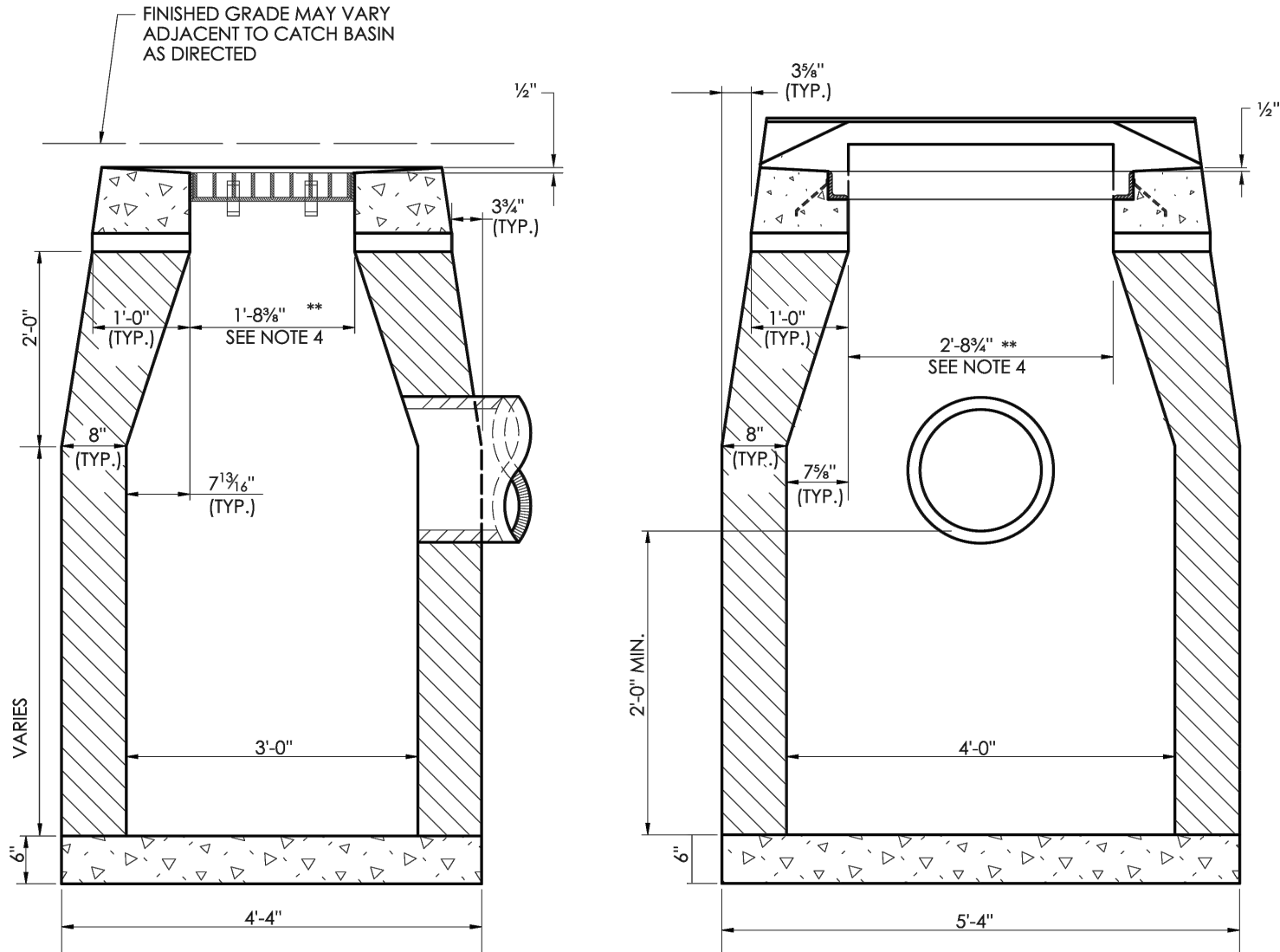
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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE	MILFORD, CT				
DWG. TITLE	TYPE 'C' CATCH BASIN	SCALE		AS NOTED	
DRAWN BY	NWE	DESIGN BY	—	DWG. NO.	02602-1A
DATE	02/06/2024			PROJECT NO.	24-034-10



## TYPE 'C-L' CATCH BASIN

N.T.S.



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SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE	ON-CALL STORM AND SANITARY SEWER PIPE LINING MILFORD, CT		
DWG. TITLE	TYPE 'C-L' CATCH BASIN	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	02602-1B
		PROJECT NO.	24-034-10

CATCH BASIN NOTES:

1. ALL FACES OF STRUCTURES IN CONTACT WITH CONCRETE PAVEMENT SHALL BE COVERED WITH A LAYER OF TAR PAPER OR APPROVED EQUAL. THE COST FOR THE PAPER SHALL BE INCLUDED IN THE BID PRICE FOR THE TYPE OF CATCH BASIN INSTALLED.
2. WALL THICKNESS OF ALL CATCH BASINS OVER 10' DEEP SHALL BE INCREASED TO 12" THICK. INSIDE DIMENSIONS SHALL REMAIN THE SAME. 12" THICKNESS SHALL START AFTER THE FIRST 10'.
3. TO CONVEY SUBSURFACE DRAINAGE, OPENINGS SHALL BE FORMED IN THE FOUR WALLS AT OR IMMEDIATELY ABOVE THE BOTTOM OF THE PVIOUS BACKFILL.
4. IF MASONRY UNITS ARE REQUIRED, THE BASIN SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE DIMENSIONS SHOWN HERE AND SECTION 5.86 OF THE STATE OF CONNECTICUT'S STANDARD SPECIFICATIONS (FORM 818). CORBELLING SHALL BE PERMITTED TO A MAXIMUM OF 3". NO PROJECTION SHALL EXTEND INSIDE THE LIMITS NOTED BY \*\*.
5. MINIMUM CONCRETE COMPRESSIVE STRENGTH OF  $F'_c = 4,000$  PSI (27,580 kPa) SHALL BE OBTAINED PRIOR TO SHIPPING.
6. LATEST STATE OF CONNECTICUT'S STANDARD SPECIFICATIONS AND SUPPLEMENTALS SHALL GOVERN.
7. TOP OF FRAME (TF) ELEVATION SHALL BE MEASURED IN THE CENTER OF GRATE AT GUTTER LINE.
8. SPACERS CAN BE EITHER CONCRETE MASONRY UNIT (CMU) OR PRECAST WITH THE REQUIRED REINFORCING (RECOMMENDED BY THE MANUFACTURER) AS NEEDED TO PROVIDE THE PROPER GRADE SHOWN ON THE PLANS.
9. INSTALL CATCH BASIN ON 8" THICK BASE OF  $\frac{3}{4}$ " CRUSHED STONE.

CATCH BASIN NOTES



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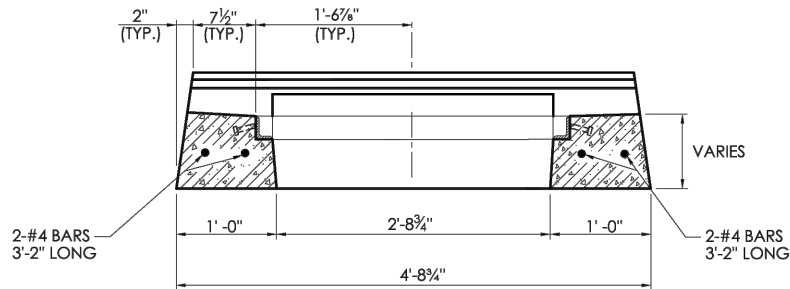
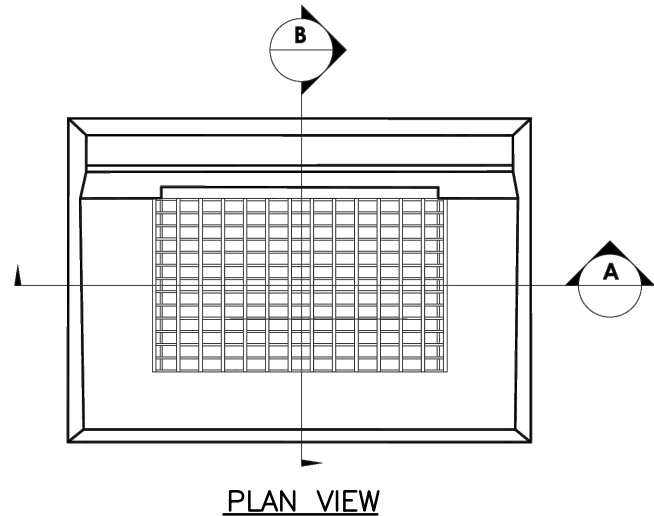
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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

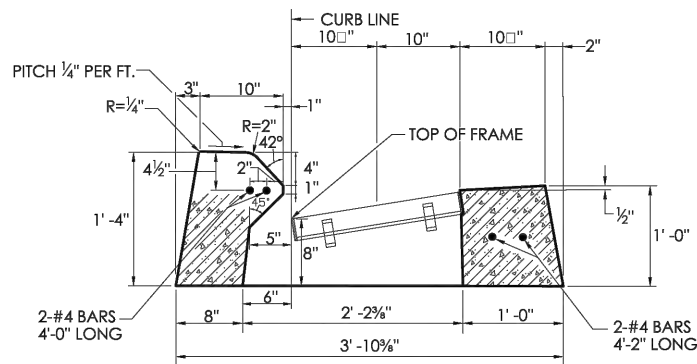
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DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	02602-1C
		PROJECT NO.	24-034-10

#### NOTES:

1. CATCH BASIN TOPS SHALL BE APPROVED PRECAST UNITS, FACTORY MANUFACTURED.
2. VARY THE CROSS SLOPE OF THE GUTTER IN THE VICINITY OF THE CATCH BASIN TO MATCH THE CATCH BASIN TOP.
3. CATCH BASIN TOPS SHALL BE SET IN ALIGNMENT WITH THE LONGITUDINAL SLOPE OF THE GUTTER, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
4. FRAMES AND GRATES SHALL BE GALVANIZED STEEL PER CT DOT SPECIFICATIONS.
5. CATCH BASINS ADJACENT TO BITUMINOUS CONCRETE CURBING SHALL BE CT DOT STANDARD TYPE "C" TOPS FOR "BITUMINOUS CURB".
6. CATCH BASINS ADJACENT TO CONCRETE CURBING SHALL BE CT DOT STANDARD TYPE "C" TOPS FOR "CONCRETE CURBING".
7. FOR MORE INFORMATION, SEE CT DOT STANDARD DETAIL HW-586\_07a - CATCH BASIN TOPS TYPE "C" AND "C-L".



**SECTION A**



**SECTION B**

## TYPE 'C' CATCH BASIN TOP

N.T.S.



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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE

DWG. TITLE

TYPE 'C' CB TOP

SCALE

AS NOTED

DRAWN BY

NWE

DESIGN BY

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DWG. NO.

02602-2A

DATE

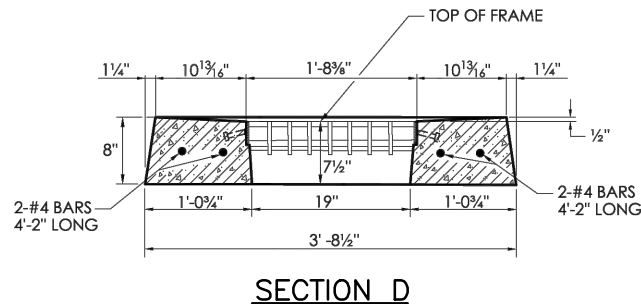
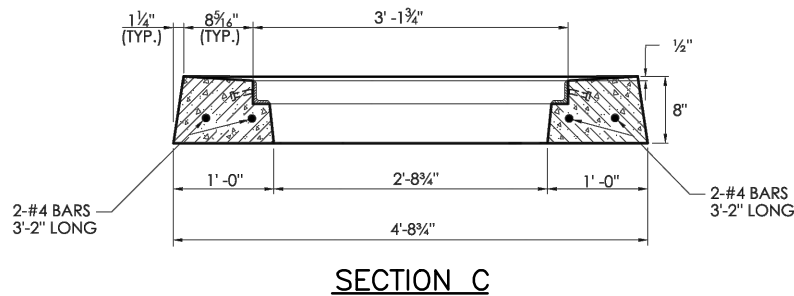
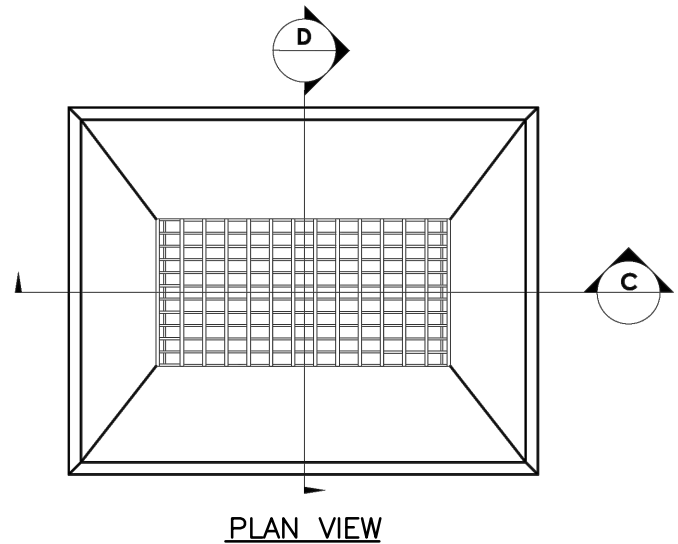
02/06/2024

PROJECT NO.

24-034-10

# NOTES:

1. CATCH BASIN TOPS SHALL BE APPROVED PRECAST UNITS, FACTORY MANUFACTURED.
2. VARY THE CROSS SLOPE OF THE GUTTER IN THE VICINITY OF THE CATCH BASIN TO MATCH THE CATCH BASIN TOP.
3. FRAMES AND GRATES SHALL BE GALVANIZED STEEL PER CT DOT SPECIFICATIONS.
4. CATCH BASINS ADJACENT TO BITUMINOUS CONCRETE CURBING SHALL BE CT DOT STANDARD TYPE "C" TOPS FOR "BITUMINOUS CURB".
5. CATCH BASINS ADJACENT TO CONCRETE CURBING SHALL BE CT DOT STANDARD TYPE "C" TOPS FOR "CONCRETE CURBING".
6. FOR MORE INFORMATION, SEE CT DOT STANDARD DETAIL HW-586\_07a - CATCH BASIN TOPS TYPE "C" AND "C-L".



## **TYPE 'C-L' CATCH BASIN TOP** N.T.S.



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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

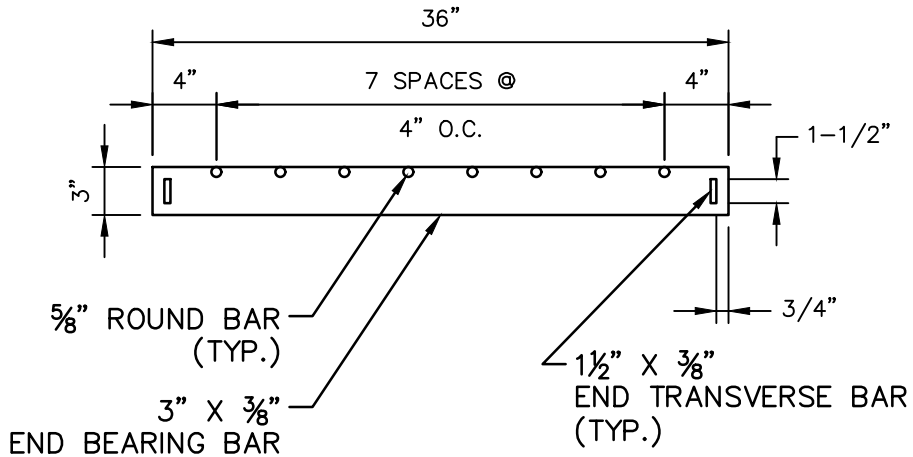
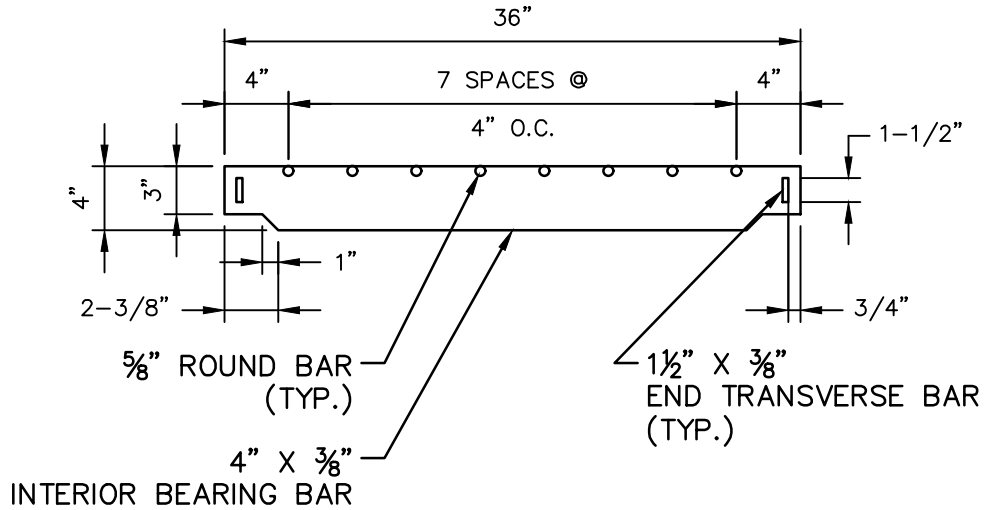
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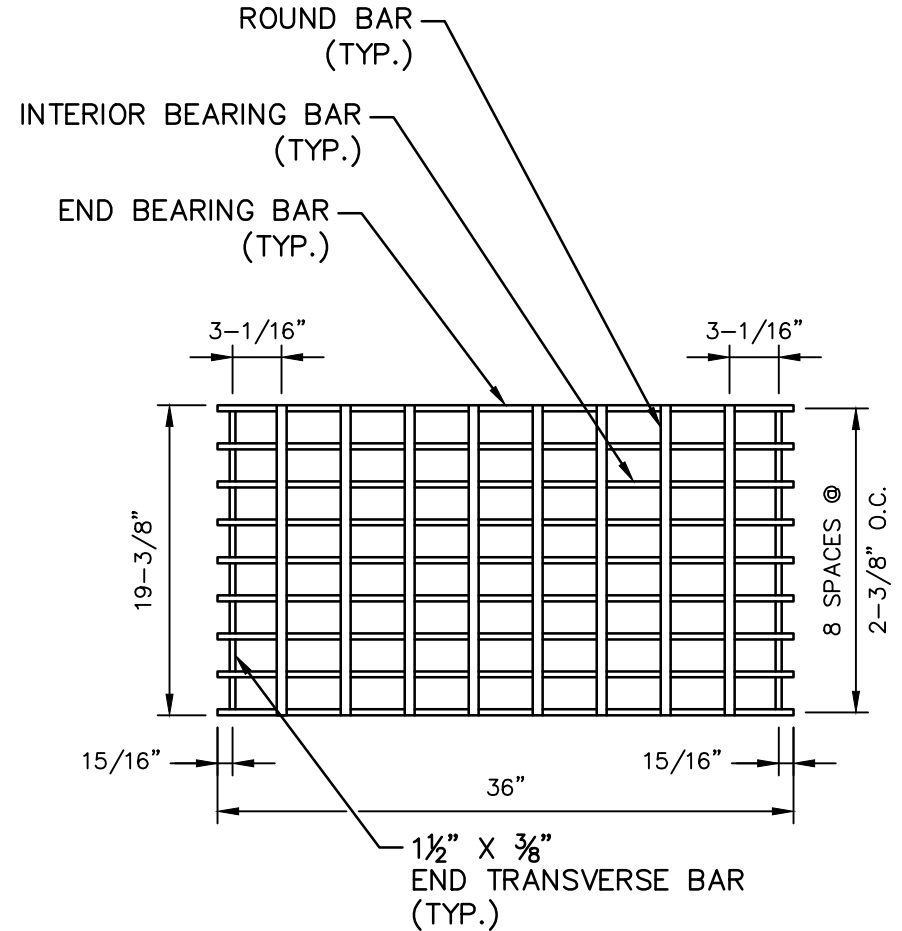
DRAWN BY NWE DESIGN BY - DWG. NO. 02602-2B

DATE 02/06/2024 PROJECT NO. 24-034-10

### ELEVATION VIEW — INTERIOR BEARING BAR



### ELEVATION VIEW — END BEARING BAR



### PLAN VIEW

## CATCH BASIN GRATE (TYPE A)

N.T.S.

ON-CALL STORM AND SANITARY  
SEWER PIPE LINING

PROJ. TITLE MILFORD, CT

DWG. TITLE CATCH BASIN GRATE SCALE AS NOTED

DRAWN BY NWE DESIGN BY — DWG. NO. 02602-2C

DATE 02/06/2024 PROJECT NO. 24-034-10



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**SECTION 02622**

**POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to install and test Polyvinyl Chloride (PVC) pipe and fittings for the construction of storm and sanitary sewers and force mains, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. Unless otherwise specified, all PVC pipe shall be solid wall pipe.
- C. The Contractor shall provide approved adapters for transition to other types of pipes.

**1.02 RELATED SECTIONS:**

- A. Section 02315 – Excavation and Trenching
- B. Section 02320 – Backfilling, Grading and Compaction
- C. Section 02601 – Manholes
- D. Section 02602 – Catch Basins
- E. Section 02623 – High Density Polyethylene (HDPE) Pipe and Fittings
- F. Section 02953 – Storm and Sanitary Sewer Point Repairs

**1.03 REFERENCE STANDARDS:**

- A. American Society for Testing and Materials (ASTM) Publications and Standards (latest revision):
  - 1. C1173 – Standard Specification for Flexible Transition Couplings for Underground Piping Systems.
  - 2. D1784 – Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
  - 3. D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
  - 4. D3034 – Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  - 5. D3139 – Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
  - 6. D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.



SECTION 02622

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

7. F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
8. F679 – Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- B. American Water Works Association (AWWA) Publications and Standards (latest revision):
  1. C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. Through 60 in. (100 mm through 1,500 mm).
- C. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

1.04 SUBMITTALS:

- A. Shop drawings and manufacturer's descriptive literature showing detailed pipe dimensions.
- B. Joints, joint gaskets, pipe stiffness, and other such details for each size of pipe indicated or required.
- C. Gasket and pipe manufacturers' joint assembly directions.
- D. Submit certification, with each delivery, that pipe and fittings comply to this specification.
- E. Submit certified copies of test reports, with each delivery, stating compliance with the appropriate reference standards specified herein

1.05 QUALITY ASSURANCE:

- A. Provide any/all labor necessary to assist the Engineer in inspecting pipe upon delivery to project site(s). Pipe rejected after delivery shall be visibly marked for identification, and shall be immediately removed from the project site(s).
- B. Perform tests in accordance with the methods prescribed by ASTM standards.
- C. Reject pipe of any manufacturer if more than five (5) unsatisfactory joint assembly operations or "bell breaks" in 100 consecutive joints, even if they conform to ASTM standards. Remove all unsatisfactory pipe of that manufacturer of same shipment from the work, and furnish pipe from another manufacturer conforming to these specifications.
- D. Each type of pipe and fittings shall be from a single manufacturer. If this is not the case, the pipe manufacturer shall provide certification that the fittings are suitable for installation and use with the pipe.

SECTION 02622

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- E. The manufacturer shall have manufacturing and quality assurance facilities capable of producing and assuring the quality of the pipe and fittings required by these specifications.

**PART 2 – PRODUCTS**

**2.01 PIPE, FITTINGS, AND SPECIALS:**

- A. Polyvinyl Chloride (PVC) gravity pipe and fittings, including those required for stubs and service laterals or building connections, shall meet the requirements of ASTM D3034 for pipe sizes up through 15 inches, or ASTM F679 for pipe sizes from 18 inches through 36 inches. Pipe stiffness (PS) shall be 46 psi (minimum) when tested in accordance with ASTM D2412. PVC material shall have a cell classification 12454 or 1254, as defined in ASTM 1784, with a minimum modulus of elasticity of 400,000 psi in tension.
- B. Where indicated on the plans or directed by the Engineer, pipe and fittings for sanitary gravity sewers and building connections shall meet the requirements of AWWA C900.
- C. Service lateral pipe utilized for residential gravity sewer service connections and chimneys shall be 6 inches in diameter. Commercial service connections shall be 8 inches in diameter.
- D. Provide straight pipe in lengths of 20 feet maximum, and Y-branches in lengths of 3 feet maximum. Saddle Y-branches are not acceptable.
- E. Provide specials as indicated on the drawings or as specified herein, in conformance with these specifications for straight pipe insofar as applicable.
- F. Provide approved stainless steel “shear ring” type flexible transition couplings, as indicated on the drawings or as directed by the Engineer, designed by the manufacturer for connecting new PVC sewer pipe to existing sewer pipe materials, including vitreous clay sewer pipe and manhole pipe stubs, as follows:
  - 1. Clamps: Conforming to CSA B602.
  - 2. Shear Ring: 0.12 inches thick, 300 Series stainless steel.
  - 3. Coupling: Conforming to ASTM C1173.
  - 4. As manufactured by Fernco Inc., Mission Rubber Company LLC, or approved equal.
- G. “Inserta Tee” Polyvinyl Chloride (PVC) lateral connection specialty fittings furnished under these specifications shall be watertight bell connection fittings conforming to ASTM D3034 and the requirements as follows:
  - 1. Band: SS No. 301, ASTM F477.
  - 2. Screw: SS No. 305.
  - 3. Housing: SS No. 301, ASTM F477.

**SECTION 02622**

**POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS**

4. As manufactured by Inserta Tee Technologies, or approved equal.
- H. Polyvinyl Chloride (PVC) force main pipe furnished under these specifications shall conform to the requirements of AWWA C900 as follows:
  1. Joints: Conforming to ASTM D3139.
  2. Gaskets: Conforming to ASTM F477.
  3. Pressure Class: 150.
  4. Standard Dimension Ratio (SDR): 18 (maximum).

**2.02 JOINTS:**

- A. Joints shall conform to ASTM D3212 for gravity sewers, and ASTM D3139 for force main sewers.
- B. Provide push-on bell and spigot joints with elastomeric ring gaskets.
- C. Gaskets shall conform to ASTM F477, and be resistant to common ingredients of sewage and industrial wastes, including oils and groundwater; and capable of enduring such ingredients permanently under proposed conditions. Fix gaskets into place in bells to avoid dislodging during joint assembly.

**PART 3 – EXECUTION**

**3.01 INSPECTION:**

- A. Examine excavation before pipe placement to ensure:
  1. The excavation is complete to the elevations and slopes required.
  2. No obstructions exist which would interfere with pipe installation.
  3. The bottom of the excavation is firm and dry.
- B. Inspect each pipe and fitting before installation. Remove any/all defective pipe, and replace it with sound pipe.

**3.02 HANDLING:**

- A. Store until installation in a manner acceptable to the Engineer; keep pipe at ambient outdoor temperature.
- B. Provide temporary shading, as required.
- C. Do not use covering which may cause temperature build-up.
- D. Otherwise handle pipe materials with care to avoid damage, using methods acceptable to the Engineer.

SECTION 02622

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

3.03 INSTALLATION:

- A. Pipe shall be installed starting from the downstream end of the system, and working upstream, unless otherwise directed by the Engineer.
- B. Do not install non-straight pipe:
  - 1. Do not allow pipe centerline to deviate from straight line drawn between ends, by more than  $\frac{1}{16}$  inch per foot of pipe length.
  - 2. Remove pipe failing to meet above requirement.
- C. Support pipe on compacted screened gravel in accordance with Section 02320 – Backfilling, Grading and Compaction. Do not permanently support on saddles, blocking or stones.
- D. Excavate bell holes so that only the pipe barrel receives bearing pressure.
- E. Clear pipe units of debris, dirt, and any other foreign material before installation, and keep clean until acceptance.
- F. Install pipe to the lines and grades required.
- G. The new sewer pipeline alignment shall be set with a properly calibrated pipe laser. The laser beam projector shall be rigidly mounted with two-point suspension to its support platforms. The laser shall be operated by competent, trained personnel. The Contractor shall establish centerline and offset stakes at each manhole or catch basin. Laser aligning shall not be used to establish a continuous line in excess of 300 feet.
- H. Maintain close joints with previously installed pipe. Match with adjoining pipe.
- I. Do not drive pipe down to required grade by striking.
- J. Clean joint surfaces. Lubricate bell according to manufacturer's recommendation. Push pipe unit into place without damage to pipe or gasket. Use devices to force pipes together with minimum open recess inside and outside, and tightly seal joints. Avoid force that could wedge apart and split bell ends.
- K. Do not pull or cramp joints without permission of the Engineer.
- L. Remove unfittable pipes, and replace with sound pipe units.
- M. Follow directions of joint material and pipe manufacturers when installing gaskets and joints to render them watertight and flexible.
- N. Close open ends of pipe and branches with secured-in-place PVC stoppers.
- O. After bedding pipe, place and compact screened gravel between pipe and sides of trench. Use extra care to compact screened gravel under lower half of pipe. Fill bell holes with screened gravel and compact. Place and compact screened gravel as required.

SECTION 02622

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- P. All excavations shall be kept dry while pipe is being laid and until each joint and pipe has been inspected by the Engineer and approval given to commence backfilling operations. Any pipe which is not laid to grade and alignment shall be re-laid to the satisfaction of the Engineer.
- Q. Prevent pipe flotation in trench.
- R. Make open ends of pipe and branches watertight with temporary plugs when pipe installation is not in progress.
- S. If water is in the trench, do not remove the plug until provisions are made to prevent water, earth, or other substances from entering the pipe; then resume work.
- T. Do not use the pipeline as a conductor for trench drainage.
- U. Cleaning:
  - 1. Prevent earth, water, and other material from entering the pipeline.
  - 2. Clean pipeline, manholes, and catch basins upon completion.
- V. At locations in the field, as determined by the Engineer, the Contractor shall furnish and install 6-inch or 8-inch wye branches or tees. The depth of cover from the road surface to the top of the branch and the distance from the downstream manhole shall be recorded. No wyes or tees shall be backfilled before location measurements are taken.
- W. Service connections shall be installed to within 2 feet of the street line at a minimum slope of  $\frac{1}{4}$  inch per foot, unless otherwise directed by the Engineer. A 2-inch by 2-inch pressure-treated wood stake marker shall be installed at the end and tied into a minimum of three (3) points including, if possible, the permanent corners of the building which is to be served. A range line tie shall also be recorded. The depth of cover from ground surface to the top of pipe at the cap shall be recorded. The standard minimum depth of the lateral at its end is to be 7 feet below the edge of pavement grade.

3.04 ALLOWABLE PIPE DEFLECTION:

- A. Allow a maximum deflection of installed pipe of 5 percent of the base diameter.
- B. Measure deflection after completion of a section, including placement and compaction of backfill. Pull a specially designed gage through completed section. Use a gage as recommended by the pipe manufacturer and accepted by the Engineer.
- C. Provide base diameter and gage diameter (diameter of circumscribing circle):

*(See Next Page)*

SECTION 02622

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

Nominal Size (in.)	Base Diameter (in.)	Gage Diameter (in.)
6	5.742	5.45
8	7.665	7.28
10	9.563	9.08
12	11.361	10.79
15	13.898	13.20
18	16.969	16.12
21	19.990	18.99
24	22.453	21.33
27	25.280	24.02

- D. Should the installed pipe fail to meet the above requirement, the Contractor shall perform all work necessary to correct the problem without additional compensation.

3.05 LEAKAGE TESTS:

- A. Perform leakage tests and measurements:
1. After completion of sewer line, including service connections, backfill and compaction, and manhole/joints showing any sign of leakage have been repaired.
  2. After return of groundwater to normal.
- B. Furnish test plugs, water pumps, appurtenances, and labor. Install bulkheads for testing and weirs for measurements, as necessary.
- C. Determine groundwater elevation from observation wells or excavations subject to acceptance by the Engineer.
- D. Conduct low-pressure air tests; unless the maximum pressure exerted by groundwater is greater than 4 psig, then conduct an infiltration test.
- E. Perform infiltration test on sections of approved length and before connection to buildings. Perform low pressure air tests on manhole-to-manhole sections of pipeline.
- F. Low-pressure air test:
1. Equipment:
    - a. Designed for testing sewers using low-pressure air.
    - b. Provide air regulator or safety valve so air pressure does not exceed 8 psig.
    - c. Air through single control panel.
  2. Procedure:
    - a. Perform tests from manhole-to-manhole after backfill has been completed.

SECTION 02622

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- b. Place pneumatic plugs. Sealing length shall be greater than or equal to the pipe diameter. Plugs shall be capable of resisting internal test pressure without external bracing or blocking.
  - c. Introduce low-pressure air into sealed line and achieve internal air pressure 4 psig greater than the maximum pressure exerted by groundwater above the pipe invert.
  - d. Limit internal pressure in sealed line below 8 psig.
  - e. Allow 2 minutes minimum for air pressure to stabilize. Disconnect low-pressure air hose from control panel.
3. Acceptable Test Result:
- a. Allow a time for pressure to drop from 3.5 to 2.5 psig greater than the maximum pressure exerted by groundwater above the pipe invert of no less than:

Pipe Diameter (in.)	Time (min.)
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	8.5
21	10.0
24	11.5
27	13.0
30	14.0
36	17.0
42	20.0
48	23.0

- b. Allow a time for sewers with more than one (1) size of pipe based on the largest diameter reduced by 0.5 minutes.
4. Locate and repair leaks, and re-test as required, without additional compensation.
- G. Infiltration Test:
1. Dewater and conduct the infiltration test for at least 24 hours, minimum.
  2. Locate and repair leaks, and re-test as required, without additional compensation.

SECTION 02622

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

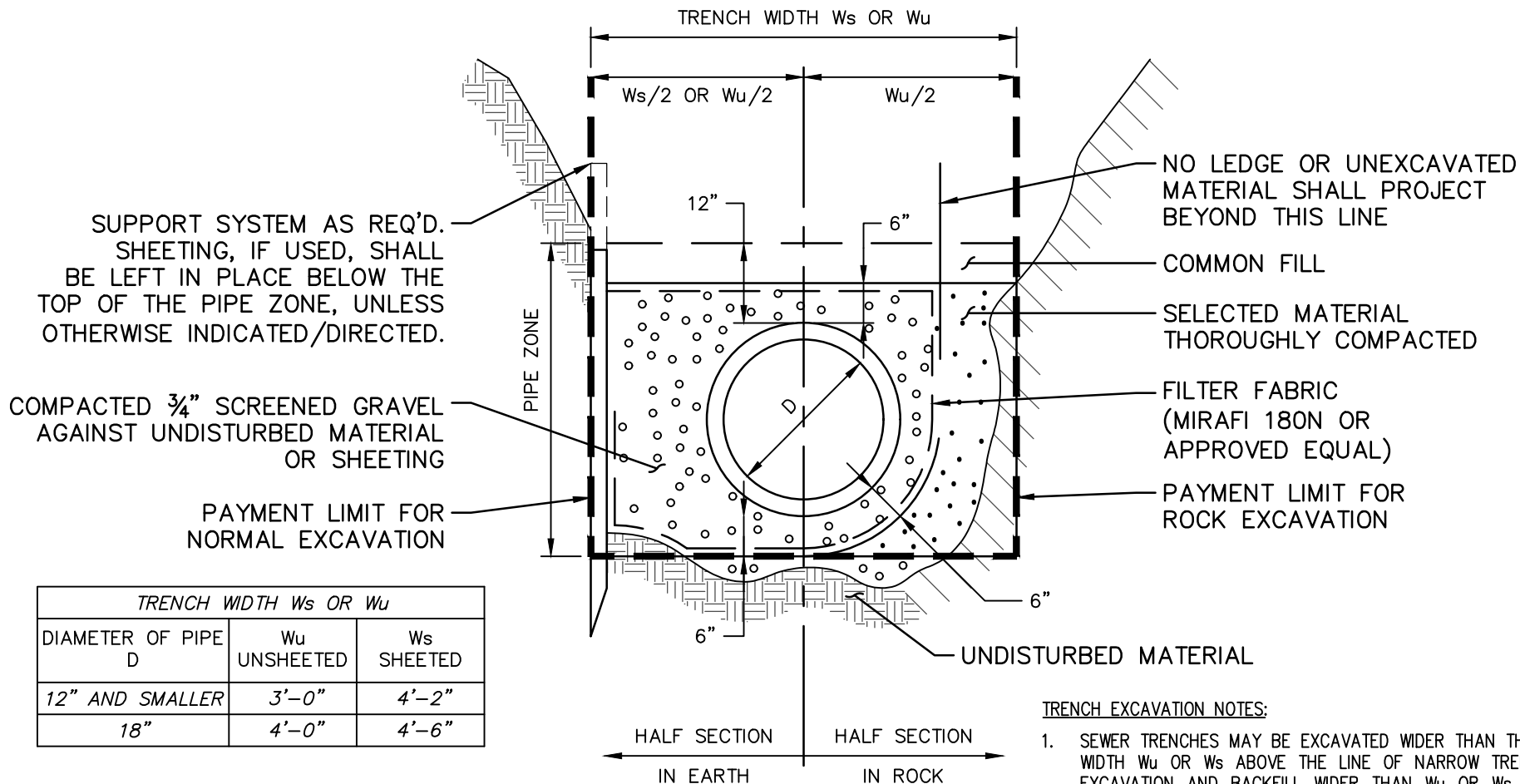
3. Allow a maximum infiltration, including manholes, fittings and service connections, of 100 gallons per inch of inside pipe diameter, per mile of pipe, per 24 hours.

3.06 TELEVISION INSPECTION:

- A. At the conclusion of the work, the Contractor shall thoroughly clean the sewers by flushing with water or other means to remove dirt, stones, and other material. Prior to acceptance, all pipelines shall be inspected for cleanliness and to be sure no sand bags, broken pipe or other obstructions exist.
- B. When the installed sewer has been completely cleaned, tested, and prepared for internal television inspection, the Contractor shall notify the Engineer who will arrange, through the City Sewer Commission for the internal television inspection to be conducted by the City Wastewater Division. If the television inspection is unsatisfactory, the Contractor shall do all required corrective work at no cost to the City and shall be charged, at an hourly rate, for re-television inspection by the City.
- C. Should sewer television inspection by the Owner reveal defects the Contractor will be responsible for completing repairs as ordered, at no charge to the Owner, and furthermore will be charged, at an hourly rate, for the time necessary to repeat television inspection subsequent to repairs being made.

END OF SECTION





## PVC PIPE

N.T.S.

### TRENCH EXCAVATION NOTES:

- SEWER TRENCHES MAY BE EXCAVATED WIDER THAN THE TRENCH WIDTH  $W_u$  OR  $W_s$  ABOVE THE LINE OF NARROW TRENCH LIMIT. EXCAVATION AND BACKFILL WIDER THAN  $W_u$  OR  $W_s$  SHALL BE AT NO ADDITIONAL COST TO THE CITY OF MILFORD.
- THE TRENCH BELOW THE TOP OF THE PIPE ZONE SHALL NOT BE EXCAVATED WIDER THAN THE TRENCH WIDTH  $W_s$  UNLESS OTHERWISE INDICATED/DIRECTED.
- SEE SPECIFICATION SECTION 02250 - TEMPORARY EARTH SUPPORT AND DEWATERING, AND SECTION 02260 - TEMPORARY SUPPORT AND PROTECTION OF UTILITIES, FOR ADDITIONAL TRENCH EXCAVATION REQUIREMENTS.

ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT



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PROJ. TITLE

DWG. TITLE PVC PIPE

DRAWN BY NWE

DATE

DESIGN BY -

02/06/2024

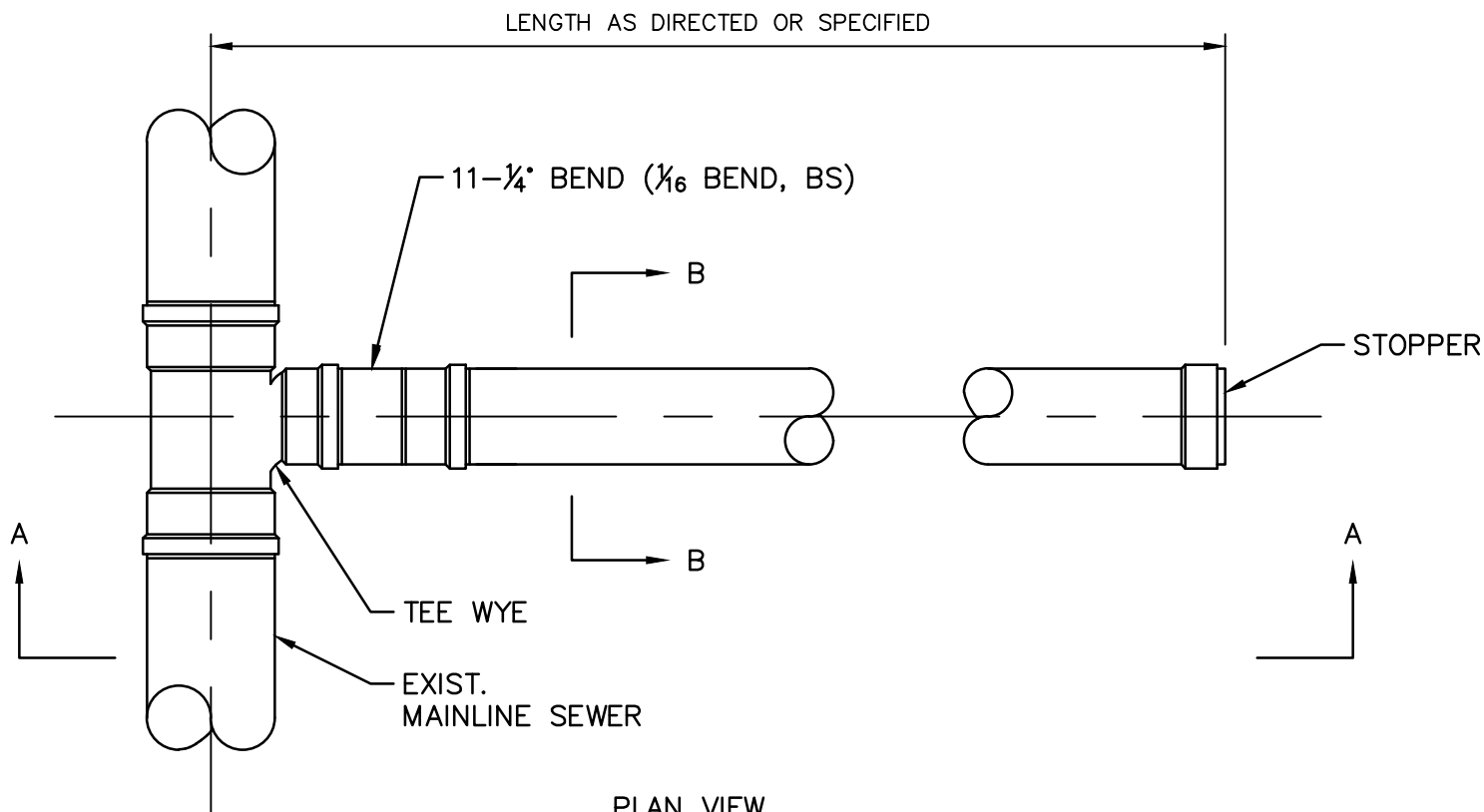
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DWG. NO.

PROJECT NO. 24-034-10

AS NOTED

02622-1



PLAN VIEW

## SANITARY SEWER LATERAL

N.T.S.



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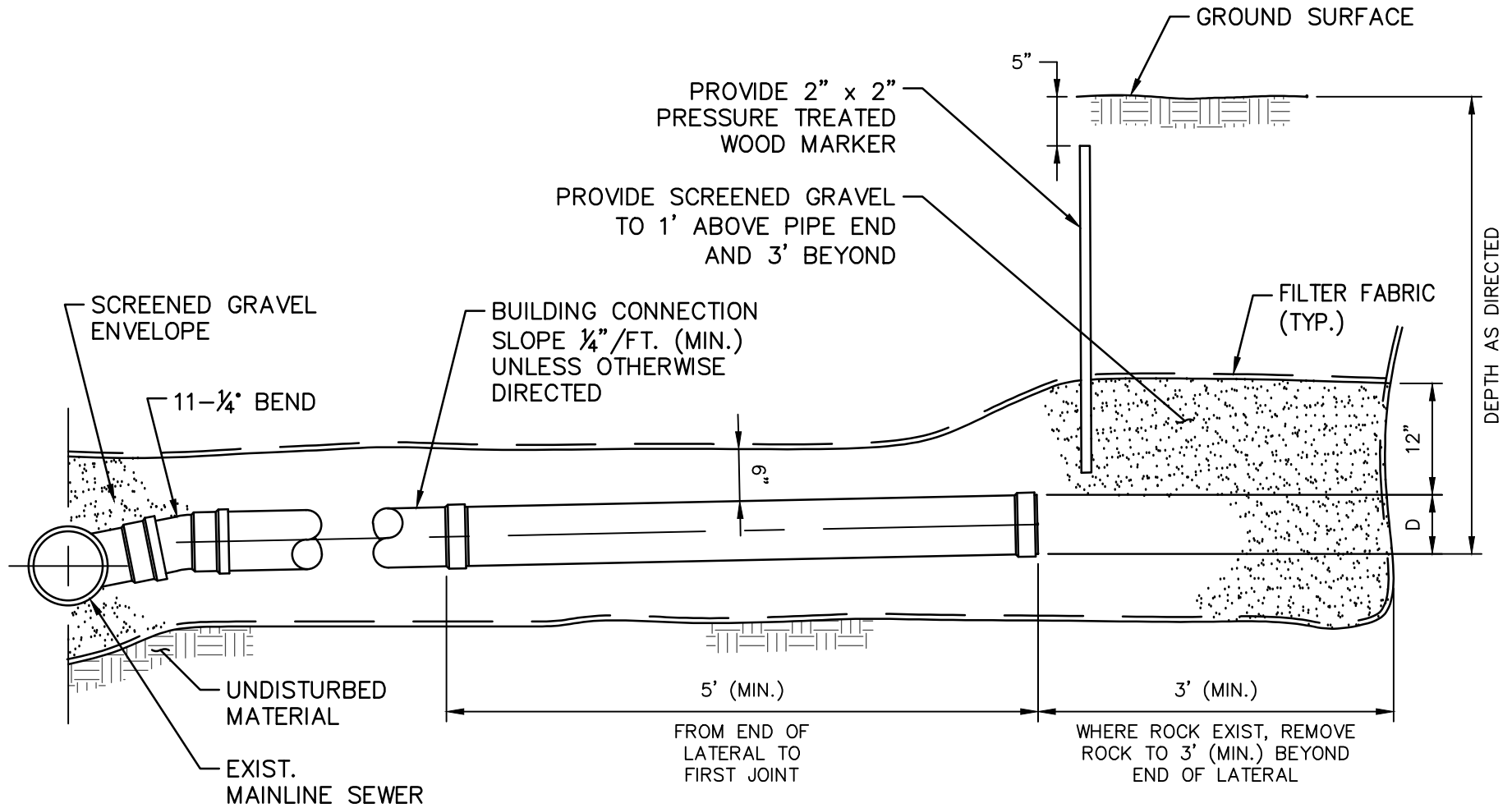
ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE

DWG. TITLE SANITARY SEWER LATERAL SCALE AS NOTED

DRAWN BY NWE DESIGN BY - DWG. NO. 02622-2A

DATE 02/06/2024 PROJECT NO. 24-034-10



SECTION A-A

# SANITARY SEWER LATERAL

N.T.S.



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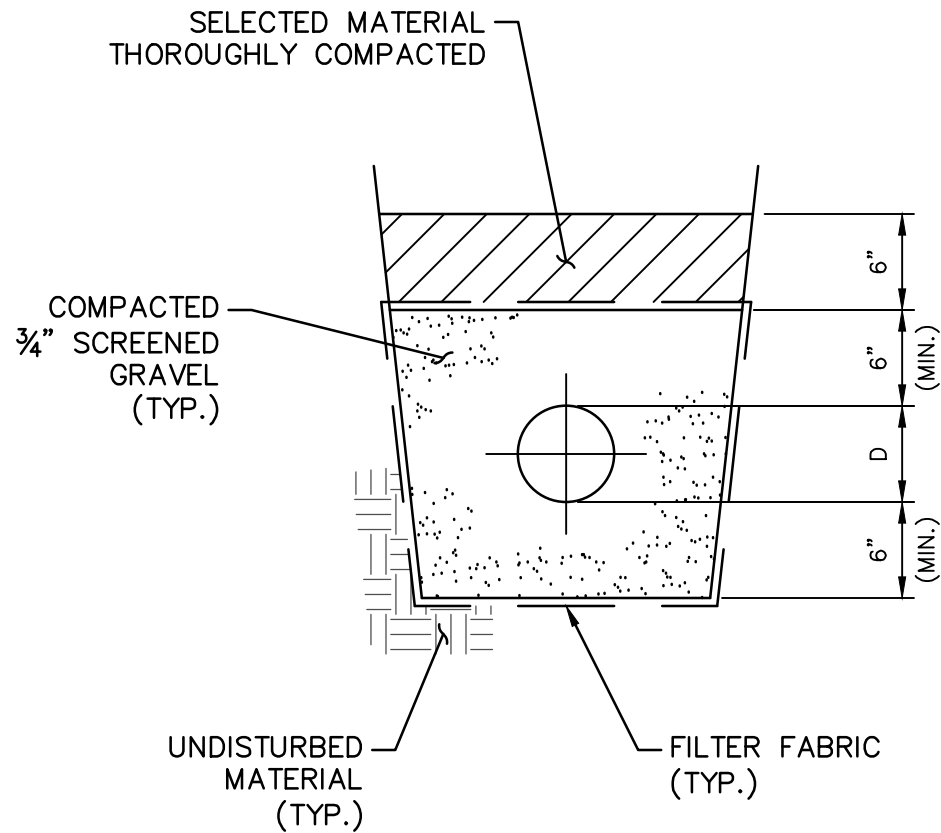
ON-CALL STORM AND SANITARY  
SEWER PIPE LINING

PROJ. TITLE MILFORD, CT

DWG. TITLE	SANITARY SEWER LATERAL	SCALE	AS NOTED
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DATE	02/06/2024	PROJECT NO.	24-034-10
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SECTION B-B

# SANITARY SEWER LATERAL

N.T.S.



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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE	MILFORD, CT		
DWG. TITLE	SANITARY SEWER LATERAL	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	02622-2C
		PROJECT NO.	24-034-10

**SECTION 02623 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to install and test High Density Polyethylene (HDPE) pipe and fittings for the construction of storm sewers and culverts, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. The types of HDPE piping covered under this section are as follows:
  - 1. Corrugated exterior, smooth interior, solid wall HDPE pipe;
  - 2. Smooth exterior, smooth interior, solid wall HDPE pipe; and
  - 3. Steel Reinforced Polyethylene (SRPE) pipe.

**1.02 RELATED SECTIONS:**

- A. Section 02315 – Excavation and Trenching
- B. Section 02320 – Backfilling, Grading and Compaction
- C. Section 02601 – Manholes
- D. Section 02602 – Catch Basins
- E. Section 02622 – Polyvinyl Chloride (PVC) Pipe and Fittings
- F. Section 02953 – Storm and Sanitary Sewer Point Repairs

**1.03 REFERENCE STANDARDS:**

- A. American Association of State Highway and Transportation Officials (AASHTO) Publications and Standards (latest revision):
  - 1. M252 – Standard Specification for Corrugated Polyethylene Drainage Pipe.
  - 2. M294 – Standard Specification for Corrugated Polyethylene Pipe, 300- to 1,500-mm (12- to 60-in.) Diameter.
  - 3. M335 – Standard Specification for Steel-Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 1,500-mm (12- to 60-in.) Diameter.
- B. American Society for Testing and Materials (ASTM) Publications and Standards (latest revision):
  - 1. D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
  - 2. D2239 – Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.

SECTION 02623 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

3. D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
4. D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
5. D2683 – Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
6. D2737 – Standard Specification for Polyethylene (PE) Plastic Tubing.
7. D2774 – Standard Practice for Underground Installation of Thermoplastic Pressure Pipe.
8. D2837 – Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.
9. D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
10. D3261 – Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
11. D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
12. F405 – Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings.
13. F667 – Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings.
14. F714 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.
15. F894 – Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe.
16. F905 – Standard Practice for Qualification of Polyethylene Saddle-Fused Joints.
17. F1417 – Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air.
18. F2306 – Standard Specification for 300 mm to 1,500 mm (12 in. to 60 in.) Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Non-Pressure Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
19. F2562 – Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage.
20. F2620 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

**SECTION 02623 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS**

- C. American Water Works Association (AWWA) Publications and Standards (latest revision):
  - 1. C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in. (100 mm Through 1,650 mm), for Waterworks.
- D. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

**1.04 SUBMITTALS:**

- A. Shop drawings and product data for all pipe, fittings, and accessories.
- B. Submit certification, with each delivery, that pipe and fittings comply to this specification.
- C. Submit certified copies of test reports, with each delivery, stating compliance with the appropriate reference standards specified herein.
- D. Submit resumes and project experience for all Contractor personnel and/or subcontractors performing heat fusion joining.

**1.05 QUALITY ASSURANCE:**

- A. Provide any/all labor necessary to assist the Engineer in inspecting pipe upon delivery to project site(s). Pipe rejected after delivery shall be visibly marked for identification, and shall be immediately removed from the project site(s).
- B. Perform tests in accordance with the methods prescribed by ASTM standards.
- C. Each type of pipe and fittings shall be from a single manufacturer. If this is not the case, the pipe manufacturer shall provide certification that the fittings are suitable for installation and use with the pipe.
- D. The manufacturer shall have manufacturing and quality assurance facilities capable of producing and assuring the quality of the pipe and fittings required by these specifications.
- E. Contractor personnel and/or subcontractors performing heat fusion joining shall have adequate training and experience in the necessary procedures, demonstrated by at least twelve (12) months of applicable experience.

**PART 2 – PRODUCTS**

**2.01 PIPE IDENTIFICATION:**

- A. The following shall be continuously indent printed on the pipe or spaced at intervals not exceeding 5 feet:

SECTION 02623 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

1. Name and/or trademark of the pipe manufacturer;
2. Nominal pipe size;
3. Dimension ratio;
4. The letters "PE" followed by the polyethylene grade, in accordance with ASTM designation, followed by the hydrostatic design basis in lbs. per square inch (psi); and
5. A production code from which the date and place of manufacture can be determined.

2.02 CORRUGATED EXTERIOR/SMOOTH INTERIOR HDPE PIPE AND FITTINGS:

- A. Polyethylene pipe and fittings shall conform to AASHTO M294, Type S (smooth wall interior).
- B. Polyethylene pipe shall be as manufactured by Advanced Drainage Systems, Inc. (ADS), or approved equal.
- C. Pipe and fittings shall be high density polyethylene, conforming to ASTM D3350 minimum cell classification 324420C for 4-inch through 10-inch diameters, and 335420C for 12-inch through 60-inch diameters.
- D. Installation shall conform to the appropriate ASTM standards.
- E. Pipe shall be joined by bell-and-spigot joints. Gaskets and joint lubricant shall be utilized.
- F. Minimum parallel plate pipe stiffness shall be as recommended for each specified diameter of pipe per ASTM D2412.
- G. Pipe and fittings shall be free of foreign inclusions and visible defects. The ends of the pipe shall be cut squarely and cleanly so as to not adversely affect joining.
- H. The nominal size of the pipe and fittings is based on the nominal inside diameter of the pipe. Corrugated fittings shall either be molded or fabricated by the manufacturer. Fittings and gaskets supplied by manufacturers other than the supplier of the pipe shall not be permitted without prior approval by the Engineer.

2.03 JOINTS FOR CORRUGATED HDPE PIPING:

- A. Pipe shall provide soil-tight joints with built-in gaskets.
- B. Pipe shall be N-12 ST IB pipe, as manufactured by ADS, or approved equal.
- C. Pipe shall meet silt-tight and leak resistant joint requirements.
- D. Polyethylene flared end sections shall be as manufactured in accordance with the same criteria as the mainline pipe.



SECTION 02623 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

- E. Manhole and catch basin pipe connections shall be made using non-shrink grout, and as specified in Section 02601 – Manholes, and Section 02602 – Catch Basins, unless otherwise directed by the Engineer.

2.04 SMOOTH INTERIOR/SMOOTH INTERIOR HDPE PIPE:

- A. Pipe shall be as manufactured by Performance Pipe, a division of Chevron Phillips Chemical Company LLC, or approved equal.
- B. Pipe shall be made of virgin, extra high molecular weight polyethylene compounds equaling a PE 4710 designation, which meets or exceeds the requirements of ASTM D3350, with cell classification 445574C.
- C. Pipe shall be manufactured in accordance with ASTM F714.
- D. Pipe and fittings shall be free of foreign inclusions and visible defects. The ends of the pipe shall be cut squarely and cleanly so as to not adversely affect joining.
- E. Pipe and fittings shall be joined by butt fusion welding.
- F. Polyethylene fittings shall be fabricated to the same outside diameter, wall thickness, and tolerances as the mating pipe.
- G. Standard laying lengths shall be 40 feet, unless otherwise directed.
- H. All smooth interior/smooth exterior HDPE pipe and fittings shall have SDR ratings as indicated on the drawings, or as specified by the Engineer.

2.05 FITTINGS FOR SMOOTH INTERIOR/SMOOTH INTERIOR HDPE PIPE:

- A. Fittings shall be made from material meeting the same requirements as the pipe. Polyethylene fittings shall be molded and fabricated by the manufacturer of the pipe.
- B. Molded fittings shall be manufactured in accordance with ASTM D3261.
- C. Fittings for pressure pipe systems shall meet the requirements of AWWA C906.
- D. Mechanical Joints:
  - 1. Mechanical joint connections shall require the use of a stainless-steel stiffener insert for the HDPE piping that is mechanically locked into the adapter in accordance with the manufacturer's recommendations.
  - 2. Use Series 2100 MEGAFLANGE with HDPE insert, as manufactured by EBAA Iron, Inc. (or approved equal), at transitions requiring flange by flange connections, such as valves.
- E. Flanged Transitions:
  - 1. Flanged transitions between HDPE and ductile iron pipes shall be made by means of HDPE flanged adapters with ductile iron lap joint flange followers. Nuts and bolts shall be 304 stainless steel.

SECTION 02623 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

2. Polyethylene flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion-joining machine without the use of a stub-end holder. The sealing surface of the flange adapter shall be machined with a series of small V-shaped grooves to promote gasket-less sealing, or restrain the gasket against blowout.
3. Flange adapters shall be fitted with convoluted ductile iron back-up rings. The back-up ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius. Flange bolts and nuts shall be Grade 2 or higher.

F. Joint Couplings:

1. Joint couplings shall consist of an external joint collar and fastening straps.
2. The collar shall consist of a band 12 inches wide. The band shall have an outer layer of polyethylene, with an under layer of rubberized mastic that is reinforced with woven polypropylene fabric. There shall be a peelable protective paper against the mastic that is removed when the collar is applied to the joint.
3. Within the collar, there shall be three (3) steel straps, each  $\frac{5}{8}$  inch wide. The straps shall be in tubes that isolate them from the mastic and allow them to slip freely when tightened around the pipe.
4. The collar shall be designed such that when it is applied around the joint, the ends overlap by at least 6 inches; and when the straps are secured, a layer shall completely cover the straps protecting them from moisture and rust.

G. Lateral Pipe Connections:

1. Branch connections to the mainline shall be made with saddle fittings or tees.
2. Watertight, flexible seals for pipe-to-pipe connections shall be made using NPC Kor-N-Tee saddle, with stainless steel hardware and bands.
3. As an alternative penetrating hole-mounted sleeves may be used, as approved by the Engineer. Tee connectors shall be "Inserta Tee", or approved equal.
4. Fully-bolted, wrap-around tapping sleeve may also be used, as approved by the Engineer.
5. Reconnection of service laterals shall incorporate elastomeric tube connectors secured in place with stainless steel band clamps.

H. Pipe Connections at Structures:

1. HDPE pipe connections to non-polyethylene manholes, catch basins, and similar structures shall be made using a mechanical seal such as a link seal, a chemical seal such as packing with oakum rope saturated with water-activated polyurethane sealant, or other means approved by the Engineer. The seal should be completed in the manhole, catch basin, or similar structure with non-shrink grout.

**SECTION 02623 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS**

**2.06 STEEL REINFORCED POLYETHYLENE (SRPE) PIPE AND FITTINGS:**

- A. Steel reinforced polyethylene pipe and fittings shall conform to ASTM F2562, or AASHTO M335.
- B. Pipe shall be DuroMaxx pipe, as manufactured by Contech Engineered Solutions LLC, or approved equal.
- C. Pipe and fittings shall be high density polyethylene, conforming to ASTM D3350 minimum cell classification 345464C.
- D. Pipe shall be joined with welded coupler joints specifically designed for the specified pipe. Welded joints shall utilize pressure testable extrusion welded couplers. Only those fittings supplied by or recommended by the SRPE pipe manufacturer shall be used.
- E. Pipe and fittings shall be free of foreign inclusions and visible defects. The ends of the pipe shall be cut squarely and cleanly so as to not adversely affect joining.
- F. The nominal size of the pipe and fittings is based on the nominal inside diameter of the pipe. Corrugated fittings shall either be molded or fabricated by the manufacturer. Fittings and gaskets supplied by manufacturers other than the supplier of the pipe shall not be permitted without prior approval by the Engineer.

**PART 3 – EXECUTION**

**3.01 INSPECTION:**

- A. Examine excavation before pipe placement to ensure:
  - 1. The excavation is complete to the elevations and slopes required.
  - 2. No obstructions exist which would interfere with pipe installation.
  - 3. The bottom of the excavation is firm and dry.
- B. Inspect each pipe and fitting before installation. Remove any/all defective pipe, and replace it with sound pipe.

**3.02 HANDLING:**

- A. Store until installation in a manner acceptable to the Engineer; keep pipe at ambient outdoor temperature.
- B. Provide temporary shading, as required.
- C. Do not use covering which may cause temperature build-up.
- D. Otherwise handle pipe materials with care to avoid damage, using methods acceptable to the Engineer.

SECTION 02623 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

3.03 INSTALLATION:

A. Open-Cut Installations:

1. Pipe shall be installed starting from the downstream end of the system, and working upstream, unless otherwise directed by the Engineer.
2. Do not install non-straight pipe:
  - a. Do not allow pipe centerline to deviate from straight line drawn between ends, by more than  $\frac{1}{16}$  inch per foot of pipe length.
  - b. Remove pipe failing to meet above requirement.
3. Polyethylene pipe and fittings shall be installed in accordance with the drawings, the appropriate reference standards herein listed, and the manufacturer's recommendations.
4. Clear pipe units of debris, dirt, and any other foreign material before installation, and keep clean until acceptance.
5. Pipe is to be lifted or rolled into position, not dragged over the prepared bedding.
6. The pipe is to be set at the slope and grades indicated on the drawings, or as specified by the Engineer. Provide shoring and excavation support systems in accordance with Section 02250 – Temporary Earth Support and Dewatering.
7. The new sewer pipeline alignment shall be set with a properly calibrated pipe laser. The laser beam projector shall be rigidly mounted with two-point suspension to its support platforms. The laser shall be operated by competent, trained personnel. The Contractor shall establish centerline and offset stakes at each manhole or catch basin. Laser aligning shall not be used to establish a continuous line in excess of 300 feet.
8. All pipe shall be bedded in 6 inches of screened gravel, or as indicated on the drawings, whichever is greater.
9. All excavations shall be kept dry while pipe is being laid and until each joint and pipe has been inspected by the Engineer and approval given to commence backfilling operations. Any pipe which is not laid to grade and alignment shall be re-laid to the satisfaction of the Engineer.
10. Prevent pipe flotation in trench.
11. Screened gravel shall be used as backfill to a point of 6 inches above the top of the pipe, or as indicated on the drawings, whichever is greater.
12. Make open ends of pipe and branches watertight with temporary plugs when pipe installation is not in progress.
13. If water is in the trench, do not remove the plug until provisions are made to prevent water, earth, or other substances from entering the pipe; then resume work.

SECTION 02623 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

14. Do not use the pipeline as a conductor for trench drainage.

15. Cleaning:

- a. Prevent earth, water, and other material from entering the pipeline.
- b. Clean pipeline, manholes, and catch basins upon completion.

B. Joint Couplings:

1. Joint couplings shall be installed in accordance with the manufacturer's recommendations.
2. Remove the protective paper and wrap the collar around the pipe (with the mastic side to the pipe). The overlap shall be at the top of the pipe.
3. Secure the steel straps, as required.
4. The closing flap shall cover the exposed straps.
5. Encase the entire joint with a minimum of 8 inches of concrete around all sides. The concrete encasement shall extend along the pipe 12 inches on each side of the joint.

C. Mechanical Joint and Flange Installation:

1. Mechanical joint and flange connections shall be installed in accordance with the manufacturer's recommendations.
2. Mechanical joint adapters and flanges shall be centered and aligned to each other before assembling and tightening bolts.
3. In no case shall the mechanical joint gland or flange bolts be used to draw the connection into alignment.
4. Bolt threads shall be lubricated, and flat washers shall be used under the nuts.
5. Bolts shall be evenly tightened according to the tightening and torque pattern of the manufacturer.

3.04 PIPE JOINING:

A. Heat Fusion Joining:

1. Joints between plain end pipes and fittings shall be made by means of butt fusion.
2. Joints between the mainline and saddle branch fittings shall be made using saddle fusion procedures, as recommended by the manufacturer.
3. Fusion of pipes of the same nominal diameter but with different wall thickness is acceptable, with previous written approval of the Engineer, if the difference in wall thickness is limited to one (1) SDR.

B. For transitions between pipes of the same nominal diameter with wall thicknesses that differ by more than one (1) SDR, transition nipples will be required.

SECTION 02623 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

C. Joining by Other Means:

1. The use of flanged connections, mechanical couplings, and electrofusion required written approval of the Engineer.

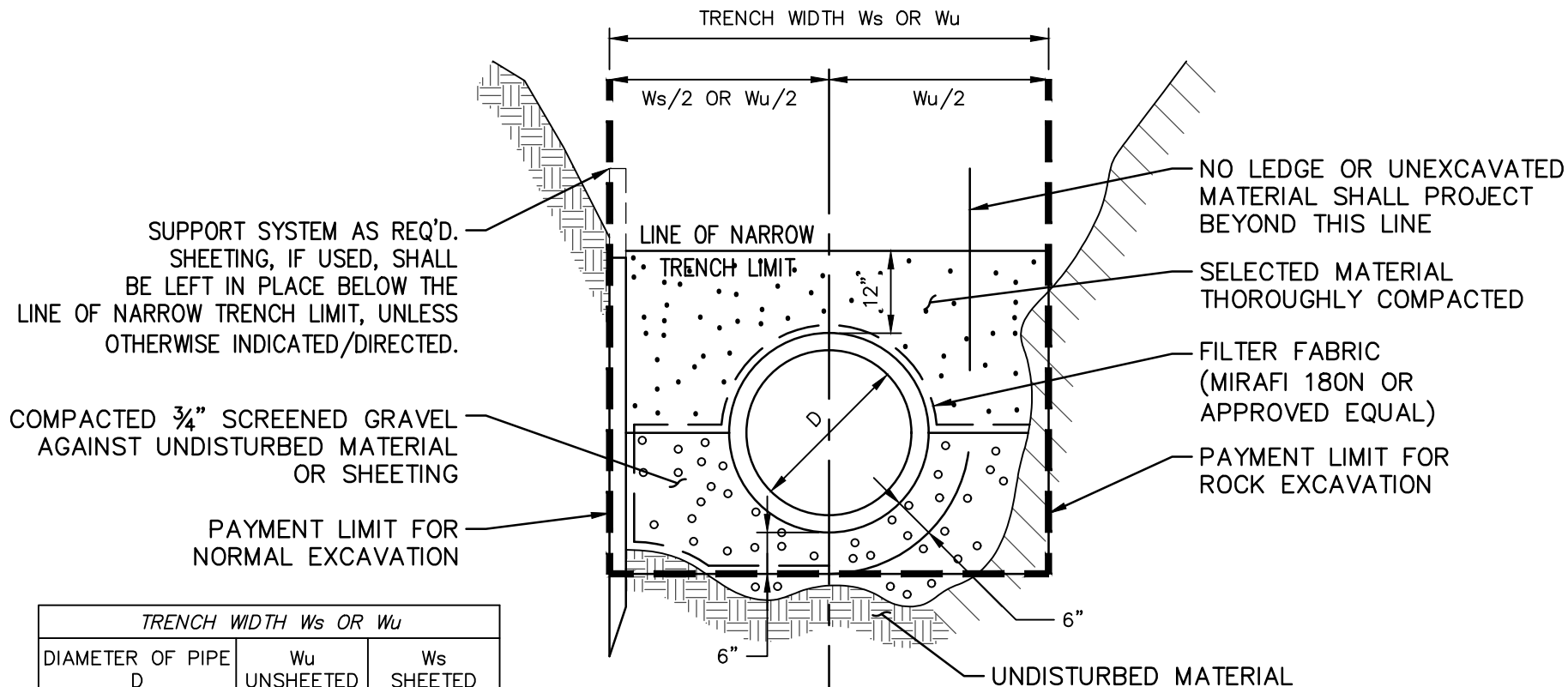
D. Joint Testing:

1. On every day that butt fusion is to be performed, the first fusion of the day shall be performed on a trial joint. After the trial joint has been allowed to cool completely, three (3) test coupons will be cut across the joint. Each coupon shall be bent until its opposing ends come in contact. If any of the coupons fail at the joint, the fusion will be considered unsatisfactory.
2. Vary the fusion set-up and procedure, and re-run the test, as necessary, to produce a satisfactory joint. Production butt fusion will not commence until the trial joint has satisfactorily passed this test.
3. Test coupon length shall be the lesser of either 12 inches or 30 times the wall thickness. The joint shall be centered in the coupon. Coupon width shall be the greater of 1 inch or 1.5 times the wall thickness.

3.05 TESTING:

- A. Clean out all dirt, dust, oil, grease and other foreign material in the pipe before conducting pressure and leakage tests, and television inspection.
- B. Conduct pressure and leakage tests, and television inspection, in accordance with Paragraphs 3.05 and 3.06 of Section 02622 – Polyvinyl Chloride (PVC) Pipe and Fittings, if/as required, or as directed by the Engineer.
- C. The Contractor shall locate, uncover, and repair or replace defective pipe, fittings, or joints, at no additional cost and without time extension. Conduct additional tests and repairs until the section passes all tests.

END OF SECTION



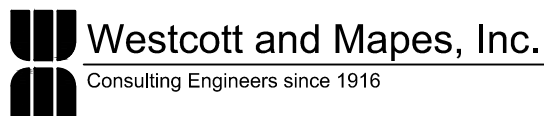
TRENCH WIDTH $W_s$ OR $W_u$		
DIAMETER OF PIPE D	$W_u$ UNSHEETED	$W_s$ SHEETED
12" AND SMALLER	3'-0"	4'-2"
15"	3'-2"	4'-4"
18"	3'-6"	4'-8"
21"	3'-10"	5'-0"
24"	4'-2"	5'-4"
27"	4'-6"	5'-8"
30"	4'-10"	6'-0"
36"	5'-6"	6'-8"
42"	6'-2"	7'-4"
48"	6'-10"	8'-0"

## HDPE PIPE

N.T.S.

### TRENCH EXCAVATION NOTES:

- SEWER TRENCHES MAY BE EXCAVATED WIDER THAN THE TRENCH WIDTH  $W_u$  OR  $W_s$  ABOVE THE LINE OF NARROW TRENCH LIMIT. EXCAVATION AND BACKFILL WIDER THAN  $W_u$  OR  $W_s$  SHALL BE AT NO ADDITIONAL COST TO THE CITY OF MILFORD.
- SEE SPECIFICATION SECTION 02250 - TEMPORARY EARTH SUPPORT AND DEWATERING, AND SECTION 02260 - TEMPORARY SUPPORT AND PROTECTION OF UTILITIES, FOR ADDITIONAL TRENCH EXCAVATION REQUIREMENTS.



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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
PROJ. TITLE MILFORD, CT

DWG. TITLE	HDPE PIPE	SCALE	AS NOTED
DRAWN BY	NWE	DESIGN BY	-
DATE	02/06/2024	DWG. NO.	02623-1
		PROJECT NO.	24-034-10

**SECTION 02950**

**FLOW CONTROL**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to handle and control existing storm and sanitary sewer flows, at all times, to perform pipeline and structure inspection, cleaning, and rehabilitation and/or replacement operations in suitably dry conditions, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. The Contractor shall be responsible for the installation, maintenance, and removal of all temporary connections, line stop plugs, flow-through plugs, bypass pumping systems, and other flow control devices, as may be required.
- C. Limited flow is acceptable for closed-circuit television (CCTV) inspections (see Paragraph 3.01, below). Complete stoppage and diversion of flow is required for sewer pipeline and structure rehabilitation and/or replacement work, as specified herein or as directed by the Engineer.

**1.02 RELATED SECTIONS:**

- A. Section 01015 – Special Requirements
- B. Section 02270 – Sewage Bypass Pumping
- C. Section 02951 – Sewer Cleaning
- D. Section 02952 – Sewer Television Inspection
- E. Section 02953 – Storm and Sanitary Sewer Point Repairs
- F. Section 02955 – Cured-In-Place Pipe (CIPP) Lining for Mainline Sewers
- G. Section 02956 – Cured-In-Place Pipe (CIPP) Lining for Service Laterals
- H. Section 02957 – Service Lateral Grouting
- I. Section 02960 – Cementitious Liner Manhole Rehabilitation

**1.03 REFERENCE STANDARDS:**

- A. Occupational Safety and Health Administration (OSHA), OSHA Safety and Health Regulations (latest revision):
  - 1. 29 CFR Part 1910 – Occupational Safety and Health Standards.
  - 2. 29 CFR Part 1926 – Safety and Health Regulations for Construction.



**SECTION 02950**

**FLOW CONTROL**

**1.04 SUBMITTALS:**

The Contractor shall submit flow control and bypass pumping plans and locations with sufficient detail to assure that work can be accomplished without service interruption, sewage spills, or surcharging of the existing system(s). The bypass pumping plan shall be in accordance with Section 02270 – Sewage Bypass Pumping.

**1.05 QUALITY ASSURANCE:**

- A. Precautions must be taken to ensure that sewer flow control operations do not cause flooding or damage to public or private property being impacted by the work involved.
- B. All personnel working in confined spaces shall have the appropriate confined space entry training, as appropriate. Precautions shall be taken by the Contractor to ensure the health and safety of his workers, the public, the Engineer and the Owner during construction, as may be required.

**1.06 LEGAL, HEALTH AND SAFETY REQUIREMENTS:**

- A. The Contractor shall observe all federal, state and local laws, ordinances, policies, practices and regulations. In addition, the Contractor agrees to promptly procure all necessary approvals, licenses and permits, pay all charges and fees, and give notices necessary and incident to the due and lawful prosecution of the work.
- B. The Contractor shall conduct the work, at all times, in such a manner as to ensure the safety of, and least possible obstruction to, the traveling public. The convenience of the general public and of the residents along and adjacent to the site/work area shall be provided for in an adequate and satisfactory manner, as determined by the Engineer and/or Owner.
- C. All equipment and materials shall be placed or stored in such locations so as not to be or to create the danger of becoming a hazard to the traveling public. No section of road shall be closed to the public except where/when permitted by the Owner and the local traffic authority.
- D. The Contractor shall perform operations in strict accordance with OSHA and manufacturers' safety requirements. Particular attention is drawn to safety requirements involving entering confined spaces, work on elevated platforms, and working with pressurized equipment.

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION**

**3.01 GENERAL:**

- A. All flows through existing sanitary sewer system(s) shall be properly maintained during the rehabilitation/replacement work. Methods for maintaining such sanitary sewer

SECTION 02950

FLOW CONTROL

- flows shall be in accordance with these specifications, and approved by the Engineer prior to installation/execution.
- B. High flow conditions in the sewers may result in a temporary suspension of flow control operations, to ensure that spills or back-ups do not occur. No additional payment will be made to the Contractor for temporary suspension of the work due to high flows.
  - C. The Contractor shall protect against surcharging of the existing system(s) upstream of the area of work by installing temporary bypass pumping system(s) to handle both dry- and wet-weather flows.
  - D. Any damage to the existing pipelines or structures resulting from the Contractor's failure to control, handle, and maintain such flows shall be repaired and/or replaced to the satisfaction of the Engineer and Owner, at no additional cost to the Owner.
  - E. Flow control devices and bypass systems shall be removed in such a manner that permits flows to slowly return to normal without surge, to prevent surcharging or other major disturbances downstream.
  - F. For CCTV inspections, sewer flows shall not exceed those levels shown below for the respective line sizes as measured in the upstream manhole during performance of the work, unless otherwise approved by the Owner.

Maximum Sewer Line Flows for CCTV Inspections	
Pipe Size (Diameter)	Maximum Flow Level
6" to 10" Pipe	20% of Pipe Diameter
12" to 14" Pipe	25% of Pipe Diameter
Over 24" Pipe	30% of Pipe Diameter

3.02 PLUGGING OR BLOCKING:

- A. A sewer line plug may be inserted into the line at a manhole/structure upstream from the section being inspected, lined, replaced, and/or tested if required for flow control.
- B. The plug shall be so designed that all or any portion of the sewer flows can be released.
- C. Sewer flows shall be shut off or substantially reduced during pipeline and manhole/structure rehabilitation.
- D. For the rehabilitation of certain manholes/structures, as determined by the Engineer, flow-through plugs may be installed in the inlet and outlet pipes within the same manhole/structure, and connected with an adequately sized hose, to perform internal rehabilitation work to the bench and invert in suitably dry conditions.
- E. The Contractor shall be allowed to temporarily block sanitary sewage flows from service connections entering mainline sewers during the installation of the cured-in-place pipe (CIPP) lining process, and during the grouting of service laterals, as may be

SECTION 02950

FLOW CONTROL

necessary. The interruption of flows from service connections shall be coordinated with the owners and/or occupants of the affected buildings. Flow shall only be blocked after the owners and/or occupants have received proper notification. See Section 02955 – Cured-In-Place Pipe (CIPP) Lining for Mainline Sewers, Section 02956 – Cured-In-Place Pipe (CIPP) Lining for Service Laterals, and Section 02957 – Service Lateral Grouting, for more information.

3.03 PUMPING AND BYPASSING:

- A. When required for the rehabilitation/replacement of certain sewer sections, manholes and/or structures, the Contractor shall provide for the complete bypassing of sewer flows in accordance with the requirements of Section 02270 – Sewage Bypass Pumping.
- B. Complete bypassing shall be accomplished by plugging the sewer line at the upstream manhole/structure, and pumping the flow into a downstream manhole/structure or adjacent system; which shall eliminate sewer flows from entering the line, manhole, and/or structure to be rehabilitated and/or replaced, except flows from direct service connections.

3.04 CLEANUP:

Upon acceptance of the work, the Contractor shall restore the project area affected by the operations to original conditions, in a manner acceptable to the Engineer.

END OF SECTION

SECTION 02951

SEWER CLEANING

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to properly clean existing storm and sanitary sewer pipelines and structures prior to closed-circuit television (CCTV) inspection, sewer pipe lining, and other sewer rehabilitation work, using approved hydraulic and bucket cleaning methods, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. Sewer line cleaning shall be performed to prepare the insides of the host pipes prior to the installation of cured-in-place pipe (CIPP) linings, prior to the grouting of service laterals, and as required under Section 02955 – Cured-In-Place Pipe (CIPP) Lining for Mainline Sewers, Section 02956 – Cured-In-Place Pipe (CIPP) Lining for Service Laterals, and Section 02957 – Service Lateral Grouting.
- C. The work shall include the removal and disposal of sediment, rocks, debris, roots, grease accumulations, scale, encrustations, loose mortar, and other obstructions so that no foreign intrusion shall cause imperfections in the lining (e.g., bumps, folds, dimples).
- D. Video inspection of the designated sewer pipeline sections shall be performed following the completion of each sewer line cleaning operation to inspect and document the condition of the pipeline, in accordance with Section 02952 – Sewer Television Inspection.
- E. The Contractor shall comply with the continuous operating requirements of Section 01015 – Special Requirements and Section 02270 – Sewage Bypass Pumping, to ensure there is no disruption or interference with the sewerage system flows.
- F. Sewer hydraulic cleaning shall mean at least four (4) passes of washing with high pressure water, unless alternate means are approved, in writing, by the Engineer. The removal of roots and grease shall also be included in such cleaning efforts.
- G. Sewer bucket cleaning shall mean the mechanical removal of obstructions using bucket-type equipment followed by sewer hydraulic cleaning (above).

**1.02 RELATED SECTIONS:**

- A. Section 01015 – Special Requirements
- B. Section 02270 – Sewage Bypass Pumping
- C. Section 02951 – Flow Control
- D. Section 02952 – Sewer Television Inspection
- E. Section 02955 – Cured-In-Place Pipe (CIPP) Lining for Mainline Sewers
- F. Section 02956 – Cured-In-Place Pipe (CIPP) Lining for Service Laterals

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SEWER CLEANING

- G. Section 02957 – Service Lateral Grouting
- H. Section 02960 – Cementitious Liner Manhole Rehabilitation

1.03 REFERENCE STANDARDS:

- A. National Association of Sewer Service Companies (NASSCO) Publications and Standards (latest revision):
  - 1. NASSCO Performance Specification Guideline – Sewer Pipe Cleaning.
  - 2. NASSCO Performance Specification Guideline – Pipe Condition Assessment Using CCTV.
- B. Occupational Safety and Health Administration (OSHA), OSHA Safety and Health Regulations (latest revision):
  - 1. 29 CFR Part 1910 – Occupational Safety and Health Standards.
  - 2. 29 CFR Part 1926 – Safety and Health Regulations for Construction.

1.04 SUBMITTALS:

- A. Submit written detailed description of the methods that will be used to remove and dispose of sediment, rocks, debris, roots, grease accumulations, scale, encrustations, loose mortar, and other obstructions throughout the section of sewer to be cleaned. Include the following information:
  - 1. Proposed cleaning processes.
  - 2. Provide source and estimated amount of fresh water necessary for cleaning and flushing out the pipeline(s) prior to video inspections.
  - 3. Proposed cleaning equipment.
  - 4. Cleaning schedule, including all required coordination efforts with the Milford Wastewater Division and/or City of Milford Department of Public Works, as applicable.
  - 5. References.
- B. For cleaning of sanitary sewers, coordinate all plans with the Milford Wastewater Division to mitigate any potential impacts during cleaning operations.
- C. Submit pipe inspection video/documentation following sewer line cleaning, and after completion of the sewer lining operation for acceptance.

1.05 QUALITY ASSURANCE:

- A. Where sewer television inspection follows cleaning, comply with the requirements of Section 02952 – Sewer Television Inspection.

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SEWER CLEANING

- B. The Contractor shall have at least five (5) years of experience cleaning underground piping and structures.
- C. The Contractor shall have successfully completed a minimum of ten (10) projects where piping and structures of similar size and condition to those on this project were cleaned.
- D. All personnel working in confined spaces shall have the appropriate confined space entry training, as appropriate. Precautions shall be taken by the Contractor to ensure the health and safety of his workers, the public, the Engineer and the Owner during construction, as may be required.

1.06 LEGAL, HEALTH AND SAFETY REQUIREMENTS:

- A. The Contractor shall observe all federal, state and local laws, ordinances, policies, practices and regulations. In addition, the Contractor agrees to promptly procure all necessary approvals, licenses and permits, pay all charges and fees, and give notices necessary and incident to the due and lawful prosecution of the work.
- B. The Contractor shall conduct the work, at all times, in such a manner as to ensure the safety of, and least possible obstruction to, the traveling public. The convenience of the general public and of the residents along and adjacent to the site/work area shall be provided for in an adequate and satisfactory manner, as determined by the Engineer and/or Owner.
- C. All equipment and materials shall be placed or stored in such locations so as not to be or to create the danger of becoming a hazard to the traveling public. No section of road shall be closed to the public except where/when permitted by the Owner and the local traffic authority.
- D. The Contractor shall perform operations in strict accordance with OSHA and manufacturers' safety requirements. Particular attention is drawn to safety requirements involving entering confined spaces, work on elevated platforms, and working with pressurized equipment.

**PART 2 – PRODUCTS**

2.01 MATERIALS:

- A. Equipment: Sewer line cleaning shall be performed using hydraulically propelled, high-velocity jets, or mechanically powered equipment, to dislodge, cut, transport, and remove debris and/or roots from the pipeline. Equipment shall have selection of two (2) or more high-velocity nozzles capable of producing scouring action from 15 to 45 degrees in all size lines designated to be cleaned, and capable of producing flows from a fine spray to a solid stream. Provide water tanks, auxiliary engines, and high-pressure water pump(s) as required.

SECTION 02951

SEWER CLEANING

1. Combination Unit Pump: Capable of pumping at least 80 gallons per minute at 2,000 psi, measured at beginning of hose reel.
  2. Water Pump: Able to run at 2,000 psi while pulling full vacuum, completely independent from vacuum system, with ability to vary vacuum without affecting water pressure.
- B. Water: Contractor shall furnish clean, fresh water for sewer line cleaning operations. Do not utilize any water source until it has been approved for use. When water must be taken from fire hydrants, the Contractor shall obtain all permits from the appropriate water utility and local agencies for any use of the potable water source. It shall be the responsibility of the Contractor to contact the appropriate water utility to determine, and comply with, all limitations including payment of fees. All water utility requirements stipulated by the permits for the use of potable water supply shall be strictly enforced. The Contractor shall not be allowed to utilize the water source until it has been approved by appropriate water utility, the Engineer, and the Owner.
- C. The Contractor shall provide all of the necessary temporary piping, valves, certified reduced pressure backflow preventers, equipment, and other items for handling potable water and wastewater.
- D. Chemicals: Do not use chemicals without written approval of the Engineer. Do not use any chemical that may be considered hazardous or detrimental to organisms or equipment of wastewater treatment plant and/or the surrounding environment.

**PART 3 – EXECUTION**

3.01 SEWER LINE CLEANING:

- A. Access, Cleaning and Inspection:
1. The Contractor shall provide access to each end of sewer for the sewer line cleaning.
  2. The Contractor shall remove all internal debris out of the pipeline that will interfere with the CIPP installation. The Contractor shall clean pipes with high-velocity jet cleaners, mechanically powered equipment, cable-attached devices or fluid-propelled devices (e.g., pipe pigs) as needed, and remove internal obstructions such as roots or gaskets by trenchless techniques when the obstruction encountered prevents further pipe cleaning or proper installation of CIPP lining.
- B. Procedures to remove internal obstructions may include use of equipment such as rodding machines, root saws, bucket machines and winches using root cutters, porcupines, and jet machines equipped with hydraulically driven cutters.
- C. If cleaning of the entire pipeline section cannot be successfully performed from one end of the sewer, set up equipment at the other end and attempt cleaning again.

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SEWER CLEANING

- D. If successful cleaning cannot be performed or equipment fails to traverse entire sewer pipeline section, it will be assumed that major blockage exists. Temporarily suspend cleaning efforts and immediately notify the Engineer. Upon removal of obstruction(s), complete cleaning operations.
- E. Employ satisfactory precautions to protect sewer pipeline from damage that might be inflicted by improper use of cleaning equipment. Immediately notify the Engineer if fresh soil, pieces of pipe, or other visible signs of potential problems occur during cleaning operations.
- F. Removal of Debris: Flush debris to the downstream structure for collection, removal, and proper off-site disposal. Do not discharge sewage or solids removed from the cleaning operation into ditches, catch basins or storm drains. Do not allow debris to flow past the downstream structure; all debris must be collected and removed.

3.02 CONTRACTOR'S RECORD:

- A. It shall be the Contractor's responsibility to keep records of all cleaning operations performed. These records shall be in printed form, showing Owner's name, type of project, Contractor's name, date, manhole/structure locations, section cleaned, type of sewer, size of pipe, type of equipment used and any special remarks concerning the condition of the line and manholes/structures, and the material removed there from. A copy of these records shall be given to the Owner.
- B. If areas of structural failure or other obstructions are noted during cleaning operations, the Contractor shall immediately notify the Owner of the approximate location.

3.03 ACCEPTANCE:

Acceptance of sewer line cleaning shall be made upon the successful completion of the CCTV inspection to the satisfaction of the Engineer. If CCTV inspection shows the cleaning to be unsatisfactory, the Contractor shall be required to re-clean and re-inspect the sewer line until the cleaning has been shown to be satisfactory.

3.04 CLEANUP:

- A. Keep the work area free of accumulations of waste materials, rubbish and other debris resulting from the cleaning operations.
- B. Upon acceptance of the work, the Contractor shall restore the project area affected by the operations to original conditions, in a manner acceptable to the Engineer.

END OF SECTION



**SECTION 02952**

**SEWER TELEVISION INSPECTION**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to inspect the conditions of all designated storm and sanitary sewer line interiors using a color closed-circuit television (CCTV) camera, and documenting the inspections in DVD-R or CD-R/RW media format with audio locations, inspection dates and times, and video title information, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. The Contractor shall provide the Engineer and Owner with paper and digital copies of all inspection logs upon completion, as applicable.
- C. Work may be performed independently or in conjunction with sewer cleaning, installation of cured-in-place pipe (CIPP) lining, and/or sanitary sewer manhole rehabilitation.

**1.02 RELATED SECTIONS:**

- A. Section 01015 – Special Requirements
- B. Section 02950 – Flow Control
- C. Section 02951 – Sewer Cleaning
- D. Section 02955 – Cured-In-Place Pipe (CIPP) Lining for Mainline Sewers
- E. Section 02956 – Cured-In-Place Pipe (CIPP) Lining for Service Laterals
- F. Section 02957 – Service Lateral Grouting
- G. Section 02960 – Cementitious Liner Manhole Rehabilitation

**1.03 REFERENCE STANDARDS:**

- A. National Association of Sewer Service Companies (NASSCO) Publications and Standards (latest revision):
  - 1. NASSCO Performance Specification Guideline – Pipe Condition Assessment Using CCTV.
  - 2. NASSCO Performance Specification Guideline – Cured-In-Place Pipe (CIPP) Installation.
  - 3. NASSCO Performance Specification Guideline – Cured-In-Place Pipe (CIPP) Lateral Pipe Lining.
  - 4. NASSCO Guidelines for Quality Control (QC) of NASSCO's PACP™, LACP™ and MACP™ Surveys.

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- B. Occupational Safety and Health Administration (OSHA), OSHA Safety and Health Regulations (latest revision):
  - 1. 29 CFR Part 1910 – Occupational Safety and Health Standards.
  - 2. 29 CFR Part 1926 – Safety and Health Regulations for Construction.

1.04 SUBMITTALS:

- A. Submit manufacturer's product data for the CCTV equipment, including camera, television monitor, carriage, recording device, etc.
- B. Submit a sample of the CCTV inspection log that will be used. Provide a legend for all abbreviations, symbols, codes, or other such information depicted/used on the inspection logs.
- C. Submit inspection log sheets upon completion of the CCTV inspections which include stationing, manhole/structure numbers, findings, and other pertinent data.
- D. Provide two (2) copies of the CCTV inspections in DVD-R or CD-R/RW media format. The DVD/CD shall include both the pre-rehabilitation pipeline inspections and the post-rehabilitation pipeline inspections.

1.05 QUALITY ASSURANCE:

- A. The Contractor shall provide qualified and experienced personnel and all necessary equipment, tools, materials and incidentals necessary to perform the sewer television inspections, in accordance with the requirements of these specifications.
- B. Inspections shall be performed by a NASSCO Pipeline Assessment Certification Program (PACP) certified operator, and shall meet the coding and reporting standards and guidelines set by PACP. All report annotations, pipe conditions and pipe defects shall be identified properly using PACP codes, as defined by PACP, and severity ratings shall be calculated according to PACP standards.
- C. All personnel working in confined spaces shall have the appropriate confined space entry training, as appropriate. Precautions shall be taken by the Contractor to ensure the health and safety of his workers, the public, the Engineer and the Owner during construction, as may be required.

1.06 LEGAL, HEALTH AND SAFETY REQUIREMENTS:

- A. The Contractor shall observe all federal, state and local laws, ordinances, policies, practices and regulations. In addition, the Contractor agrees to promptly procure all necessary approvals, licenses and permits, pay all charges and fees, and give notices necessary and incident to the due and lawful prosecution of the work.
- B. The Contractor shall conduct the work, at all times, in such a manner as to ensure the safety of, and least possible obstruction to, the traveling public. The convenience of the general public and of the residents along and adjacent to the site/work area shall be

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SEWER TELEVISION INSPECTION

- provided for in an adequate and satisfactory manner, as determined by the Engineer and/or Owner.
- C. All equipment and materials shall be placed or stored in such locations so as not to be or to create the danger of becoming a hazard to the traveling public. No section of road shall be closed to the public except where/when permitted by the Owner and the local traffic authority.
  - D. The Contractor shall perform operations in strict accordance with OSHA and manufacturers' safety requirements. Particular attention is drawn to safety requirements involving entering confined spaces, work on elevated platforms, and working with pressurized equipment.

**PART 2 – PRODUCTS**

**2.01 MATERIALS:**

- A. Television Inspection Camera(s): Specifically designed and constructed for sewer inspection work. Equipped with rotating head, capable of 275-degree ( $\pm$ ) rotation from horizontal, and 360-degree rotation about its centerline.
  - 1. Minimum Camera Resolution: 400 vertical lines and 460 horizontal lines; picture quality and definition shall be to the satisfaction of the Engineer.
  - 2. Camera Lens: Not less than 140-degree viewing angle, with automatic or remote focus and iris controls.
  - 3. Focal Distance: Adjustable through range of 6 inches to infinity.
  - 4. Camera(s) shall be intrinsically safe and operative in 100 percent humidity conditions.
  - 5. Lighting Intensity: Remote-controlled and adjusted to minimize reflective glare.
  - 6. Lighting and Camera Quality: Provide clear, in-focus picture of entire inside periphery of sewer. A reflector in front of the camera may be required to enhance lighting in large diameter pipes.
  - 7. Height adjustment: Use a camera with camera height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe being inspected.
- B. Footage Counter: Measure distance traveled by camera from the centerline of the starting manhole/structure, accurate to two-tenths (0.2) of a foot over the entire length of sewer section being inspected.
- C. Video Titling: Video equipment shall include genlocking capabilities to extent that computer generated data (such as footage, date, and size), as determined by SDR, can be overlaid onto video, and be indicated on television monitor and permanently recorded on inspection videotape.

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**SEWER TELEVISION INSPECTION**

**D. Recording:** All recordings are to be in digital format.

1. **Image Capture:** Capture color still-shots of video recordings for all defects encountered. Digitized picture images shall be stored and be exportable as JPEG formats.
2. **Video Capture:** Full-time live video and audio files shall be captured for each pipe segment and lateral inspected. The files shall be stored in industry standard MPEG format viewable from a DVD/CD on an external personal computer that utilizes Microsoft Media Player to view recording. The MPEG video shall be ISO-MPEG Level 1 (MPEG-1) coding with a resolution of 352 pixels (x) by 240 pixels (y) and an encoding frame rate of 29.97 frames per section. System shall perform an automatic disk image/file naming structure to allow saved video/data sections to be “burned” to DVD-R or CD-R/RW format. It shall have the capability of “burning” a minimum of 120 minutes of recording to the DVD-R or CD-R/RW media. The video recording shall be free of electrical interference and shall produce a clear and stable image. The audio recording shall be sufficiently free of background and electrical noise as to produce an oral report that is clear and discernable. The digital recordings and inspection data shall be cross-referenced to allow instant access to any point of interest within the digital recording.
3. The completed DVD/CD will become the property of the Owner.

**PART 3 – EXECUTION**

**3.01 FLOW REQUIREMENTS:**

- A. Minimal visible flow in the storm and sanitary sewers shall be allowed during CCTV inspection. If in the opinion of the Engineer, the amount of flow observed during the CCTV inspection becomes detrimental to the effectiveness of the work, it shall be eliminated by plugging of the sewers in the upstream manhole/structure and/or bypass pumping, as necessary. For more information, see Section 02950 – Flow Control.
- B. Plugs for flow control shall be of a design which permits the release of a portion or all of the stored sewage flow in an emergency.
- C. Water levels in the manholes/structures upstream of the plugs shall not be allowed to rise to an elevation higher than 2 feet above the manhole/structure invert. If water levels rise to higher elevations, the plugs shall be removed to release a portion of the stored sewage or bypass pumping shall be utilized. Flows shall be restored to normal after completion of the CCTV inspection.

**3.02 PERFORMANCE OF WORK:**

- A. When performed in conjunction with CIPP lining, the Contractor shall perform the work in the following sequence:

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SEWER TELEVISION INSPECTION

1. Clean sewer lines and manholes/structures in accordance with requirements of Section 02951 – Sewer Cleaning.
  2. Perform CCTV inspection of sewer lines in accordance with requirements of this specification section.
  3. Install CIPP lining in accordance with requirements of Section 02955 – Cured-In-Place Pipe (CIPP) Lining for Mainline Sewers, or Section 02956 – Cured-In-Place Pipe (CIPP) Lining for Service Laterals.
  4. Repeat CCTV inspection of sewer lines, in same direction as previous inspection and after completion of installation of CIPP lining, in accordance with requirements of this specification section.
- B. The speed of camera travel shall be slow enough to inspect each pipe joint, tee connection, structural deterioration/defect, infiltration and inflow source, and deposit area, but should not, at any time, be faster than 30 feet per minute. The camera must be centered in the pipe to provide accurate distance measurements for exact locations of important features/defects in the sewer section, and these footage measurements shall be displayed and documented on the video.
- C. Stop at every joint for three (3) seconds and use pan and tilt view when appropriate. Stop elsewhere when necessary to ensure proper documentation of the sewer condition. Stop at every lateral service connection. Center camera so that the lighting and the pan and tilt view can be used to inspect as far into the lateral service connection as possible. Record all defects found in the service connection. Where service connection flow is observed, observe flow for approximately two (2) minutes to ascertain if the flow is sanitary or extraneous flow. The video recording may be paused during observation. Record results of the flow observed on video recording and inspection logs.
- D. The Engineer shall have access to observe and monitor CCTV operations at all times.
- E. Every section of sewer (structure to structure) shall be identified by audio and alphanumeric characters on the video display, and shall include: project title, time of day, structure to structure pipe section, pipe material, sewer diameter and length, compass direction of viewing, direction of camera travel, pipe depth, and operator name.
- F. Important features to be identified by audio and on PACP log shall include all manholes/structures, active and inactive service connections, structural defects, maintenance problems, grease, roots, infiltration, obvious inflow sources, etc. All videos must be continuously metered from structure to structure. In addition to televising the sewer, all manholes/structures shall be panned with the video camera and visually inspected.

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SEWER TELEVISION INSPECTION

3.03 CLEANUP:

Upon acceptance of the work, the Contractor shall restore the project area affected by the operations to original conditions, in a manner acceptable to the Engineer.

END OF SECTION

**SECTION 02953**

**STORM AND SANITARY SEWER POINT REPAIRS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to repair and/or replace existing storm and sanitary sewer pipe and fittings, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. Work shall include, but not be limited to, sawcutting the existing pavement, excavation and trenching, earth support, dewatering, protection of other underground structures and utilities, removing existing deteriorated pipe section(s), formation and placement of bedding material, laying new pipe section(s), connection of new pipe to existing pipe, backfilling, bituminous concrete trench repair and permanent pavement restoration, in accordance with the appropriate specification sections and as ordered by the Engineer.

**1.02 RELATED SECTIONS:**

- A. Section 02270 – Sewage Bypass Pumping
- B. Section 02315 – Excavation and Trenching
- C. Section 02320 – Backfilling and Grading
- D. Section 02622 – Polyvinyl Chloride (PVC) Pipe and Fittings
- E. Section 02623 – High Density Polyethylene (HDPE) Pipe and Fittings
- F. Section 02950 – Flow Control
- G. Section 02955 – Cured-In-Place Pipe (CIPP) Lining for Mainline Sewers
- H. Section 02956 – Cured-In-Place Pipe (CIPP) Lining for Service Laterals
- I. Section 02957 – Service Lateral Grouting

**1.03 REFERENCE STANDARDS:**

- A. American Society for Testing and Materials (ASTM) Publications and Standards (latest revision):
  - 1. C425 – Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
- A. Occupational Safety and Health Administration (OSHA), OSHA Safety and Health Regulations (latest revision):
  - 1. 29 CFR Part 1910 – Occupational Safety and Health Standards.
  - 2. 29 CFR Part 1926 – Safety and Health Regulations for Construction.

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STORM AND SANITARY SEWER POINT REPAIRS

- B. State of Connecticut Department of Transportation, Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818 (2020), together with all errata, addenda, additions, revisions, and supplemental specifications (hereafter referred to as *CT DOT Form 818*).

**PART 2 – PRODUCTS**

2.01 MATERIALS:

- A. The materials and equipment necessary are those specified under the appropriate sections of these specifications.
- B. In the event that such material and equipment requirements are not provided by these specifications, *CT DOT Form 818* shall govern.

**PART 3 – EXECUTION**

3.01 GENERAL:

- A. The Contractor shall comply with the requirements of the appropriate sections of these specifications for the type of pipe being repaired and/or replaced, as referenced above.
- B. All defective pipes shall be excavated and uncovered so that the entire defect is exposed and the repair can be made, and that the restored pipe can be aligned into its final position to the correct line and grade as shown on the drawings or as directed. This work shall be accomplished in such a manner that the integrity of the existing pipe beyond the affected section, and the joints on either side of the repair/replacement, are not displaced.
- C. Any joints damaged by the Contractor beyond the section of repairs shall be repaired/replaced in accordance with the requirements of these specifications, at no additional cost to the Owner.
- D. Removal of fences, base material, storm drains, etc., that interfere with the point repair and are necessary to complete the work at the designated locations shall be restored/replaced to their original condition, at no additional cost to the Owner.
- E. Joints: When connecting plain-end spigot pipe, suitable adapters shall be used for joining dissimilar materials or similar materials. The adapters shall be of either the insert type or the shielded coupling type as directed and approved by the Engineer. The adapter and coupling material shall be of materials which pass the strength and chemical requirements of ASTM C425. All banded maintenance couplings and adapters shall bear the manufacturer's identifying mark and size.
- F. Service Connections: Any service connection replaced during a point repair shall conform to these specifications and all applicable ASTM specifications for material and installation requirements. Materials shall be similar to that of the connecting pipe.



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STORM AND SANITARY SEWER POINT REPAIRS

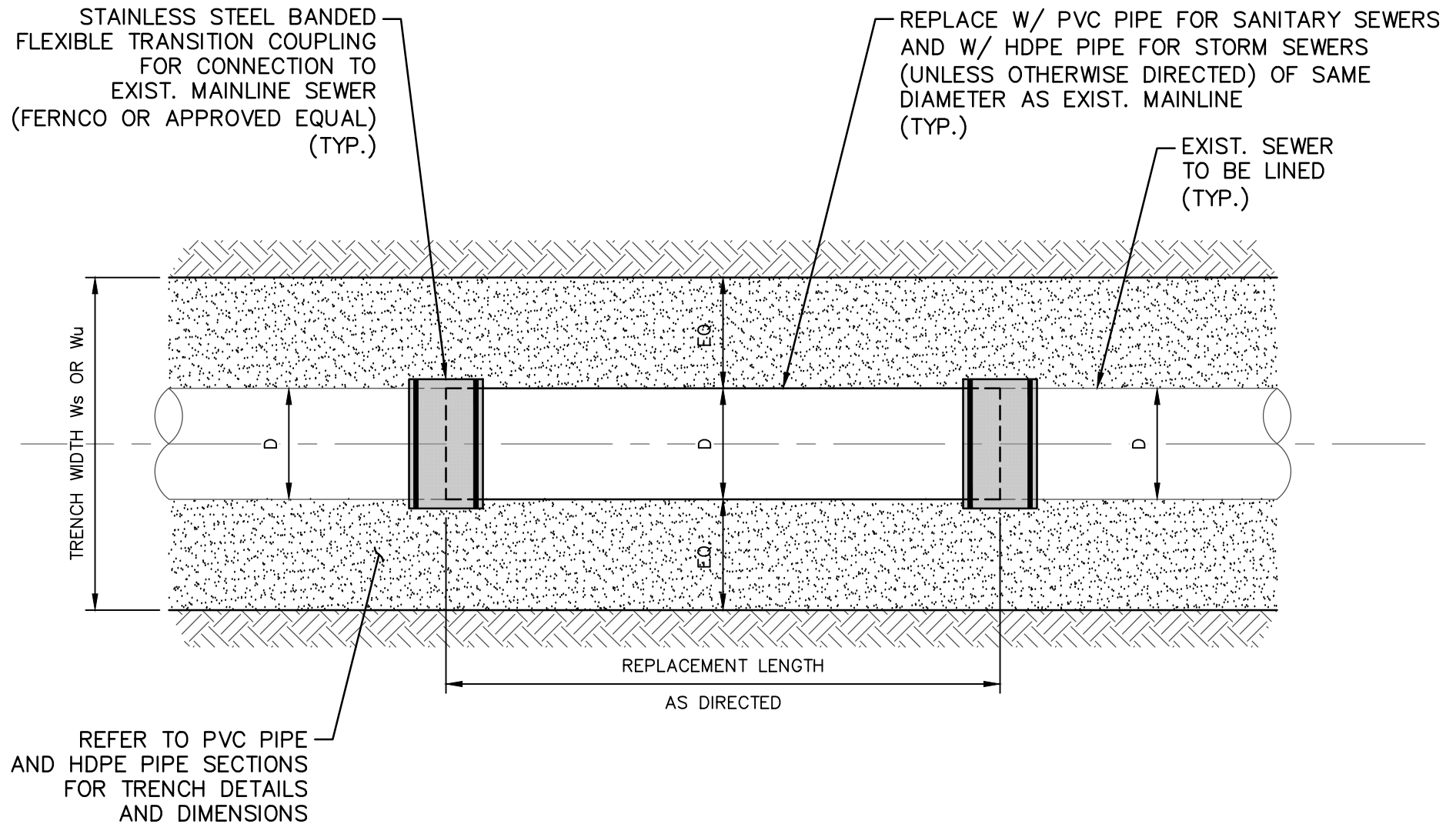
- G. Cleanouts: Any cleanout replaced during a point repair shall conform to the pipe manufacturer's recommendations/specifications and all applicable ASTM specifications for material and installation requirements. The material of the cleanout shall be similar to the sewer pipe it is connected to.
- H. Cleanout Plugs: All cleanout plugs used to seal an open cleanout shall be a cap or plug, and shall be installed per the cleanout manufacturer's recommendations/specifications.

3.02 CLEANUP:

- A. Keep the work area free of accumulations of waste materials, rubbish and other debris resulting from the repair operations.
- B. Upon acceptance of the work and testing, the Contractor shall restore the project area affected by the operations to original conditions, in a manner acceptable to the Engineer.

END OF SECTION

FILE NAME: L:\PROJECTS-2024\24-034-00 CITY OF MILFORD ON-CALL PIPE LINING SPECIFICATIONS\DRAWINGS\24-034-10 DETAILS.DWG



## SEWER POINT REPAIR

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ON-CALL STORM AND SANITARY  
SEWER PIPE LINING  
MILFORD, CT

PROJ. TITLE

DWG. TITLE

DRAWN BY

DATE

SEWER POINT REPAIR

NWE DESIGN BY -

02/06/2024

SCALE

DWG. NO.

PROJECT NO. 24-034-10

AS NOTED

02953-1

**SECTION 02955 CURED-IN-PLACE PIPE (CIPP) LINING FOR MAINLINE SEWERS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to install a cured-in-place pipe (CIPP) lining system in existing storm and sanitary mainline sewers, and reinstate lateral connections post-lining, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. The cured-in-place pipe lining (hereinafter referred to as “CIPP lining”) shall be formed by the insertion of an epoxy or vinyl ester resin-impregnated flexible fiber-reinforced felt tube into the existing sewers of the type and size indicated on the drawings. The tube may be inserted into the existing host pipeline using hydrostatic head (water pressure), compressed air pressure, or pulled into the pipeline using approved mechanical equipment (winch).
- C. The tube shall be expanded with water in an inversion process to fit against the original pipeline, and then heated by circulating hot water or by introducing controlled air or steam to cure the resin into a hard impermeable pipe. The finished product shall be a jointless pipe lining formed to the profile of the existing host pipe. The pipe lining shall be designed to span and seal pinholes, eliminate leakage through joints and prevent internal corrosion and/or erosion in the existing structurally sound pipe.
- D. The lining shall have a suitable membrane coating for protection of the interior surface and to provide a uniform, smooth flow surface. The resin shall be a polyester-type liquid thermosetting resin and shall be suitable for the design conditions as well as the curing process.
- E. The Contractor shall perform all sewer line cleaning operations in the existing host pipe and end structures prior to installation of the CIPP lining.
- F. The Contractor shall perform closed-circuit television (CCTV) inspection after sewer line cleaning to reveal and document the condition of the existing host pipe, and perform CCTV inspection after completion of the CIPP lining operations to reveal and document the condition of the cured-in-place pipe and inspect the work for conformance with these specifications and acceptance by the Engineer.

**1.02 RELATED SECTIONS:**

- A. Section 02270 – Sewage Bypass Pumping
- B. Section 02950 – Flow Control
- C. Section 02951 – Sewer Cleaning
- D. Section 02952 – Sewer Television Inspection
- E. Section 02953 – Storm and Sanitary Sewer Point Repairs
- F. Section 02956 – Cured-In-Place Pipe (CIPP) Lining for Service Laterals

SECTION 02955 CURED-IN-PLACE PIPE (CIPP) LINING FOR MAINLINE SEWERS

G. Section 02960 – Cementitious Liner Manhole Rehabilitation

1.03 REFERENCE STANDARDS:

- A. American Society for Testing and Materials (ASTM) Publications and Standards (latest revision):
  - 1. D543 – Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
  - 2. D638 – Standard Test Method for Tensile Properties of Plastics.
  - 3. D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  - 4. D2990 – Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics.
  - 5. D5813 – Standard Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems.
  - 6. F1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
  - 7. F1743 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP).
- B. National Association of Sewer Service Companies (NASSCO) Publications and Standards (latest revision):
  - 1. NASSCO Performance Specification Guideline – Cured-In-Place Pipe (CIPP) Installation.
- C. Occupational Safety and Health Administration (OSHA), OSHA Safety and Health Regulations (latest revision):
  - 1. 29 CFR Part 1910 – Occupational Safety and Health Standards.
  - 2. 29 CFR Part 1926 – Safety and Health Regulations for Construction.
- D. In case of conflicting requirements between this specification and the referenced documents above, this specification shall govern.

1.04 SUBMITTALS:

- A. Bidders shall submit the required information and references with the Statement of Bidder's Qualifications for review by the Owner at the time of the bid. Installation references of projects that are similar in size and scope shall be included. The submittal shall include, at a minimum, the client contact name, phone number, and the diameter and footage of pipe rehabilitated.

SECTION 02955 CURED-IN-PLACE PIPE (CIPP) LINING FOR MAINLINE SEWERS

- B. Submit documentation of the installation Contractor's required licensing, and details of two (2) years minimum training of the on-site superintendent, and foreman responsible for installation of CIPP lining, with the bid.
- C. Prior to the start of construction, the Contractor shall make the following submittals to the Engineer for approval:
  - 1. Design – Detailed design calculations for both the internal and external loading parameters specified in Paragraph 2.02 (below) shall be submitted for review and approval. The design submittal shall follow the requirements specified in Paragraph 2.02 (below). The design submittal shall also clearly identify the physical properties used for design. These physical properties shall be the basis for acceptance of pre-qualification submittals of previous field samples and acceptance of the final product.
  - 2. Chemical Resistance – The Contractor shall submit test results which indicates that the pipe lining system proposed meets the chemical resistance requirements of Paragraph 3.09 (below).
  - 3. Hydraulic Capacity – The Contractor shall submit calculations which show that the pipe lining, at a minimum, achieves the full-flow (100 percent) capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition. The roughness coefficient of the pipe lining shall be verified by test data.
  - 4. Field Samples – The Contractor shall submit physical property test results from previous installations of the proposed pipe lining system. These test results must verify that the physical properties used in the design submittal, as well as minimum values specified in Paragraph 2.02 (below) have been achieved in previous applications.
  - 5. Reinstatements – The Contractor shall submit details of how existing laterals, tees, air relief valves, blow off valves, threaded taps, etc., will be reinstated. Reinstatements shall provide a sufficient seal to prevent water tracking between the pipe lining and the host pipe.
  - 6. Access Points – The number and location of access points required for installation of the pipe lining shall be provided.
  - 7. Public Notification – The Contractor shall submit a copy of the initial public notification as described in Paragraph 1.07 (below).
- D. Submit flow control and bypass pumping plans and locations with sufficient detail to assure that work can be accomplished without service interruption, sewage spills, or surcharging of the existing system(s). The bypass pumping plan shall be in accordance with Section 02270 – Sewage Bypass Pumping.

SECTION 02955 CURED-IN-PLACE PIPE (CIPP) LINING FOR MAINLINE SEWERS

- E. Submit CCTV inspection video following sewer line cleaning, and after completion of the sewer lining operation.

1.05 QUALITY ASSURANCE:

- A. The installation Contractor shall be properly licensed and trained to install the specified CIPP lining system(s), and shall have a combined total of 10,000 lineal feet (minimum) of successful CIPP lining installation in the United States within the last three (3) years, in pipelines ranging from 8 to 48 inches in diameter.
- B. All personnel working in confined spaces shall have the appropriate confined space entry training, as appropriate. Precautions shall be taken by the Contractor to ensure the health and safety of his workers, the public, the Engineer and the Owner during construction, as may be required.

1.06 MANUFACTURERS:

- A. Subject to compliance with the requirements of these specifications, manufacturers offering products that may be incorporated in the work shall include the following companies:
  - 1. Insituform Technologies, Inc.
  - 2. Inliner Solutions, LLC
  - 3. CIPP Corporation
  - 4. National Liner, LLC

1.07 PUBLIC NOTIFICATION:

- A. The Contractor shall provide written notices to each affected property owner, not identified for service bypass, that their sewage service will be off-line while the liner is being installed.
- B. Written notices shall be distributed to each affected property owner one (1) week prior to and again 48 hours in advance of commencement of the work being performed in their section, providing the date, state time and time when service will be completely restored. Written notices shall include a local telephone number for the Contractor which property owners can call for information during the execution of the work.
- C. Written notices shall be approved by the Engineer prior to distribution.
- D. The Contractor shall contact any property owner whose sewer service cannot be reconnected/restored within the time stated in the written notice.
- E. The maximum amount of time any property shall be without sewer service is eight (8) hours. Any sewer service to be off-line longer than eight (8) hours shall be bypassed to a sanitary sewer, at no cost to the property owner.

**SECTION 02955 CURED-IN-PLACE PIPE (CIPP) LINING FOR MAINLINE SEWERS**

**1.08 GUARANTEE:**

All cured-in-place pipe installed in mainline sewers shall be guaranteed by the Contractor for a period of three (3) years from the date of acceptance by the Engineer. During this period, all serious defects discovered in the lining, as determined by the Engineer and/or Owner, shall be repaired in a manner satisfactory to the Engineer, or the liner shall be replaced, at no additional cost to the Owner.

**1.09 LEGAL, HEALTH AND SAFETY REQUIREMENTS:**

- A. The Contractor shall observe all federal, state and local laws, ordinances, policies, practices and regulations. In addition, the Contractor agrees to promptly procure all necessary approvals, licenses and permits, pay all charges and fees, and give notices necessary and incident to the due and lawful prosecution of the work.
- B. The Contractor shall conduct the work, at all times, in such a manner as to ensure the safety of, and least possible obstruction to, the traveling public. The convenience of the general public and of the residents along and adjacent to the site/work area shall be provided for in an adequate and satisfactory manner, as determined by the Engineer and/or Owner.
- C. All equipment and materials shall be placed or stored in such locations so as not to be or to create the danger of becoming a hazard to the traveling public. No section of road shall be closed to the public except where/when permitted by the Owner and the local traffic authority.
- D. The Contractor shall perform operations in strict accordance with OSHA and manufacturers' safety requirements. Particular attention is drawn to safety requirements involving entering confined spaces, work on elevated platforms, and working with pressurized equipment.

**PART 2 – PRODUCTS**

**2.01 MATERIALS:**

- A. The liner material shall be compatible with municipal sewage, and chemically resistant to withstand exposure to sewer gases, as applicable. The liner shall be fabricated to a size that, when installed, neatly fits the internal circumference of the existing host pipe. The installation Contractor shall verify the pipe length(s) and diameter(s) in the field prior to fabrication and installation.
- B. The tube shall be fabricated with non-woven synthetic fiber combined with glass fiber reinforcement material. The tube shall be fabricated to dimensions such that it will stretch to a size that when installed will cure while in contact with the existing pipe.
- C. The outside layer of the tube shall be plastic coated with a translucent flexible material that clearly allows inspection of the resin impregnation (wet-out) procedure.

SECTION 02955 CURED-IN-PLACE PIPE (CIPP) LINING FOR MAINLINE SEWERS

- D. The tube shall have a uniform thickness that when compressed at installation pressures will exceed the minimum required thickness specified in the design submittals.
- E. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. The tube shall contain glass fiber reinforcement quantities appropriate for the internal pressure requirements.
- F. The wall color of the interior pipe surface of the pipe lining after installation shall be a light reflective color so that a clear, detailed examination may be made of the final product with CCTV inspection equipment or by man-entry.
- G. A vinyl ester or epoxy resin system that is compatible with the inversion process shall be used.
- H. The felt content of the liner shall be determined by the manufacturer but shall not exceed 25 percent of the total impregnated liner volume.
- I. The actual cured liner thickness shall be plus 5 percent of the approved design thickness, and shall not include the thickness of the membrane coating.

2.02 DESIGN PARAMETERS:

- A. The pipe lining shall be designed, fabricated, and installed for the actual conditions encountered for this application, including the material of the host pipe, in accordance with the applicable provisions of ASTM F1216, and shall meet the following minimum design conditions:
  - 1. No bonding to the host pipe
  - 2. Host pipe condition – fully deteriorated
  - 3. Factor of safety – 2.0
  - 4. Long-term flexural strength – 50 percent of initial
  - 5. Long-term flexural modulus – 50 percent of initial
  - 6. Ovality of pipe – 2 percent (minimum); if ovality of host pipe is found to be worse, use actual ovality percentage up to 5 percent (maximum).
  - 7. Soil unit weight – 120 pcf
  - 8. Soil modulus – 1,000 psi
  - 9. Soil cover (above top of pipe) – as measured in field
  - 10. Groundwater depth (above invert) – assume at ground surface
  - 11. Minimum service life – 50 years
  - 12. Superimposed loading (live load) – AASHTO HS-20
- B. The physical properties used in the design submittal shall be clearly identified. These physical properties shall be the basis for the acceptance of pre-qualification submittals



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of previous field samples, and the acceptance of the final product. At a minimum, the pipe lining shall have the following physical properties:

Property	Test Method	Minimum Value <sup>1</sup>
Flexural Strength (initial)	ASTM D790	4,500 psi
Flexural Strength (50-year)	ASTM D790	2,250 psi
Flexural Modulus (initial)	ASTM D790	250,000 psi
Flexural Modulus (50-year)	ASTM D790	125,000 psi
Tensile Strength <sup>2</sup>	ASTM D638	3,000 psi

<sup>1</sup> Values are in accordance with ASTM F1216.

<sup>2</sup> For pressure pipes only.

- C. The pipe lining shall be designed to withstand all imposed loads, including live loads and hydrostatic pressure, as applicable. The pipe lining shall have sufficient wall thickness to withstand all anticipated external pressures and loads that may be imposed after installation. The design shall be performed and certified by a professional engineer licensed in the State of Connecticut.
- D. The external hydrostatic load design shall be performed using the applicable equations listed under ASTM F1216, Appendix XI, and the design parameters listed above.
- E. The pipe lining shall be capable of withstanding instantaneous transient vacuum occurrences. It is assumed that the internal vacuum effect is similar to the external loading effect of groundwater.
- F. The pipe lining shall be designed to span over any small holes that exist in the host pipeline.
- G. If the pipe is above-ground, the pipe lining shall be designed to withstand internal pressure and vacuum only.

**PART 3 – EXECUTION**

**3.01 GENERAL:**

- A. The Contractor shall take field measurements of pipe inside diameter of all sewer lines to be rehabilitated.
- B. In conjunction with review of CCTV inspection records, the Contractor shall provide the correct liner diameter and wall thickness to ensure tight fit with existing pipe to be restored.
- C. Confirm lengths of liner to be installed.

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- D. Locate live services prior to rehabilitation activities. Each service connection shall be noted by size, position from reference manhole/structure, and orientation with respect to circumference of pipe.
- E. The lining system shall be constructed of materials and methods that when installed shall provide a jointless and continuous structurally sound CIPP able to withstand all imposed static and dynamic loads on a long-term basis.

3.02 PREPARATION:

- A. The Contractor shall successfully complete the following items before installation of the work:
  - 1. Notify all affected property owners in accordance with Paragraph 1.07 (above).
  - 2. Control sewer flow.
  - 3. Clean sewer.
  - 4. Perform CCTV inspection of sewer.
  - 5. Take precautions to protect the new liner, and existing pipe and manholes/structures from damage that might result from the liner insertion process.

3.03 SEQUENCE OF WORK:

- A. The Contractor shall perform work in the following sequence:
  - 1. Notify all affected property owners in accordance with Paragraph 1.07 (above).
  - 2. Divert/control sewer flow to comply with the requirements of Section 02270 – Sewage Bypass Pumping, and Section 02950 – Flow Control.
  - 3. Perform point repairs (if necessary) as indicated on the drawings or as directed by the Engineer, in accordance with Section 02953 – Storm and Sanitary Sewer Point Repairs, and all other appropriate sections.
  - 4. Clean sewer in accordance with the requirements of Section 02951 – Sewer Cleaning, and perform pre-insertion CCTV inspection to comply with the requirements of Section 02952 – Sewer Television Inspection. Complete sewer cleaning and CCTV inspection a minimum of four (4) hours prior to commencement of lining operations.
  - 5. Install and cure liner, and seal ends.
  - 6. Perform adaptation and sealing of liner at intermediated manhole/structure inverts, as applicable.
  - 7. Reinstate service connections.
  - 8. Perform post-insertion CCTV inspection to comply with the requirements of Section 02952 – Sewer Television Inspection.

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3.04 PIPELINE POINT REPAIR:

- A. The Contractor shall repair pipeline where point repairs are identified on the drawings or directed by the Engineer, according to the requirements of Section 02953 – Storm and Sanitary Sewer Point Repairs.
- B. Pipe and repair materials shall be as directed by the Engineer and in accordance with these specifications, unless otherwise indicated on the drawings.
- C. Trenching, excavation and backfilling shall conform to the requirements of Section 02315 – Excavation, and Trenching, and Section 02320 – Backfilling, Grading and Compaction.
- D. Bypass pumping shall conform to the requirements of Section 02270 – Sewage Bypass Pumping, and Section 02950 – Flow Control.
- E. Notify the Engineer a minimum of forty-eight (48) hours in advance of commencement of pipeline point repair work, at each particular location.
- F. Installation of replacement pipe and/or repair work shall conform to the requirements of Section 02953 – Storm and Sanitary Sewer Point Repairs, and all other appropriate sections. All pipeline point repairs shall be inspected by the Engineer/Owner prior to backfilling and compaction.

3.05 LINER INSTALLATION:

- A. Access, Cleaning and Inspection:
  - 1. Prior to entering access areas (such as manholes/structures) and performing CCTV inspection or cleaning operations, the Contractor shall make an evaluation of the atmosphere to determine the presence of toxic or flammable vapors or lack of oxygen, in accordance with local, state, or federal safety regulations.
  - 2. The Contractor shall state in his pre-qualification submittals (see Paragraph 1.04 above) the number and location of access points required. The Owner shall provide rights of access to the pipeline. The Contractor or Owner, as specified in the contract documents, shall provide the excavation, pipe work, and reconnection/restoration work for the installation access points.
  - 3. The Contractor shall remove all internal debris out of the pipeline that will interfere with the installation. Pipes shall be cleaned by the Contractor, as needed, with high-velocity jet cleaners, mechanically powered equipment, cable-attached devices or fluid-propelled devices (e.g., pipe pigs). The Contractor is responsible for the proper off-site disposal of all debris removed from the pipe during the cleaning operation.
  - 4. Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, etc., by CCTV or man entry. The interior of the pipeline shall be carefully inspected to determine the location of any conditions that may prevent proper installation of the impregnated tube, and it shall be noted so that

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these conditions can be corrected. A videotape and suitable log shall be kept for reference. If unseen obstructions are encountered such as, but not limited to, reducers, line valves, protruding connections, etc., that will prevent proper installation, the Contractor shall remove such obstructions on written order from the Owner/Engineer.

B. Bypassing/Flow Control:

1. The Contractor shall be responsible for bypassing and/or controlling all stormwater and wastewater flows during the renovation process, as required.

C. Resin Impregnation:

1. The tube shall be vacuum-impregnated (wet-out) with resin under controlled conditions. The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and loss of resin through cracks and irregularities in the original pipe wall.
2. The Contractor shall designate a location where the tube will be vacuum-impregnated prior to installation. To ensure a thorough wet-out, the point of vacuum shall be no further than 25 feet from the point of initial resin introduction. After vacuum in the tube is established, the vacuum points shall be no further than 75 feet from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular as possible. Vacuum points shall be sealed as they are vacated. A roller system shall be used to uniformly distribute the resin throughout the tube. The Contractor shall allow the Owner/Engineer to inspect the materials and procedures used to vacuum impregnate the tube.

D. Installation:

1. The existing pipeline shall be dewatered and free of incoming water. If water is present, alternative measures shall be taken to minimize contact of the water with the inverting tube.
2. The wet-out tube shall be inserted through an existing manhole/structure or approved access point by means of an inversion process and the application of a hydrostatic head sufficient to extend it to the next designated manhole/structure or termination point.
3. Before the installation begins, the Contractor shall determine the minimum pressure required to hold the tube tight against the existing pipeline, and the maximum allowable pressure so as not to damage the tube. Once the installation has started, the pressure shall be maintained between the minimum and maximum pressures until the installation has been completed. Tube installation forces or pressures shall be limited so as not to stretch the tube longitudinally by more than 5 percent of the original length.

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4. The use of a lubricant during inversion may be needed to reduce friction. The lubricant used shall be a non-toxic product that has no detrimental effects on the tube or boiler and pump system, shall not support the growth of bacteria, and shall not adversely affect the fluid to be transported.

E. Curing:

1. After installation is completed, suitable heat source and water recirculation equipment shall be used to circulate heated water throughout the pipeline. The equipment shall be capable of delivering hot water throughout the pipeline to uniformly raise the water temperature above the temperature required to affect a cure of the resin. Water temperature in the line during the cure period shall be as determined by the Contractor.
2. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water supply. To determine the temperatures during the cure cycle, a gauge shall be placed at the beginning and termination points between the impregnated tube and the invert of the existing pipe. The temperature of the cure water shall be monitored at the termination end by placing a temperature probe through a small hole in the tube, near the invert, into the cure water. The hole in the tube shall be made such that the temperature probe fits tightly and minimizes cure water leakage.
3. Initial cure will occur during temperature heat-up and is completed when exposed portions of the new pipe appear to be hard and sound, and the remote temperature sensor indicates that the temperature is of a magnitude to realize an exothermic reaction or cure in the resin. After initial cure is reached, the temperature shall be raised to the post-cure temperature as determined by the Contractor. The post-cure temperature shall be held for a period as determined by the Contractor, during which time the recirculation of the water and cycling of the boiler to maintain the temperature continues. The curing process shall take into account the existing pipe material, the resin system, and ground conditions (temperature, moisture level, and thermal conductivity of soil).
4. Specifically for storm drainage pipe outfalls, the linings shall be cured using water inversion and heat curing methods.

F. Cool-Down:

1. The pipe lining shall be cooled to a temperature below 90° F (32° C) before relieving the hydrostatic head. Cool-down shall be accomplished by the introduction of cool water to replace water being drained from the system. Care shall be taken in the release of the static head so that a vacuum will not be developed that could damage the newly installed pipe lining. In addition, the cure water incoming temperature during cool-down shall not decrease at a rate greater than 20° F (11° C) per hour.

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3.06 INTERNAL END SEALS AND REINSTATEMENTS:

- A. The Contractor shall install end seals at the pipe lining beginning and termination points, for all pipes 20 inches or larger in diameter, unless otherwise directed by the Engineer.
- B. The end seals shall be a mechanical, expansion type, constructed of stainless steel and elastomeric seals. The end seals shall be rated by the manufacturer for the operating pressure and shall be compatible with the piped fluid. The pipe at the end seal installation points shall be structurally sound and free of any significant pitting or heavy corrosion. This is required to ensure an adequate seal between the pipe lining and the existing pipeline. Otherwise, replacement with a new steel spool piece at these ends may be required.
- C. All reinstatements of laterals, tees, air relief valves, blow-off valves, threaded taps, etc., shall be completed following the approved procedures identified in the submittal described in Paragraph 1.04 (above).
- D. Reconnect the existing service laterals only after the minimum recommended curing time has elapsed. This shall be performed without excavation, and be means of a television camera and cutting device that re-establishes the service connection to the previous (pre-lining) capacity. Brush the opened service laterals to a smooth finish, free from any burrs.
- E. CIPP lining installation shall be in accordance with ASTM F1216, Section 7, or ASTM F1743, Section 6, with the following modifications:
  - 1. Resin Impregnation – The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the potential loss of resin during installation through cracks and irregularities in the original pipe wall, as applicable.
  - 2. Tube Insertion – The wet-out tube shall be positioned in the pipeline using either inversion or a pull-in method as defined within relevant ASTM standards previously stipulated. If pulled into place, a power winch or its equivalent should be utilized and care should be exercised not to damage the tube as a result of pull-in friction. The tube should be pulled-in or inverted through an existing manhole/structure or approved access point and fully extend to the next designated manhole/structure or termination point.
- F. Temperature gauges shall be placed between the tube and the host pipe's invert position to monitor the temperatures during the cure cycle.
- G. Curing shall be accomplished by utilizing hot water under hydrostatic pressure or steam pressure in accordance with the manufacturer's recommended cure schedule. A cool-down process shall be conducted that complies with the resin manufacturer's instructions/specifications.

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3.07 SEALING AT MANHOLES/STRUCTURES:

- A. If the CIPP lining fails to make tight seal at manhole/structure walls, apply seal consisting of resin mixture compatible with liner/resin system, in accordance with manufacturer's specifications and approved by the Engineer.
- B. All cutting and sealing of lining at manhole/structure connections shall provide watertight pipe and trough seals. All cut edges of the cured liner shall be thoroughly sealed with the same resin as was used in the liner. The catalyst or hardener used shall be compatible with the resin/catalyst used in the liner previously, but shall not require an external heat source to begin the exothermic reaction (curing).
- C. Where the liner has been continuously laid through a manhole/structure during installation, the cured liner shall be neatly sawcut to fit the top of the trough through the width of the manhole/structure base. Any void between the manhole/structure apron and the liner wall shall be cleaned and filled with hydraulic grout. The cut edges of the cured liner shall be sealed with resin as described above.

3.08 INSPECTION AND TESTING:

- A. The installation shall be inspected visually, if appropriate, or by CCTV if visual inspection cannot be accomplished. Variations from true line and grade may be inherent because of the conditions of the original piping. No infiltration of groundwater shall be observed.
- B. The finished pipe lining shall be continuous over the entire length of an installation run and be free of dry spots, lifts, and delamination.
- C. For each inversion length designated by the Owner in the contract documents or purchase order, one (1) pipe lining sample shall be prepared using one (1) of the following methods:
  - 1. The sample shall be cut from a section of the cured pipe lining at an intermediate manhole/structure or at the termination point that has been inverted through a like diameter pipe which has been held in place by a suitable heat sink, such as sandbags.
  - 2. The sample shall be fabricated from material taken from the tube and the resin/hardener system used and cured in a clamped mold placed in the down-tube.
- D. The costs of obtaining and testing the samples shall be the sole responsibility of the Contractor.
- E. The pipe lining samples shall be large enough to provide a minimum of three (3) specimens and a recommended five (5) specimens for flexural and tensile testing.
- F. The pipe lining samples shall be tested in accordance with ASTM D790 and ASTM D638 to confirm that the required physical properties have been achieved.
- G. The pipe lining shall meet the chemical resistance requirements outlined in Paragraph 3.09 (below).

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- H. For pressure pipes (force mains), the pipe lining shall be tested for water-tightness following the test protocol described in Paragraph 3.10 (below).

**3.09 CHEMICAL RESISTANCE:**

- A. The pipe lining system shall meet the minimum chemical resistance requirements listed below. Test samples shall be the same resin system and similar tube material as that proposed for the project.
- B. Chemical resistance tests shall be completed in accordance with ASTM D543, with the chemical solutions shown in the table below. Pipe lining test specimens shall lose no more than 20 percent of their initial flexural strength and initial flexural modulus of elasticity when tested for a minimum of one (1) month at 73.4° F (23° C).

Minimum Chemical Resistance Requirements	
Chemical Solution	Concentration, %
Tap Water (pH 6-9)	100
Nitric Acid	5
Phosphoric Acid	10
Sulfuric Acid	10
Gasoline	100
Vegetable Oil	100
Detergent	0.1
Soap	0.1

**3.10 PRESSURE TESTING FOR WATER TIGHTNESS (FOR PRESSURE PIPES):**

- A. This section provides procedures for pressure testing for water-tightness of the pipe lining used in the renovation of pressure pipelines (force mains). Pressure testing for water-tightness shall be provided on all force main pipe lining sections identified by the Owner in the contract documents or purchase order.
- B. Test Procedure:
1. The pipe lining shall be cooled down to the original ambient ground temperature, which existed before pipe lining installation, prior to proceeding with the pressure test.
  2. The test section shall be subjected to a hydrostatic pressure of twice the known internal operating pressure, or at the internal operating pressure plus 50 psi, whichever is less.
  3. The pressure test shall be conducted after placement of all appurtenances such as end seals, reinstatements of side connections, corporation stops, etc. To avoid the



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testing of other associated piping, the side connections, corporation stops, etc., shall be capped or otherwise isolated. When sections of rehabilitated piping are reconnected with new spool pieces, ensure that all flange connections are watertight during the pressure test. Note, the emphasis is that only renovated piping (and its appurtenances) shall be tested. Otherwise, leakage in other side piping could contribute to a leakage rate measured for the pipe lining.

4. The pipe section to be tested shall be isolated with blind flanges or other appropriate method rated for the required test pressure. Means for temperature measurement, air relief and filling the test section with water shall be provided. The line tested shall be configured such that leakage from the ends and branch lines can be visually monitored.
5. The ends, termination points, elbows, etc. that are removed shall be properly braced, blocked and supported for the duration of the test. The test pressure shall not exceed the safe pressure on such fittings.
6. The test shall be one (1) hour in duration.
7. The test section shall be filled slowly from any available water source. All air shall be expelled from the pipeline during filling. This is a very critical step of the process since trapped air will compress during pressurization giving erroneous leakage measurements. When filling the pipeline with water, all air release valves and the high elevation end of the pipeline shall be opened until a free flow of water is visible, to release all air from the pipeline to be tested. Ensure the rate of filling does not significantly pressurize the pipeline prematurely. If the above technique for expelling air is not sufficient, another approach may be more effective. One alternative is to push a pig through the line with the fill water behind it. This is done after each end of the test section is sealed off so the pig remains in the pipe during the pressure test. When the pipe is full and the pig reaches the far end of the test section, the air in front of the pig is bled off through a relief valve in the blind flange or pressure plug at the termination end.
8. Once the pipe lining is filled, the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Owner. The test pressure shall be applied in steps at intervals of 50 psi or one-half of the test pressure, whichever is less, until the required test pressure is reached. The pressure shall be held at each step for a minimum of 30 minutes.
9. A minimum stabilization period of two (2) to three (3) hours is recommended before starting the pressure test. During this time, the test pressure shall be maintained within close proximity of the required test pressure. A small annular gap may exist between the pipe lining wall and the existing pipe. During this stabilization period, the pipe lining will re-round and stretch. Some trapped air may still exist in the pipe and the mean water temperature may fluctuate. These can

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cause erroneous leakage readings if the pressure test is run during this period. Therefore, the required stabilization period may be considerably longer than expected for some installations. Decreasing make-up water during the stabilization period should indicate that at least one of these effects is present and is gradually being counteracted.

10. Bleed off any air at the ends of the test section prior to beginning the test. As stated previously, the pressure test shall be for a duration of one (1) hour after the stabilization period is completed. Begin the test at the required test pressure. After the one (1) hour test, the amount of make-up water needed to return to the required pressure shall be quantified.

C. Acceptance:

1. The test shall require that the quantified make-up water for the one (1) hour test shall not exceed 20 gallons per inch of internal pipe diameter, per mile of pipe, per 24-hour day (20 GPDIM). The quantified make-up water for the one (1) hour test shall be extrapolated to the 24-hour rate for comparison purposes.
2. Any visible leakage at termination points shall be eliminated. If not feasible or possible at the time of the test, the termination point leakage shall be kept to a minimum, collected and then deducted from the actual make-up water rate. If the leakage at test pressure exceeds the allowable, the Contractor shall endeavor to locate the source of the leakage and reduce it in a manner acceptable to the Owner.
3. The pressure test for water-tightness shall be deemed acceptable if that actually measured during the one (1) hour test (which has been extrapolated to a 24-hour day rate) is equal to or less than the allowable make-up water rate of 20 GPDIM.

3.11 CLEANUP:

- A. Keep the work area free of accumulations of waste materials, rubbish and other debris resulting from the lining operations.
- B. Upon acceptance of the work and inspection/testing, the Contractor shall restore the project area affected by the operations to original conditions, in a manner acceptable to the Engineer.

END OF SECTION

SECTION 02956 CURED-IN-PLACE PIPE (CIPP) LINING FOR SERVICE LATERALS

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to install a cured-in-place pipe (CIPP) lining system in existing sewer service laterals, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. It is the intent of this specification to provide for the rehabilitation of identified active sewer laterals extending from a mainline sewer towards the house or building with a sealed connection, without the need of a cleanout.
- C. All sewer service lateral rehabilitation shall occur without excavation by installation of a vacuum epoxy-impregnated, one-piece main and lateral liner in the form of an internal sleeve. The liner shall consist of a sectional liner in the mainline (full wrap around the circumference of the mainline extending 5 inches on either side of the service connection), and the continuous liner shall have the capacity to extend up the lateral, towards the house/building foundation, to the length specified. The liner shall form a continuous, one-piece, tight-fitting, corrosion-resistant and verifiable non-leaking cured-in-place pipe.
- D. The liner shall be manufactured in a factory setting prior to its arrival on site. No component of the liner (i.e., lateral tube to mainline piece) shall be glued or sewn fused in the field prior to installation.
- E. All lateral lining work shall be performed from mainline sewers. Mainline sewer may be lined or unlined pipe. Existing service laterals shall be flush with the mainline sewer wall prior to service lateral liner installation.
- F. Service lateral connections may be a combination of tees, wyes or break-in taps or varying sizes and angles ranging from 30 to 90 degrees. Service laterals may enter the mainline sewer at any point on the circumference, including perpendicular, tangential, etc. The lateral lining system must be capable of maneuvering through the various conditions described above.
- G. The installation of an upstream cleanout is not allowed and shall only be allowed by the Engineer on a case-by-case basis. The cost of installing such cleanout, if needed, shall be considered incidental to the liner installation work, and shall be included in the cost to furnish and install the service liner. No separate bid item is allowed for cleanout installation work.
- H. The Contractor shall verify all pipe diameter and materials for service laterals to receive CIPP lining prior to commencing operation.
- I. The mainline portion of the carrier packer shall accommodate pipe diameters ranging from 6 inches to 15 inches, unless otherwise specified or dictated by field conditions.

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1.02 RELATED SECTIONS:

- A. Section 02270 – Sewage Bypass Pumping
- B. Section 02950 – Flow Control
- C. Section 02951 – Sewer Cleaning
- D. Section 02952 – Sewer Television Inspection
- E. Section 02953 – Storm and Sanitary Sewer Point Repairs
- F. Section 02955 – Cured-In-Place Pipe (CIPP) Lining for Mainline Sewers

1.03 REFERENCE STANDARDS:

- A. American Society for Testing and Materials (ASTM) Publications and Standards (latest revision):
  - 1. D543 – Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
  - 2. D638 – Standard Test Method for Tensile Properties of Plastics.
  - 3. D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  - 4. D2990 – Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics.
  - 5. D5813 – Standard Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems.
  - 6. F1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
  - 7. F1743 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP).
- B. National Association of Sewer Service Companies (NASSCO) Publications and Standards (latest revision):
  - 1. NASSCO Performance Specification Guideline – Cured-In-Place Pipe (CIPP) Lateral Pipe Lining.
- C. Occupational Safety and Health Administration (OSHA), OSHA Safety and Health Regulations (latest revision):
  - 1. 29 CFR Part 1910 – Occupational Safety and Health Standards.
  - 2. 29 CFR Part 1926 – Safety and Health Regulations for Construction.
- D. In case of conflicting requirements between this specification and the referenced documents above, this specification shall govern.

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1.04 SUBMITTALS:

- A. Bidders shall submit the required information and references with the Statement of Bidder's Qualifications for review by the Owner at the time of the bid. Installation references of projects that are similar in size and scope shall be included. The submittal shall include, at a minimum, the client contact name, phone number, and the diameter and footage of pipe rehabilitated.
- B. Submit documentation of the installation Contractor's required licensing, and details of two (2) years minimum training of the on-site superintendent, and foreman responsible for installation of CIPP lining, with the bid.
- C. Prior to the start of construction, the Contractor shall make the following submittals to the Engineer for approval:
  - 1. Shop drawings and schedules of all service lateral liners and appurtenances required. Design data and specification data sheets listing all parameters used in the liner design thickness calculations based on ASTM F1216 and D2412 for fully deteriorated pipe, and as specified herein. All service connection liner design calculations shall be sealed and signed by a Professional Engineer registered in the State of Connecticut.
  - 2. Detailed procedure for installing the service lateral liner.
  - 3. The name of the manufacturer of the material components (liner and resin), and the location of the facility where the materials were manufactured.
  - 4. Public Notification – The Contractor shall submit a copy of the initial public notification as described in Paragraph 1.07 (below).
  - 5. Safety Data Sheets – The Contractor shall submit Safety Data Sheets (SDS) for each component of the service lateral liner system.
  - 6. Test Results – Prior to the use of any materials, the Contractor shall furnish, at his expense, the results of testing of the proposed materials by an independent laboratory in conformance with these specifications and ASTM F1216.
    - a. Full and complete testing as per ASTM F1216, including long term 10,000-hour test results.
    - b. Test results from field installed samples within the last 12 months, as per ASTM F1216.
    - c. All testing must be performed by an accredited independent laboratory to verify that the products to be used meet all minimum strength standards as set forth in ASTM F1216, Table 1. Testing shall also verify that any product to be used on the project meet the minimum chemical resistance requirements as established in ASTM F1743, Table 2, where the testing is in accordance with Section 7.2.1 of ASTM F1743.

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7. Pipe Cleaning Procedure – The Contractor shall submit a narrative describing in sufficient detail the proposed methods of root cutting and cleaning the existing laterals. Prepare such narrative to include the degree of cleaning as recommended by the lining manufacturer. Such narrative shall indicate approval of proposed cleaning methods by the lining manufacturer's technical representative.
8. Liner Thickness Calculations – The Contractor shall perform liner thickness calculations for all scenarios grouped by service lateral diameter and depth range. Design parameters shall be as specified herein.
9. Curing Cycle and Cooling Rate – The Contractor shall submit the epoxy manufacturer's recommended curing cycle as well as the recommended cooling rate. The Contractor shall submit a copy of the cure logs for each lateral installation.
10. The Contractor shall submit two (2) copies of the final CCTV inspection that show the rehabilitated service lateral.

1.05 QUALITY ASSURANCE:

- A. The Contractor performing the lateral lining work shall provide a list of references, including owner name, contact name with phone number, start and completion dates and quantity of laterals lined, with the CIPP lateral lining system used for that specific project provided, verifying compliance with these qualifications.
- B. A five (5) year history of satisfactory performance in the CIPP industry.
- C. A minimum of 500 CIPP lateral installations.
- D. A minimum of two (2) years continuous experience installing CIPP lateral lining in pipe of similar size, length and configuration as proposed in this project.
- E. The on-site superintendent must have installed over 250 CIPP laterals of like condition, and have a minimum of five (5) years of experience in the CIPP industry.
- F. License or certificate that the installation Contractor is approved to install the proposed lateral lining system.
- G. All personnel working in confined spaces shall have the appropriate confined space entry training, as appropriate. Precautions shall be taken by the Contractor to ensure the health and safety of his workers, the public, the Engineer and the Owner during construction, as may be required.

1.06 SYSTEM DESCRIPTION:

- A. The service lateral liner must be a seamless one-piece product affixed to the walls of the lateral pipe and at the junction between the pipe and mainline sewer. The junction between the collar and the lateral sleeve must be watertight and shall consist of a sectional liner in the mainline (full wrap around the circumference of the main line extending 5 inches on either side of the service connection), and the continuous liner

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- shall have the capacity to extend up the lateral, towards the house/building foundation, to the length specified. The liner shall form a continuous, one-piece, tight-fitting, corrosion-resistant and verifiable non-leaking cured-in-place pipe.
- B. The liner shall be manufactured in a factory setting prior to its arrival on-site. No component of the liner (i.e., lateral tube to mainline piece) shall be glued or sewn fused in the field prior to installation. The material shall be capable of conforming to offset joints, bells and disfigured pipe sections.
  - C. The carrier packer shall be specifically designed for various diameter service connections. It shall be manufactured to conform to either tee, wye or break-in-type connections. The mainline portion of the carrier packer shall accommodate pipe diameters ranging from 6 inches to 15 inches, unless otherwise specified or dictated by field conditions.
  - D. A corrosion-resistant epoxy compatible with the installation process shall be used.
  - E. Both the liner and the resin components shall be supplied by the manufacturer of the complete system. Material components (i.e., liner, resin and hardener) cannot be sourced from various suppliers. The material system shall be fully compatible as per the system supplier material specification(s).

1.07 PUBLIC NOTIFICATION:

- A. The Contractor shall provide written notices to each affected property owner, not identified for service bypass, that their sewage service will be off-line while the liner is being installed.
- B. Written notices shall be distributed to each affected property owner one (1) week prior to and again 48 hours in advance of commencement of the work being performed in their section, providing the date, state time and time when service will be completely restored. Written notices shall include a local telephone number for the Contractor which property owners can call for information during the execution of the work.
- C. Written notices shall be approved by the Engineer prior to distribution.
- D. The Contractor shall contact any property owner whose sewer service cannot be reconnected/restored within the time stated in the written notice.
- E. The maximum amount of time any property shall be without sewer service is eight (8) hours. Any sewer service to be off-line longer than eight (8) hours shall be bypassed to a sanitary sewer, at no cost to the property owner.

1.08 GUARANTEE:

All cured-in-place pipe installed in service laterals shall be guaranteed by the Contractor for a period of three (3) years from the date of acceptance by the Engineer. During this period, all serious defects discovered in the lining, as determined by the Engineer and/or

**SECTION 02956 CURED-IN-PLACE PIPE (CIPP) LINING FOR SERVICE LATERALS**

Owner, shall be repaired in a manner satisfactory to the Engineer, or the liner shall be replaced, at no additional cost to the Owner.

**1.09 LEGAL, HEALTH AND SAFETY REQUIREMENTS:**

- A. The Contractor shall observe all federal, state and local laws, ordinances, policies, practices and regulations. In addition, the Contractor agrees to promptly procure all necessary approvals, licenses and permits, pay all charges and fees, and give notices necessary and incident to the due and lawful prosecution of the work.
- B. The Contractor shall conduct the work, at all times, in such a manner as to ensure the safety of, and least possible obstruction to, the traveling public. The convenience of the general public and of the residents along and adjacent to the site/work area shall be provided for in an adequate and satisfactory manner, as determined by the Engineer and/or Owner.
- C. All equipment and materials shall be placed or stored in such locations so as not to be or to create the danger of becoming a hazard to the traveling public. No section of road shall be closed to the public except where/when permitted by the Owner and the local traffic authority.
- D. The Contractor shall perform operations in strict accordance with OSHA and manufacturers' safety requirements. Particular attention is drawn to safety requirements involving entering confined spaces, work on elevated platforms, and working with pressurized equipment.

**PART 2 – PRODUCTS**

**2.01 MATERIALS:**

- A. The liner material shall be compatible with municipal sewage, and chemically resistant to withstand exposure to sewer gases, as applicable. The liner shall be fabricated to a size that, when installed, neatly fits the internal circumference of the existing host pipe.
- B. The service lateral lining material shall be a fiberglass/polyester needle fleece vacuum epoxy-impregnated or equivalent material tube, matching the diameter of the lateral pipe, which is inserted into the service lateral to be rehabilitated and cure-in-place by an acceptable curing method. No polyester resins will be accepted. The epoxy shall be suitable for the design conditions as well as the curing process. The lateral liner shall have a minimum service life of 50 years, and shall have the minimum structural properties listed below:

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Property	Test Method	Minimum Value <sup>1</sup>
Flexural Strength (initial)	ASTM D790	4,500 psi
Flexural Strength (50-year)	ASTM D790	2,250 psi
Flexural Modulus (initial)	ASTM D790	250,000 psi
Flexural Modulus (50-year)	ASTM D790	125,000 psi
Tensile Strength <sup>2</sup>	ASTM D638	3,000 psi

<sup>1</sup> Values are in accordance with ASTM F1216.

<sup>2</sup> For pressure pipes only.

- C. The lateral liner system shall consist of a sectional liner in the mainline (full wrap around the circumference of the mainline extending 5 inches on either side of the service connection), and the continuous liner shall have the capacity to extend up the lateral, towards the house/building foundation, to the length specified. The liner shall form a continuous, one-piece, tight-fitting, corrosion-resistant and verifiable non-leaking cured-in-place pipe.
- D. The liner shall be manufactured in a factory setting prior to its arrival on-site. No component of the liner (i.e., lateral tube to mainline piece) shall be glued or sewn fused in the field prior to installation. The material shall be capable of conforming to offset joints, bells and disfigured pipe sections.
- E. The lateral liner shall be designed, fabricated, and installed for the actual conditions encountered for this application, including the material of the host pipe, in accordance with the applicable provisions of ASTM F1216, and shall meet the following minimum design conditions:
  - 1. No bonding to the host pipe
  - 2. Host pipe condition – fully deteriorated
  - 3. Factor of safety – 2.0
  - 4. Long-term flexural strength – 50 percent of initial
  - 5. Long-term flexural modulus – 50 percent of initial
  - 6. Ovality of pipe – 2 percent (minimum); if ovality of host pipe is found to be worse, use actual ovality percentage up to 5 percent (maximum).
  - 7. Soil unit weight – 120 pcf
  - 8. Soil modulus – 1,000 psi
  - 9. Soil cover (above top of pipe) – as measured in field
  - 10. Groundwater depth (above invert) – assume at ground surface
  - 11. Minimum service life – 50 years

**SECTION 02956 CURED-IN-PLACE PIPE (CIPP) LINING FOR SERVICE LATERALS**

12. Superimposed loading (live load) – AASHTO HS-20

- F. The lateral liner shall be designed to withstand all imposed loads, including live loads and hydrostatic pressure, as applicable. The lateral liner shall have sufficient wall thickness to withstand all anticipated external pressures and loads that may be imposed after installation. The design shall be performed and certified by a professional engineer licensed by the State of Connecticut.
- G. The lateral liner shall be designed to span over any small holes that exist in the host pipeline.
- H. The finished lateral liner product shall be which when cured is chemically resistant to domestic sewage over the expected life time of the rehabilitated pipe.

**PART 3 – EXECUTION**

3.01 GENERAL:

- A. Rehabilitation of service laterals shall be performed from within the mainline sewer, unless otherwise specified.
- B. Service lateral liners shall be installed continuously from the mainline sewer, up the lateral, and terminate at a point determined/specified by the Owner.
- C. In conjunction with review of CCTV inspection records, the Contractor shall provide the correct liner diameter and wall thickness to ensure tight fit with existing pipe to be restored.
- D. The lining system shall be constructed of materials and methods that when installed shall provide a jointless and continuous structurally sound CIPP able to withstand all imposed static and dynamic loads on a long-term basis.

3.02 PREPARATION:

- A. The Contractor shall successfully complete the following items before installation of the work:
  - 1. Notify all affected property owners in accordance with Paragraph 1.07 (above).
  - 2. Control sewer flow.
  - 3. Clean sewer.
  - 4. Perform CCTV inspection of sewer.
  - 5. Take precautions to protect the new liner, and existing pipe and manholes/structures from damage that might result from the liner insertion process.

SECTION 02956 CURED-IN-PLACE PIPE (CIPP) LINING FOR SERVICE LATERALS

3.03 SEQUENCE OF WORK:

- A. The Contractor shall perform work in the following sequence:
  - 1. Notify all affected property owners in accordance with Paragraph 1.07 (above).
  - 2. Divert/control sewer flow to comply with the requirements of Section 02270 – Sewage Bypass Pumping, and Section 02950 – Flow Control.
  - 3. Perform point repairs (if necessary) as indicated on the drawings or as directed by the Engineer, in accordance with Section 02953 – Storm and Sanitary Sewer Point Repairs, and all other appropriate sections.
  - 4. Clean sewer in accordance with the requirements of Section 02951 – Sewer Cleaning, and perform pre-insertion CCTV inspection to comply with the requirements of Section 02952 – Sewer Television Inspection.
  - 5. Install, cure and seal lateral liner in accordance with Paragraph 3.05 (below).
  - 6. Perform post-insertion CCTV inspection to comply with the requirements of Section 02952 – Sewer Television Inspection.

3.04 PIPELINE POINT REPAIR:

- A. The Contractor shall repair pipeline where point repairs are identified on the drawings or directed by the Engineer, according to the requirements of Section 02953 – Storm and Sanitary Sewer Point Repairs.
- B. Pipe and repair materials shall be as directed by the Engineer and in accordance with these specifications, unless otherwise indicated on the drawings.
- C. Trenching, excavation and backfilling shall conform to the requirements of Section 02315 – Excavation, and Trenching, and Section 02320 – Backfilling, Grading and Compaction.
- D. Bypass pumping shall conform to the requirements of Section 02270 – Sewage Bypass Pumping, and Section 02950 – Flow Control.
- E. Notify the Engineer a minimum of forty-eight (48) hours in advance of commencement of pipeline point repair work, at each particular location.
- F. Installation of replacement pipe and/or repair work shall conform to the requirements of Section 02953 – Storm and Sanitary Sewer Point Repairs, and all other appropriate sections. All pipeline point repairs shall be inspected by the Engineer/Owner prior to backfilling and compaction.

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3.05 LINER INSTALLATION AND FINISH:

A. Installation:

1. The entire liner shall be wet-out using vacuum impregnation.
2. The CIPP liner shall be installed and cured in the host pipe per the manufacturer's specifications as described and submitted.
3. CIPP liner installation shall be performed in accordance with ASTM F1216, Section 7 – Installation.
4. The CIPP liner shall be installed via carrier transported through the mainline to enable the liner to be inverted up the lateral.
5. The wet-out tube shall be positioned in the pipeline using the method specified by the manufacturer. Care should be exercised not to damage the tube as a result of installation. The tube shall be placed within a manufacturer-designated (or approved) carrier for transport to the lateral via the mainline from a manhole/structure or approved access point, and fully extend up the lateral from the main to a termination point.
6. If required by the manufacturer, temperature gauges or sensors shall be placed inside the host pipe to monitor the temperatures during the cure cycle. Liner and/or host pipe interface temperatures shall be monitored and logged during the curing of the liner.
7. Curing shall be accomplished by utilizing the appropriate medium in accordance with the manufacturer's recommended cure schedule. The curing source or in and output temperatures shall be monitored and logged during the cure cycles, if/as applicable. The manufacturer's recommended cure method and schedule shall be used for each line segment installed, and the liner wall thickness and the existing ground conditions with regard to temperature, moisture level, and thermal conductivity of soil, per ASTM as applicable, shall be taken into account by the Contractor.
8. Thermoset resins shall have a cool-down period in accordance with manufacturer's recommendations and noted as part of the cure log.
9. The manufacturer shall provide the method of sealing the CIPP ends and submit supporting documentation confirming the method will provide a long-term seal.

B. Finish:

1. The installed CIPP liner shall be continuous over the specified length of the lateral section and be free from visual defects such as foreign inclusions, dry spots, pinholes, major wrinkles and delamination.
2. Any defect, which will or could affect the structural integrity or water-tightness, of the CIPP liner shall be repaired at the Contractor's expense.

SECTION 02956 CURED-IN-PLACE PIPE (CIPP) LINING FOR SERVICE LATERALS

3. The beginning and end of the CIPP liner shall be sealed to the existing host pipe. The sealing material shall be compatible with the pipe end and shall provide a watertight seal.
4. Branch lateral connections or any other pre-existing connections to the service lateral shall be reinstated by a remote-controlled cutting device from within the pipeline. The reinstated connection shall be brushed to allow for a smooth edge.

3.06 INSPECTION AND TESTING:

- A. The installation shall be inspected by CCTV. Variations from true line and grade may be inherent because of the conditions of the original piping. No infiltration of groundwater shall be observed.
- B. The finished pipe lining shall be continuous over the specified length of the lateral section and be free of dry spots, lifts, and delamination.
- C. For each inversion length designated by the Owner in the contract documents or purchase order, one (1) pipe lining sample shall be obtained and prepared in accordance with the methods outlined in ASTM F1216.
- D. The costs of obtaining and testing the samples shall be the sole responsibility of the Contractor.
- E. The pipe lining samples shall be large enough to provide a minimum of three (3) specimens and a recommended five (5) specimens for flexural and tensile testing.
- F. The pipe lining samples shall be tested in accordance with ASTM D790 and ASTM D638 to confirm that the required physical properties have been achieved.
- G. The pipe lining shall meet the chemical resistance requirements outlined in Paragraph 3.07 (below), in accordance with ASTM F1743.

3.07 CHEMICAL RESISTANCE:

- A. The pipe lining system shall meet the minimum chemical resistance requirements listed below. Test samples shall be the same resin system and similar tube material as that proposed for the project.
- B. Chemical resistance tests shall be completed in accordance with ASTM D543, with the chemical solutions shown in the table below. Pipe lining test specimens shall lose no more than 20 percent of their initial flexural strength and initial flexural modulus of elasticity when tested for a minimum of one (1) month at 73.4° F (23° C).

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Minimum Chemical Resistance Requirements	
Chemical Solution	Concentration, %
Tap Water (pH 6-9)	100
Nitric Acid	5
Phosphoric Acid	10
Sulfuric Acid	10
Gasoline	100
Vegetable Oil	100
Detergent	0.1
Soap	0.1

**3.08 RECORDS:**

- A. Complete records shall be kept of all service laterals receiving any form of rehabilitation described above. The records shall document the location of the rehabilitated lateral; the type of rehabilitation received; the materials, products and equipment used in the performance of each type of rehabilitation; and any other required information, as specified herein or as directed by the Engineer/Owner.
- B. Upon completion of the service lateral lining work, a final CCTV inspection of the lined lateral shall be performed in accordance with Section 02952 – Sewer Television Inspection. The CCTV inspection shall provide a clear view of the lateral connection at the mainline and the entire length of lateral lined with cured-in-place pipe. Copies of all CCTV inspection recordings and record documentation shall be provided to the Engineer/Owner upon completion.

**3.09 CLEANUP:**

- A. Keep the work area free of accumulations of waste materials, rubbish and other debris resulting from the lining operations.
- B. Upon acceptance of the work and inspection/testing, the Contractor shall restore the project area affected by the operations to original conditions, in a manner acceptable to the Engineer.

END OF SECTION

**SECTION 02957**

**SERVICE LATERAL GROUTING**

**PART 1 – GENERAL**

**1.01 DESCRIPTION:**

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to test sewer pipe laterals by applying a positive air pressure to the lateral connection, monitoring, and recording the pressure in the void, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. The intent of lateral connection testing is to identify those sewer lateral connections that are not watertight, and that can be successfully sealed by packer injection grouting.
- C. Work under this section shall also consist of furnishing all labor, materials, tools, equipment, and incidentals required to grout sewer pipe lateral connections to the mains, and upstream sewer pipe lateral joints, using the packer injection method, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- D. Packer injection grouting is used to reduce the infiltration within the pipeline, seal annular space between liners and host pipes at lateral connections that have failed the lateral test criteria, provide external pipe support, but not a structural rehabilitation, by stabilizing soils outside the pipe and prevent further loss of pipe bedding into the pipe.
- E. Packer injection grouting shall be accomplished by pressure injection of chemical grout into the soils encompassing the exterior of pipe joint. Chemical grouts shall be designed to be injected into the soil surrounding the pipe, which stabilizes the soil and forms a permanent impermeable seal called a grout/soil ring, and into the annular space between liners and host pipes. Adequate volumes of grout must be injected to form an effective seal. Adequate amounts of grout are based generally upon pipe size and field conditions. This application will be through structurally sound joints and lateral connections through penetrations from within the pipe by using the packer method in tandem with a closed-circuit television (CCTV) inspection system.

**1.02 RELATED SECTIONS:**

- A. Section 02270 – Sewage Bypass Pumping
- B. Section 02950 – Flow Control
- C. Section 02951 – Sewer Cleaning
- D. Section 02952 – Sewer Television Inspection
- E. Section 02953 – Storm and Sanitary Sewer Point Repairs
- F. Section 02955 – Cured-In-Place Pipe (CIPP) Lining for Mainline Sewers

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SERVICE LATERAL GROUTING

1.03 REFERENCE STANDARDS:

- A. National Association of Sewer Service Companies (NASSCO) Publications and Standards (latest revision):
  - 1. NASSCO Performance Specification Guideline – Pipeline Packer Injection Capital Grouting.
  - 2. NASSCO Grouting Unified Safe Operating Practices Program (SOPP).

1.04 SUBMITTALS:

- A. The Contractor shall provide a minimum 48-hour advance written notice of proposed testing schedules and testing procedures for review and concurrence of the Owner.
- B. Public Notification – The Contractor shall submit a copy of the initial public notification as described in Paragraph 1.07 (below).
- C. Equipment operating procedures and systems.
- D. Grout Information:
  - 1. Description of all grout materials to be used.
  - 2. Description of all additives to be used.
  - 3. Manufacturer's recommended procedures for storing, mixing, testing and handling of grout materials.
  - 4. Safety Data Sheets (SDS) for all materials to be used.
- E. Identify the manufacturers and models of the packers to be utilized on the project.
- F. Upon the completion of CIPP lining for each pipe segment, submit to the Owner a report showing the following data for each lateral connection tested, grouted, or attempted to be grouted, as required by NASSCO's Pipeline Assessment Certification Program (PACP).
  - 1. Identification of the sewer pipe section tested by assigned sewer ID (if available) and length.
  - 2. Type of pipe material, diameter and depth of pipe to the surface.
  - 3. Length of pipe sections between joints.
  - 4. Test pressure used and duration of test.
  - 5. Pass/fail results for each joint/connection tested.
  - 6. Location stationing of each joint/connection tested, and location of any joints/connections not tested with an explanation for not testing.
  - 7. Volume of grout material used on each joint/connection.
  - 8. Gel set time used (cup test results from tanks).



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SERVICE LATERAL GROUTING

9. Grout mix record of the batches mixed including amount of grout and catalyst, additives, and temperature of the grout solution in tanks.
10. Operator conducting testing and sealing shall be noted on the reports.
11. Video Recordings:
  - a. Video recordings shall include testing and sealing operations for each lateral (including inflation and deflation over the joint/lateral), displaying the final air test of laterals.
  - b. Final recordings shall include inspection of the lateral connection after all grouting work is complete.
- G. National Association of Sewer Service Companies (NASSCO) prepared Pipeline Assessment and Certification Program (PACP), TV inspection form and sewer condition codes.

1.05 QUALITY ASSURANCE:

- A. Project requires work in active sewers. The Contractor shall follow all federal, state, and local requirements for safety in confined spaces and uniform traffic controls.
- B. All personnel working in confined spaces shall have the appropriate confined space entry training, as appropriate. Precautions shall be taken by the Contractor to ensure the health and safety of his workers, the public, the Engineer and the Owner during construction, as may be required.
- C. Additional safety considerations including safely handling, mixing, and transporting of chemical grouts should be provided by the grout manufacturer/supplier, and should include safe operating practices and procedures, appropriate personal protective equipment (PPE) for the various grouting operations, and proper storage, transportation, mixing, and disposal of grouts, additives, and their associated containers.
- D. Require completion of grout handling and mixing training certification from the grout manufacturer/supplier for personnel working with chemical grouts and additives.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Materials shall be delivered to the site(s) in the manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. All materials shall be stored properly and in accordance with manufacturer's instructions.

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1.07 PUBLIC NOTIFICATION:

- A. The Contractor shall provide written notices to each affected property owner, not identified for service bypass, that their sewage service will be off-line while the liner is being installed.
- B. Written notices shall be distributed to each affected property owner one (1) week prior to and again 48 hours in advance of commencement of the work being performed in their section, providing the date, state time and time when service will be completely restored. Written notices shall include a local telephone number for the Contractor which property owners can call for information during the execution of the work.
- C. Written notices shall be approved by the Engineer prior to distribution.
- D. The Contractor shall contact any property owner whose sewer service cannot be reconnected/restored within the time stated in the written notice.
- E. The maximum amount of time any property shall be without sewer service is eight (8) hours. Any sewer service to be off-line longer than eight (8) hours shall be bypassed to a sanitary sewer, at no cost to the property owner.

1.08 GUARANTEE:

All service lateral joint sealing/grouting work shall be guaranteed against leakage and faulty workmanship and/or materials, by the Contractor, for a period of three (3) years from the date of acceptance by the Engineer. During this period, all serious defects discovered in the lateral joint sealing/grouting work, as determined by the Engineer and/or Owner, shall be repaired in a manner satisfactory to the Engineer, or the lateral joint sealing/grouting work shall be redone, at no additional cost to the Owner.

1.09 LEGAL, HEALTH AND SAFETY REQUIREMENTS:

- A. The Contractor shall observe all federal, state and local laws, ordinances, policies, practices and regulations. In addition, the Contractor agrees to promptly procure all necessary approvals, licenses and permits, pay all charges and fees, and give notices necessary and incident to the due and lawful prosecution of the work.
- B. The Contractor shall conduct the work, at all times, in such a manner as to ensure the safety of, and least possible obstruction to, the traveling public. The convenience of the general public and of the residents along and adjacent to the site/work area shall be provided for in an adequate and satisfactory manner, as determined by the Engineer and/or Owner.
- C. All equipment and materials shall be placed or stored in such locations so as not to be or to create the danger of becoming a hazard to the traveling public. No section of road shall be closed to the public except where/when permitted by the Owner and the local traffic authority.

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- D. The Contractor shall perform operations in strict accordance with OSHA and manufacturers' safety requirements. Particular attention is drawn to safety requirements involving entering confined spaces, work on elevated platforms, and working with pressurized equipment

**PART 2 – PRODUCTS**

**2.01 TESTING AND GROUTING EQUIPMENT:**

- A. The device for testing lateral connections shall consist of inflatable mainline end elements and a lateral grouting plug that creates a void area extending beyond the main connection. Whenever possible, use a lateral grouting plug sized to match the diameter of the lateral being grouted with an effective sealing length of at least 3 feet.
- B. Void pressure data shall be transmitted from the void area to the monitoring equipment or video picture of a pressure gauge mounted on the packer and connected to the void area. All test monitoring shall be above-ground, and in a location to allow for simultaneous and continuous observation of the televising monitor and test monitoring equipment.
- C. Grouting equipment shall consist of the packer, appropriate pumping, and hosing systems capable of supplying an uninterrupted flow of sealing materials to completely fill the voids. Grout pumping system shall be sized to deliver a mixed volume of grout at a minimum of 3 gallons per minute (gpm) and 30 gallons of uninterrupted flow within 10 minutes.
- D. Volume of mixed grout pumped must be capable of being measured and recorded for each grouted connection. Generally, the equipment shall be capable of performing the specified operations in sewers where flows do not exceed 25 percent of pipe diameter, unless otherwise permitted by Owner.
- E. Provide back-up bladders for each packer on-site at all times during grouting procedures.
- F. Equipment for cleaning lateral blockages shall be readily available while any lateral grouting work is being performed.

**2.02 GROUTS – GENERAL:**

- A. All grout materials shall have the following characteristics:
1. While being injected, the grout shall be able to react/perform in the presence of water (groundwater).
  2. The ability to increase grout mix viscosity, density, and gel strength by increased concentration of constituents or the use of approved additives.
  3. The cured grout must withstand submergence in water without degradation.

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4. The resultant grout formation must be homogeneous and prevent the passage of water (infiltration) through the pipe joint.
  5. The grout must not be biodegradable.
  6. The cured grout should be chemically stable and resistant to organics found in sewage.
  7. Residual grout shall be easily removable from the sewer line to prevent blockage of the sewage flow.
- B. Handle, mix, and store grout in accordance with the manufacturer's recommendations. Materials shall be delivered to the site(s) in the manufacturer's original, unopened containers and packaging.

2.03 CHEMICAL GROUTS:

- A. Water based chemical grouts shall have the following characteristics:
1. A minimum of 10 percent acrylamide base material by weight in the total grout mix. A higher concentration (%) of acrylamide base material may be used to increase strength or offset dilution during injection.
  2. The ability to tolerate some dilution and react in moving water during injection.
  3. A viscosity of approximately 2 centipoise, which can be increased with approved additives.
  4. A constant viscosity during the reaction period.
  5. A controllable reaction time from 10 seconds to 1 hour.
  6. A reaction (curing) that produces a homogenous, chemically stable, non-biodegradable, firm, flexible gel.
  7. The ability to increase mix viscosity, density, and gel strength by increased concentrations of the mix constituents or by the use of approved additives.
  8. Product Manufacturer: American Chemical Grout Co. ACG-AG Acrylamide-MBA Premix, or approved equal.
- B. Acrylate base grout shall have the following characteristics:
1. A minimum of 10 percent acrylate base material by weight in the total grout mix. A higher concentration (%) of acrylate base material may be used to increase strength or offset dilution during injection.
  2. The ability to tolerate some dilution and react in moving water during injection.
  3. A viscosity of approximately 2 centipoise, which can be increased with approved additives.
  4. A constant viscosity during the reaction period.

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5. A controllable reaction time from 10 seconds to 1 hour.
6. A reaction (curing) that produces a homogenous, chemically stable, non-biodegradable, firm, flexible gel.
7. The ability to increase mix viscosity, density, and gel strength by the use of approved additives.

**2.04 ADDITIVES:**

- A. At the Contractor's discretion and according to field conditions, additives may be selected and used within the manufacturer's recommended quantities.
- B. Strengthening Agents:
  1. For joint grouting, a latex or "diatomaceous earth" additive may be added to increase compressive and tensile strength. The quantity of strengthening agent additive shall be as recommended by the manufacturer, and approved by the Owner.
  2. Product Manufacturer: American Chemical Grout Co. ACG-RA Grout Reinforcing Agent, or approved equal.
- C. Dye – A manufacturer approved, water-soluble dye without trace metals may be added to the grout tank(s) for visual confirmation.
- D. Gel Time Modifier – A gel time extending agent may be used to, in accordance with the manufacturer's recommendations, to extend gel time, as necessary.
- E. When using non-soluble additives, the grout tanks must have mechanical mixing devices to keep the additives in suspension and maintain a uniform solution of grout and additive.

**PART 3 – EXECUTION**

**3.01 CONTROL TESTS:**

- A. Packer Tests – Demonstrate the acceptable performance of air test.
- B. To ensure the accuracy, integrity and performance capabilities of the testing equipment, a demonstration test will be performed in an above-ground 8-inch nominal diameter test cylinder with lateral connection suitable to contain the full length of the packer and sustain the void test pressure. The test cylinder shall be equipped with a void release valve to exercise a controlled release of pressurized air from the void area to test the packer under both sound and leaking conditions. The test cylinder shall also be equipped with a local pressure gauge (0-25 psi) within the void space.
  1. With the void release valve sealed, inflate the packer and air test void at 7-10 psi. The observed void pressure at the test cylinder pressure gauge must be within  $1.0 \pm$  psi of the reading in the control center/studio void pressure gauge, and follow both up and down pressure changes (allowing time for pressure equalization).

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2. If above test is passed, crack the release valve to simulate a small leak. The cylinder shall be equipped with a void release valve to exercise a controlled release of the test media with the associated pressure drop to be equally displayed within  $1.0 \pm$  psi of the cylinder gauge and test monitoring equipment.
- C. Pump Tests – At the beginning of the contract, prior to application of grout, perform a pump test to determine if proper ratios are being pumped from the grout component tanks at the proper rates and to measure pump rates. Use separate containers to capture the discharges from each of the grout component hoses, to simulate the actual volumes of each component through the interconnect hoses, hose reel and length of grout hose and confirm accuracy of grout pump totalizer. Take corrective action if ratios or rates are not within manufacturer's recommended standards.
- D. Grout Tests – Perform and record a grout gel test in the presence of the Engineer/Owner by recording the grout tank solution temperature, catalyst tank solution temperature, ambient air temperature in truck, and gel time of the sample whenever the following conditions occur:
  1. At the beginning of each day, the material in the hoses shall be recycled to the tanks and a sample shall be taken.
  2. Whenever new batches of grout are mixed.
  3. Whenever the temperature in the tanks or ambient temperature have changed by more than  $10^{\circ}$  F ( $\pm$ ) from the previous gel test.

3.02 PIPE PREPARATION:

Prior to the application of the chemical grouting materials, the Contractor shall thoroughly clean the sewer designated to receive the chemical grouting. Cleaning shall constitute removal of all loose debris and solids which inhibit proper seating of the packer. Cleaning shall be performed in accordance with Section 02951 – Sewer Cleaning.

3.03 ROOTS AND LOOSE DEBRIS IN LATERAL CONNECTIONS:

- A. During mainline sewer cleaning and CCTV inspection, document all lateral connections containing roots, mineral deposits and/or obstructive conditions that are either (a) greater than fine roots or (b) of a nature to prevent testing and sealing of connection.
- B. For each such connection, submit a screenshot image clearly showing the extent of roots or obstructive condition to the Engineer/Owner. Submit images in electronic format, labeled and organized in a manner to easily retrieve the image for the lateral connection in question.
- C. The list of lateral connections with roots shall include upstream and downstream manhole numbers and stationing. The Owner will review the list of lateral connections containing roots and obstructions, and direct the Contractor as to which laterals are to be (a) cleaned and grouted, (b) grouted without cleaning (in which case such lateral

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connection would be excluded from warranty testing), or (c) removed from the scope of work (in which case no payment for such lateral will be made).

3.04 JOINT TESTING:

- A. Test service pipe joints and defects running around the circumference of the pipe (i.e. circular crack) to determine if the defects require sealing/grouting. Testing of joints which are visibly leaking is unnecessary; these joints require sealing/grouting.
- B. Joint test pressure shall be 3 psi higher than the groundwater pressure on the pipe. Groundwater pressure may be determined by positioning the testing device on a visibly infiltrating joint and measuring the resulting void pressure with the void pressure monitoring equipment.
- C. In the absence of groundwater pressure data, the test pressure shall be equal to 0.5 psi per vertical foot of pipe depth below the ground surface, or 3 psi (whichever is greater). The maximum pressure shall not exceed 10 psi.
- D. Test each pipe joint which is not visibly leaking at the test pressure specified above, in accordance with the test procedures described below.
- E. Prior to starting the pipe joint testing phase of the work, perform the control tests as described in Paragraph 3.01 (above).
- F. Air Test Procedure:
  1. Position the testing device within the sewer line in such a manner as to straddle the pipe joint to be tested.
  2. Expand the testing device end elements (sleeves) so as to isolate the joint from the remainder of the line and create a void area between the testing device and the pipe joint. Expand the ends of the testing device against the pipe with sufficient inflation pressure to contain the air within the void without leakage past the expanded ends.
  3. Introduce air into the void area until a pressure equal to or greater than the required test pressure is observed with the void pressure monitoring equipment. If the required test pressure cannot be developed (due to joint leakage), the joint will have failed the test and shall be sealed/grouted as specified.
  4. After the void pressure is observed to be equal to or greater than the required test pressure, the air flow shall be stopped. If the void pressure decays by more than 2 psi within 15 seconds (due to joint leakage), the joint fails the test and shall be sealed/grouted as specified.
- G. During the joint testing work, maintain the following records:
  1. The pipe section tested;
  2. The test pressure used;
  3. Location (footage) of each joint tested;

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4. A statement indicating the test results for each joint tested; and
5. Test pressure achieved and maintained for each joint passing the test.

3.05 GROUT PREPARATION:

- A. Follow the manufacturer's recommendations for mixing and safety procedures, as applicable.
- B. Adjust gel time as necessary to compensate for changes in temperature in grout component tanks or hoses. The addition of dilution water to extend gel times is not acceptable unless resulting base grout tank only material exceeds 20 percent by weight for solution grouts.
- C. During the grouting process, the Contractor's grouting technician shall monitor the grout component tanks to make sure that proper ratios are being pumped. If unequal levels are noted in the tanks, repeat the pump test as described above and correct any defective equipment.

3.06 JOINT SEALING/GROUTING:

- A. Joints and defects running along the circumference of the pipe (i.e. circular cracks) showing visible leakage or joints/defects that have failed the joint test specified, shall be sealed/grouted as specified.
- B. Joint sealing/grouting shall be accomplished by forcing chemical grouting materials into or through faulty joints by a system of pumps, hoses, and sealing packers.
- C. Jetting or driving pipes from the surface that could damage or cause undermining of the pipe lines shall not be allowed. Uncovering the pipe by excavation of pavement and soil (which would disrupt traffic, undermine adjacent utilities and structures, and cause further damage to the pipe lines being repaired) is not acceptable.
- D. The packer shall be positioned over the faulty joint by means of a measuring device and the CCTV camera in the line. It is important that the procedure used for positioning the packer be accurate to avoid overpulling the packer and thus not effectively sealing (grouting) the intended joint.
- E. The packer ends (end elements, sleeves) shall be expanded using controlled pressure. The expanded ends shall seal against the inside periphery of the pipe to form a void area at the faulty joint, isolating the joint from the remainder of the pipeline.
- F. Sealant materials shall be pumped through the hose system at a controlled pressure in excess of groundwater pressures.
- G. The pumping unit, metering equipment, and the packer device shall be designed so that proportions and quantities of materials can be regulated in accordance with the type and size of the leak being sealed.
- H. Residual grouting materials that extend into the pipe, reduce the pipe diameter, or restrict the flow shall be removed from the joint. The sealed joints shall be left



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reasonably flush with the existing pipe surface. If excessive residual grouting materials accumulate in the line, the pipe section shall be cleaned to remove the residual materials.

- I. Suitable screening or similar devices shall be installed in the downstream manhole to collect and trap solids and other material cleaned and removed from upstream pipes. The screens and all debris trapped in the screens shall be removed and disposed of in an approved manner.
- J. Maintain the following records of the joint sealing/grouting:
  - 1. The pipe section in which the grouting was done;
  - 2. The location of each joint sealed/grouted;
  - 3. The test pressure before and after grouting; and
  - 4. The amount of grout material used.

3.07 RECORDS:

- A. Complete records shall be kept of all service laterals receiving any form of rehabilitation described above. The records shall document the location of the rehabilitated lateral; the type of rehabilitation received; the materials, products and equipment used in the performance of each type of rehabilitation; the test results; and any other required information, as specified herein or as directed by the Engineer/Owner.
- B. Upon completion of the service lateral sealing/grouting work, a final CCTV inspection of the sealed/grouted lateral shall be performed in accordance with Section 02952 – Sewer Television Inspection. The CCTV inspection shall provide a clear view of the lateral connection at the mainline and all sealed/grouted lateral joints. Copies of all CCTV inspection recordings and record documentation shall be provided to the Engineer/Owner upon completion.

3.08 CLEANUP:

- A. Keep the work area free of accumulations of waste materials, rubbish and other debris resulting from the grouting operations.
- B. Upon acceptance of the work and inspection/testing, the Contractor shall restore the project area affected by the operations to original conditions, in a manner acceptable to the Engineer.

END OF SECTION

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CEMENTITIOUS LINER MANHOLE REHABILITATION

**PART 1 – GENERAL**

1.01 DESCRIPTION:

- A. Work under this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals required to rehabilitate existing manholes using a cementitious liner system, as indicated on the drawings or as directed by the Engineer, in conformity with these specifications.
- B. Work shall include, but not be limited to, the elimination of active infiltration by prior to mix application, the removal and patching of loose and/or unsound material, cleaning surfaces, the repair and sealing of the invert and bench, the spray-on application of a cementitious mix to form the liner, and the application of an additional layer of epoxy for corrosion protection, unless otherwise directed.
- C. Work shall further include the removal, replacement, and salvage of the existing manhole frames and covers with new standard or watertight manhole frames and covers, as indicated/directed, and the application of a flexible coating to the manhole frame and chimney, as specified herein.
- D. Rehabilitation work for all manholes except precast concrete shall be completed in accordance with the following methods as shown on the contract documents and as ordered by the Engineer:
  - 1. Manholes which are structurally stable: Spray on application of a uniform and densely compacted cementitious layer. Certain manholes shall receive an additional layer of epoxy for corrosion protection. The manholes with cementitious layer and epoxy will be as shown on the contract documents or as ordered by the Engineer.
- E. Rehabilitation work for precast concrete manholes shall be completed in accordance with the following methods as shown on the contract documents and as ordered by the Engineer:
  - 1. Injection Grout Manhole Base: Work includes injection of chemical grout and application of joint sealing compound to the manhole base to make a structurally sound, watertight manhole base.
  - 2. Injection Grout Manhole Wall Joint: Work includes injection of chemical grout and application of joint sealing compound to wall joints to make a structurally sound, watertight manhole.
  - 3. Injection Grout Pipe Penetration: Work includes injection of chemical grout and application of joint sealing compound to the joint of the penetrating pipe to make a structurally sound, watertight pipe connection.

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- F. Rehabilitation work for all manholes shall include the replacement of all manhole frames and covers and the structural adjustment to grade, unless otherwise directed.
- G. Flex Coat Chimney Seal: Work includes applying alkylamine epoxy or urethane based flexible coating to chimney section of manhole. Work also includes chimney rehabilitation including replacement of any loose or broken bricks or block.

1.02 RELATED SECTIONS:

- A. Section 02270 – Sewage Bypass Pumping
- B. Section 02601 – Manholes
- C. Section 02950 – Flow Control

1.03 REFERENCE STANDARDS:

- A. American Society for Testing and Materials (ASTM) Publications and Standards (latest revision):
  - 1. C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  - 2. C94 – Standard Specification for Ready-Mixed Concrete.
  - 3. C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
  - 4. C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete.
  - 5. C150 – Standard Specification for Portland Cement.
  - 6. C157 – Standard Test Method for Length Change of Hardened Cement Mortar and Concrete.
  - 7. C267 – Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
  - 8. C293 – Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading).
  - 9. C307 – Standard Test Method for Tensile Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing.
  - 10. C321 – Standard Test Method for Bond Strength of Chemical-Resistant Mortars.
  - 11. C403 – Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance.
  - 12. C469 – Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.
  - 13. C495 – Standard Test Method for Compressive Strength of Lightweight Insulating Concrete.

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14. C496 – Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
15. C579 – Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
16. C596 – Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement.
17. C666 – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing, Method A.
18. C882 – Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
19. C1202 – Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
20. C1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.
21. D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
22. D638 – Standard Test Method for Tensile Properties of Plastics.
23. D648 – Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
24. D695 – Standard Test Method for Compressive Properties of Rigid Plastics.
25. D790 – Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
26. D1004 – Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
27. D2240 – Standard Test Method for Rubber Property – Durometer Hardness.
28. F2414 – Standard Practice for Sealing Sewer Manholes Using Chemical Grouting.
- B. National Association of Corrosion Engineers (NACE) Publications and Standards (latest revision):
  1. RP0274 – High-Voltage Electrical Inspection of Pipeline Coatings.
- C. National Association of Sewer Service Companies (NASSCO) Publications and Standards (latest revision):
  1. NASSCO Performance Specification Guideline – Manhole Rehabilitation.
- D. Occupational Safety and Health Administration (OSHA), OSHA Safety and Health Regulations (latest revision):
  1. 29 CFR Part 1910 – Occupational Safety and Health Standards.

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2. 29 CFR Part 1926 – Safety and Health Regulations for Construction.
- E. In case of conflicting requirements between this specification and the referenced documents above, this specification shall govern.
- 1.04 SUBMITTALS:
- A. The Contractor shall submit for review, manufacturer's technical data, details, and specifications showing complete information on surface preparation and application procedures, material composition, physical properties and installation equipment.
  - B. The Contractor shall submit for approval all manufacturer warranties for all materials furnished under this section and manufacturer's certification that the materials supplied are in compliance with this specification.
  - C. The Contractor shall submit for approval, the manufacturer's license certification for the installer under this section.
  - D. The Contractor shall provide a reference list of not less than five (5) manhole rehabilitation projects, where the proposed product has been utilized and project completed in the past three (3) years that are similar in the size and scope of this project. Reference shall include: Name and address of client, project name, contact person, phone number, scope including number of manholes lined, and gross dollar amount of the project.
  - E. Contractor shall submit copies of the manhole dimensions, installation instructions, and manufacturer's product data sheet to the Engineer for review.
- 1.05 DELIVERY, STORAGE, AND HANDLING:
- A. Materials shall be delivered to the site(s) in the manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
  - B. All materials shall be stored properly and in accordance with manufacturer's instructions.
- 1.06 CONFINED SPACES:
- All personnel working in confined spaces shall have the appropriate confined space entry training, as appropriate. Precautions shall be taken by the Contractor to ensure the health and safety of his workers, the public, the Engineer and the Owner during construction, as may be required.

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**CEMENTITIOUS LINER MANHOLE REHABILITATION**

**1.07 GUARANTEE:**

All manhole repairs shall be guaranteed by the Contractor against infiltration, spalling, or loss of adhesion for a period of five (5) years from the date of acceptance. During this period, all defects discovered, as determined by the Engineer and/or Owner, shall be repaired by Contractor in a manner satisfactory to the Engineer at no additional cost to the Owner.

**1.08 LEGAL, HEALTH AND SAFETY REQUIREMENTS:**

- A. The Contractor shall observe all federal, state and local laws, ordinances, policies, practices and regulations. In addition, the Contractor agrees to promptly procure all necessary approvals, licenses and permits, pay all charges and fees, and give notices necessary and incident to the due and lawful prosecution of the work.
- B. The Contractor shall conduct the work, at all times, in such a manner as to ensure the safety of, and least possible obstruction to, the traveling public. The convenience of the general public and of the residents along and adjacent to the site/work area shall be provided for in an adequate and satisfactory manner, as determined by the Engineer and/or Owner.
- C. All equipment and materials shall be placed or stored in such locations so as not to be or to create the danger of becoming a hazard to the traveling public. No section of road shall be closed to the public except where/when permitted by the Owner and the local traffic authority.
- D. The Contractor shall perform operations in strict accordance with OSHA and manufacturers' safety requirements. Particular attention is drawn to safety requirements involving entering confined spaces, work on elevated platforms, and working with pressurized equipment.

**PART 2 – PRODUCTS**

**2.01 GENERAL:**

- A. Handling, formulation, and storage of the sealing compounds and grouts shall be in strict conformance with the manufacturer's recommendations. The uncured compound and grouts shall be delivered to the site in unopened containers, with the date of manufacture clearly indicated. Any uncured compound determined to be more than six (6) months old shall be immediately removed from the site. Once a container of uncured compound or grout has been opened it shall be used within 24 hours of being opened.
- B. Mixing and handling of the compounds and grouts and the constituents producing it, which may be toxic on contact or inhalation, shall be as recommended by the manufacturer, and the Contractor shall minimize hazard to personnel. The Contractor is responsible for providing appropriate protective measures to ensure that the components and the chemicals produced in the mixing are under the control of the

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Contractor at all times and are not available to unauthorized personnel or others. Excess material resulting from rehabilitation operations shall be disposed of in a safe manner. All equipment and material shall be subject to the review of the Engineer.

- C. All chemical materials used shall meet the following minimum application requirements:
1. All component materials shall be easily transported by common carriers.
  2. Packing of component materials shall be compatible with field storage requirements.
  3. Components shall be packed in such a fashion as to provide for maximum worker safety when handling the materials and minimize spillage when preparing for use.
  4. Mixing of the components shall be compatible with field applications, not require precise measurements, and be within the limits recommended by the manufacturer.
  5. Catalyzation shall take place at the point of injection/repair.
  6. Cleanup shall be done without inordinate use of flammable or hazardous chemicals.
  7. Residual sealing materials shall be removed from the sewer/structure after injection to ensure there are no reductions, restrictions or blockages of sewer flow.

2.02 SPRAY-ON CEMENTITIOUS LINER:

- A. Provide the following as manufactured by AP/M Permaform, or approved equal, for plugging holes and stopping active hydrostatic infiltration at points in concrete and masonry manholes:
1. A premixed Portland cement-based hydraulic cement consisting of Portland cement, graded silica aggregates, special plasticizing and accelerating agents. It shall not contain chlorides, gypsums, plasters, iron particles, or gas forming agents or promote the corrosion of steel it may come in contact with. Set time shall be approximately 50 seconds. The 10-minute compressive strength shall be approximately 500 psi.
  2. A silicate-based liquid accelerator field mixed with neat Portland cement. Set time approximately 50 seconds.
  3. A pre-mixed Portland cement-based hydraulic cement consisting of Portland cement, graded silica aggregates, special plasticizing and accelerating agents. It shall not contain chlorides, gypsums, plasters, iron particles, or gas-forming agents or promote the corrosion of steel it may come in contact with. Set time approximately three (3) minutes or 15 minutes to suit application. One-hour compressive strength shall be approximately 600 psi.

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B. Provide the following MS-10,000 **lining mortar** as manufactured by AP/M Permaform, or approved equal:

1. Ultra-high strength, high build, corrosion resistant mortar, based on Portland cement fortified with micro silica. The mortar, when mixed with the appropriate amount of water, shall be able to be sprayed, cast, pumped or gravity-flowed into any are  $\frac{1}{2}$  inch and larger. The mortar shall harden quickly without any need for special curing and shall develop 80 percent of its ultimate flexural strength in the first 24 hours.
2. The hardened binder shall be dense and highly impermeable. Graded quartz sands shall be added to enhance particle packing and further improve the fluidity and hardened density. The mortar shall possess excellent thin-section toughness, high modulus of elasticity and be self-bonding. Fibers shall be added as an aid to casting, for increased cohesion and to enhance flexural strength.
3. The water content shall be adjusted to achieve the desired consistency. Despite its high fluidity, the mortar shall have good wet adhesion and shall not sag or run after placement. The mortar shall be able to be cast against soil, metals (including aluminum and lead), wood, plastic, cardboard and other normal construction material.

4. Physical Properties:

Unit Weight:	125 pcf
Set Time at 70° F (ASTM C403):	244 minutes (initial set) 440 minutes (final set)
Modulus of Elasticity (ASTM C469):	180,000 psi (24 hours) 1,150,000 psi (28 days)
Flexural Strength (ASTM C293):	650 psi (24 hours) 800 psi (28 days)
Compressive Strength (ASTM C307):	3,000 psi (24 hours) 10,000 psi (28 days)
Tensile Strength (ASTM C307):	600 psi
Shear Bond (ASTM C882):	>1,000 psi
Shrinkage (ASTM C157):	None
Chloride Permeability (ASTM C1202):	<550 Coulombs



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C. Provide the following COR+GARD **chemical protective coating** as manufactured by AP/M Permaform, or approved equal:

1. The chemical protective coating shall be a two-component 100 percent solids epoxy design formulated for use in sewer systems. It shall be white in color for enhanced visibility and shall be applied uniformly over the entire interior surface. Application shall avoid air bubble entrapment. The chemical protective coating shall cure quickly, even when immersed in fresh or salt water and rapidly form a tenacious bond to freshly applied mortars. The chemical protective coating shall produce a smooth, glossy and homogenous protective layer that is impervious to biological corrosion, water, oils and chemicals.
2. The chemical protective coating shall be applied at a minimum thickness of 0.125 inches (125 mil) to provide a complete and uniform vapor barrier against attack by sewer gases and corrosion causing bacteria. The surface shall be free of entrapped air bubbles or holidays.

3. Physical Properties:

Dry Time:	four (4) to six (6) hours at 75° F
Compressive Strength (ASTM D695):	16,800 psi
Flexural Strength (ASTM D790):	13,900 psi
Tensile Strength (ASTM D638):	12,400 psi
Hardness (ASTM D2240):	68 to 72 Shore D
Heat Distortion (ASTM D648):	220° F
Ultimate Elongation (ASTM D638):	4.5 percent
Adhesive Shear (ASTM C882):	1,000 psi

2.03 MANHOLE GROUT INJECTION:

A. Acrylamide base grout shall have the following characteristics:

1. A minimum of 10 percent acrylamide base material by weight in the total grout mix. A higher concentration (%) of acrylamide base material may be used to increase strength or offset dilution during injection.
2. The ability to tolerate some dilution and react in moving water during injection.
3. A viscosity of approximately 2 centipoise, which can be increased with approved additives.
4. A constant viscosity during the reaction period.
5. A controllable reaction time from 10 seconds to 1 hour.
6. A reaction (curing) that produces a homogenous, chemically stable, non-biodegradable, firm, flexible gel.

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7. The ability to increase mix viscosity, density and gel strength by the use of additives.
  8. Product Manufacturer: Avanti AV-100, or approved equal.
- B. Acrylic base grout shall have the following characteristics:
1. A minimum of 10 percent acrylic base material by weight in the total grout mix. A higher concentration (%) of acrylic base material may be used to increase strength of set dilution during injection.
  2. The ability to tolerate some dilution and react in moving water during injection.
  3. A viscosity of approximately 2 centipoise, which can be increased with additives.
  4. A constant viscosity during the reaction period.
  5. A controllable reaction time from 5 seconds to 6 hours.
  6. A reaction (curing) that produces a homogenous, chemically stable, non-biodegradable, flexible gel.
  7. The ability to increase mix viscosity, density and gel strength by the use of the additives.
  8. Product Manufacturer: Avanti AV-118, or approved equal.
- C. Additives:
1. Latex additive (or equal) shall be added to strengthen the grout. The quantity of latex additive will be according to the manufacturer's recommendation. The grout admixture shall be adjusted to meet specified viscosity and reaction time. Strictly follow manufacturer's recommendations for product handling and start. Latex additive shall have the following characteristics:

Solids Content (ASTM D1010):	49 percent (minimum)
pH:	7.5 to 8.5 (average)
Viscosity (ASTM D1638):	130 cps at 77° F
Density (ASTM D1564W):	8.52 lbs. per gallon
Solvent:	Water

Shall provide protection against shrinkage and improve the strength of the gel.

Shall not contain organic solvents.
  2. A root deterrent chemical, such as Dichlobenil, shall be added to the grout in proportions as recommended by the manufacturer.
  3. A shrink control agent that is water-based emulsion shall be used with the grout. The shrink control agent shall reduce shrinkage and improve strength of grout providing the resultant cured material with both improved hydrostatic pressure

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resistance and flexibility. The agent shall be added in proportions as recommended by the manufacturer.

2.04 FLEX COAT CHIMNEY SEAL:

- A. Coating shall be 100 percent solids, solvent-free flexible epoxy or urethane coating having the following characteristics:

Tensile Strength (ASTM D412):	1,100 psi
Tensile Ultimate Elongation (ASTM D412):	400 percent
Hardness, Shore D (ASTM D2240):	65
Adhesion Strength (ASTM D412):	175 lbs. per inch
Initial Tear Resistance (ASTM D1004):	150 lbs. per inch
Minimum Application Thickness:	170 mil

- B. Acceptable Manufacturer: Flex-Seal Utility Sealant by Sealing Systems, Inc., or approved equal.

2.05 WALL PATCH:

- A. A quick setting fiber reinforced calcium aluminate cementitious shall be used as a patching mix, mixed and applied according to manufacturer's recommendations, and having the following minimum physical properties:

Compressive Strength (ASTM C109B):	1,400 psi (1 hour) 2,000 psi (24 hours)
Shrinkage (ASTM C596):	<0.06 percent at 90 percent R.H.
Bond Strength (ASTM C321):	900 psi (24 hours)
Flexural Strength:	500 psi (24 hours) 900 psi (28 days)
Cement:	Sulfate resistant
Density (when applied):	105 pcf (±5 pcf)

2.06 HYDRAULIC CEMENT:

- A. A rapid setting cementitious product specifically formulated for leak control shall be used to stop minor water infiltration, mixed and applied according to manufacturer's recommendations, and having the following minimum physical properties:

Compressive Strength (ASTM C109B):	600 psi (6 hours)
Shrinkage (ASTM C596):	2000 psi (24 hours) <0.06 percent at 90 percent R.H.

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Bond Strength (ASTM C321):	40 psi (1 hour)
	80 psi (24 hours)

**2.07 WATER:**

Water used in mixing shall be potable.

**PART 3 – EXECUTION**

**3.01 WORK IN CONFINED SPACES:**

All work in existing manholes shall be performed in accordance with OSHA 29 CFR 1910.146 (Permit-required confined spaces).

**3.02 REMOVAL AND REPLACEMENT OF MANHOLE FRAMES AND COVERS:**

The existing frames and covers of all sewer manholes to be rehabilitated shall be removed for salvage and turned over to the City of Milford Public Works Department, or disposed of as directed. New manholes frames and covers shall be installed in accordance with Section 02601 – Manholes, and as indicated on the drawings.

**3.03 STRUCTURE PREPARATION/CLEANING:**

- A. The Contractor shall remove and replace and/or make grade adjustment to frame and cover, as needed, prior to the installation of the liner system.
- B. Contractor shall perform preliminary cleaning of the structure with a high-pressure water jet blast at a minimum of 3,500 psi, to prepare the structure for any necessary grouting and/or other rehabilitation work.
- C. The Contractor shall remove the existing manhole steps. The metal portion of all steps shall be removed flush with the manhole interior wall surface, and any remaining holes are to be patched flush with patching mix prior to applying the CIPM liner system. The final coated surface shall have a smooth, uniform appearance.
- D. Prior to patching severe defects in the manhole, all loose and deteriorated material shall be removed and disposed of by the Contractor. The bench areas shall be repaired with patching mix, as required, and contoured to promote hydraulic flow. The prepared surface of the shelves shall be smooth and shall be sloped to allow for all bench areas to drain to the pipe invert.
- E. Manhole chimney, wall and shelf repair shall include plugging and/or patching, as necessary, with specified chemical grout, infiltration control mix, or patching mix.
- F. All active hydrostatic water leakage shall be stopped within 4 inches of where the liner will end around pipes or the shelf area, in accordance with manufacturer's instruction.
- G. Contractor shall plug the inlet pipe and inspect for infiltration leaks around the inlet and outlet pipes, as well as in the invert channel. All leaks present shall be stopped by

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- the use of chemical grout and/or by the use of infiltration control mix. After stopping leaks with chemical grout, infiltration control mix shall be used to refinish the surface where the leak was occurring.
- H. All cracked or disintegrated material shall be removed from the area to be patched, exposing a sound substrate. Patches for filling of voids shall be allowed to cure according to the manufacturer's specifications before continuing with the rehabilitation process.
  - I. Contractor shall remove any drop pipes to within 2 inches of the wall. All other incoming laterals shall be trimmed within 2 inches of the interior wall, and sewer main line inlet and outlet openings shall be properly trimmed within 4 inches of the wall in areas where such pipes protrude above the benches that form the invert channel. All incoming and outgoing lines shall be grouted with an approximate 60-degree taper with infiltration control mix, patching mix, or 50/50 combination of infiltration control mix and patching mix, forming a filet (not less than a 6-inch radius) between the structure wall and each pipe. Such application of grout shall extend at least 4 inches from the outlet onto the wall area making a smooth transition for the liner connection to the pipe openings.
  - J. Prior to liner installation, the installation Contractor shall clean all surfaces of the host structure with a high-pressure sprayer having an operating pressure of at least 3,500 psi. After pressure cleaning, installation Contractor may clean structure with degreaser or other solvents as needed to remove any film or residue on the surface. Structure shall then be pressure rinsed with clean water.

3.04 SPRAY-ON CEMENTITIOUS LINER:

- A. Plug any active leaks with hydraulic cement as specified in Paragraph 3.03 (above). Fill voids and overhangs with patching material.
- B. Equipment: Mortar mixers, compressors and pumps shall be standard commercial models.
- C. Avoid overly windy and arid curing conditions.
- D. Application of cementitious liner shall be performed as follows:
  - 1. Material shall be applied evenly around the entire circumference of the manhole. Multiple passes shall be made until the desired thickness has been obtained. Thickness shall be verified at any point with a wet gage as directed by the Engineer.
  - 2. Total thickness of cementitious product to be spray applied shall be  $\frac{1}{2}$ -inch minimum. The liner shall start in the manhole invert and stop at the bottom of the manhole frame. All inverts shall be included in the manhole lining.
- E. Application of the chemical protective coating, if required, shall be performed as follows:

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1. The epoxy shall be uniformly cast onto the fresh mortar lining before re-exposure to the chemicals can contaminate the underlying mortar.
2. If application is delayed beyond 24 hours, or if the mortar liner is exposed to foreign matter, it shall be rinsed to neutralize its surface and the epoxy shall then be applied.
3. The epoxy corrosion protection coating shall be applied at a thickness of 0.125 inches (125 mil) and shall include the invert, up the walls, and overlap the bottom of the manhole frame by a minimum of 2 inches.

3.05 JOINT SEALING BY GROUT INJECTION:

- A. Sealing of the manhole base and wall joints, and of penetrating pipe joints shall be by grout injection method as directed by the Engineer.
- B. Where indicated by field conditions or directed by the Engineer, grout wall joints as follows:
  1. The wall joints shall have the drill holes at 4, 8 and 12 o'clock positions 1 foot above the joint to be sealed and drill holes with grout sleeves inserted into the walls at 2, 6 and 10 o'clock positions 1 foot below the joint to be sealed.
  2. For each wall joint, pump grout into the lower holes until grout comes out of the upper holes.
- C. Where indicated by field conditions or directed by the Engineer, grout base and/or bench by drilling one hole on one side of the defect with grout sleeves inserted into the bench or base, whichever is lower. Pump grout into the drill hole.
- D. For each penetrating pipe joint, drill one hole on each side of the pipe with grout sleeves inserted into the walls at the spring line or top of manhole bench, whichever is lower. Pump grout into both drill holes.
- E. Into each insert sleeve, grout shall be pumped at controlled pressures which are in excess of groundwater pressures. The Contractor shall install additional insert sleeves and grout as necessary, due to type and size of leak encountered, type of soil and type of voids being filled.
- F. Leaks, which are determined to be too large to be effectively eliminated by the grout injection method, shall be plugged with hydraulic cement prior to initiating the injection of grout. The hydraulic cement shall require no additives, shall set in 45 to 90 seconds, and shall be dimensionally stable, freeze/thaw resistant and sulfate resistant.
- G. The Contractor shall allow one (1) day for the grout to cure, after which each sealed joint shall be inspected. If leaks are observed in the sealed area, the Contractor shall place new gel insert sleeves and apply more sealant as necessary to stop the leak. The process shall be repeated as necessary to stop the leaks.

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- H. All holes created by the grouting process shall be repaired with hydraulic cement. Manholes shall be cleaned, as specified, after chemical sealing operation. Any large voids shall be filled with wall patch mix.

3.06 FLEX COAT CHIMNEY SEAL:

- A. All manholes identified for rehabilitation using a cementitious liner system shall receive a flex coat chimney seal.
- B. If inflow or infiltration is observed within the structure after surface preparation is complete, grout/seal leaks by grout injection method first. Hydraulic cement may also be used upon approval by the Engineer. No infiltration leaks may be evident in the manhole prior to installing chimney seal.
- C. Prepare all chimney surfaces in accordance with manufacturer's recommendations.
- D. After surface preparation, apply flexible coating to prepared surfaces in accordance with manufacturer's recommendations.
- E. The chimney seal shall be applied from a point 2 inches above the joint between the manhole frame and chimney, to a depth as required to rehabilitate the chimney. The minimal coverage shall be 12 inches, unless otherwise directed by the Engineer.

3.07 FINAL INSPECTION AND ACCEPTANCE:

A. Quality Assurance and Acceptance:

- 1. Two (2) test cubes of the cementitious liner with chemical protective coating and/or two (2) test cubes of the formed-in-place concrete with embedded plastic liner shall be taken randomly for every seventh (7<sup>th</sup>) manhole, as directed by the Engineer, at the Contractor's expense to verify strengths in accordance with ASTM C109. Testing shall be done by an independent testing laboratory acceptable to the Engineer and paid for by the Contractor.
- 2. After completion of manhole rehabilitation, Contractor shall verify the minimum coating thickness of the manhole liner with a wet gauge. Test several points on the manhole wall; four (4) minimum. Repair verification points. Any areas found to be thinner than minimum tolerances shall immediately receive additional material.
- 3. Spark testing shall be performed by the Contractor in the presence of the Engineer for each manhole, to verify the thickness, continuity and thoroughness of the chemical protective coating. NACE RP0274 testing standard will detect bubble or blister type voids, cracks, thin spots, and foreign inclusions or contaminants in the coating. All areas found to be a defect shall immediately receive additional material. All costs associated with testing shall be paid for by the Contractor.

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CEMENTITIOUS LINER MANHOLE REHABILITATION

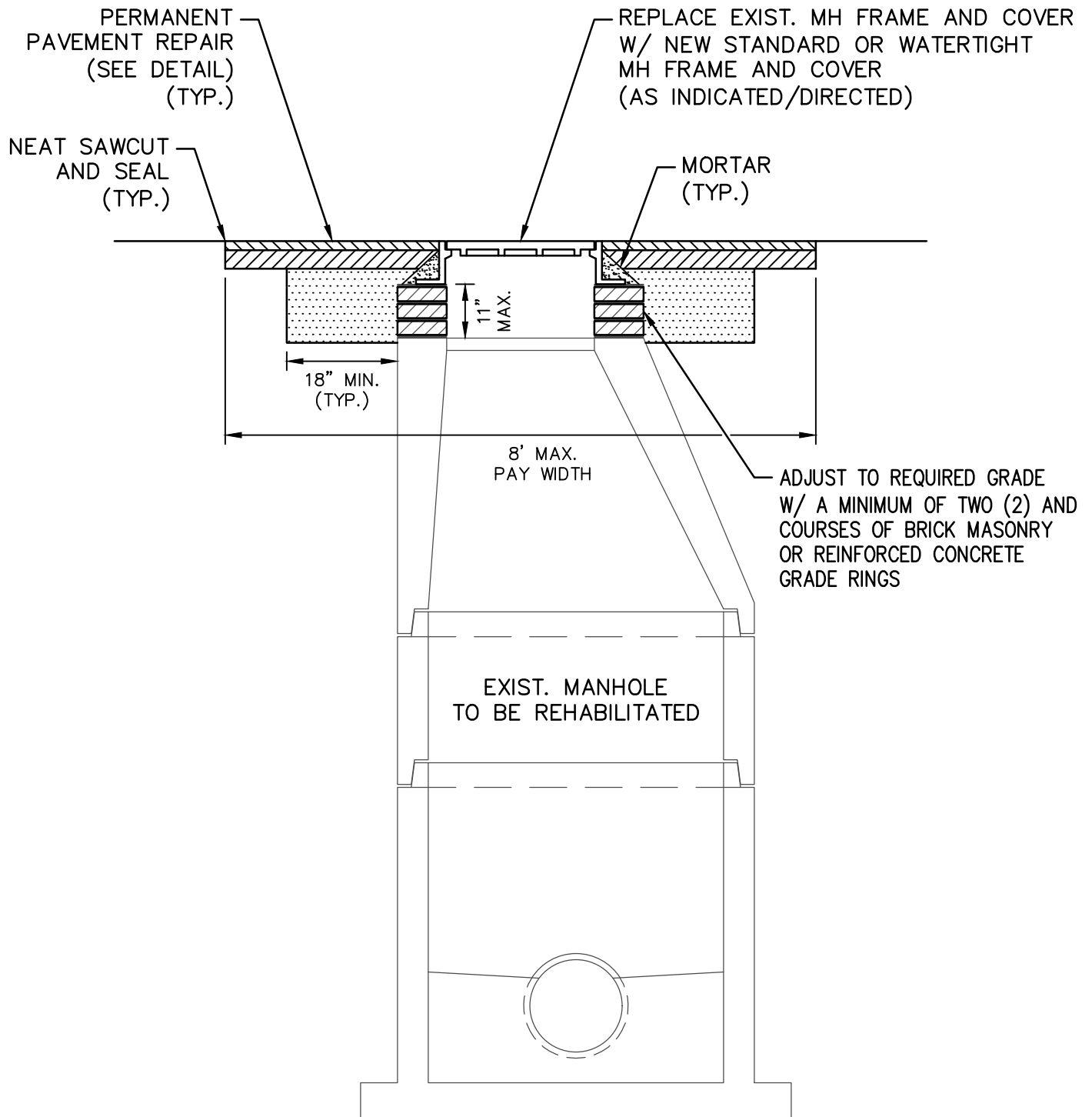
4. All work shall be performed in accordance with T&R testing voltage. The dielectric strength of the chemical protective coating requires testing at 100 volts per each mil of thickness.
- B. After the manhole rehabilitation work has been completed, the manhole shall be visually inspected by the Engineer in the presence of the Contractor. All manholes shall be free of visible leaks, and the work shall be found satisfactory to the Engineer. Any work that has been found to be defective shall be redone by the Contractor at no additional expense to the Owner.
- C. Approximately one (1) year after the manhole rehabilitation work has been completed, and prior to the expiration of the contract warranty period, the Engineer shall visually re-inspect each manhole in the presence of the Contractor. The re-inspection shall be performed during periods of high groundwater, and at a time approved by the Engineer. At the time of the re-inspection, the Contractor shall provide such health and safety equipment necessary for the confined space entry of select manholes by the Engineer, if requested, to perform a more detailed visual inspection. Any work that has been found to be defective shall be redone by the Contractor at no additional expense to the Owner.

1.09 CLEANUP:

- A. Keep the work area free of accumulations of waste materials, rubbish and other debris resulting from the manhole rehabilitation operations.
- B. Upon acceptance of the work and inspection/testing, the Contractor shall restore the project area affected by the operations to original conditions, in a manner acceptable to the Engineer.

END OF SECTION





## REPLACEMENT OF MANHOLE FRAME AND COVER

N.T.S.



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PROJ. TITLE

DWG. TITLE REPLACEMENT OF MANHOLE  
FRAME AND COVER

SCALE

AS NOTED

DRAWN BY

NWE DESIGN BY -

DWG. NO.

02960-1

DATE

02/06/2024

PROJECT NO. 24-034-10