

**PROJECT MANUAL**

**PORTSMOUTH,  
NEW HAMPSHIRE**

**FOR CONSTRUCTION**

**CITY OF PORTSMOUTH**

**CORPORATE DRIVE AND  
GOOSE BAY DRIVE  
SEWER IMPROVEMENTS**

**July 28, 2017**

**Underwood Engineers, Inc.**  
**Portsmouth, New Hampshire**  
FILE NO. 2097

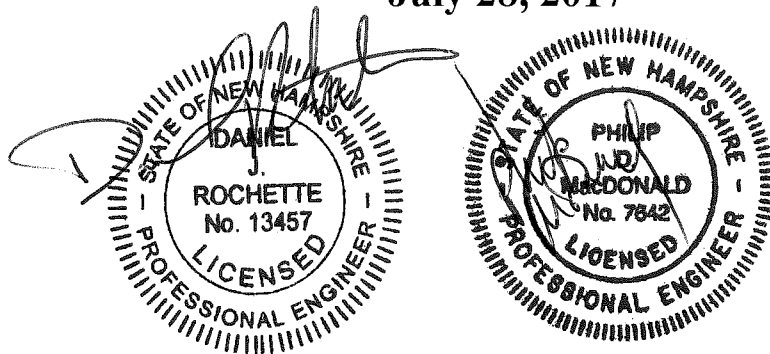
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Prepared and Copyrights by

Underwood Engineers, Inc.  
25 Vaughan Mall  
Portsmouth, NH 03801

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## **A. BIDDING REQUIREMENTS**

**ADVERTISEMENT FOR BIDS**

**City of Portsmouth**

Owner

1 Junkins Avenue  
Portsmouth, NH 03801

Address

Will be accepting separate sealed BIDS for the construction of:  
**Corporate Drive and Goose Bay Drive Sewer Improvements**

The work to be completed under this Contract includes but is not limited to:

1. Construction of approximately 2,150 linear feet of 18” and 27” centrifugally cast reinforced polymer mortar (CCFRPM) sewer pipe and roadway repairs.
2. Installation of new sewer beneath existing multiple pipe (3-24” x 40” CMP) drainage crossing.
3. Piping and structure modifications necessary to tie into existing systems.
4. Complete restoration of all properties both public and private.
5. Abandoning existing sewers and manholes

Sealed Bids will be received by the City of Portsmouth at the office of **Purchasing Department** until **2:00 PM**, (local time) on **August 31, 2017** and then publicly opened and read aloud.

1. Completion time for the project will be calculated as calendar days from the date specified in the “Notice to Proceed” as follows:

**120** calendar days for substantial completion

**150** calendar days for final completion

Liquidated damages will be in the amount of \$ 1,000.00 for each calendar day of delay from the date established for substantial completion, and \$ 1,000.00 for each calendar day of delay from the date established for contract completion.

2. Each General Bid shall be accompanied by a bid security in the amount of 5% of the Total Bid Price.
3. The successful bidder must furnish 100% Performance and Payment Bonds and will be required to execute the Contract Agreement within 10 days following notification of the acceptance of his bid.
4. Any Contract awarded under the Advertisement for Bids will be dependent on available funds.
5. No Bidder may withdraw a Bid within 60 days after the actual date of opening thereof.
6. The owner reserves the right to reject any and all bids, to accept any bid, to waive any informality on bids received, and to omit any item or items as it may deem to be in the best interest of the Owner.

A-1.2

7. There will be a **MANDATORY** pre-bid meeting for all prospective (qualified) bidders held at the:

Portsmouth Public Work Department  
680 Peverly Hill Road  
Portsmouth, New Hampshire  
at **1:00 PM**, (local time) on **August 16, 2017**

Representatives of the Owner and Engineers will be present to discuss the project.

8. Copies of the Contract Documents and all issued addenda may be obtained electronically from the City of Portsmouth Purchasing Department on the City's website (<http://www.cityofportsmouth.com/finance/purchasing.htm>).
9. Addenda issued under this Advertisement for Bids will not be distributed to bidders. It will be the bidder's responsibility to check the website provided above for any addenda issued prior to submitting their bid. Bidders must acknowledge receipt of all in the space provided in the Bid (Page A-3.1).
10. Technical questions regarding the plans and specifications shall be directed to Dan Rochette, P.E., Underwood Engineers, Inc., at 603-436-6192 ([drochette@underwoodengineers.com](mailto:drochette@underwoodengineers.com)).

The CONTRACT DOCUMENTS may be examined at the following locations:

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City of Portsmouth, Public Works Department, 680 Peverly Hill Road, Portsmouth, NH 03801  
Office of Underwood Engineers, Inc., 25 Vaughan Mall, Portsmouth, NH 03801;  
Office of Underwood Engineers, Inc., 99 North State Street, Concord, NH 03301;

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**INFORMATION FOR BIDDERS**

BIDS will be received from qualified contractors by City of Portsmouth, New Hampshire  
(herein called the "OWNER"), at City of Portsmouth, Purchasing Department,  
1 Junkins Avenue, Portsmouth, New Hampshire 03801

until 2:00 PM on August 31, 2017 and then at said office publicly opened and read aloud.  
Each BID must be submitted in a sealed envelope, addressed to:

**City of Portsmouth** at **Purchasing Department**  
**1 Junkins Avenue**  
**Portsmouth, New Hampshire 03801**

Each sealed envelope containing a BID must be plainly marked on the outside as BID

for Corporate and Goose Bay Drive Sewer Improvements and the

envelope should bear on the outside the BIDDER's name, address, and license number if applicable and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at

**City of Portsmouth, Purchasing Department, 1 Junkins Avenue, Portsmouth, New Hampshire 03801**

All BIDS must be made on the required BID form. 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. Only one copy of the BID form is required.

The OWNER may waive any informalities or minor defects or reject any and all BIDS. Any BID may be withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within 60 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID Schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

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.

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 risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the contract.

## A-2.2

Each BID must be accompanied by a BID bond payable to the OWNER for five (5) percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will upon request, return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed, the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will upon request, be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A performance BOND and a payment BOND, each in the amount of 100 percent of the CONTRACT PRICE, in a form and with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or payment BONDS and performance BONDS must file with each BOND a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance BOND and payment BOND and proof 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. In case of failure of the BIDDER to execute the Agreement, the OWNER may at his option consider the BIDDER in default, in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER within ten (10) days of receipt of acceptable performance BOND, payment BOND, proof of insurance and Agreement signed by the party to whom the Agreement 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.

The NOTICE TO PROCEED shall be issued within ten (10) 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 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.

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.

A conditional or qualified BID will not be accepted.

Award will be made to the lowest responsive and responsible BIDDER.



### A-2.3

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site 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 its BID.

The low BIDDER shall supply the names and addresses of major material SUPPLIERS and SUBCONTRACTORS when requested to do so by the OWNER.

**MANDATORY PRE BID MEETING** pre-bid meeting for all prospective (qualified) bidders will be held at the:

Portsmouth Public Work Department  
680 Peverly Hill Road  
Portsmouth, New Hampshire  
at **1:00 PM**, (local time) on **August 16, 2017**

#### MANUFACTURERS EXPERIENCE

Wherever it may be written that an equipment manufacturer must have a specified period of experience with his product, equipment which does not meet the specified 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.

#### NON-DISCRIMINATION IN EMPLOYMENT

Contracts for work under this proposal will obligate the contractors and sub-contractors not to discriminate in employment practices

#### SAFETY AND HEALTH REGULATIONS

This project is subject to all of the Safety and Health Regulations (CFR 29 Part 1926 and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974. Contractors are urged to become familiar with the requirements of these regulations.

#### COPIES OF THE CONTRACT

There shall be at least six (6) executed copies of the Contract to be distributed as follows:

- a) One (1) copy each to the Owner, Contractor, and Engineer.
- b) Two (2) copies to the New Hampshire Department of Environmental Services.
- c) Additional copies as required dependent upon other Federal or state agencies contributing to or participating in project costs.

NON-RESIDENT CONTRACTORS

The successful bidder, if a corporation established under laws other than the State of New Hampshire, shall file, at the time of the execution of the contract, with the Owner, notice of the name of its resident attorney, appointed as required by the laws of the State of New Hampshire.

The successful bidder, if not a resident of New Hampshire, and not a corporation, shall file, at the time of execution of the contract, with the Owner a written appointment of a resident of the state of New Hampshire, having an office or place of business therein, to be his true and lawful attorney upon whom all lawful processes in any actions or proceedings against him may be served; and in such writing, which shall set forth said attorney's place of residence, shall agree that any lawful process against him which is served on said attorney shall be of the same legal force and validity as if served on him and that the authority shall continue in force so long as any liability remains outstanding against him in New Hampshire. The power of attorney shall be filed in the office of the Secretary of State if required, and copies certified by the Secretary shall be sufficient evidence thereof. Such appointment shall continue in force until revoked by an instrument in writing, designating in a like manner some other person upon whom such processes may be served, which instrument shall be filed in the manner provided herein for the original appointment.

A Non-resident Contractor shall be deemed to be:

- a) A person who is not a resident of the State of New Hampshire.
- b) Any partnership that has no member thereof resident of the State of New Hampshire.
- c) Any corporation established under laws other than those of the State of New Hampshire.

UTILIZATION OF MINORITY AND WOMEN'S BUSINESS ENTERPRISES (MBE's AND WBE's)

There is no MBE/WBE requirement for this project.

BIDDERS QUALIFICATIONS

No award will be made to any Bidder who cannot meet all of the following requirements:

- A. Bidder shall not have defaulted nor turned the work over to the bonding company on any contract within three years prior to the bid date.
- B. Bidder shall maintain a permanent place of business.
- C. Bidder shall have adequate personnel and equipment to perform the work expeditiously.
- D. Bidder shall have suitable financial status to meet obligations incidental to the work.
- E. Bidder shall have appropriate technical experience satisfactory to the Engineer and the Division in the class of work involved.
- F. Bidder shall be registered with the Secretary of State to do business in New Hampshire.
- G. Bidder shall have performed to the satisfaction of the Engineer and the Division on previous contracts of a similar nature.

H. Bidder shall not have failed to complete previous contracts on time, including approved time extensions.

WITHDRAWAL OF BIDS

Prior to Bid Opening, bids may be withdrawn upon written or telegraphic request of the Bidder provided confirmation of any telegraphic withdrawal over the signature of the Bidder is placed in the mail and postmarked prior to the time set for Bid Opening. Bid documents and security of any Bidder withdrawing his bid in accordance with the foregoing conditions will be returned.

**BID**

Proposal of \_\_\_\_\_ (hereinafter called "BIDDER"), organized and existing under the laws of the State of \_\_\_\_\_ doing business as \_\_\_\_\_  
(Corporation, Partnership, Individual)

To the \_\_\_\_\_ (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of Corporate and Goose Bay Drive Sewer Improvements in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to his own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to the BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to complete the PROJECT within:

- 120 consecutive calendar days for substantial completion
- 150 consecutive calendar days for final completion

Liquidated damages will be in the amount of \$ 1,000.00 for each calendar day of delay from the date established for substantial completion and \$ 1,000.00 for each calendar day of delay from the date established for contract completion, as provided in Section 18 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

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

A-3.2

The Bidder is requested to state below what works of a similar character to that included in the proposed contract he has done to give references that will enable the Owner to judge his experience, skill, and business standing.

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, add separate sheets.

1. Name of Bidder.
2. Permanent Main Office address.
3. When organized?
4. Where incorporated?
5. Is bidder registered with the Secretary of the State to do business in New Hampshire?
6. How many years have you engaged in the contracting business under your present firm name? Also state names and dates of previous firm names, if any.
7. Current Contracts on hand. (Schedule these, showing gross amount of each contract and the approximate anticipated dates of completion.)
8. General character of work performed by your company.
9. Have you ever failed to complete any work awarded you in the scheduled contract time, including approved time extensions? (Yes) (No)  
If so, where and why?
10. Have you ever defaulted on a contract? (Yes) (No)  
If so, where and why?
11. Have you ever had liquidated damages assessed on a contract? (Yes) (No)  
If so, where and why?
12. List the more important contracts recently executed by your company, stating approximate cost for each, and the month and year completed.
13. List your major equipment available for this contract.
14. List your key personnel such as Project Superintendent and foreman available for this contract.
15. List any subcontractors whom you would expect to use for the following (unless this work is to be done by your own organization):
  - a. Civil Engineering \_\_\_\_\_
  - b. Utility Installation \_\_\_\_\_
  - c. Paving \_\_\_\_\_

- d. Testing \_\_\_\_\_
- e. Other work \_\_\_\_\_

16. With what banks do you do business?

Do you grant the Engineer permission to contact this (these) institutions? (Yes) (No)

NOTE: Bidders may be required to furnish their latest financial statement as part of the award process.

Respectfully submitted:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

\_\_\_\_\_ Being duly sworn, deposes and says that he is

\_\_\_\_\_ of \_\_\_\_\_  
(Name of Organization)

and that the answers to the foregoing questions and all statements contained therein are true and correct.

Sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_

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

My commission expires \_\_\_\_\_

(Seal - If BID is by Corporation)

ATTEST: \_\_\_\_\_

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum:

- NOTE:
- 1.) BIDS shall include sales tax and all other applicable taxes and fees.
  - 2.) Prices written in words shall govern and unit prices shall govern over extended totals when discrepancies occur.

CONTRACTOR'S BID TABULATION

BID ITEM	EST. QUANT.	UNITS	DESCRIPTION		UNIT PRICE	EXTENDED TOTAL
<b>BASE BID</b>						
1.0	1	LS	Maintenance of sewer flows & by pass pumping: _____ Dollars and _____ Cents per	LS	LS	
1.1.08	50	LF	Furnish and install 8" SDR 35 PVC sewer pipe all depths, including earth excavation, fittings, and backfill: _____ Dollars and _____ Cents per	LF	LF	
1.1.15	15	LF	Furnish and install 15" SDR 35 PVC sewer pipe all depths, including earth excavation, fittings, and backfill: _____ Dollars and _____ Cents per	LF	LF	
1.1.18	1460	LF	Furnish and install 18" CCFRPM sewer pipe all depths, including earth excavation, fittings, and backfill: _____ Dollars and _____ Cents per	LF	LF	
1.1.18A	1	LS	Additional work for 18" CCFRPM sewer pipe installation at 3-24"x40" CMP drainage crossing: _____ Dollars and _____ Cents per	LS	LS	
1.1.27	600	LF	Furnish and install 27" CCFRPM sewer pipe all depths, including earth excavation, fittings, and backfill: _____ Dollars and _____ Cents per	LF	LF	
1.5.4	67	VF	Furnish and install 4' diameter epoxy lined sewer manholes including earth excavation, backfill, and epoxy lining: _____ Dollars and _____ Cents per	VF	VF	

**CONTRACTOR'S BID TABULATION**

BID ITEM	EST. QUANT.	UNITS	DESCRIPTION		UNIT PRICE	EXTENDED TOTAL
1.5.5	43	VF	Furnish and install 5' diameter epoxy lined sewer manholes including earth excavation, backfill, and epoxy lining: _____ Dollars and _____ Cents per	VF		
1.5.6	21	VF	Furnish and install 6' diameter epoxy lined sewer manholes including earth excavation, backfill, and epoxy lining: _____ Dollars and _____ Cents per	VF		
1.5.A	13	EA	Additional Adjustment of sewer manhole covers (to final pavement elevation): _____ Dollars and _____ Cents per	EA		
1.8.A	2125	LF	Furnish and install non-woven geotextile (separation around sewer bedding) where directed: _____ Dollars and _____ Cents per	LF		
1.8.B	200	LF*	Furnish and install geogrid geotextile (stabilization under pipe or structures) where directed: _____ Dollars and _____ Cents per	LF*		
1.9	3	EA	Field core penetration for sewer pipe, including pipe connection system (4" through 15" diameter): _____ Dollars and _____ Cents per	EA		
1.10	6	EA	Abandon existing sewer manholes: _____ Dollars and _____ Cents per	EA		



CONTRACTOR'S BID TABULATION

BID ITEM	EST. QUANT.	UNITS	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1.11	140	CY	Furnish and install flowable fill: _____ Dollars and _____ Cents per	CY	
1.12	1000	LF	Wellpoint dewatering system including pumps and monitoring wells: _____ Dollars and _____ Cents per	LF	
1.13	1000	SF*	Sheeting: _____ Dollars and _____ Cents per	SF*	
1.15A	1	LS	Health and Safety Plan (HASP): _____ Dollars and _____ Cents per	LS	
1.15B	1	LS	Management of soils and materials: _____ Dollars and _____ Cents per	LS	
1.15C	20	TON*	Load and haul surplus regulated soils and materials (where directed): _____ Dollars and _____ Cents per	TON*	
1.15D	20	TON*	Disposal of regulated soils and materials (where directed): _____ Dollars and _____ Cents per	TON*	

CONTRACTOR'S BID TABULATION

BID ITEM	EST. QUANT.	UNITS	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1.15E	1	Allow.	Analytical testing of soils (where directed): TWO THOUSAND Dollars and ZERO Cents per	Allow.	
1.16A	5	EA *	Unknown utility crossing: _____ Dollars and _____ Cents per	EA *	
1.16B	5	EA *	Repair of unknown or mismarked utility: _____ Dollars and _____ Cents per	EA *	
1.17	2125	LF	Post construction video inspection of sewers: _____ Dollars and _____ Cents per	LF	
2.1.12	40	LF	Furnish and install 12" CPE drain pipe all depths, including earth excavation, fittings, and backfill, _____ Dollars and _____ Cents per	LF	
2.6.4	2	EA	Furnish and install 4' diameter catch basin including earth excavation, and backfill: _____ Dollars and _____ Cents per	EA	
2.6.A	2	EA	Furnish and install catch basin hoods (12" through 18" diam. Outlet pipes, or as directed): _____ Dollars and _____ Cents per	EA	

CONTRACTOR'S BID TABULATION

BID ITEM	EST. QUANT.	UNITS	DESCRIPTION		UNIT PRICE	EXTENDED TOTAL
3.1	1	LS	Relocate existing water main at sewer crossing (all sizes): _____ Dollars and _____ Cents per	LS		
4.1A	290	TON	Furnish and install hot bituminous pavement - Machine method binder course: _____ Dollars and _____ Cents per	TON		
4.1B	190	TON	Furnish and install hot bituminous pavement - Machine method wearing course: _____ Dollars and _____ Cents per	TON		
4.1C	950	SY	Furnish and install temporary trench width pavement (3") repairs: _____ Dollars and _____ Cents per	SY		
4.1D	1100	SY	Furnish and install permanent trench width pavement (3.5") repairs: _____ Dollars and _____ Cents per	SY		
4.3	2100	SY	Full width pavement reclamation - 8" Depth In-Place: _____ Dollars and _____ Cents per	SY		
4.5	50	CY*	Furnish and install additional crushed gravel: _____ Dollars and _____ Cents per	CY*		

CONTRACTOR'S BID TABULATION

BID ITEM	EST. QUANT.	UNITS	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
6A	1	LS	Mobilization (Maximum 10% of Total Bid): _____ Dollars and _____ Cents per	LS	
6.1	50	CY*	Ledge excavation and disposal: _____ Dollars and _____ Cents per	CY*	
6.2	50	CY*	Additional excavation and excavation of unsuitable materials: _____ Dollars and _____ Cents per	CY*	
6.3	50	CY*	Furnish and install additional screened gravel (crushed stone) (where ordered by Engineer): _____ Dollars and _____ Cents per	CY*	
6.4	10	EA	Exploratory test pit excavation: _____ Dollars and _____ Cents per	EA	
6.5	1	LS	Maintenance of traffic: _____ Dollars and _____ Cents per	LS	
6.6	1	Allow.	Uniformed police officer for traffic control: FIVE THOUSAND Dollars and ZERO Cents per	Allow.	

CONTRACTOR'S BID TABULATION

BID ITEM	EST. QUANT.	UNITS	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
6.7	1000	HRS*	Uniformed flagger for traffic control: _____ Dollars and _____ Cents per	HRS*	
6.8A	1	LS	Develop a stormwater pollution prevention plan for approval and obtain NPDES construction permit for dewatering: _____ Dollars and _____ Cents per	LS	
6.8B	1	LS	Implement and maintain approved stormwater pollution prevention plan: _____ Dollars and _____ Cents per	LS	
6.9	100	LF*	Removal and disposal of existing asbestos cement (AC) pipe (all diameters) where encountered: _____ Dollars and _____ Cents per	LF*	
6.10	1	Allow.	Allowance for geotechnical testing: TWO THOUSAND FIVE HUNDRED Dollars and ZERO Cents per	Allow.	
6.14.0224	450	LF	Furnish and install 2" thick x 24" wide rigid polystyrene insulation: _____ Dollars and _____ Cents per	LF	
<b>LINE #1 - TOTAL BASE BID (BASIS OF AWARD):</b>					

CONTRACTOR'S BID TABULATION

BID ITEM	EST. QUANT.	UNITS	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
<b>ADD ALTERNATE #1 - Groundwater Monitoring and Treatment</b>					
1.15F	4	EA*	Installation of groundwater monitoring wells (where directed): _____ Dollars and _____ Cents per	EA*	
1.15G	80	EA*	Analytical testing of groundwater samples for the 23 perfluoroalkyl substances (PFAS) (where directed): _____ Dollars and _____ Cents per	EA*	
1.15H	1	Allow.	Procure Temporary Groundwater Discharge Permit from NHDES (where directed): FIVE THOUSAND Dollars and ZERO Cents per	Allow.	<b>\$5,000.00</b>
1.15I	3	Month*	Provide a temporary groundwater treatment system: _____ Dollars and _____ Cents per	Month*	
1.15J	12	Week*	Operate and maintain the temporary groundwater treatment system: _____ Dollars and _____ Cents per	Week*	

**LINE #2 - TOTAL ADD ALTERNATE #1:**

**LINE #3 - TOTAL BID (BASE BID + ADD ALT. #1):**

Name of Contractor: \_\_\_\_\_

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

**Notes to Bidders:**

- The lowest bid and the Basis of Award will be based on the engineer's estimated quantities and Contractor's unit item costs shown on **LINE #1 - TOTAL BASE BID**
- \* Indicates Indeterminate Quantity.

**BID BOND**

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, \_\_\_\_\_  
 \_\_\_\_\_ as Principal, and  
 \_\_\_\_\_ as Surety, are hereby  
 held and firmly bound unto \_\_\_\_\_ as OWNER  
 in the penal sum of \_\_\_\_\_  
 for the payment of which, well and truly to be made, we hereby jointly and severally bind  
 ourselves, successors and assigns.

Signed, this \_\_\_\_\_ day of \_\_\_\_\_

The Condition of the above obligation is such that whereas the Principal has submitted to  
 The City of Portsmouth, New Hampshire

a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing,  
 for the Corporate Drive and Goose Bay Drive Sewer Improvements

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (Properly completed in accordance with said BID) and shall furnish a BOND for faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise, the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

A-4.2

The Surety , for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are 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

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

\_\_\_\_\_  
Surety

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

**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 of New Hampshire.



## **B. CONTRACT**

**NOTICE OF INTENT TO AWARD**

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

TO: \_\_\_\_\_  
(BIDDER)

ADDRESS: \_\_\_\_\_

OWNER'S PROJECT NO: \_\_\_\_\_

PROJECT: Corporate Drive and Goose Bay Drive Sewer Improvements

OWNER'S CONTRACT NO: \_\_\_\_\_

CONTRACT FOR: Corporate Drive and Goose Bay Drive Sewer Improvements

\_\_\_\_\_  
(Insert name of contract as it appears in the Bid Documents)

You are notified that your Bid dated \_\_\_\_\_ for the above Contract has been considered. You are the apparent successful bidder and the City intends to award you the contract for: the construction of approximately 2,150 LF of 18" and 27" centrifugally cast reinforced polymer mortar sewer and other work as shown on the drawings.

\_\_\_\_\_  
(Indicate total Work, alternates or sections of Work awarded)

The Contract Price of your contract is \_\_\_\_\_ Dollars (\$ \_\_\_\_\_).

Five (5) copies of each of the proposed Contract Documents (except Drawings) accompany this Notice of Intent to Award. The same number of sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within ten days of receiving this Notice of Intent to Award.

1. You must deliver to the OWNER all of the fully executed counterparts of the Agreement including all the Contract Documents. This includes the sets of Drawings. Each of the Contract Documents must bear your signature on (the cover) (every) page.
2. You must deliver with the executed Agreement the Contract Security (Bonds) as specified in the Information for Bidders and General Conditions.

B-1.2

3. (List other conditions precedent).

- Provide insurance certificates showing additional insured parties as required prior to Notice to Proceed.
- Provide draft bonds for review and approval

Failure to comply with these conditions within the time specified will entitle **OWNER** to consider your bid abandoned, to annul this Notice of Intent to Award and to declare your Bid Security forfeited.

Within ten days after receipt of acceptable performance BOND, payment BOND and agreement signed by the party to whom the Agreement was awarded, the **OWNER** will return to you one fully signed counterpart of the Agreement with the Contract Documents attached.

City of Portsmouth  
(OWNER)

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

Judy Belanger  
Finance Director  
(TITLE)

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF INTENT TO AWARD is hereby acknowledged

By \_\_\_\_\_

The \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_

By \_\_\_\_\_

Title \_\_\_\_\_

Copy to ENGINEER  
(Use Certified Mail, Return Receipt Requested)

**AGREEMENT**

**THIS AGREEMENT**, made this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ by and between City of Portsmouth, hereinafter called "**OWNER**" (Name of Owner) and \_\_\_\_\_ doing business as (an individual,) or (a partnership,) or (a corporation) hereinafter called "**CONTRACTOR**".

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

1. The **CONTRACTOR** will commence and complete the construction of

Corporate Drive and Goose Bay Drive Sewer Improvements  
(Project)

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. The **CONTRACTOR** will commence the work required by the **CONTRACT DOCUMENTS** within Ten (10) calendar days after the date of the **NOTICE TO PROCEED unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS**. Completion time for the project will be calculated as calendar days from the date specified in the **NOTICE TO PROCEED** as follows:

- 120 calendar days for substantial completion.\*
- 150 calendar days for contract completion.\*

\* One hundred twenty (120) calendar days shall be allowed for completion of all sewer work and temporary pavement. This shall be considered Substantial Completion for Contract purposes. The Contractor shall be allowed thirty (30) calendar days following substantial completion to complete all cleanup and remaining work except final paving. This shall be considered Final Completion for Contract purposes. Final paving shall be completed the following spring no later than June 19, 2009.

Liquidated damages will be in the amount of \$ 1,000.00 for each calendar day of delay from the date established for substantial completion and \$ 1,000.00 for each calendar day of delay from the date established for final completion.

4. The **CONTRACTOR** agrees to perform all of the **WORK** described in the **CONTRACT DOCUMENTS** and comply with the terms therein for the sum of \$ \_\_\_\_\_ or as shown in the **BID** schedule.

B-2.2

5. The term "**CONTRACT DOCUMENTS**" means and includes the following:

(A) PROJECT MANUAL prepared or issued by: Underwood Engineers, Inc.

Corporate Drive and Goose Bay Drive Sewer Improvements

\_\_\_\_\_, and dated July 28, 20 17

1. ADVERTISEMENT FOR BIDS
2. INFORMATION FOR BIDDERS
3. BID
4. BID BOND
5. AGREEMENT
6. GENERAL CONDITIONS
7. SUPPLEMENTAL GENERAL CONDITIONS
8. SPECIAL CONDITIONS
9. PAYMENT BOND
10. PERFORMANCE BOND
11. NOTICE OF AWARD
12. NOTICE TO PROCEED
13. CONTRACTORS AFFIDAVIT
14. CONTRACTORS RELEASE
15. CERTIFICATE OF SUBSTANTIAL COMPLETION
16. CHANGE ORDER(S)
17. TECHNICAL SPECIFICATIONS
18. ADDENDA:

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

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

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

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

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

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

19. APPENDICES

(B) DRAWINGS prepared by: Underwood Engineers, Inc.

Corporate Drive and Goose Bay Drive Sewer Improvements

numbered 1 through 6, and dated July 28, 20 17

B-2.3

6. 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**.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

**IN WITNESS WHEREOF**, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in Five (5) copies, each of which shall be deemed an original on the date first above written.

**OWNER:** City of Portsmouth

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

John P. Bohenko

Name: City Manager

(Please type)

(SEAL)

ATTEST: \_\_\_\_\_

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

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

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

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

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

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

\_\_\_\_\_

(SEAL)

ATTEST: \_\_\_\_\_

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

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

**PAYMENT BOND**

**KNOW ALL MEN BY THESE PRESENTS:** that

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

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

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

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

\_\_\_\_\_ (Address of Surety)

hereinafter called Surety, are held and firmly bound unto

\_\_\_\_\_ (Name of Owner)

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

hereinafter called **OWNER** and unto all persons, firms, and corporations who or which may furnish labor, or who furnish materials to perform as described under the contract and to their successors and assigns, in the total aggregate 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, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

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

**NOW, THEREFORE**, if the Principal shall promptly make payment to all persons, firms, 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 all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such **WORK**, and for all labor cost incurred in such **WORK** including that be a subcontractor, and to any mechanic or material lienholder whether it acquires its lien by operation of State or Federal Law; then this obligation shall be void; otherwise to remain in full force and effect.

B-3.2

**PROVIDED**, that beneficiaries or claimants hereunder shall be limited to the subcontractors, and persons, firms, and corporations having a direct contract with the PRINCIPAL or its SUBCONTRACTORS.

**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 way 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 suit or action shall be commenced hereunder by any claimant: (a) Unless claimant, other than one having a direct contract with the PRINCIPAL shall have given written notice to any two of the following: The PRINCIPAL, the OWNER, or the SURETY above named within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the PRINCIPAL, OWNER, or SURETY, at any place where an office is regularly maintained for the transaction business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer. (b) After the expiration of one (1) year following the date on which PRINCIPAL ceased work on said CONTRACT, this bond is hereby understood, however, that if any limitation embodied in the BOND is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

PROVIDED, FURTHER, that it is expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND, the contract or the loan Documents shall include any alteration, addition, extension or modification of any character whatsoever.

**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 \_\_\_\_\_ counterparts, each one of  
(number)  
which shall be deemed an original, this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_ .

ATTEST:

By: \_\_\_\_\_  
(Principal) Secretary

(SEAL)

\_\_\_\_\_  
Principal

BY

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

By: \_\_\_\_\_  
Witness as to Principal  
\_\_\_\_\_  
(Address)

ATTEST:

By \_\_\_\_\_  
Witness as to Surety

**Superceded See Special Conditions**

\_\_\_\_\_  
(Surety)

BY

\_\_\_\_\_  
Attorney - in - Fact  
\_\_\_\_\_  
(Address)

\_\_\_\_\_  
\_\_\_\_\_  
(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 of New Hampshire.

**PERFORMANCE BOND**

**KNOW ALL MEN BY THESE PRESENTS:** that

\_\_\_\_\_

(Name of Contractor)

\_\_\_\_\_

(Address of Contractor)

a \_\_\_\_\_, hereinafter called Principal,

(Corporation, Partnership or Individual)

and \_\_\_\_\_

(Name of Surety)

\_\_\_\_\_

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

\_\_\_\_\_

(Name of Owner)

\_\_\_\_\_

(Address of Owner)

hereinafter called **OWNER**, in the total aggregate bond 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, our heirs, executors, administrators successors, and assigns, jointly and severally, firmly by these presents.

**Superseded See Special Conditions**

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

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

**NOW, THEREFORE**, 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 extension thereof which may be granted by the **OWNER**, with or without notice to the Surety and during the one year guaranty period, and if the **PRINCIPAL** shall satisfy all claims and demands incurred under such contract, and shall fully indemnify 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 this obligation shall be void: otherwise to remain in full force and effect.

**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 WORK to be performed thereunder or the specifications accompanying same shall in any way 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 it is expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND, the contract or the loan Documents shall include any alteration, addition, extension or modification of any character whatsoever.

**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 \_\_\_\_\_ counterparts, each one of \_\_\_\_\_ (number) which shall be deemed an original, this \_\_\_\_\_ day of \_\_\_\_\_.

**ATTEST:**

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

(SEAL)

**Superceded See Special Conditions**

Principal

**BY**

(Address)

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

Witness as to Principal

(Address)

(Surety)

**ATTEST:**

**BY**

By \_\_\_\_\_

Witness as to Surety

Attorney - in - Fact

(Address)

(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 of New Hampshire

B-5.1

**NOTICE TO PROCEED**

Dated \_\_\_\_\_, 20 17

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

(Insert Name of Contractor as it appears in the Bid Documents)

ADDRESS: \_\_\_\_\_

OWNER'S PROJECT NO. \_\_\_\_\_

PROJECT: Corporate Drive and Goosebay Drive Sewer Improvements

OWNER'S CONTRACT NO. \_\_\_\_\_

CONTRACT FOR: Corporate Drive and Goosebay Drive Sewer Improvements

You are notified that the Contract Time under the above contract will commence to run on \_\_\_\_\_, 20 \_\_\_\_\_. By that date, you are to start performing your obligations under the Contract Documents. In accordance with paragraph 3 of the Agreement, the dates of Substantial Completion and Final Completion are \_\_\_\_\_, 20 \_\_\_\_ and \_\_\_\_\_, 20 \_\_\_\_\_, respectively. Final paving shall be completed no later than \_\_\_\_\_.

Before you may start any Work at the site, paragraph 27 of the General Conditions provides that you and Owner must each deliver to the other (with copies to ENGINEER) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also before you may start any Work at the site, you must:

Provide a: Storm water pollution prevention plan and EPA Notice of Intent, project schedule, project superintendent and work force, pre-construction video, plans for traffic control.

(add other requirements)

Copy to ENGINEER

(Use certified Mail, return Receipt Requested)

City of Portsmouth, New Hampshire

(owner)

By \_\_\_\_\_

(Authorized Representative)

Brian Goetz, Deputy Public Works Director

(Title)

**ACCEPTANCE OF NOTICE**

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

(Contractor)

this the \_\_\_\_\_, 20 \_\_\_\_

Employer Identification

Number: \_\_\_\_\_

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

(Title)

**CONTRACTOR'S AFFIDAVIT**

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

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

Before me, the undersigned, a \_\_\_\_\_  
(Notary Public, Justice of Peace, Alderman)

in and for said County and State personally appeared, \_\_\_\_\_  
(Individual, Partner or duly  
authorized representative of corporate contractor) who being duly sworn according to law

deposes and says that the cost of all the Work, and outstanding claims and indebtedness of whatever  
nature arising out of the performance of the contract between \_\_\_\_\_ City of Portsmouth  
(Owner)

and \_\_\_\_\_ of \_\_\_\_\_  
(Contractor)

dated \_\_\_\_\_ for the construction of the Corporate Drive and Goosebay  
Drive Sewer Improvements

and necessary appurtenant installations have been paid in full.

\_\_\_\_\_  
(Individual, Partner, or duly authorized representative of corporate contractor)

\_\_\_\_\_  
(Title)

Sworn to and subscribed before me  
this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_

\_\_\_\_\_

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

**CONTRACTOR'S RELEASE**

KNOW ALL MEN BY THESE PRESENTS that \_\_\_\_\_

\_\_\_\_\_  
(Contractor)

of \_\_\_\_\_, County of \_\_\_\_\_

and State of \_\_\_\_\_ do \_\_\_\_\_ hereby acknowledge that

\_\_\_\_\_  
(Contractor)

has \_\_\_\_\_ this day had, and received of and from \_\_\_\_\_

City of Portsmouth, New Hampshire

\_\_\_\_\_  
(Owner)

the sum of One Dollar and other valuable considerations in full and complete satisfaction and payment of all sums of money owed, payable and belonging to

\_\_\_\_\_  
(Contractor)

by any means whatsoever, for on account of a Contract Agreement between

City of Portsmouth, New Hampshire

\_\_\_\_\_  
(Owner)

and \_\_\_\_\_

\_\_\_\_\_  
(Contractor)

dated \_\_\_\_\_ for Corporate Drive and Goosebay Drive Sewer Improvements

\_\_\_\_\_  
(Project)

NOW, THEREFORE, the said \_\_\_\_\_

\_\_\_\_\_  
(Contractor)

(for myself, my heirs, executors and administrators) (for itself, its successors and assigns)

do/does, by these presents remise, release, quit-claim and forever discharge The City of Portsmouth

\_\_\_\_\_  
(Owner)

\_\_\_\_\_, of and from all claims and demands, arising from or in

connection with the said contract dated \_\_\_\_\_, and of and from all, and all manner of

action and actions, cause and causes of action and actions, suits, debts, dues, duties, sum and sums

of money, accounts, reckonings, bonds, bills, specialties, covenants, contracts, agreements,

promises, variances, damages, judgments, extents, executions, claims and demand, whatsoever in

law or equity, or otherwise, against The City of Portsmouth

\_\_\_\_\_  
(owner)

its successors and assigns, which (I, my heirs, executors, or administrators) (it, its successors and

B-7.2

assigns) ever had, now have or which (I, my heirs, executors, or administrators) (it, its successors and assigns) hereafter can, shall or may have, for, upon or by reason of any matter, cause, or thing whatsoever; from the beginning of recorded time to the date of these presents.

IN WITNESS WHEREOF, \_\_\_\_\_

\_\_\_\_\_  
(Contractor)

has caused these presents to be duly executed this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_

Signed, Sealed and Delivered in the presence of:

\_\_\_\_\_  
(Individual - Contractor) (seal)

\_\_\_\_\_

\_\_\_\_\_  
(Partnership - Contractor) (seal)

\_\_\_\_\_  
(seal) By \_\_\_\_\_  
(Partner)

\_\_\_\_\_

Attested:

\_\_\_\_\_  
(Corporation)

\_\_\_\_\_  
(Secretary) By \_\_\_\_\_  
(President or Vice President)

(Corp. Seal)

**CERTIFICATE OF SUBSTANTIAL COMPLETION**

OWNER's Project No.: \_\_\_\_\_ ENGINEER's Project No.: 2097

Project: Corporate Drive and Goosebay Drive Sewer Improvements

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

Contract For: Corporate Drive and Goosebay Drive Sewer Improvements Contract Date: \_\_\_\_\_

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

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

To: City of Portsmouth  
(Owner)

And To: \_\_\_\_\_  
(Contractor)

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that 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 Thirty (30) calendar days of the above date of Substantial Completion.



B-8.2

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as follows:

RESPONSIBILITIES:

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

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

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

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

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR's obligation to complete the Work in accordance with the Contract Documents.

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

Underwood Engineers, Inc.  
(Engineer)

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

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

\_\_\_\_\_  
(Contractor)

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

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

City of Portsmouth  
(Owner)

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

**CHANGE ORDER**

No.

**PROJECT: Corporate Drive and Goosebay Drive  
Sewer Improvements**

**DATE OF ISSUANCE:**

**OWNER: City of Portsmouth**  
(Name & Address) 1 Junkins Avenue  
Portsmouth, NH 03801

**OWNER'S  
Project No.**

**CONTRACTOR:**

**ENGINEER: Underwood Engineers, Inc.**

**CONTRACT FOR: Corporate Drive and Goosebay Drive Sewer Improvements**

**ENGINEER'S Project No. 2097**

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

Purpose of Change Order:

Attachments:

<b>CHANGE IN CONTRACT PRICE</b> Original Contract Price \$	<b>CHANGE IN CONTRACT TIME</b> Original Contract Time days (days or date)
Previous Change Orders No. -to No. -	Net change from previous Change Orders <b>0 days</b> (days)
Contract Price prior to this Change Order \$	Contract Time prior to this Change Order <b>days</b> (days or date)
Net Increase (Decrease) of this Change Order \$	Net Increase (Decrease) of this Change Order <b>0 days</b> (days)
Contract Price with all approved Change Orders \$	Contract Time with all approved Change Orders <b>days</b> (days or date)

This document will become a supplement to the CONTRACT and all provisions will apply hereto. The attached Contractor's Revised Project Schedule reflects increases or decreases in Contract Time as authorized by this Change Order. Stipulated price and time adjustment includes all costs and time associated with the above described change. Contractor waives all rights for additional time extension for said change. Contractor and Owner agree that the price(s) and time adjustment(s) stated above are equitable and acceptable to both parties.

Recommended:  
By: \_\_\_\_\_  
Engineer  
P.E.

Accepted:  
By: \_\_\_\_\_  
Contractor

Approved:  
By: \_\_\_\_\_  
NHDES  
P.E.

Approved:  
By: \_\_\_\_\_  
Deputy Public Works Dir.  
Brian Goetz

Approved:  
By: \_\_\_\_\_  
Finance Dept. Director

Approved:  
By: \_\_\_\_\_  
City Manager  
John P. Bohenko

**CERTIFICATE OF FINAL COMPLETION**

Owner's Project No. \_\_\_\_\_ Engineer's Project No. \_\_\_\_\_  
Project \_\_\_\_\_  
Owner: \_\_\_\_\_  
Contractor: \_\_\_\_\_  
Engineer: \_\_\_\_\_

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

Notice to Proceed Date: \_\_\_\_\_

Contractual Substantial Completion Date as modified by Change Orders: \_\_\_\_\_

Actual Substantial Completion Date: \_\_\_\_\_

Contractual Final Completion Date as modified by Change Orders: \_\_\_\_\_

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, Engineer and NHDES, the punch list has been completed and the Work of the Contract is hereby declared to be Finally Complete in accordance with the Contract Documents on:

\_\_\_\_\_  
Date of Final Completion

This Certificate does not constitute an acceptance of any Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents. The Warranty for all Work completed subsequent to the date of Substantial Completion expires one year from the date of this Final Acceptance.

Executed by Engineer on: \_\_\_\_\_, 20\_\_\_\_\_

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

Contractor Accepts this Certificate of Final Completion on: \_\_\_\_\_, 20\_\_\_\_\_

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

Owner Accepts this Certificate of Final Completion on: \_\_\_\_\_, 20\_\_\_\_\_

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

NHDES Accepts this Certificate of Final Completion on: \_\_\_\_\_, 20\_\_\_\_\_

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

## **C. GENERAL CONDITIONS**

General Conditions

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## GENERAL CONDITIONS

1. The plans, information for bidders, bids, advertisement for bids, bid payment and performance bonds, Agreements, change orders, notice to proceed, specifications and addenda, hereinafter enumerated in the Agreement, shall form part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect, limit or cast light on the interpretation of the provisions to which they refer.
2. Definitions.
  - 2.1 “Addenda” means written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the Contract Documents, drawings and specifications, by additions, deletions, clarifications or corrections. Such written or graphic instruments will be issued no less than five days before the bid opening.
  - 2.2 “Bid” means the offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the work to be performed.
  - 2.3 “Bidder” means any person, firm or corporation submitting a bid for the work.
  - 2.4 “Bonds” means bid, performance, and payment bonds and other instruments of security, furnished by the Contractor and his surety in accordance with the Contract Documents.
  - 2.5 “Change order” means 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.
  - 2.6 “Contract Documents” means the Contract, including any advertisement for bids, information for bidders, bid, bid bond, Agreement, payment bond, performance bond, notice of award, notice to proceed, change orders, drawings, specifications and addenda.
  - 2.7 “Contract Price” means the total monies payable to the Contractor under the terms and conditions of the Contract Documents.
  - 2.8 “Contract Time” means the number of calendar days stated in the Contract Documents for the completion of the Work.
  - 2.9 “Contractor” means the person, firm or corporation with whom the Owner has executed the Agreement.

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- 2.10 “Division” means the state of New Hampshire Department of Environmental Services, Water Division.
- 2.11 “Drawings” mean the part of the Contract Documents which show the characteristics and scope of the work to be performed and which have been prepared or approved by the Engineer.
- 2.12 “Engineer” means the person, firm or corporation named as such in the contract documents.
- 2.13 “Field order” means a written order effecting a change in the work not relating to an adjustment in the contract price or an extension of the contract time and issued by the Engineer to the Contractor during construction.
- 2.14 “Notice of Award” means the written notice of the acceptance of the Bid from the Owner to the successful Bidder.
- 2.15 “Notice to Proceed” means the written communication issued by the Owner to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Work.
- 2.16 “Owner” means a public or quasi-public body or authority, corporation, association, partnership, or individual for whom the work is to be performed.
- 2.17 “Plans” means the contract drawings or exact reproductions thereof which show the scope, character, dimensions and details of the work and which have been prepared or approved by the Engineer.
- 2.18 “Project” means the undertaking to be performed as provided in the Contract Documents.
- 2.19 “Resident Project Representative” means the authorized representative of the Owner who is assigned to the Project site or any part thereof.
- 2.20 “Shop Drawings” means all drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, a Subcontractor, manufacturer, supplier or distributor, which illustrates how specific portions of the Work shall be fabricated or installed.
- 2.21 “Special conditions” means revisions or additions to these general conditions, Supplemental General Conditions or specifications applicable to an individual project.
- 2.22 “Specifications” means a part of the contract documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.



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2.23 "Subcontractor" means 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.

2.24 "Substantial Completion" means that 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.

2.25 "Supplemental General Conditions" means modifications to these general conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such documents that may be imposed by applicable State laws.

2.26 "Supplier" means 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.

2.27 "Work" means 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.

2.28 "Written Notice" means any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the Work.

3. The Contractor may be furnished additional instructions and detail drawings as necessary to carry out the work included in the contract. The additional drawings and instructions thus supplied to the Contractor will coordinate with the contract documents and will be so prepared that they can be reasonably interpreted as part thereof.

4. Shop or setting drawings shall be in accordance with the following:

4.1 The Contractor shall furnish 6 copies of the manufacturer's shop drawings, specific design data as required in the detailed specifications, and technical literature covering all equipment and fabricated materials which he proposes to furnish under this contract in sufficient detail to indicate full compliance with the specifications. Shop drawings shall indicate the method of installing, the exact layout dimensions of the equipment or materials, including the location, size and details of valves, pipe connections, etc.

4.2 No equipment or materials shall be shipped until the manufacturer's shop drawings and specifications or other identifying data, assuring compliance with these specifications, are approved by the Engineer.

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4.3 The Contractor shall check and verify all field measurements and shall be responsible for the prompt submission of all shop and working drawings so that there shall be no delay in the work.

4.4 Regardless of corrections made in or approval given to such drawings by the Engineer, the Contractor will nevertheless be responsible for the accuracy of such drawings and for their conformity to the plans and specifications. The Contractor shall notify the Engineer in writing of any deviations at the time he furnishes such drawings. He shall remain responsible for the accuracy of the drawings showing the deviations but not for the acceptance of the deviations from the original design shown in the plans and specification. Approval by the Engineer and the Owner of any deviation in material, workmanship or equipment proposed subsequent to approval of the shop drawings or design data, shall be requested in writing by the Contractor.

4.5 When submitted for the Engineer's review, Shop Drawings shall bear the Contractor's certification that he has reviewed, checked and approved the Shop Drawings and that they are in conformance with the requirements of the Contract Documents.

5. Materials, services, facilities and workmanship shall be furnished as follows:

5.1 Except as otherwise specifically stated in the contract documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete, and deliver the work within the specified time.

5.2 Unless otherwise specifically provided for in the specifications, all workmanship, equipment, materials and articles incorporated in the work shall be new and the best grade of the respective kinds for the purpose.

5.3 The Contractor shall furnish to the Engineer for approval the manufacturer's detailed specifications for all machinery, mechanical and other special equipment, which he contemplates installing together with full information as to type, performance characteristics, and all other pertinent information as required.

5.4 Materials which are specified by reference to the number or symbol of a specific standard, such as an ASTM standard, a federal specification or other similar standard, shall comply with requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of the advertisement for bids, except as limited to type, class or grade, or modified in such reference. The standards referred to shall have full force and effect as though printed therein.

5.5 For equipment or for materials, when requested by the Engineer, the Contractor shall submit certificates of compliance from the manufacturer,

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certifying that the equipment or the materials comply with the requirements of the specifications or the standards.

5.6 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

5.7 Materials, supplies, and equipment shall be in accordance with samples submitted by the Contractor and approved by the Engineer.

6. No material, supplies, or equipment to be installed or furnished under this contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease purchase or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. The Contractor shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed or placed thereon by him to the Owner free from any claims, liens, or charges. Neither the Contractor nor any person, firm or corporation furnishing any material or labor for any work covered by this contract shall have any right to a lien upon any improvement or appurtenance thereon. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any bond given by the Contractor for their protection or any rights under any law permitting such persons to look to funds due the Contractor in the hands of the Owner. The provisions of this paragraph shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when formal contract is entered into for such materials.

7. Inspection and testing of materials shall be as follows:

7.1 All materials and equipment used in the construction of the project shall be subject to inspection and testing by the Engineer in accordance with accepted standards at any and all times during manufacture or during the project construction and at any or all places where such manufacture is carried on.

7.2 The Contractor shall furnish promptly upon request by the Engineer, all materials required to be tested. All tests made by the Engineer shall be performed in such manner and ahead of scheduled installation, as not to delay the work of the Contractor. When required, testing of concrete, masonry, soils, pipe and pipe materials will be made in accordance with provisions in the specifications.

7.3 Material required to be tested which is delivered to the job site shall not be incorporated into the work until the tests have been completed and approval or acceptance given in writing by the Engineer.

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7.4 Each sample submitted by the Contractor for testing shall carry an identification label containing such information as is requested by the Engineer. It shall also include a statement that the samples are representative of the remaining materials to be used on the project.

7.5 Approval of any materials shall be general only and shall not constitute a waiver of the Owner's right to demand full compliance with the contract requirements.

7.6 The Engineer may, at his own discretion, undertake the inspection of materials at the source. In the event plant inspection is undertaken, the following conditions shall be met:

- a. The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom he has contracted for materials.
- b. The Engineer shall have full entry at all reasonable times to such areas as may concern the manufacture or production of the materials being furnished.
- c. If required, the Contractor shall arrange for a building for the use of the inspector; such building to be located near the plant, independent of any building used by the material producer, in which to house and use the equipment necessary to carry on the required tests. Cost for such arrangement shall be paid by the Owner as a stated allowance in the bid.
- d. Adequate safety measures shall be provided and maintained at all times.

7.7 Except as otherwise specifically stated in the contract, the costs of sampling and testing will be divided as follows:

- a. The Contractor shall furnish the Engineer, without extra cost, all samples required for testing purposes. All sampling and testing including the number and selection of samples shall be determined by the Engineer for his own information and use.
- b. When testing of materials is specified in the appropriate section of the specifications, the cost of the same shall be charged to the Owner or Contractor, as detailed in the specifications. However, costs of equipment performance tests shall be borne by the Contractor, as detailed in the appropriate section of the specifications.
- c. When the Contractor proposes a material, article or component as equal to the ones specified, reasonable tests may, or may not, be required

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by the Engineer. If the Engineer requires tests of a proposed equal item, the Contractor will be required to assume all costs of such testing.

d. Any material, article or component which fails to pass tests required by the Engineer or by the specifications, will be rejected and shall be removed from the project site. However, if, upon request of the Contractor, retesting or further tests are permitted by the Engineer, the Contractor shall assume all costs related to such retesting or further tests.

e. Neither the Owner nor the Engineer will in any way be charged for the manufacturer's costs in supplying certificates of compliance.

7.8 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 will give the Engineer timely notice of readiness. The Contractor will then furnish the Engineer with the required certificates of inspection, testing or approval.

7.9 Inspections, tests, or approvals by the engineer or others shall not relieve the Contractor from obligations to perform the Work in accordance with the requirements of the Contract Documents.

### 8. "Or equal" clause, substitutions, and Contractor's options.

8.1 Whenever a material, article, or piece of equipment is identified on the plans or in the specifications by reference to manufacturer's or vendor's names, trade names, catalogue numbers, etc., it is intended merely to establish a standard of quality and performance. Any material, article, or equipment of other manufacturers and vendors, which will perform satisfactorily the duties imposed by the general design shall be considered equally acceptable provided the material, article, or equipment so proposed is, in the opinion of the Engineer, of equal quality and function. The Engineer shall determine equality based on such information, tests, or other supporting data that may be required of the Contractor.

8.2 Upon acceptance and approval by the Engineer of an equal product, it shall remain the responsibility of the Contractor to coordinate installation of the item with all other items to be furnished to assure proper fitting together of all items. Similar responsibility applies to items which are left to the Contractor's option. Any additional cost of equal items and any additional cost incidental to the coordination and/or fitting together of such items shall be borne by the Contractor at no extra cost to the Owner.

8.3 If a specified or equal item is not available to meet the construction schedule, the Contractor may propose a substitute item of less than equal performance and quality. If this substitute is acceptable to the Engineer, any

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difference in purchase cost or costs incidental to the installation of such item will be negotiated between the parties to the contract.

8.4 Neither equal nor substitute items shall be installed without written approval of the Engineer.

8.5 The Contractor shall warrant that if substitutes are approved, no major changes in the function or general design of the Project will result.

### 9. Patent information is as follows:

9.1 The Contractor shall hold and save the Owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the contract, including its use by the Owner, unless otherwise specifically stipulated in the contract documents.

9.2 License and/or royalty fees for the use of a process used in wastewater plant design which is authorized by the Owner for the project, must be reasonable, and paid to the holder of the patent, or his authorized licensee.

9.3 If the Contractor uses any design, device or materials in the construction methods for the project covered by patents or copyrights, he shall provide for such use by suitable agreement with the owner of such patented or copyrighted design, device or material. It is mutually agreed and understood, that, without exception, the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract, and shall indemnify the Owner for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the construction of the work or after completion of the work.

### 10. Surveys of land, property and construction shall be as follows:

10.1 The Owner will provide all land surveys and will establish and locate all property lines relating to the project.

10.2 For structures, the Engineer will establish and stake out one or more base lines as needed and will establish bench marks in and around the project site for the use of the Contractor and for the Engineer's own reference in checking the work in progress. For structures such as pipelines, the Engineer will establish the location of the pipe, manholes and other appurtenances, and will establish bench

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marks along the route of the pipeline at intervals for the using of the Contractor and for his own reference in checking the pipe and manhole inverts and other elevations throughout the project. The Contractor shall utilize the lines and bench marks established by the Engineer to set up whatever specific detail controls he may need for establishing location, elevation lines and grades of all structures. All this work is subject to checking, approval, and continuous surveillance by the Engineer to avoid error. The Contractor shall provide the Engineer with a qualified man or men to assist in this checking as needed and on request of the Engineer.

10.3 For construction other than pipelines and appurtenances in roadways and cross country, the Contractor shall be responsible for the location and setting lines and grades. The Contractor shall establish the location for pump station and wastewater treatment facility structures, associated yard piping including electrical conduits, internal piping and all equipment. Base lines and benchmarks for setting of the lines and grades for the above shall be provided by the Engineer.

10.4 Protection of stakes. The Contractor shall protect and preserve all of the established baseline stakes, bench marks, or other controls placed by the Engineer. Any of these items destroyed or lost through fault of the Contractor will be replaced by the Engineer at the Contractor's expense.

11. Contractor's obligation is as follows: The Contractor shall and in good workmanlike manner, do and perform all work and furnish and pay for all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this contract, within the time stated in the proposal in accordance with the plans and drawings covered by this contract, and any and all supplemental plans and drawings, in accordance with the directions of the Engineer as given from time to time during the progress of the work, whether or not he considers the direction in accordance with the terms of the contract. He shall furnish, erect, maintain and remove such construction plant and such temporary works as may be required. The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements, and limitations of the contract documents, and shall do, carry on and complete the entire work to the satisfaction of the Engineer and Owner.

Contractor shall carry on the work and adhere to the progress schedule during all disputes, disagreements or unresolved claims with the Owner. No work shall be delayed or postponed pending the resolution of any disputes, disagreements, or claims except as the Owner and Contractor may otherwise agree in writing.

12. In the event of temporary suspension of work, or during inclement weather, or whenever the Engineer shall direct, the Contractor and his Subcontractors shall protect their work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any work or material shall have been damaged or

injured by reason of failure on the part of the Contractor or any of his Subcontractors to so protect his work, such materials shall be removed and replaced at the expense of the Contractor.

13. Protection of work and property shall be provided as follows:

13.1 The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this contract. He shall at all times safely guard and protect his own work, and that of adjacent property, from damage. The Contractor shall replace or make good any such damage, loss or injury unless caused directly by errors contained in the contract, or by the Owner, or his authorized representatives. The Contractor will notify owners of adjacent utilities when prosecution of the Work may affect them.

13.2 The Contractor shall take all necessary precautions for the safety of employees on the work site, and shall comply with all applicable provisions of federal, state and municipal safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the work is being performed. He shall erect and properly maintain at all times, as required by the conditions and progress of the work, all necessary safeguards for the protection of the workmen and the public and shall post danger signs warning against the hazards created by such features of construction as protruding nails, hoists, well holes, elevator hatchways, scaffolding, window openings, stairways, trenches and other excavations, and falling materials, and he shall designate a responsible member of his organization on the work, whose duty shall be the prevention of accidents. The name and position of any person so designated shall be reported to the Engineer by the Contractor. The person so designated shall be available by phone during nonworking hours.

13.3 In case of emergency which threatens loss or injury of property, and/or safety of life, the Contractor is allowed to act, without previous instructions from the Engineer. He shall notify the Engineer immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be promptly submitted in writing to the Engineer for approval.

13.4 When the Contractor has not taken action but has notified the Engineer of an emergency threatening injury to persons or damage to the work or any adjoining property, he shall act as instructed or authorized by the Engineer.

13.5 The intention is not to relieve the Contractor from acting, but to provide for consultations between Engineer and Contractor in an emergency which permits time for such consultations.

13.6 The amount of reimbursement claimed by the Contractor on account of any emergency action shall be determined in the manner provided in Article 17 (extra work and change orders) of the general conditions.



14. Inspection of work for conformance with plans and specifications.

14.1 For purposes of inspection and for any other purpose, the Owner, the Engineer, and agents and employees of the Division or of any funding agency may enter upon the work and the premises used by the Contractor, and the Contractor shall provide safe and proper facilities therefore. The Engineer shall be furnished with every facility for ascertaining that the work is in accordance with the requirements and intention of this contract, even to the extent of uncovering or taking down portions of finished work.

14.2 During construction and on its completion, all work shall conform to the location, lines, levels and grades indicated on the drawings or established on the site by the Engineer and shall be built in a workmanlike manner, in accordance with the drawings and specifications and the supplementary directions given from time to time by the Engineer. In no case shall any work which exceeds the requirements of the drawings and specifications be paid for as extra work unless ordered in writing by the Engineer.

14.3 Unauthorized work and work not conforming to plans and specifications shall be handled as follows:

a. Work considered by the Engineer to be outside of or different from the plans and specifications and done without instruction by the Engineer, or in wrong location, or done without proper lines or levels, may be ordered by the Engineer to be uncovered or dismantled.

b. Work done in the absence of the Engineer or his agent may be ordered by the Engineer to be uncovered or dismantled.

c. Should the work thus exposed or examined prove satisfactory, the uncovering or dismantling and the replacement of material and rebuilding of the work shall be considered as "Extra Work" to be processed in accordance with article 17.

d. Should the work thus exposed or examined prove to be unsatisfactory the uncovering or dismantling and the replacement of material and rebuilding of the work shall be at the expense of the Contractor.

15. Reports, records and data shall be furnished as follows: The Contractor shall submit to the Owner such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as are required by the Contract Documents or as the Owner, Division or any funding agency may request concerning work performed or to be performed under this contract.

16. Superintendence by Contractor shall be furnished as follows: At the site of the work, the Contractor shall employ a competent construction superintendent or foreman who shall have full authority to act for the Contractor. The superintendent or foreman shall have been designated in writing by the Contractor as the Contractor's representative at the site. It is understood that such representative shall be acceptable to the Engineer and shall be the one who can be continued in that capacity for the particular job involved unless he ceases to be on the Contractor's payroll. Such representative shall be present on the site at all times as required to perform adequate supervision and coordination of the Work.

17. Extra work and change-orders shall be processed as follows:

17.1 The Engineer may at any time by written order and without notice to the sureties require the performance of such extra work or changes in the work as may be found necessary. The amount of compensation to be paid to the Contractor for any extra work so ordered shall be made in accordance with one or more of the following methods in the order of precedence listed below:

- a. A price based on unit prices previously approved; or
- b. A lump sum price agreed upon between the parties and stipulated in the order for the extra work;
- c. A price determined by adding 15 percent to the "reasonable cost" of the extra work performed, such "reasonable cost" to be determined by the Engineer in accordance with the following paragraph.

17.2 The Engineer shall include the reasonable cost to the Contractor of all materials used, of all labor, both common and skilled, of foreman, trucks, and the fair-market rental rate for all machinery and equipment for the period employed directly on the work. The reasonable cost for extra work shall include the cost to the Contractor of any additional insurance that may be required covering public liability for injury to persons and property, the cost of workmen's compensation insurance, federal social security, and any other costs based on payrolls, and required by law. The cost of extra work shall not include any cost or rental of small tools, buildings, or any portion of the time of the Contractor, his project supervisor or his superintendent, as assessed upon the amount of extra work, these items being considered covered by the 15 percent added to the reasonable cost. The reasonable cost for extra work shall also include the premium cost, if any, for additional bonds and insurance required because of the changes in the work.

17.3 In the case of extra work which is done by Subcontractors under the specific contract, or otherwise if so approved by the Engineer, the 15 percent added to the reasonable cost of the work will be allowed only to the Subcontractor. On such work an additional percentage of the reasonable cost (before addition of the 15 percent) will be paid to the Contractor for his work in directing the operations of the Subcontractor, for administrative supervision, and for any overhead costs. Such percentage shall be in accordance with the following schedule: reasonable cost up to and including \$50,000—10 percent;

next \$50,000 to and including \$100,000—7½ percent; greater than \$100,000—5 percent.

17.4 The Engineer may authorize minor changes or alterations in the work not involving extra cost and not inconsistent with the overall intent of the contract documents. These shall be accomplished by a written field order. However, if the Contractor believes that any minor change or alteration authorized by the Engineer entitles him to an increase in the contract price, he may make a claim therefore as provided in article 21.

18. The following paragraphs address time for completion and liquidated damages:

18.1 It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the date of beginning and the time for completion as specified in the contract of the work to be done hereunder are Essential Conditions of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the "Notice to Proceed."

18.2 The Contractor agrees that said work shall be pursued regularly, diligently and continuously at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

18.3 If the Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part consideration for the awarding of this contract, to pay to the Owner the amount specified in the contract, not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the contract for completing the work.

18.4 The liquidated damages amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain. Said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be deducted from time to time by the owner from current periodical payments.

18.5 It is further agreed that "time is of the essence" of each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall "be of the essence". Provided, that the Contractor shall not be charged with liquidated damages or any excess cost when the Owner determines that the Contractor is without fault and the Contractor's reasons for the time extension are acceptable to the Owner; provided, further, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in the completion of the work is due to:

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- a. A preference, priority or allocation order duly issued by the government;
- b. An unforeseeable cause 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 in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and severe weather;
- c. Any delays of Subcontractors or suppliers occasioned by any of the causes specified in subsections (a) and (b) of this article:

18.6 The Contractor shall promptly notify the Owner in writing of the causes of the delay. The Owner shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of his decision in the matter.

19. Defective work shall be processed as follows:

19.1 The Contractor shall promptly remove from the premises all materials and work condemned by the Engineer as failing to meet contract requirements, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the contract and without expense to the Owner and shall bear the expense of making good all work of other Contractors which was destroyed or damaged by such removal or replacement.

19.2 All removal and replacement work shall be done at the Contractor's expense. If the Contractor does not take action to remove such condemned work and materials within 10 days after receipt of written notice, the Owner may remove them and store the material at the expense of the Contractor. If the Contractor does not pay the expense of such removal and storage within 10 days time thereafter, the Owner may, upon 10 days written notice, sell such materials at auction or at private sale and shall pay to the Contractor any net proceeds thereof, after deducting all the costs and expenses that should have been borne by the Contractor.

20. Claims for Differing Site Conditions shall be processed as follows:

20.1 The Contractor shall promptly and before such conditions are disturbed, notify the Engineer in writing of:

- a. Subsurface or latent physical conditions at the site differing materially from those indicated in this contract; or,
- b. Unknown physical conditions at the site, differing materially from those ordinarily encountered and generally recognized as inherent in the type of work provided for in this contract.

20.2 The Engineer shall promptly investigate the conditions. If he finds that conditions differ materially and will cause an increase or decrease in the Contractor's cost or the time required to perform any part of the work under this contract whether or not changed as a result of such conditions, the Engineer shall make an equitable adjustment and modify the contract in writing.

20.3 No claim of the Contractor under this clause shall be allowed unless the Contractor has given proper notice as required in paragraph 20.1 of this clause.

20.4 No claim by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

21. Claims for extra cost shall be processed as follows:

21.1 No claim for extra work or cost shall be allowed unless the same was done pursuant to a written order by the Engineer, approved by the Owner and the claim presented for payment with the first estimate after the changed or extra work is done. When work is performed under the terms of article 17, the Contractor shall furnish satisfactory bills, payrolls and vouchers covering all items of cost when requested by the Owner and shall allow the Owner access to accounts relating thereto.

21.2 If the Contractor claims that any instructions by drawings or similar documents issued after the date of the contract involve extra cost under the contract, he shall give the Engineer written notice after the receipt of such instruction and before proceeding to execute the work, except in an emergency which threatens life or property, then the procedure shall be as provided for under article 17, "Extra Work & Change Orders." No claim shall be valid unless so made.

22. Right of the Owner to terminate contract:

22.1 In the event that any of the provisions of this contract are violated by the Contractor, or by any of his Subcontractors, the Owner may serve written notice upon the Contractor and the surety of its intention to terminate the contract, and unless within 10 days after the serving of such notice upon the Contractor, such violation or delay shall cease and satisfactory arrangement for correction be made, the contract shall, upon the expiration of said 10 days cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the surety and the Contractor and the surety shall have the right to take over and perform the contract; provided, however, that if the surety does not commence performance thereof within 10 days from the date of the mailing to such surety of notice of termination, the Owner may take over the work and prosecute the same to completion by contract or by force account for the account and at the expense of the Contractor and the Contractor and his surety shall be liable to the Owner for any excess cost occasioned the Owner thereby, and in such event the Owner may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work and necessary therefore.

22.2 If the Contractor should be adjudged bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should refuse or should fail, except in cases for which extensions of time are provided, to supply enough skilled workmen or materials, or if he should fail to make payments to Subcontractors or for material or labor, so as to affect the progress of the work, or be guilty of a violation of the contract, then the Owner, upon the written notice of

the Engineer that sufficient cause exists to justify such action may, without prejudice to any other right or remedy and after giving the Contractor and his surety 7 days' written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, tools, equipment and other facilities installed on the work and paid for by the Owner, and finish the work by whatever method he may deem expedient. In the case of termination of this contract before completion from any cause whatever, the Contractor, if notified to do so by the Owner, shall promptly remove any part or all of his equipment and supplies at the expense of the Contractor. If such expense exceeds such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner as herein provided, and the damage incurred through the Contractor's default, shall be approved by the Engineer.

22.3 Where the contract has been terminated by the Owner, said termination shall not affect or terminate any of the rights of the Owner as against the Contractor or his surety then existing or which may thereafter accrue because of such default. Any retention or payment of monies by the Owner due the Contractor under the terms of the contract, shall not release the Contractor or his surety from liability for his default.

22.4 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 remedy, elect to abandon the Project and terminate the Contract. In such case the Contractor shall be paid for all Work executed and any expense sustained plus reasonable profit.

22.5 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 paid all amounts then due, in which event and upon resumption of the Work Change Orders shall be issued for adjusting the Contract Price or Extending the Contract Time or both to compensate for the costs and delays attributable to the stoppage of the Work.

22.6 If the performance of all or any portion of the Work is suspended, delayed, or interrupted as a result of failure of the Owner or Engineer to act within the time specified in the Contract Documents, or if no time is specified, within a reasonable time, an adjustment in the Contract Price or an extension of the Contract Time, or both, shall be made by Change Order to compensate the Contractor for the costs and delays necessarily caused by the failure of the Owner or Engineer.

23. Construction schedule and periodic estimates shall provide for the following:

23.1 Before starting the work or upon request by the Engineer during its progress, the Contractor shall submit to the Engineer a work plan showing construction methods and the various steps he intends to take in completing the work.

23.2 Before the first partial payment is made, the Contractor shall prepare and submit to the Engineer:

- a. A written schedule fixing the dates for submission of drawings; and
- b. A written schedule fixing the respective dates for the start and completion of segments of the work. Each such schedule shall be subject to review and change during the progress of the work.
- c. Respective dates for submission of Shop Drawings and for the beginning of manufacture, the testing, and the installation of materials, supplies, and equipment.
- d. A schedule of payments that the Contractor anticipates will be earned during the course of the Work.

24. Payments to the Contractor shall be made as follows:

24.1 Progress payments. The Owner will once each month make a progress payment to the Contractor on the basis of an estimate of the total amount of work done to the time of the estimate and its value as prepared by the Contractor and approved by the Engineer.

24.2 Retainage by Owner. The Owner will retain a portion of the progress payment, each month, in accordance with the following procedures:

- a. The Owner will establish an escrow account in the bank of the Owner's choosing. The account will be established such that interest on the principal will be paid to the Contractor. The principal will be the accumulated retainage paid into the account by the Owner. The principal will be held by the bank, available only to the Owner, until termination of the contract.
- b. Until the work is 50% complete, as determined by the Engineer, retainage shall be 10% of the monthly payments claimed. The computed amount of retainage will be deposited in the escrow account established above.
- c. After the work is 50% complete, and provided the Contractor has satisfied the Engineer in quality and timeliness of the work, and provided further that there is no specific cause for withholding additional retainage no further amount will be withheld. The escrow account will remain at the same balance throughout the remainder of the project, unless drawn upon by the Owner in accordance with articles 19, 22, and 58.

d. Upon substantial or final completion (as defined in article 25), the amount of retainage will be reduced to 2% of the total Contract Price plus an additional retainage based on the Engineer's estimate of the fair value of the punch list items and the cost of completing and/or correcting such items of work, with specified amounts for each incomplete or defective item of work. As these items are completed or corrected, they shall be paid for out of the retainage until the entire project is declared completed (See article 25). The final 2% retainage shall be held during the one-year warranty period and released only after the Owner has accepted the project.

24.3 In reviewing monthly estimates for payments of the value of work done, the Engineer may accept in the estimate, prior to subtracting the retainage, the delivered cost of certain equipment and nonperishable material which have been delivered to the site or off-site location and which are properly stored and protected from damage. With the estimate, the Contractor shall submit to the Engineer invoices as evidence that the material has been delivered to the site. Prior to submitting the next monthly estimate, the Contractor shall provide the Engineer with paid invoices or other evidence that the materials have been paid for. If the Contractor fails to submit such evidence, the Engineer may then subtract the value of such materials or equipment for which the Owner has previously paid, from the next monthly estimate. The type of equipment and material eligible for payment prior to being incorporated in the work will be at the Engineer's discretion. Material and equipment made specifically for the subject job will be eligible for payment.

24.4 All material and work for which partial payments have been made shall thereupon become the sole property of the Owner. This provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or for the restoration of any damaged work, or as a waiver of the right of the Owner to require compliance with all of the terms of the contract.

24.5 Owner's right to withhold payments and make application. The Contractor agrees that he will indemnify and save the Owner or the Owner's agents harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, material men, and furnishers of machinery and parts, equipment, power, tools and all supplies, including commissary, incurred in the furtherance of the performance of this contract. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all claims of the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails to do so, then the Owner may, upon written notice to the Contractor either pay unpaid bills of which the Owner has written notice directly, or withhold from the Contractor's unpaid compensation a sum of money to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged. Payment to the Contractor shall then be resumed in accordance with the terms of this contract but in no event shall the above provisions be construed to impose any obligations upon the Owner to either the Contractor or his surety or any third party. In paying any unpaid bills of the Contractor, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as payment made under contract by the Owner to



the Contractor and the Owner shall not be liable to the Contractor for any such payments made in good faith.

24.6 If the Owner fails to make payment forty-five (45) days after approval by the Engineer, in addition to other remedies available to the Contractor, there shall be added to each such payment interest at an annual rate of 10% commencing on the first day after said payment is due and continuing until the payment is received by the Contractor.

25. Acceptance and payment provisions shall be as follows:

25.1 Substantial completion and payment.

a. Substantial completion shall be that point, as certified by the Engineer, at which the contract has been completed to the extent that the Owner may occupy and/or make use of the work performed for the purposes for which it was intended. Upon substantial completion there may be minor items, such as seeding, landscaping, etc., yet to be completed or items of work to be corrected.

b. Upon receipt of written notice from the Contractor that the work is substantially complete, the Engineer shall promptly make an inspection, and when he finds the work complies with the terms of the contract and the contract is substantially completed, he will issue a signed and dated certificate, and a list of all items to be completed or corrected, stating that the work required by this contract has been substantially completed and is accepted by him.

c. Upon substantial completion, the entire balance due and payable to the Contractor less 2 percent of the Contract Price, and less a retention based on the Engineer's estimate of the fair value for the cost of completing or correcting listed items of work with specified amounts for each incomplete or defective item of work shall be made.

d. The general guarantee period for the work shall begin on the date certified by the Engineer that the work is substantially completed.

25.2 Final completion shall be that point at which all work has been completed and all defective work has been corrected. Unless the Engineer has issued a certificate of substantial completion, the general guarantee period shall begin upon certification by the Engineer of final completion.

25.3 At the end of the general guarantee period for the entire contract which has been certified finally completed or substantially completed, the Owner, through the Engineer, shall make a guarantee inspection of all or portions of the work. When it is found that the work is satisfactory and that no work has become defective under the terms of the contract, the Owner will accept the entire project and make final payment, including the reimbursement of monies retained pursuant to the guarantee period.

25.4 If the guarantee inspection discloses any work as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of such

work, and the Contractor shall immediately execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the guarantee inspection, provided the work has been satisfactorily completed.

25.5 Before issuance of final payment, the Contractor shall certify in writing to the Engineer that all payrolls, material bills, and other indebtedness connected with the work have been paid or otherwise satisfied; except that in case of disputed indebtedness or liens, if the contract does not include a payment bond, the Contractor may submit in lieu of certification of payment a surety bond in the amount of the disputed indebtedness or liens, guaranteeing payment of all such disputed amounts, including all related costs and interest in connection with said disputed indebtedness or liens which the Owner may be compelled to pay upon adjudication.

25.6 If upon substantial completion, full completion is delayed through no fault of the Contractor, and the Engineer so certifies, the Owner may, upon certificate of the Engineer, and without termination of the contract, make payment of the balance due for that portion of the work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

25.7 The acceptance by the Contractor of final payment shall release the Owner from all claims and all liability to the Contractor for all things relating to this work and for every act and neglect of the Owner and others relating to or arising out of this work. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations of the performance and payment bond under this contract.

26. The Contractor shall pay the costs:

26.1 For all transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered;

26.2 For all materials, tools, and other expendable equipment to the extent of 90 percent of the cost thereof, not later than the 20th day of the calendar month following that in which such materials, tools and equipment are delivered at the site of the work and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in or on which such materials, tools and equipment are incorporated or used; and

26.3 To each of his Subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his Subcontractors to the extent of each Subcontractor's interest therein.

27. The Contractor and any Subcontractor shall obtain all the insurance required under this article and such insurance.

27.1 The Contractor and all Subcontractors shall procure and shall maintain during the life of this contract workmen's compensation insurance as required by applicable state law. The Contractor shall provide and shall cause each Subcontractor to provide adequate employer's liability insurance.

C-1.23

Limits of Liability: \$100,000 each accident;  
\$500,000 disease - policy limit;  
\$100,000 disease - each employee.

27.2 The Contractor shall procure and shall maintain during the life of this contract Commercial General liability insurance to include contractual liability, explosion, collapse and underground coverages.

Limits of liability: \$1,000,000 each occurrence bodily injury and property damage;  
\$2,000,000 general aggregate - include per project aggregate endorsement;  
\$2,000,000 products/completed operations aggregate.

If blasting or demolition or both is required by the contract, the Contractor or Subcontractor shall obtain the respective coverage and shall furnish the Engineer a certificate of insurance evidencing the required coverages prior to commencement of any operations involving blasting or demolition or both.

27.3 The Contractor shall procure and shall maintain during the life of this contract comprehensive automobile liability insurance to include all motor vehicles including owned, hired, borrowed and non-owned vehicles.

Limits of liability: \$1,000,000 combined single limit for bodily injury and property damage.

27.4 The Contractor shall either:

- a. Require each of his Subcontractors to procure and to maintain during the life of his subcontract commercial general liability insurance and comprehensive automobile liability insurance of the type and in the amounts specified in articles 27.2 and 27.3; or
- b. Insure the activities of his Subcontractors in his policy.

27.5 The required insurance shall provide adequate protection for the Contractor and his Subcontractors, respectively, against damage claims which may arise from work under this contract, whether such work be by the insured or by anyone employed by him and also against any of the special hazards which may be encountered in the performance of this contract.

27.6 The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations covered, effective dates and dates of expiration of policies. Such insurance shall not be canceled or materially altered, except after 10 days written notice has been received by the Owner.

27.7 For builder's risk insurance (fire and extended coverage) and until the work is completed and accepted by the Owner, the Contractor is required to maintain builder's risk type insurance on a 100 percent completed value basis on the insurable portion of the work for the benefit of the Owner, the Contractor, and Subcontractors as their interests may appear.

27.8 The Contractor shall take out and furnish to the Owner and maintain during the life of this contract, complete Owner's protective liability insurance.

Limits of Liability: \$1,000,000 each occurrence;  
\$2,000,000 aggregate.

28. The Contractor shall within ten (10) days after the receipt of the Notice of Award furnish the Owner with a performance bond and a 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 the 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 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.
29. If at any time a surety on any such Bond is declared as 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 accepted on Federal Bonds, the Contractor shall within ten (10) days after notice from the Owner to do so, substitute an acceptable bond (or bonds) 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 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 such an acceptable bond to the Owner.
30. The Contractor shall not assign the whole or any part of this contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any monies due or to become due under this contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this contract.
31. If, through acts of neglect on the part of the Contractor, any other Contractor or any Subcontractor shall suffer loss or damage on the work site, the Contractor agrees to settle with such other Contractor or Subcontractor by agreement or arbitration if such other Contractor or Subcontractors will so settle. If such other Contractor or Subcontractors shall assert any claim against the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim.
32. When subcontracting, the Contractor:
  - 32.1 May utilize the services of specialty Subcontractors on those parts of the work which, under usual contracting practices, are performed by specialty Subcontractors.

C-1.25

32.2 Shall be as fully responsible to the Owner for the acts and omissions of his Subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

32.3 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.

32.4 Shall not create any contractual relation between any Subcontractor and the Owner.

32.5 Shall not award Work to Subcontractor(s), in excess of fifty percent (50%) of the Contract Price, without prior written approval of the Owner.

33. In performing his duties, the Engineer or his representative shall:

33.1 Have the authority to suspend the work in whole or in part for such periods as he may deem necessary due to the failure of the Contractor to carry out provisions of the Contract or for failure of the Contractor to suspend work in weather conditions considered by the Engineer to be unsuitable for the prosecution of the work. The Engineer shall give all orders and directions under this contract, relative to the execution of the work. The Engineer shall determine the amount, quality, acceptability, and fitness of the several kinds of work and materials which are to be paid for under this contract and shall decide all questions which may arise in relation to the work. The Engineer's estimates and decisions shall be final and conclusive, except as otherwise provided. In case any question shall arise between the parties hereto relative to said contract or specifications, the determination or decision of the Engineer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected to any extent by such question. The Engineer shall decide the meaning and intent of any portion of the specifications and of any plans or drawings where the same may be found unclear. Any differences or conflicts in regard to their work which may arise between the Contractor under this contract and other Contractors performing work for the Owner shall be adjusted and determined by the Engineer.

a. The purpose of the above article is not in any way to relieve the Contractor of his responsibilities for the safety of workmen or general public in the execution of the work. Attention is drawn to Article 13 of these Conditions which refers to the safety obligations of the Contractor.

b. The Engineer, acting on behalf of the Owner, has the authority to enforce corrective action for work not in accordance with the specifications.

c. In addition, the Engineer, acting on behalf of the Owner, is to ensure that the work is in accordance with the Contract documents. He is not held responsible, however, for the methods of construction, sequences, schedules and procedures in the execution of the work. The Engineer does

have the opportunity under 33.1 to reject the method of construction, work plan schedule, procedures, as he thinks appropriate.

33.2 Appoint assistants and representatives as he desires, and they shall be granted full access to the work under the contract. They have the authority to give directions pertaining to the work, to approve or reject materials, to suspend any work that is being improperly performed, to make measurements of quantities, to keep records of costs, and otherwise represent the Engineer in all matters except as provided below. The Contractor may, however, appeal from their decision to the Engineer himself, but any work done pending its resolution is at the Contractor's own risk. Except as permitted and instructed by the Engineer, the assistants and representatives are not authorized to revoke, alter, enlarge, relax, or release any requirements of these specifications, nor to issue instructions contrary to the plans and specifications. They are not authorized to act as superintendents or foremen for the Contractor, or to interfere with the management of the work by the Contractor. Any advice which the assistants or representatives of the Engineer may give the Contractor shall not be construed as binding the Engineer or the Owner in any way, nor as releasing the Contractor from the fulfillment of the terms of the contract. All transactions between the Contractor and the representatives of the Engineer which are liable to protest or where payments are involved shall be made in writing.

34. The Contractor shall include in his proposal for costs of materials not shown in his bid under "cash allowances" or "allowed materials," any cash allowances stated in the supplemental general conditions or other contract documents. The Contractor shall purchase the "allowed materials" as directed by the Owner on the basis of the lowest and best bid of at least 3 competitive bids. If the actual price for purchasing the "allowed materials" is more or less than the "cash allowance," the contract price shall be adjusted accordingly. The adjustment in contract price shall be made on the basis of the purchase price without additional charges for overhead, profit, insurance or any other incidental expenses. The cost of installation of the "allowed materials" shall be included in the applicable sections of the contract specifications covering this work.
35. In the use of premises or removal of debris, the Contractor expressly undertakes at his own expense: to take every precaution against injuries to persons or damage to property; to maintain sanitary conditions; to store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not interfere with the progress of his work or the work of any other Contractors; to place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work; to clean up frequently all refuse, rubbish, scrap materials and debris caused by his operations, to the end that at all times the site of the work shall present an orderly and workmanlike appearance; before final payment to remove all surplus material falsework, temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations, and to put the site in an orderly condition; to effect all cutting, fitting or patching of his work required to make the same conform to the plans and specifications and, except with the consent of the Engineer, not to cut or otherwise alter the work of any other Contractor; to provide and maintain in a sanitary condition such toilet accommodations for the use of his employees as may be necessary to comply with the requirements of the state and local boards of health, or of other bodies or authorities having jurisdiction.

36. Wherever the estimated quantities of work to be done and materials to be furnished under this contract are shown in any of the documents including the proposal, they are given for use in comparing bids and the right is specifically reserved except as herein otherwise specifically limited, to increase or decrease them as may be deemed reasonably necessary by the Owner to complete the work contemplated by this contract, and such increase or decrease shall in no way invalidate this contract, nor shall any such increase or decrease give cause for claims or liability for damages. Such increases or decreases shall not exceed 25 percent of the estimated quantities of work. An increase or decrease in quantities for subsurface materials (e.g. ledge, unsuitable backfill), which overrun or underrun by 25% or more of the bid quantity may be the basis for a contract price adjustment, at the rate of a negotiated adjusted unit rate. Negotiated unit price rates shall be equitable and shall take into account, but not be limited to the following factors; bid unit rate, distribution of rates and bid balance, and the scope of work as effected by the changed quantities. Claims for extra work resulting from changed quantities shall be processed under article 21.
37. Lands and rights-of-way acquisition and usage shall be as follows:
  - 37.1 Prior to issuing the Notice to Proceed , the Owner shall legally obtain all lands and rights-of-way necessary for carrying out and completing the work to be performed under this contract.
  - 37.2 The Contractor shall not (except after written consent from the Owner) enter or occupy with men, tools, materials, or equipment, any land outside the rights-of-way or property of the Owner. A copy of the written consent shall be given to the Engineer.
  - 37.3 The Owner shall provide to the Contractor information which delineates and describes the lands owned and the rights-of-way acquired.
  - 37.4 The Contractor shall provide at its own 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.
38. With reference to warranties, neither the final certificate of payment nor any provision in the contract documents, nor partial or entire occupancy of the premises by the Owner, shall constitute an acceptance of work not done in accordance with the contract documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom, which appear within the warranty period one year or longer if required by the contract, from the certified date of completion or substantial completion of the work. The Owner will give notice of observed defects within two working days of their discovery.
39. With reference to errors and inconsistency in contract documents, any provisions in any of the contract documents which may be in conflict with the paragraphs in these general conditions shall be subject to the following order of precedence for interpretation:

- 39.1 Drawings will govern technical specifications.
  - 39.2 General conditions will govern drawings and technical specifications.
  - 39.3 Supplemental general conditions will govern general conditions, drawings and technical specifications.
  - 39.4 Special conditions will govern supplemental general conditions, general conditions, drawings and technical specifications.
  - 39.5 The Contractor shall take no advantage of any apparent error or omission in the plans or specifications. In the event the Contractor discovers such an error or omission, he shall notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.
  - 39.6 Figure dimensions on Drawings shall govern over general drawings.
- 40. Notice and service thereof. Any notice to the Contractor from the Owner relative to any part of this contract will be in writing and will be considered delivered and the service completed, when said notice is mailed, by certified registered mail, to the Contractor at his last given address, or delivered in person to the Contractor or his authorized representative on the work.
  - 41. Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted or is not correctly inserted (example; miswording, etc.), then upon the application of either party the contract shall forthwith be physically amended to make such insertion or correction.
  - 42. The work under this contract is subject to the safety and health regulations (CRF 29, part 1926, and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974. Contractors are urged to become familiar with the requirements of these regulations.
  - 43. [Reserved]
  - 44. Under equal employment opportunity requirements and during the performance of this contract the Contractor agrees to the following:
    - 44.1 The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, or sex. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, national origin, or sex. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.



44.2 The Contractor will in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment, without regard to race, creed, color, national origin, or sex.

44.3 The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the labor union or worker's representative of the Contractor's commitment under section 202 of executive order no. 11246 of September 24, 1965, and 11375 of October, 13, 1967, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

44.4 The Contractor will comply with all provisions of executive orders no. 11246 and 11375.

44.5 The Contractor will furnish all information and reports required by executive orders no. 11246 and 11375.

44.6 In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part by the Owner or the Department of Labor and the Contractor may be declared ineligible for further government contracts or federally-assisted construction, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a Subcontractor or vendor as a result of such direction by the Department of Labor, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

44.7 A breach of this article may be grounds for termination of this contract and for debarment as provided in 29 CFR 5.6.

45. No federal, state or local official, shall be admitted to any share or part of this contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.
46. No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept or approve, or to take part in negotiating, making, accepting, or approving any architectural, Engineering, inspection, construction or material supply contract or any subcontract in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part hereof. No officer, employee, architect, attorney, Engineer or inspector of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

47. Use and occupancy of a portion or unit of the project, upon completion of that portion or unit, and before substantial completion of the project, shall be a condition of this contract with the following provisions:
  - 47.1 The Owner will make his request for use or occupancy to the Contractor in writing.
  - 47.2 There must be no significant interference with the Contractor's work or performance of duties under the contract.
  - 47.3 The Engineer, upon request of the Owner and agreement by the Contractor, will make an inspection of the complete part of the work to confirm its status of completion.
  - 47.4 Consent of the surety and endorsement of the insurance carrier must be obtained prior to use and/or occupancy by the Owner. Also, prior to occupancy, the Owner will secure the required insurance coverage on the building.
  - 47.5 The Owner will have the right to exclude the Contractor from the subject portion of the project after the date of occupancy but will allow the Contractor reasonable access to complete or correct items.
  - 47.6 The warranty period shall begin upon substantial completion.
48. The Owner may, at any time and without cause, suspend the work or any portion thereof for a period of not more than 90 days by notice in writing to the Contractor and the Engineer. The Owner shall fix the date on which work shall be resumed. The Contractor will be allowed an increase in the contract price or an extension of the contract time, or both, directly attributable to any suspension if he makes a claim therefore as provided in articles 17 and 21.
49. [Reserved]
50. [Reserved]
51. [Reserved]
52. Furnish and erect a sign at the project site to identify the project and to indicate that the State Government is participating in the development of the project. Place the sign in a prominent location as directed by the Engineer. Do not place or allow the placement of other advertising signboards at the project site or along rights-of-way furnished for the project work. See Exhibit 1 for details of construction.
53. [Reserved]
54. Public convenience and traffic control requirements:
  - 54.1 The Contractor shall at all times so conduct his work as to assure minimal obstruction to traffic. The safety and convenience of the general public and the residents along the work site route and the protection of property shall be

provided for by the Contractor. The Contractor shall be responsible for timely notification to local residents before causing any interruptions of their access.

54.2 Fire hydrants and water holes for fire protection on or adjacent to the work site shall be kept accessible to fire apparatus at all times, and no obstructions shall be placed within 10 feet of any such facility. No footways, gutters, drain inlets, or portions of highways adjoining the work site shall be obstructed. In the event that all or part of a roadway is officially closed to traffic during construction, the Contractor shall provide and maintain safe and adequate traffic accessibility, satisfactory to the Engineer, for residences and businesses along and adjacent to the roadway so closed.

54.3 When the maintenance of traffic is considered by the Engineer to be minimal, the contract may not show this work as a pay item. In such cases, the Contractor shall bear all expense of maintaining traffic over the sections of road undergoing improvement and of constructing and maintaining such approaches, crossings, intersections, and other features as may be necessary, without direct reimbursement.

55. The Contractor shall not commence work until a pre-construction conference has been held at which representatives of the Contractor, Engineer, Division and Owner are present. The pre-construction conference shall be scheduled by the Engineer.

56. Maintenance during construction:

56.1 The Contractor shall maintain the work during construction and until it is accepted by the Owner. This maintenance shall be continuous and effective work prosecuted day by day, with adequate equipment and forces, to the end that roads or structures are kept in satisfactory condition at all times.

56.2 All cost of maintenance during construction and before the work is accepted by the Owner shall be included in the unit prices bid on the various pay items and the Contractor shall not be paid an additional amount for such maintenance.

56.3 If the Contractor, at any time, fails to comply with the provisions above, the Engineer may direct the Contractor to do so. If the Contractor fails to remedy unsatisfactory maintenance within the time specified by the Engineer, the Engineer may immediately cause the project to be maintained and the entire cost of this maintenance will be deducted from money to become due the Contractor on this contract.

57. Cooperation with utilities.

57.1 The Owner will notify all utility companies, all pipe line owners, or other parties affected, and have all necessary adjustments of the public or private utility fixtures, pipe lines, and other appurtenances within or adjacent to the limits of construction made as soon as practicable.

57.2 Water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals, and all

other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted are to be moved by the owners of such utilities at their expense, except as may otherwise be provided for in the special conditions or as noted on the plans.

57.3 It is understood and agreed that the Contractor has considered in his bid all of the permanent and temporary utility appurtenances in their present or relocated positions as shown on the plans and as evident on the site, and that no additional compensation will be allowed for any delays, inconvenience, damage sustained by him due to any interference from such utility appurtenances or the operation of moving them.

57.4 The Contractor shall cooperate with the Owners of any underground or overhead utility lines in their removal and rearrangement operations in order that these operations may progress in a reasonable manner, that duplication of rearrangements may be reduced to a minimum, and that services rendered by those parties will be minimal.

57.5 In the event of interruption to a water or utility service as a result of accidental breakage or as a result of being exposed or unsupported, the Contractor shall promptly notify the proper authority and shall cooperate with said authority in the restoration of services. If water service is interrupted, repair work shall be continuous until the service is restored. No work shall be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority. If any utility service is interrupted for more than 4 hours, the Contractor shall make provisions for temporary service at his own expense until service is resumed.

58. Work performed at night and on Sundays and holidays shall comply with the following:

58.1 No work will be permitted at night or on Sundays or holidays except as approved in writing by the Engineer, and provided such work is not in violation of a local ordinance. When working at night, the Contractor shall provide flood lighting sufficient to insure the same quality of workmanship and the same conditions regarding safety as would be achieved in daylight.

58.2 Whenever Memorial Day or Fourth-of-July is observed on a Friday or a Monday and during the weekend of Labor Day, the Contractor may be required to suspend work for the 3 calendar days. Prior to the close of work, the work site shall be placed in a condition acceptable to the Engineer for the comfort and safety of the traveling public. An arrangement shall be made for responsible personnel acceptable to the Engineer to maintain the project in the above conditions.

59. With reference to laws that shall be observed:

59.1 The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations, and all orders and decrees of tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work. He shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify

the state and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his employees.

#### 59.2 Indemnification

The Contractor will indemnify and hold harmless the Owner and the Engineer and their 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, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the Contractor, and Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

In any and all claims against the Owner or the Engineer, or any of their agents or employees, by any employees of the Contractor, and Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by disability benefit or other employee benefit acts.

The obligation of the Contractor under this paragraph shall not extend to the liability of the Engineer, his agents or employees arising out of the preparation or approval of maps, Drawings, opinions, reports, surveys, Change Orders, designs or Specifications.

#### 60. Permits to be obtained by the Contractor shall be in accordance with the following:

60.1 Permits and licenses of a temporary nature necessary for the prosecution of the work shall be obtained and paid for by the Contractor. Permits, licenses and easements for permanent structures or permanent changes in existing facilities will be secured and paid for by the Owner. Permits may include:

- a. New Hampshire Department of Transportation Highway Trench Permits.
- b. RSA 485-A:17 and 483-A N.H. DES Wetlands Bureau Dredge and Fill Permit.
- c. RSA 485-A:17 - N.H. DES Site Specific Permit (Water Quality)
- d. RSA 149-M:10 N.H. DES Solid Waste Management Bureau - disposal of construction debris and/or demolition waste.
- e. N.H. Department of Environmental Services Air Resources Division (burning permits).
- f. Other permits, as required by State and Local laws and ordinances.

g. Notice of intent for coverage under EPA's General NPDES Permit for construction dewatering activities.

61. Control of Pollution Due to Construction shall comply with the following:

61.1 During construction, the Contractor shall take precautions sufficient to avoid the leaching or runoff of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride and any other polluting materials which are unsightly or which may be harmful to humans, fish, or other life, into groundwaters and surface waters of the State.

61.2 In waters used for public water supply or used for trout, salmon, or other game or forage fish spawning or nursery, control measures must be adequate to assure that turbidity in the receiving water will be increased not more than 10 standard turbidity units (s.t.u.) in the absence of other more restrictive locally-established limitations, unless otherwise permitted by the Division. In no case shall the classification for the surface water be violated.

61.3 In water used for other purposes, the turbidity must not exceed 25 s.t.u. unless otherwise permitted by the Division.

62. Use of Explosives.

62.1 When the use of explosives is necessary for the prosecution of the Work, exercise the utmost care not to endanger life or property. The Contractor shall be responsible for any and all damage resulting from the use of explosives.

62.2 Store all explosives in a secure manner, in compliance with all State and local laws and ordinances, and legally mark all such storage places. Storage shall be limited to such quantity as may be needed for the work underway.

62.3 Designate as a "Blasting Area" all sites where electric blasting caps are located and where explosive charges are being placed. Mark all blasting areas with signs as required by law. Place signs as required by law from each end of the blasting area and leave in place while the above conditions prevail. Immediately remove signs after blasting operations or the storage of caps is over.

62.4 Notify each property Owner and public utility company having structures in proximity to the site of the work sufficiently in advance to enable the companies to take such steps as they may deem necessary to protect their property. Such notice shall not relieve the Contractor of any of his responsibility for damage resulting from his blasting operation. Warn all persons within the danger zone of blasting operations and do not perform blasting work until the area is cleared. Provide sufficient flagmen outside the danger zone to stop all approaching traffic and pedestrians. Provide watchmen during the loading period and until charges have been exploded. Place adequate protective covering over all charges before being exploded.

63. Arbitration by Mutual Agreement

63.1 All claims, disputes, and other matters in question arising out of, or relating to, the Contract Documents or the breach thereof, except for claims which

have been waived by making an acceptance of final payment as provided in Section 25, may be decided by arbitration if the parties mutually agree. Any agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

63.2 Notice of the request for arbitration shall be filed in writing with the other party to the Contract Documents and a copy shall be filed with the Engineer. Request for arbitration shall in no event be made on any claim, dispute, or other matter in question which would be barred by the applicable statute of limitations.

63.3 The Contractor will carry on the Work and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

64. The Contractor will pay all sales, consumer, use, and other similar taxes required by the laws of the place where the Work is performed.

65 Separate Contracts

65.1 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 properly connect and coordinate the 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.

65.2 The Owner may perform additional Work related to the Project or the Owner may let other contracts containing provisions similar to these. The Contractor will afford the other Contractors who are parties to such Contracts (or the Owner, if the Owner is performing the additional Work) reasonable opportunity for the introduction and storage of materials and equipment and the execution of the Work, and shall properly connect and coordinate the Work with theirs.

65.3 If the performance of the additional Work by other Contractors or the Owner is not noted in the Contract Documents prior to the execution of the Contract, written notice shall thereof be given to the Contractor prior to starting such additional Work. If the Contractor believes that the performance of such additional Work by the Owner or others involves it in additional expense or entitles it to an extension of the Contract Time, the Contractor may make a claim thereof as provided in Sections 17 and 18.

## SPECIAL CONDITIONS

Special Conditions

The following special conditions modify, change, delete, or add to the "General Conditions." Where any part of the General Conditions is modified or voided by these Sections, the unaltered provisions of that part shall remain in effect.

<u>Section No.</u>	<u>Section Title</u>	<u>Page No.</u>
Index	7. Inspection and Testing of Materials	C1.1
Index	14. Inspection	C1.1
SC-7	Inspection and Testing of Materials	C1.7
SC-17.1	Extra Work and Change Orders	C-2.2
SC-20.2	Claims for Differing Site Conditions	C-2.2
SC-27	Insurance; Special Condition to GC 27	C-2.2, 2.3
SC-28	Contract Security	C-2.4
SC-44.2	Non-Discrimination	C-2.4
SC-62.5	Use of Explosives	C-2.4
SC-63	Arbitration by Mutual Agreement	C-2.4
	Performance Bond (Portsmouth)	C-2.5
	Labor and Material Payment Bond (Portsmouth)	C-2.7



SPECIAL CONDITIONS

Index 7. Inspection and Testing of Materials

**Replace** the word “Inspection” with the word “Observation.”

Index 14. Inspection

**Replace** the word “Inspection” with the word “Observation.”

SC-7 Inspection and Testing of Materials

**Replace** the word “inspection” with the word “observation” as it appears throughout the Section (Section title, 7.1, 7.6 – 3 times and 7.9).

**Replace** the word “inspector” with the word “Engineer” as it appears in Section 7.6.c.

SC-17.1 Extra Work and Change Orders

The first sentence is modified to read: “The Engineer, with the approval of the Owner, may at any time by written order and without notice to the sureties require the performance of such extra work or changes in the work as may be found necessary.”

SC-20.2 Claims for Differing Site Conditions

**Delete** paragraph 20.2 in its entirety. **Replace** with the following:

“The Engineer shall promptly investigate the conditions. If he finds that conditions differ materially and will cause an increase or decrease in the Contractor’s cost or the time required to perform any part of the work under this contract whether or not changed as a result of such conditions, the Engineer will notify the Owner and recommend an equitable adjustment. Contractor and Owner will enter into negotiations to modify the contract in writing.”

SC-27 Insurance (Special Condition to GC27)

**Change** the following in paragraph two, Article 27.1:

“Limits of Liability: \$100,000	\$500,000 each accident
	\$500,000 disease-policy limit
\$100,000	\$500,000 disease- each employee”

**Change** the following in paragraph two, Article 27.2:

“Limits of liability: \$1,000,000	\$2,000,000 each occurrence bodily injury and property damage;
	\$2,000,000 general aggregate- include per project aggregate endorsement;
	\$2,000,000 products/completed operations aggregate.”



SPECIAL CONDITIONS

SGC-28 Contract Security (Supplement to GC 28)

**Add** the following paragraphs to Article 28 of the General Conditions:

The payment bond and performance bond furnished by the contractor shall be in the form of the bonds shown on Page C-2.6 and C-2.7 and C-2.8 and C-2.9, unless approved otherwise by the engineer.

The terms contained in the performance bond shall in no way invalidate the provisions of the contract documents or the right of the owner to terminate the contract as specified therein.

SC-44.2 Non-Discrimination

**Add** the following sentence to paragraph 44.2:

“Pursuant to New Hampshire law, the Contractor shall not discriminate on the basis of sexual orientation.”

SC-62.5 Use of Explosives (Special Condition to GC 62)

**Add** the following after paragraph 62.4:

All blasting shall conform fully with all applicable local, state and Federal laws.

SC-63 Arbitration by Mutual Agreement

**Delete** Section 63 in its entirety.

SPECIAL CONDITIONS

**PERFORMANCE BOND**

(This format provided for convenience, actual Performance Bond is acceptable in lieu, if compatible)

Bond Number \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS

that \_\_\_\_\_ as Principal, hereinafter called Contractor, and \_\_\_\_\_ (Surety Company) a corporation organized and existing under the laws of the State of \_\_\_\_\_ and authorized to do business in the State of New Hampshire as surety, hereinafter called Surety, are held and firmly bound unto the City of Portsmouth, N.H. Oblige, hereinafter called Owner, in the amount of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents. WHEREAS, Contractor has by written agreement dated \_\_\_\_\_ entered into a contract with Owner for Corporate Drive and Goosebay Drive Sewer Improvements in accordance with drawings and specifications prepared by the Public Works Department, 700 Islington Street, Portsmouth, N.H. 03801, which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Contractor shall well and faithfully do and perform the things agreed by him to be done and performed, according to the terms of said Contract and such alterations as may be made in said Contract during progress work, and shall further indemnify and save harmless the said Owner in accordance with the Contract and shall remedy without cost to the Owner any defect which may develop within one year from the time of completion and acceptance of the work.

The Surety hereby waives notice of any alteration in work or extension of time made by the Owner or any of its agents or representatives.

Whenever Contractor shall be, and declared by Owner to be, in default under the Contract, the Owner having performed Owner's obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

(1) Complete the Contract in accordance with its terms and conditions, or

(2) Obtain a bid or bids for submission to the Owner for completing the Contract in accordance with its terms and conditions, and upon determination by Owner and Surety of the lowest responsible bidder, arrange for a contract between such bidder and Owner and make available as work progresses (even though there should be a default or a succession of defaults under the contract of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price", as used in this paragraph, shall mean the total amount payable by the Owner to Contractor under the Contract and any amendments thereto, less the amount paid by Owner to Contractor.

Any suit under this bond must be instituted before the expiration of (2) years from the date on which final payment under the contract falls due.

SPECIAL CONDITIONS

No right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the heirs, executors, administrators or successors of Owner.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_ A.D., 20\_.

In the presence of:

\_\_\_\_\_  
(Witness) BY: \_\_\_\_\_  
(Principal) (Seal)

\_\_\_\_\_  
(Surety Company)

\_\_\_\_\_  
(Witness) BY: \_\_\_\_\_  
(Principal) (Seal)

Note:

If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized Officer or Officers.

If this bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his Power of Attorney showing his authority to sign such Bonds.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Agreement.

SPECIAL CONDITIONS

**LABOR AND MATERIAL PAYMENT BOND**

(This format provided for convenience, actual Labor and Material Bond is acceptable in lieu, if compatible)

Bond Number \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS:

that \_\_\_\_\_

as Principal, hereinafter called Contractor, and \_\_\_\_\_ (Surety Company) a corporation organized and existing under the laws of the State of

\_\_\_\_\_ and authorized to do business in the State of New Hampshire hereinafter called Surety, are held and firmly bound unto the City of Portsmouth, N.H. Obligee, hereinafter called Owner, for the use and benefit of claimants as herein below defined, in the

amount of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated \_\_\_\_\_ entered into a

contract with Owner for Corporate Drive and Goosebay Drive Sewer Improvements in accordance with drawings and specifications prepared by the Public Works Department, 700 Islington Street, Portsmouth, N.H. 03801, which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that the Principal shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract and for the hire of all equipment, tools, and all other things contracted for or used in connection therewith, then this obligation shall be void, otherwise it shall remain in full force and effect, subject however, to the following conditions:

(1) A claimant is defined as one having a direct contract with the Principal or, with a subcontractor of the Principal for labor, material, equipment, or other things used or reasonably required for use in the performance of the Contract. "Labor and material" shall include but not be limited to that part of water, gas, power, light, heat, oil and gasoline, telephone service or rental of equipment applicable to the Contract.

(2) The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such a claimant, may sue on this bond for the use of such claimant, prosecute the suit by final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any such suit or any costs or expenses of any such suit, and principal and surety shall jointly and severally indemnify, defend and hold the Owner harmless for any such suit, costs or expenses.

SPECIAL CONDITIONS

(3) No suit or action shall be commenced hereunder by any claimant:

(a) Unless Claimant, other than one having a direct contract with the Principal, shall have given notice to all the following:

The Principal, the Owner and the Surety above named, within six (6) calendar months after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner, and Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the State of New Hampshire save that such service need not be made by a public officer.

(b) After the expiration of one (1) year following the date on which Principal ceased all work on said contract, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

(c) Other than in a State court of competent jurisdiction in and for the county or other political subdivision of the State in which the project, or any part thereof, is situated, or in the United States District Court for the district in which the project, or any part thereof, is situated, and not elsewhere. (4) The amount of this bond may be reduced by and to the extent of any payment of payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed on record against said improvement, whether or not claim for the amount of such lien by presented under and against this bond.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_. In the presence of:

\_\_\_\_\_  
(Witness) BY: \_\_\_\_\_  
(Principal) (Seal)

\_\_\_\_\_  
(Surety Company)

\_\_\_\_\_  
(Witness) BY: \_\_\_\_\_  
(Title) (Seal)

Note:

If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized Officer or Officers. If this bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his Power of Attorney showing his authority to sign such Bonds.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Agreement.

## **D. TECHNICAL SPECIFICATIONS**



DIVISION 1  
GENERAL REQUIREMENTS

Scope of Work

The scope of this Division covers the General Administrative Requirements and the general work related provisions of the Construction Contract.

Contents of Division

<u>Section No.</u>	<u>Section Title</u>
01000	Prosecution of Work
01010	Summary of Work
01020	Coordination
01025	Measurement and Payment
01045	Cutting and Patching
01070	Abbreviation and Symbols
01090	Reference Standards
01200	Project Meetings
01201	Community Information
01310	Construction Schedules
01340	Submittals
01381	Pre-Construction Video Records
01510	Temporary Utilities
01518	Bypass Pumping
01546	Use of Explosives
01562	Dust Control
01570	Traffic Regulation
01590	Temporary Field Office
01611	Owner's Right to Material
01630	Substitutions and Product Options
01701	Project Closeout Procedures
01710	Project Cleaning
01720	Project Record Documents

## **PROSECUTION OF WORK**

The Prosecution of Work is intended to provide the Contractor a summary of project requirements for easy reference. It is not intended to provide all requirements. Refer to Technical Specifications and Drawings for details.

### **1. DESCRIPTION OF WORK**

Generally, work will be conducted at the following locations:

- Corporate Drive (700 LF)
- Goose Bay Drive (1,400 LF)

Work to be completed for this project includes the following:

- **New Sanitary Sewers:**
  - 18" and 27" centrifugally cast fiber reinforced polymer mortar (CCFRPM) pipe, all depths
  - Maintenance of existing sewer flows/by-pass pumping
  - Installation of proposed sewer beneath 3-24"x40" CMP drain crossing (Paragraph 2.2)
- **New Storm Sewer Drains**
  - Replacement of 4' diameter catch basin on Goose Bay Drive and connection to existing drain line
  - Maintenance of drainage until completion of new systems
- **Roadway Restoration**
  - Corporate Drive:
    - Permanent trench repairs
    - Temporary trench repairs shall be completed on a weekly basis prior to weekend shut down
  - Goose Bay Drive
    - Sta. 10+45 to Sta. 17+50: Full width reclamation and paving
    - Sta. 17+50 to Sta. 24+00: Permanent trench repairs
- **Treatment of Groundwater**
  - It is assumed that ground water in the area exceeds the NHDES ambient groundwater quality standard of 70 ppt of PFOS/PHOA and will need to be treated prior to discharge from all dewatering operations.
  - Contractor shall monitor and provide a temporary groundwater treatment system for the treatment of discharge from all excavation discharge see Section 19 of this Prosecution of Work

- **Coordination and Protection of Utilities**

- Utility relocation work is not anticipated
- Protection of other utilities is the responsibility of the Contractor
- Shall conflicts with other utilities become present, the Contractor is responsible for coordinating their maintenance and/or repair (at no additional cost to the Owner)

- **Protection of Workers and Site Personnel**

Site safety shall be the Contractor's responsibility. The Contractor shall prepare a Health and Safety Plan. Refer to Section 01370 of the Project Manual.

## **2. SPECIAL SEQUENCEING OF WORK (Also, refer to Section 01310)**

Prior to the start of any work, the Contractor shall submit for approval a proposed work schedule. Schedule updates or alterations should be presented at regular progress meetings. The Contractor will need to consider the following items pertaining to general sequencing of the work:

### **2.1 Maintenance of Sewers, By-pass Pumping and Temporary Systems**

Lonza Biologics discharges their process effluent into the sewer system being replaced. It will be necessary to maintain all existing sewer and drain systems throughout the duration of the Project. The Contractor shall review sequencing with the Owner and Engineer. The existing sewer system will need to be maintained to prevent surcharging until new systems are operational (see Item 1.0 – Maintenance of Sewer Flows/By-pass pumping). The amount of temporary utilities will depend on the contractor's operations. Additional systems are subsidiary to Item 1.0 and will not be measured for payment, and the Contractor will need to consider this in the preparation of their bid.

### **2.2 Drainage Crossing**

Proposed work includes installation of sewers beneath an existing drainage crossing consisting of 3-24" x 40" elliptical CMP drain pipes set approximately 12" to 18" apart. Item 1.1.18A is provided for this section of sewer installation (30 LF) by a method selected by the Contractor. Prior to commencement, the Contractor shall submit a plan describing intended methods of installation for review and approval by the Engineer and the Owner showing the pipe will be installed in accordance to all specifications including: alignment, grade, bedding, blanket, backfill, and compaction.

### **2.3 Testing**

Coordinate all testing and acceptance of new utilities with Engineer, NHDES and Owner, prior to paving.

Testing of epoxy lined sewer manholes will be completed after installation, prior to application of epoxy liner.

## **2.4 Property Restoration**

Loam, seed & mulch and complete property restorations as work progresses.

### **3. TRAFFIC CONTROL**

A Traffic Control Plan (TCP) shall be submitted to the Engineer, for review and will require the approval by the City of Portsmouth. Road detours are anticipated. Construction warning signs must conform to MUTCD standards, as applicable. The Contractor will provide two (2) portable message boards for this project and will be responsible for siting and/or locating message boards as designated, and for maintenance of the messages throughout construction. Trenches will be backfilled (plates will not be permitted) and roads shall be re-opened to provide safe two-way vehicular and pedestrian traffic at the end of each working day. The Plan shall also include the anticipated number of flaggers to be used. The Engineer reserves the right to request more or fewer flaggers as work progresses and conditions change. Variations to the TCP will be dependent on the Contractors schedule and operations. All temporary detours require approval from the Portsmouth DPW and Pease Development Authority (PDA). The Contractor shall coordinate implementation of detours and property access with the Owner, PDA and Lonza. See Section 01020 for contact information.

Equipment - Provide necessary barricades, signs and traffic control devices in accordance with approved TCP and Section 01570. Contractor shall provide all portable message signs required for traffic control.

### **4. CONSTRUCTION LAYOUT**

Work is to be constructed as shown on the drawings. The Contractor will be responsible for all construction layouts. The Engineer will provide an electronic copy of plans and coordinates to the Contractor (to facilitate the Contractor's layout, providing the Contractor executes a release concerning the information transmitted). The Engineer and/or Owner's Representative, together with the Project Superintendent will review utility corridors, giving consideration to dig-safe markings and Contractor's work plan. The Contractor will advise the Engineer, in advance, of potential conflicts concerning execution of his work. It will be the responsibility of the Contractor to protect and maintain TBM's, layout and control points provided by the Engineer.

### **5. CONFLICTS AND COORDINATION WITH EXISTING UTILITIES**

It will be the Contractor's responsibility to coordinate with the utility companies/owners for identification and re-location, if necessary, of any utilities that are interfering or conflicting with the work shown on the drawings. Loss of production or crew downtime relating to utility work by others will not be considered for additional payment.

### **6. MEETINGS**

#### **Project Meetings (Also, see Section 01200):**

It is anticipated that regular scheduled meetings will be held with Owner's Representatives, Contractor, sub-contractors and regulatory personnel at a maximum frequency of once per month, unless additional meetings are considered necessary by the Contractor, Owner or Engineer.

**Coordination Meetings (Also, see Section 01200)**

Informal weekly meetings are anticipated between the Contractor's Superintendent, Owner, and Resident Project Representative to review progress/schedule, sequence and other day to day issues.

**7. TEMPORARY EROSION CONTROL**

The Contractor's attention is directed to the provisions of Sections 02402 and 02540 of the Project Manual. The Contractor shall exercise caution to minimize the intrusion of any spillage, sediment, turbidity, or pollution into the waterways or adjacent properties around the project area, as this watershed drains to waters of the state, including the Piscataqua River. Sediment and erosion controls shall be operational prior to commencing trench de-watering operations.

A Storm Water Pollution Prevention Plan (SWPPP) will be required and must be kept on site at all times. The Contractor will be responsible for filing the NOI and maintaining the SWPPP onsite at all times. The NOI must be submitted to the EPA at least seven (7) days prior to the start of construction. The SWPPP must be in place prior to submittal of the NOI.

The SWPPP may be amended as necessary to provide continued erosion and sediment control throughout the project. Appropriate measures shall be implemented to prevent sedimentation migration resulting from the Contractor's construction operations.

**8. EXCAVATION, BACKFILL & DEWATERING**

A geotechnical evaluation of soil and groundwater conditions is provided, in Appendix A, to assist the Contractor in the preparation of their bid. Fluctuations in groundwater may exist. The Contractor shall exercise special care in handling and managing soils and groundwater throughout the duration of the work. Recommendations included in the geotechnical evaluation, Appendix A shall be incorporated into the Contractor's work where applicable.

Trench Excavation shall be performed with a smooth-edge bucket and a systematic method for backfill and compaction shall be employed by the Contractor, based on the test strip procedure developed by NHDOT.

Excavation dewatering is expected to vary and a well-point dewatering system may be necessary to control ground water to below the bottom of the excavation. Excavation dewatering is further described in Section 02650. Well point dewatering, if required to control groundwater, is included in Bid Item 1.12.

Trench dewatering shall comply with the Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Dewatering before proceeding with the work. This NPDES general permit covers construction dewatering discharges defined as pumped or drained discharges of groundwater and/or storm water from excavations or other points of accumulation associated with a construction activity. Qualified dischargers must submit a Construction Dewatering NOI to EPA-NE to be covered and will receive a written notification from EPA-NE of permit coverage. The EPA-NE contact for NOI forms is Suzanne Warner at (617) 918-1383. The DES contact for this permit is Jeff Andrews at (603) 271-2984.

Appropriate sediment and erosion controls shall be operational prior to dewatering operations. Excavation dewatering (other than well points) is incidental. Refer to Sections 02402, 02540 and 02650 for additional project requirements.

**9. GEOTECHNICAL INFORMATION**

Refer to Appendix A and paragraph 8, above.

**10. DUST CONTROL (refer to Section 01562)**

The Contractor is required to use a mechanically enclosed street sweeper on paved surfaces when necessary to control dust. Water and/or Calcium Chloride are required on unpaved surfaces to control dust. The City will enforce a strict dust control policy for this project as described in the above referenced section.

**11. WORK HOURS (Refer to Section 01010)**

Work will be completed Monday through Friday between 7 AM to 6 PM unless specifically noted otherwise. Requests to perform work outside of these hours must be approved by the City at least 2 weeks prior to the anticipated construction operations. Additional costs associated with nighttime or weekend operations will be at the Contractor's expense.

**12. STAGING AREA**

The Contractor is required to locate and secure all staging and material storage areas. All staging areas to be secured by the Contractor must be approved in advance by the City. Contractor shall provide a Hold Harmless Release to the City prior to start of use of the staging area. At the completion of work, the Contractor shall receive a release from the property owners of the staging area(s) and a copy of each release shall be provided to the City prior to final acceptance of the project.

The Contractor may use the shoulder areas within the City Right-of-Way for staging of pipe and structures providing the following conditions are met (unless approved otherwise by the City).

- A. That structures are placed no sooner than one (1) week preceding installation.
- B. Sidewalks and driveways are unimpeded.
- C. All materials are located behind existing curb lines and the full width of the traveled way (curb to curb) is clear.
- D. That the Contractor will relocate structures upon notification by the City, if deemed necessary to maintain public relations and/or public safety.

**13. PAVEMENT MARKINGS**

Temporary pavement markings, to match the existing pavement markings, are subsidiary. Permanent pavement markings are to be reviewed with the Owner's Representative prior to placement. Markings not approved shall be removed at the Contractor's own expense, if requested by the Owner.

**14. SALVAGE OF MATERIALS (Refer to Section 01611)**

Existing drainage catch basin grates and frames, granite curb inlets, shall be salvaged to the

City of Portsmouth. All items selected by the City for salvage shall be delivered to a location specified by the City. The City has the right to salvage additional materials as requested. Contractor is to coordinate delivery of materials within the City.

**15. ABANDONMENT OF EXISTING PIPE**

All pipes to be abandoned 12-inch diameter or smaller shall be cut and capped, unless shown otherwise on the Drawings. Existing pipe larger than 12-inches or structures, outside normal excavation limits, to be abandoned, shall be filled with flowable fill or removed. All pipes and structures within the excavation limits shall be removed and disposed of by the Contractor at his own cost.

**16. PROTECTION OF TREES**

Contractor will endeavor to prevent damage to all trees that are designated to remain. A penalty will be assessed to the Contractor for damage to trees as follows:

- Limbs damaged: \$100/limb (in addition limbs will require further trimming by Contractor as directed)
  - Tree bark or surface scarring: \$10/sq. in. of impact area (\$100 MIN. and \$1000 MAX.)
- In addition, Contractor shall remove trees that are, in the opinion of the Owner, significantly altered or cosmetically impaired or terminally damaged.

**17. PEASE DEVELOPMENT AUTHORITY (PDA) ROAD RACES**

The PDA has two road races anticipated during the expected duration of the work, schedule TBD. The Contractor should anticipate these races when preparing the bid. The Contractor will be required to restore all work areas to a condition that is acceptable to the PDA to carry out the races. The contractor will be required to coordinate with the PDA to get updated race schedules. See Section 01020 – Coordination.

**18. MANAGEMENT & DISPOSAL OF SOILS and MATERIALS**

The contractor is responsible for management and disposal of all surplus soils and materials. Available information of potential soil and groundwater remediation sites within or adjacent to the project area is provided in Appendix C. Unit items are provided to facilitate payment for varying site conditions that may exist.

**18.1 Baseline Requirements:**

Item 1.15A: Health and Safety Plan

The contractor will be responsible for the safety and protection of site personnel. A HASP is required, refer to Section 13710 of the Project Manual for requirements.

Item 1.15B: Management of Soils and Materials

The contractor will be responsible for management of soils in accordance with regulatory guidelines, and in the Owner's best interest. The Contractor should anticipate varying soil conditions in preparation of their bid. Management of Soils, Item 1.15B includes the following work:

- Attend a meeting with the Owner and their representatives to discuss management of soils prior to the start of the work.
- Recognizing and segregating non-regulated materials from regulated materials.

- Contractor shall work with the Owner to develop a plan to characterize materials. This work will include separate stockpiling of materials, where contaminants are suspected, until characterization is complete.
- Where regulated materials are encountered (or are suspect), they need to be incorporated as backfill into the project as a first priority, unless directed otherwise.
- Coordination and management of all surplus materials.
- Prompt and immediate notification to Owner upon encountering soils that are regulated (or suspected to be regulated) for disposal by NHDES. Regulated materials shall be immediately separated from non-regulated materials. The contractor should recognize that certain materials are exempt from regulation including masonry, pavement, and concrete. These materials, if encountered, should be separated from regulated materials.
- Management & Disposal of Soils & Groundwater is included in Section 13100 of the Project Manual.
- Trucking and disposal of all un-regulated surplus materials will be the Contractor's responsibility.

#### Un-regulated Soils

Defined: Soils and materials that do not fall under NHDES regulation.

#### Urban Fill

Defined: Soils that come from the project site and are incorporated into the project for backfill and do not need to be disposed of at a permitted landfill. These soils may contain regulated contaminants, but because it is incorporated back into the project do not require further regulations. These do not include unregulated soils. All urban fill shall be incorporated back into the project as a first priority, unless directed otherwise by the Engineer.

#### Regulated Soils

Defined: Soils that are regulated as a solid waste. Regulated solid waste soils (i.e., urban fill) originating from the site may be incorporated into the project for backfill and should be as a first priority. Soils that cannot be incorporated back into the project may require disposal at a permitted landfill. Characterization efforts and disposal of regulated soils require prior approval from the Owner and the Engineer. The Owner, in cooperation with the permitting authority, will maintain the right to determine the limits of regulated soils requiring disposal.

### **18.2 Contingency Items (Where Directed):**

#### Item 1.15C: Loading and Hauling Surplus Regulated Soils

Where the Contractor cannot incorporate regulated soils into backfill and where directed by the Owner, regulated materials will be taken to a disposal facility. This item only involves transport of regulated surplus materials and does not apply to un-regulated materials or materials falling under the solid waste exemption (pavement, concrete, and masonry, etc.).

#### Item 1.15D: Disposal of Regulated Soils & Materials

Where the Contractor cannot incorporate regulated soils into backfill and where directed



by the Owner, regulated materials will be taken to a disposal facility. This item only involves disposal cost/tipping fees (other than transport) and does not apply to unregulated materials or materials falling under the solid waste exemption (pavement, concrete, and masonry, etc.).

Item 1.15E: Analytical Sampling

Where directed, the Contractor is to solicit services from a 3<sup>rd</sup> party testing company, approved by the Owner, for analytical soil testing. An allowance for Contractor reimbursement is provided.

19. **TREATMENT OF CONTAMINATED GROUNDWATER (ADD ALTERNATE #1)**

It is assumed that ground water in the area exceeds the NHDES ambient groundwater quality standard of 70 ppt of PFOS/PHOA and will need to be treated prior to discharge from all dewatering operations. Unit items are provided in Add Alternate #1 for the Contractor to sample, analyze, treat and dispose of all ground water. Unit items are summarized as follows:

Item 1.15F: Installation of groundwater monitoring wells

As directed, the Contractor shall install ground water monitoring wells. Wells shall be for the purpose of observing actual groundwater depths and sampling groundwater as required if it is necessary procure a Temporary Groundwater Discharge Permit from NHDES (see Item 1.15H below). A Typical Monitoring Well Detail from NHDES is provided as an attachment to this Prosecution of Work section.

Item 1.15G: Analytical testing of groundwater samples (where directed)

Testing of groundwater samples by an NHDES approved 3<sup>rd</sup> party testing company will be required. Frequency of testing will be twice per week from three (3) sampling ports specified for the temporary treatment system (Item 1.15I), if required to procure the Temporary Groundwater Discharge Permit (Item 1.15H), or as directed. The bi-weekly testing is required for the duration of the system operation. Analysis of samples shall include testing for the 23 PFAS contaminants.

Item 1.15H: Procure a Temporary Discharge Permit from NHDES

In order to discharge treated groundwater for infiltration back into the soil, the Contractor will be required to get a Temporary Ground Water Discharge Permit from NHDES. This Permit does not allow the discharge of treated water to any surface water or drainage systems. The permit application is provided as an attachment to this Prosecution of Work section. If the Owner authorizes the discharge of treated water to the sewer system, the Contractor will not be required to obtain a Permit.

Item 1.15I: Provide a Temporary Groundwater Treatment System

Discharge from all excavation dewatering operations shall be treated through a Temporary Groundwater Treatment System. The Contractor shall use this item to provide a treatment system that is onsite and ready to use at all times for use for the duration of excavation work. The intent of this item is to reimburse the Contractor for rental fees and costs associated with providing an operable system. The system provided shall meet the following requirements:

- Three 15,000 gallon settling (frac) tanks configured in series.
- One (1) 40 gpm pump with motor, automatic float control panel, and all other required electrical connections required for safe operation.
- One (1) duplex bag filter assembly with two (2) full capacity bag filters. One filter shall be used when in operation and the other shall be on standby.
- Two (2) carbon absorber vessels plumbed in lead lag series operation. Each carbon absorber shall be filled with 500 lbs (min) of activated carbon media. Vessels shall have isolation valves, pressure gauges and sample taps.
- One (1) effluent flow meter with totalizer.
- All pipes, hoses, and fittings required to interconnect all elements of the system as shown.

A schematic of the system is attached to this Prosecution of Work section.

1.15J: Operate and maintain the temporary Groundwater treatment system

This item provides compensation for the work and effort required by the Contractor to operate and maintain the treatment system. This may include but not be limited to:

- Connection of dewatering systems to the system
- Relocating the system if necessary to accommodate work
- Monitoring the system for proper operation
- Repair and/or replacement of defective equipment
- Proper disposal of used carbon filter media and sediment

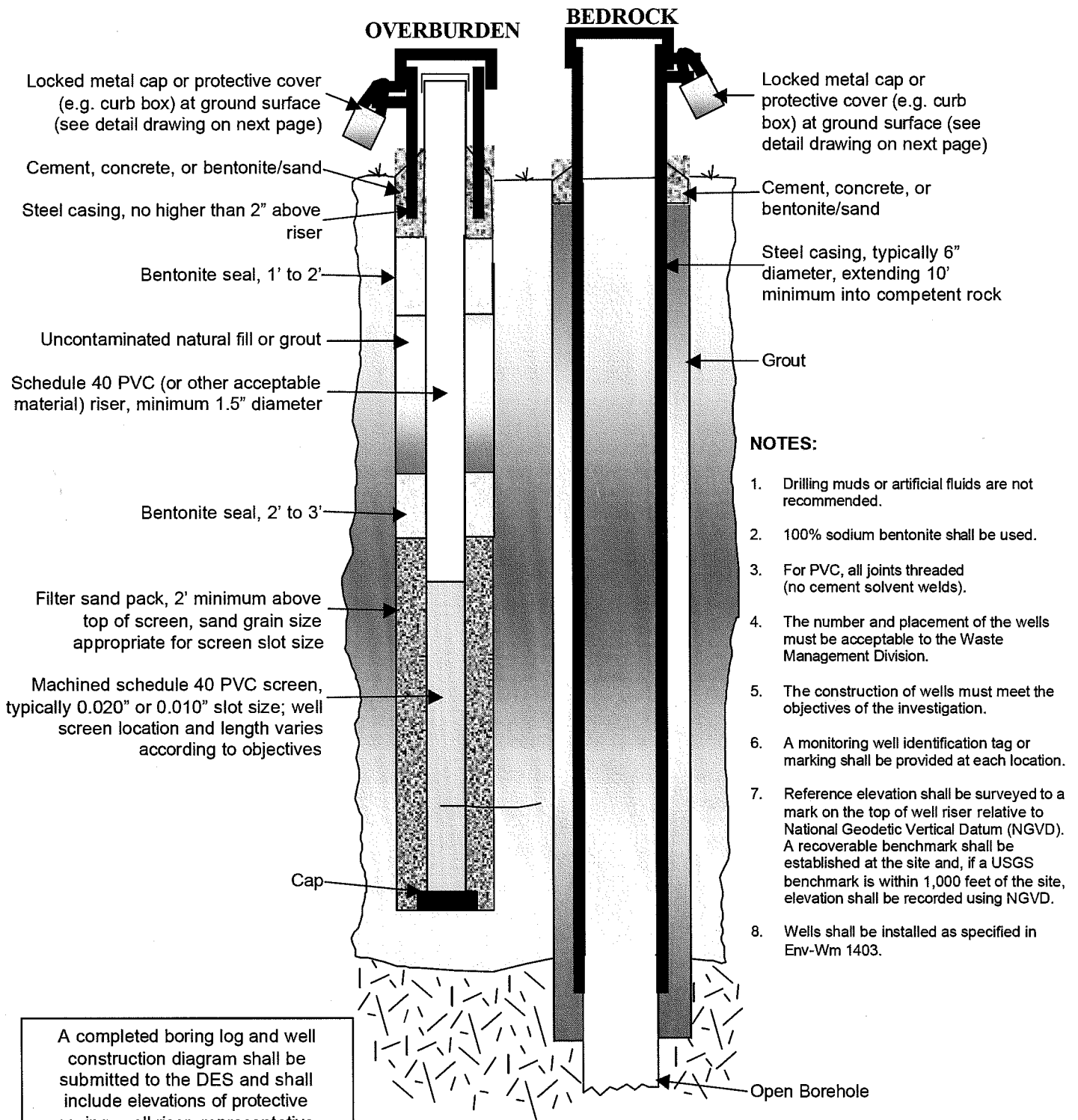
**20. COORDINATION WITH OTHER PROJECTS**

The City intends to complete drainage and roadway improvements on Corporate Drive. The Contractor shall be responsible for coordinating their operations with the work underway on the Corporate Drive project.

END OF SECTION

# Typical Monitoring Well Detail

(Not to Scale)



**NOTES:**

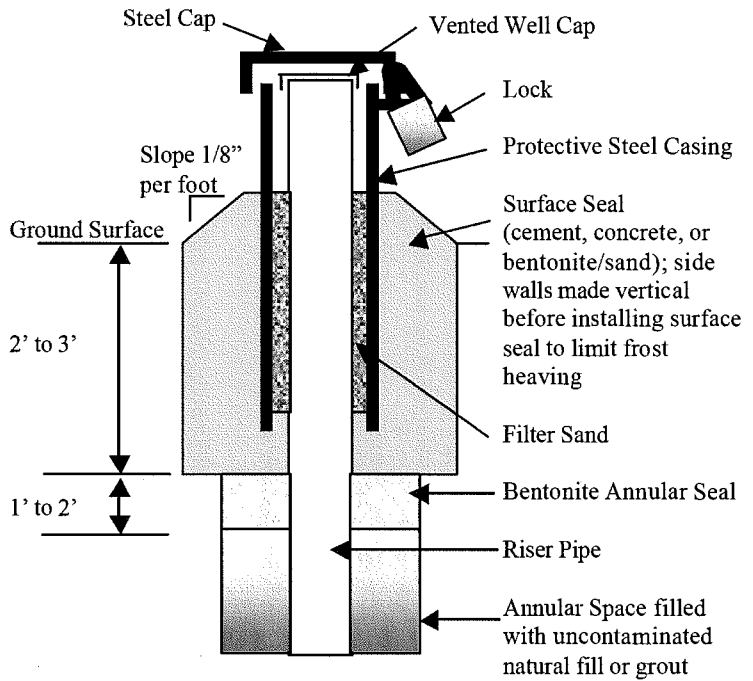
1. Drilling muds or artificial fluids are not recommended.
2. 100% sodium bentonite shall be used.
3. For PVC, all joints threaded (no cement solvent welds).
4. The number and placement of the wells must be acceptable to the Waste Management Division.
5. The construction of wells must meet the objectives of the investigation.
6. A monitoring well identification tag or marking shall be provided at each location.
7. Reference elevation shall be surveyed to a mark on the top of well riser relative to National Geodetic Vertical Datum (NGVD). A recoverable benchmark shall be established at the site and, if a USGS benchmark is within 1,000 feet of the site, elevation shall be recorded using NGVD.
8. Wells shall be installed as specified in Env-Wm 1403.

A completed boring log and well construction diagram shall be submitted to the DES and shall include elevations of protective casing, well riser, representative ground surface, and depths from ground surface to top of screen, bottom of screen, bottom of boring, and stabilized groundwater.



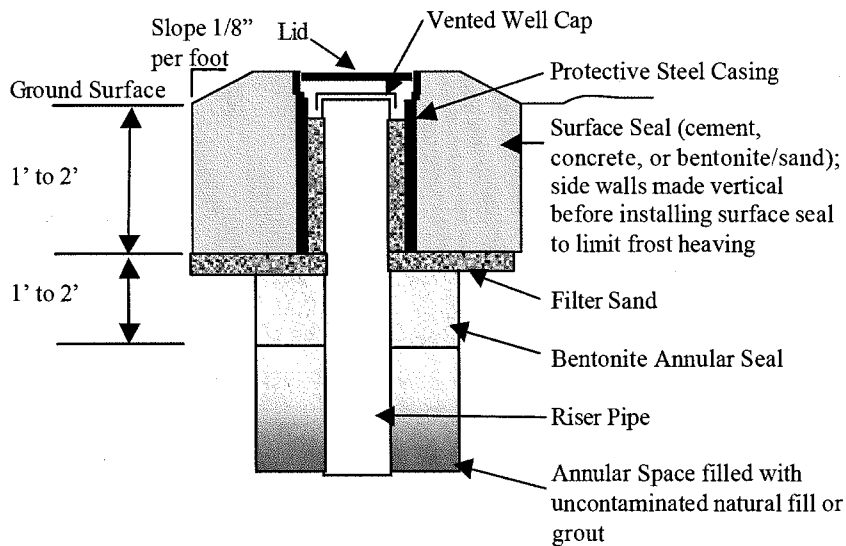
## Typical Above-Ground Monitoring Well Completion

(Not to Scale)



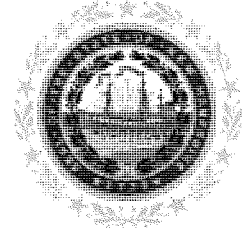
## Typical Flush-To-Ground-Surface Monitoring Well Completion

(Not to Scale)





TEMPORARY GROUNDWATER DISCHARGE PERMIT APPLICATION  
Drinking Water and Groundwater Bureau  
Groundwater Discharge Program



**RSA/Rule:** RSA 485-A:6, VII; 485:3, X; Env-Wq 402

The TEMPORARY GROUNDWATER DISCHARGE PERMIT is a nonrenewable permit issued under RSA 485-A:13 and Env-Wq 402 for the temporary discharge of nondomestic wastewater including that which has received treatment by best available technology (Examples include groundwater remediation, dewatering projects, pump tests, discharges or treated water to the ground or groundwater, etc.)

**SUBMIT:**

- ONE SIGNED AND COMPLETED APPLICATION TO THE MUNICIPALITY IN WHICH THE DISCHARGE WILL OCCUR
- ONE SIGNED AND COMPLETED APPLICATION TO NHDES AT THE ADDRESS BELOW

**TO:** NHDES/Water Division  
Drinking Water & Groundwater Bureau  
Discharge Permit Coordinator  
P.O. Box 95  
Concord, NH 03302-0095

<b><u>FOR STATE USE ONLY</u></b>
Date Received: _____
Site No: _____
Rivers Coordinator Notified Date: _____

If you have any questions, please contact the Discharge Permits Coordinator at (603) 271-2858.

**CERTIFICATION OF MUNICIPAL NOTIFICATION**

In order to meet the requirements of Env-Wq 402, the undersigned certifies that on \_\_\_\_\_ (date), a copy of this completed permit application was delivered to the Town/City Clerk of \_\_\_\_\_ (the town in which the proposed discharge will be located).

Date: \_\_\_\_\_ Signed: \_\_\_\_\_  
Applicant (Landowner)

**I. Facility**

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/Town: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Latitude and Longitude of Discharge point(s): \_\_\_\_\_  
Property Tax Map: \_\_\_\_\_ Lot Number: \_\_\_\_\_

dwgbinfo@des.nh.gov or phone (603) 271-2858  
PO Box 95, Concord, NH 03302-0095  
www.des.nh.gov

II. Applicant (if you are a contact person for the applicant check this box )

Name: \_\_\_\_\_  
Daytime Telephone: (\_\_\_\_) \_\_\_\_\_ Fax Number: (\_\_\_\_) \_\_\_\_\_  
Mailing Address: \_\_\_\_\_  
City/Town: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Email Address (Contact Person): \_\_\_\_\_  
Contact Person Phone Number:(\_\_\_\_) \_\_\_\_\_ Fax Number: (\_\_\_\_) \_\_\_\_\_

III. Facility Owner (complete only if different from Applicant)

Owner Name: \_\_\_\_\_  Owner  Operator  
Daytime Telephone: (\_\_\_\_) \_\_\_\_\_  
Mailing Address: \_\_\_\_\_  
City/Town: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Email Address (Contact Person): \_\_\_\_\_  
Contact Person Phone Number:(\_\_\_\_) \_\_\_\_\_ Fax Number: (\_\_\_\_) \_\_\_\_\_

IV. Property Owner (complete only if different from Applicant or Facility Owner)

Name: \_\_\_\_\_  
Daytime Telephone: (\_\_\_\_) \_\_\_\_\_  
Mailing Address: \_\_\_\_\_  
City/Town: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Email Address (Contact Person): \_\_\_\_\_  
Contact Person Phone Number:(\_\_\_\_) \_\_\_\_\_ Fax Number: (\_\_\_\_) \_\_\_\_\_

V. Please provide the following information related to the proposed temporary discharge:

a. The purpose of the temporary discharge (e.g. groundwater remediation, well rehab or pumping test, construction dewatering, etc.)

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

b. Proposed Discharge Location

Include a clear color copy of a USGS topographic map or equivalent map which depicts the facility or site location, the discharge location and the location of the closest sanitary sewer.

Location of discharge, if different from facility:

Address: \_\_\_\_\_  
City/Town: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Property Tax Map: \_\_\_\_\_ Lot Number: \_\_\_\_\_  
Latitude & Longitude: \_\_\_\_\_

c. Location of closest sanitary sewer: \_\_\_\_\_

d. Proposed Discharge Rate

Proposed starting date: \_\_\_\_\_  
Estimated discharge: \_\_\_\_\_ gpm for \_\_\_\_\_ hours per day  
Estimated number of days discharge will be required: \_\_\_\_\_

e. Proposed Discharge Method

dwginfo@des.nh.gov or phone (603) 271-2858  
PO Box 95, Concord, NH 03302-0095  
www.des.nh.gov

Describe the method and materials used for the temporary discharge, include a description of any erosion control measures used at the point of discharge:

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VI. Groundwater Contamination Information, Treatment and Discharge Monitoring

- a. Provide a summary of the most recent groundwater monitoring results, including total VOCs (laboratory results should also be attached to the application) of the source water for the temporary groundwater discharge:

<u>Location</u>	<u>Compound(s) Exceeding Water Quality Standards</u>	<u>Concentrations (ug/L)</u>
<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>
<hr/>	<hr/>	<hr/>
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- b. Proposed Treatment

Type of treatment proposed (include a description of the wastewater, information on influent and effluent water quality and on sludge or other by-products generated):

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- c. Provide a description of the proposed monitoring and sampling program for the water discharged at the site (applicable only if the source water for the discharge is known to contain, or is anticipated to contain, contamination):

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Applicant/Owner Certification Statement and Signature

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**By signing this application the signer certifies that the information contained in or otherwise submitted with this application is true, complete and not misleading to the best of the signer's knowledge and belief.**

**By signing this application the signer understands that submission of false, incomplete or misleading information is grounds for:**

- Denying the application;
- Revoking any application that is granted based on the information; and
- If the signer is acting as, or on behalf of, a listed engineer as defined in Env-C 502.10, debaring the listed engineer from the roster.

**By signing the application, the signer and applicant agree to comply with all applicable rules and conditions of this permit and to not discharge to the holding tank(s) until written permission from the department has been received.**

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\_\_\_\_\_  
Signature of Applicant or Contact

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Facility Owner (if not Applicant)

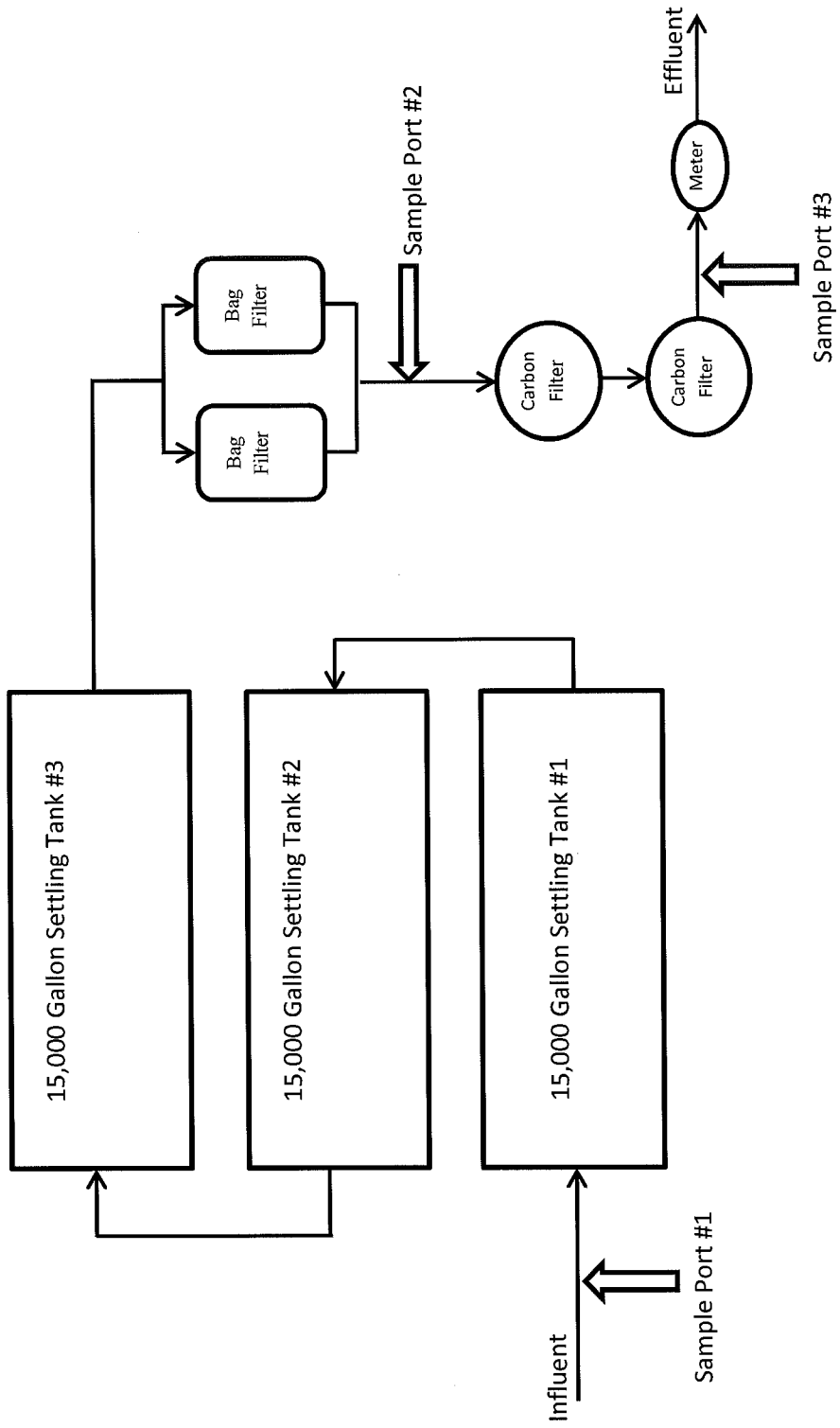
\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Property Owner (if not Applicant or Facility Owner)

\_\_\_\_\_  
Date



**Temporary Groundwater Treatment System Schematic**  
**Bid Item 1.15I**



SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 WORK UNDER THIS CONTRACT

- A. The work to be completed under this Contract includes but is not limited to:
1. Construction of approximately 2,150 linear feet of 18" and 27" centrifugally cast fiber reinforced polymer mortar (CCFRPM) gravity sewer pipe and roadway repairs. The work will be constructed from the lowest elevations to the highest elevations or as otherwise approved by the Engineer.
  2. Installation of proposed sewer pipe beneath a multiple pipe drainage crossing (3-24" x 40" CMP pipes) by an approved method selected by the Contractor (Item 1.1.18A).
  3. Piping and structure modifications necessary to tie into existing systems.
  4. Complete restoration of all properties both public and private.
  5. Abandoning existing sewers and manholes
  6. Maintenance of sanitary and stormwater flows
  7. All other work required for completion of the work as shown on the drawings and as specified

1.2 CONTRACTORS RESPONSIBILITIES

- A. The General Contractor shall have the following responsibilities:
1. Prosecution of Work – The Contractor will perform work in accordance with the Prosecution of Work Section of these specifications.
  2. Traffic Control – Coordinate with the City of Portsmouth Department of Public Works and provide all necessary barricades, signs and traffic control devices in accordance with Specification Section 01570 – Traffic Regulation.
  3. Furnish all labor, materials, equipment and incidentals required to complete all work in accordance with the Contract Documents within the allotted time schedule and maintain required warranties.
  4. Protect against vandalism. All losses incurred through vandalism are to be reimbursed by the Contractor or Contractor's insurance company.
  5. Coordinate with the Department of Public Works, including securing any required permits, on all work accomplished within City roadway rights-of-way.
  6. Perform all work within City right-of-way or limits of easements as shown on the Drawings unless written authorization is provided for further occupation of private properties.
  7. Coordinate activities involving other utilities with the respective utility companies.
  8. Obtain all necessary environmental and other permits required by federal, state and local authorities.
  9. The work also includes but is not limited to furnishing all materials, labor and equipment to perform the following activities:
    - a. Preparation and submittal of Contract specified submittals.

- b. Testing of materials as specified herein.
- 10. NPDES Permit Requirements – The Contractor shall prepare a Stormwater Pollution Prevention Plan (SWPPP) and submit a Notice of Intent (NOI) to the USEPA in accordance with the EPA Stormwater requirements associated with Construction Activities prior to construction. See specification section 02540 – Temporary Erosion Control.
- 11. Contractor shall maintain sanitary and storm flow during construction.

### 1.3 ENUMERATION OF DRAWINGS

- A. The following drawings which form a part of this contract are:
  - 1. Sheet No's 1-6, entitled "Corporate Drive and Goose Bay Drive Sewer Improvements."

### 1.4 ENUMERATION OF SPECIFICATIONS

The following specifications which form a part of this Contract are:

- A. Bid Requirements
- B. Contract
- C. General Conditions
- D. Technical Specifications
- E. Appendix A – Geotechnical Information
- F. Appendix B – City of Portsmouth Blasting Ordinance

All addendum issued during the bidding process also form a part of this contract

## PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

## PART 3 - EXECUTION

### 3.1 WORK SEQUENCE

- A. No work may commence until the following plans have been submitted and approved by the Owner and the Engineer:
  - 1. Traffic Control Plan
  - 2. Maintenance of Sewers Bypass Plan
  - 3. Stormwater Pollution Prevention Plan (SWPPP) including the submission of the "Notice of Intent" to the US EPA
- B. It is the intention that the work required to be completed under this Contract be performed in an organized and workmanlike manner. Sewer work shall proceed in accordance with approved scheduling to ensure that the new sewer system is tied into the existing sewer system as intended in the Contract and as shown on the Drawings. Construction areas shall be restored as soon as practical in an effort to minimize disturbance to private and public property. The Contractor is responsible for scheduling work to meet these objectives.
- C. Proposed test pits, as shown on the Drawings or as directed by the Engineer, shall be excavated in the presence of the Engineer. Test pits shall be excavated prior to the

start of work so that adequate time is allowed to address any required field changes and to allow for sufficient material lead time.

- D. The work will be constructed from lowest elevations to highest elevations or as otherwise approved by the Engineer.

### 3.2 SPECIAL REQUIREMENTS

- A. Contractor shall maintain existing utilities to all existing users at all times.
- B. Where possible the Contractor shall maintain access to all properties during construction.
- C. Temporary trench pavement repairs shall be required at the end of each week unless approved otherwise.
- D. Contractor shall maintain repair parts on-site for emergency repair of water system, sewer system, drain lines, etc.
- E. Contractor to receive approval from the City prior to initiating any traffic restrictions and detours, if any.

### 3.3 WORK RESTRICTIONS

- A. Work on the project will only be allowed Monday through Friday between the hours of 7:00 a.m. and 6:00 p.m., excluding holidays, except during emergencies unless otherwise approved in advance by the Owner.
- B. Work hours may be limited on days where the Pease Development Authority has scheduled foot races in the work zone. Race times will generally not interfere with work hours.

END OF SECTION

SECTION 01020

COORDINATION

PART 1 – GENERAL

1.1 DESCRIPTION

- A. All damage to existing structures, utilities, or pipelines, as a result of digging test pits, shall be paid by the Contractor. All materials shall be the responsibility of the Contractor. The Contractor will be responsible for replacing pavement around test pits for this Contract.
- B. Coordinate operation of utilities with the owner of the utility. Do not interrupt utility services to businesses or homeowners without the Owner's prior approval.
- C. The Contractor, by nature of this project, will be working in close proximity to residents, businesses and traveled ways. The Contractor, under this Contract, will be responsible for coordinating construction activities with the City of Portsmouth, where traffic control is involved, and with property owners in a manner that will lessen impacts, to the extent possible, and to ensure that residents, business services, facilities, and safe working conditions are maintained.
- D. Any damage to existing structures, equipment and property as a result of the Contractor's or their subcontractor's operations shall repaired/restored by the Contractor at no additional cost to the Owner.
- E. The Contractor will be responsible for developing a Traffic Control Plan and for coordinating its implementation with the City, local businesses and residents. The Contractor shall coordinate the relocation of Traffic Control measures and devices as needed to move traffic through and/or around the Work Zone or as directed by the Public Works Departments.
- F. The Contractor will be responsible for developing an Erosion and Sediment Control and Storm Water Management Plan, for obtaining all necessary permits and for implementing the Plan.
- G. The Contractor shall be responsible for maintaining Potable Water service and for all coordination with the City Water Department and with the local residents, businesses and facilities.
- H. The contractor shall be responsible for the maintenance of sanitary and storm flows during construction
- I. The Owner will be responsible for the operation of all existing facilities and any new facilities accepted during the construction period.
- J. The Contractor shall notify the Engineer in writing when, in his opinion, a portion of the construction is ready to be accepted by the Owner. After inspection of the work the Engineer will either recommend that the Owner accept the portion of construction or shall identify remedial work needed to be performed by the Contractor.
- K. All damage to existing or accepted equipment or structures, as a result of the Contractor's or his Subcontractor's operations shall be paid by the Contractor at no additional cost to the Owner.

1.2 COORDINATION WITH OTHERS:

- A. It will be the responsibility of the Contractor to complete all coordination required with all other utilities, homeowners and City sub-contractors to complete the work. The City may be available upon request to provide limited support for homeowner coordination.
- B. City of Portsmouth:
1. Contractor shall coordinate access, egress, detours and traffic control, if required, with the City of Portsmouth's Police Department. The Contractor shall notify the Portsmouth Police, Fire Department and Rescue Squad at least 24 hours in advance of any street closings or detours. All fees for police traffic control details shall be paid by the Contractor (Item 6.6).
  2. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
- C. City of Portsmouth: **Department of Public Works (DPW)**
1. The Contractor shall be responsible for obtaining all opening and utility location permits.
  2. The Contractor shall be responsible for coordinating access, egress, detours and traffic control on all City roadways with the City DPW.
  3. The Contractor shall be responsible for coordinating the operation of valves and work in the vicinity of water lines with the DPW.

Portsmouth Water/Sewer Division

600 Peverly Hill Road

Portsmouth, NH 03801

(603) 427-1552 (Primary contact, DPW Dispatch)

Dispatch (City Emergency Services)

(603) 427-1530

John Adams (Sewer and Water)

(603) 766-1430

D. Power, Cable, and Phone

1. The Contractor shall be responsible for coordinating and providing temporary utilities (power, phone, internet) to the construction site.
2. The Contractor shall be responsible for coordinating all work in and around existing utility facilities (aerial and below ground) and bear all costs of inspection requirements, temporary facilities relocation and all other requirements.
3. The Engineer has made initial contact to the utilities regarding the relocation of poles to accommodate the proposed work. It shall be the Contractor's responsibility to coordinate the relocation work so that it does not interrupt the day to day operations of the work to be completed.
4. The following is a list of contacts for utilities in the project area:

Eversource

Richard St. Cyr, Field Technician Specialist

(603) 436-7708 X 5641

Fairpoint  
Joe Considine  
1575 Greenland Road  
Greenland, NH  
(603) 427-5525 (phone)  
(603) 427-2090 (fax)

Comcast (Cable)  
Mike Collins  
334B Calef Highway  
Epping, NH 03042  
(603) 679-5695 X 1037

- E. New Hampshire Department of Environmental Services (NHDES) and EPA  
The Owner shall be responsible for compliance with conditions of permits obtained, for execution of the work, and for securing other permits that pertain to the Contractor's own operations.
- F. Public Services to Private Properties  
The Contractor shall be responsible for coordinating and maintaining public services to all properties. The Contractor shall notify police and fire departments and rescue squad at least 24 hours in advance of any street closings and detours.
- G. Gas
  - 1. All gas mains within the project area have been upgraded to plastic pipe prior to the commencement of this work. The Contractor shall be responsible to coordinate protection of all existing gas mains in close proximity to the proposed work.

Unitil (Gas Division)  
Phil Johnson  
325 West Road  
Portsmouth, NH 03801  
(603) 294-5157

- H. The Contractor shall coordinate and sequence daily operations with all businesses in the project area (including but not limited to religious institutions, dentist offices, and a funeral home).
- I. Lonza Biologics currently has an expansion project under construction. The construction entrance and temporary trailers are located on Goosebay Drive. The Contractor will be required to closely coordinate daily operations with Lonza, particularly for work on Goosebay Drive.

Lonza Biologics  
101 International Drive  
Portsmouth, NH 03801  
(603) 610-4500

- J. The Contractor shall coordinate and sequence daily operations with the City school bus company.
- K. The Contractor shall sequence daily operations to accommodate the weekly trash and recycling pickup. The day and time of pick-up may vary based on location of work.
- L. The Pease Development Authority (PDA) holds road races that may take place during the time period of the project. The Contractor will be required to coordinate with PDA to get updated race schedules.

Pease Development Authority  
Maria Stowell  
(603) 766-9296

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION



SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 -- GENERAL

1.1 DESCRIPTION

- A. For all items other than those to be paid for by lump sum amounts, after the work is completed and before final payment is made therefore, the Owner's Representative shall make final measurements to determine the quantities of various items of work accepted as the basis for final settlement. The Contractor, in the case of unit price items, will be paid for the actual amount of work accepted and for the actual amount of materials in place, as shown by the final measurements.
- B. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by the Engineer.
- C. At the end of each day's work, the Contractor's Superintendent or other authorized representative of the Contractor shall meet with the Owner's Representative and determine and agree upon the quantities of unit price work accomplished and/or completed during the work day.
- D. The Representative will then prepare a "Field Report" which shall be signed by both the Representative and Contractor's Representative indicating complete agreement and approval of the quantities listed.
- E. Once each month the Representative will prepare a "Monthly Progress Summation" form from the month's accumulation of "Field Report" which shall also be signed by both the Representative and Contractor's Representative indicating complete agreement and approval of quantities listed.
- F. These completed forms will provide the basis of the Engineer's monthly quantity estimate upon which payment will be made. Items not appearing on both the Field Report and Monthly Progress Summation may not be included for payment. Items appearing on forms not properly signed by the Contractor may not be included for payment.
- G. The Contractor will prepare and submit the Pay Application for approved work completed in the payment period to the Engineer. The Engineer will provide a recommendation for payment to the Contractor. Upon recommendation from the Engineer, the Owner will complete a final review and approve the Pay Application for payment.
- H. Samples of the above referenced forms are included at the end of this section of the Specifications.
- I. The Contractor shall submit a cost breakdown of all lump sum items for payment purposes. This cost breakdown shall be submitted prior to Contract signing and shall be approved by the Engineer.

## MEASUREMENT AND PAYMENT

- J. Payment Application will only be prepared in a form acceptable to the Owner and approved by the Engineer. The form shall be in a computer spreadsheet format and exportable to MS EXCEL. (Sample Forms attached).

### 1.2 SCOPE OF PAYMENT

- A. Payments to the Contractor will be made for the actual quantities of Contract items performed and accepted in accordance with the plans and specifications. Upon completion of the construction, if these actual quantities show either an increase or decrease from the quantities given in the Bid (form), the Contract unit prices will still prevail, except as provided hereinafter.
- B. The Contractor shall accept compensation, as herein provided, in full payment for furnishing all materials, labor, tools, equipment and incidentals necessary to complete the work and for performing all work included in the Contract; for all loss or damage arising from the nature of the work, or from the action of the elements; or from any unforeseen difficulties which may be encountered during the prosecution of the work and until its final acceptance by the Engineer; and for all risks of every description connected with the prosecution of the work, except as provided herein, also for all expenses incurred in consequence of the suspension of the work as herein authorized.
- C. The payment of any partial estimate or of any retained percentage except by and under the approved final invoice, in no way shall affect the obligation of the Contractor to repair or renew any defective parts of the construction or to be responsible for damage due to such defects.

### 1.3 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

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

### 1.4 ELIMINATED ITEMS

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

### 1.5 PARTIAL PAYMENTS

- A. Partial payments shall be made monthly as the work progresses. All partial payments and payments shall be subject to correction in the final quantity invoice and payment.
- B. No monthly payment shall be required to be made when, in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of the Contract, or when, in his judgment, the total value of the work done since the last payment amounts to less than \$1,000.00.

## MEASUREMENT AND PAYMENT

- C. The partial payments will be based upon invoices prepared by the Engineer of the value of the work performed, and materials complete in place in accordance with the Contract. Retainage shall be as specified in the General Conditions as modified by the Supplemental General Conditions. The Owner shall pay the Contractor within the time period specified in the General Conditions.

#### 1.6 PAYMENT FOR MATERIAL DELIVERED

- A. At the discretion of the Owner, the Engineer may act upon the request of the Contractor, prepare an invoice, accompanied by receipted bills for payment of all or part of the value of acceptable, non-perishable materials and equipment which have been delivered to the site of the work or in acceptable storage places, and not used at the time of such invoice. Materials, when so paid for by the Owner, shall become the property of the Owner, and in the event of default on the part of the Contractor, the Owner may use, or cause to be used, these materials in the construction of the work provided for in the Contract. The Contractor shall be responsible for any damage to, or loss of, these materials in accordance with Contract insurance requirements. The amount thus paid by the Owner shall go to reduce estimated amounts due the Contractor as the material is used in the work.
- B. No partial payment shall be made upon fuels, supplies, lumber, false work, or other materials, or on temporary structures of any kind which are not a permanent part of this Contract.

#### 1.7 FINAL PAYMENT

- A. The Engineer shall make, as soon as practicable after the completion of the project, a final quantity invoice of the amount of work performed under the Contract and establish the value of such work.
- B. The Owner shall retain a sum determined in accordance with the General Conditions and Supplemental Provisions of the final Contract cost for a one-year warranty period commencing on the date of substantial completion.
- C. The Owner shall then pay the entire sum found to be due, after deducting there from all previous payments and the aforementioned retainage. In addition, any amounts to be retained or deducted under the provisions of the Contract may be held by the Owner for a period of sixty (60) days after the completion of the final quantity invoice, or until such time as the Contractor submits satisfactory evidence that all bills for labor and materials used under this Contract have been paid and all required documents submitted to the Engineer.

#### 1.8 INCIDENTAL WORK

- A. Incidental work items for which separate payment items are not measured shall be included in the work. Unless paid for under a specific bid item, these items may include but are not limited to the following:
  - 1. Clearing, Grubbing and Stripping.
  - 2. Loaming and turf establishment with mulch and soil conditioning, unless otherwise paid for.

## MEASUREMENT AND PAYMENT

3. Restoration of property and staging areas.
4. Repairs to existing utilities, designated to remain and damaged as a result of Contractor's operations.
5. Utility crossings, unless otherwise paid for.
6. Utility relocation unless otherwise paid for.
7. Minor items - Such as restorations of fence, guardrails, rockwalls, etc., following construction unless otherwise paid for.
8. Steel and/or wood sheeting utilized by the Contractor other than sheeting left in place or removed when directed by the Engineer and paid for under a separate item.
9. Additional items needed as a result of the Contractor's sequencing.
10. Temporary erosion control measures. See section 02540.
11. Dust control measures unless paid for under separate items
12. Remove and reset granite curb
13. Sewage bypass pumping, unless paid for otherwise.
14. Construction dewatering, unless paid for otherwise.
15. Materials testing
16. Restoration of all properties impacted by Construction, unless paid for otherwise.

**1.9 DESCRIPTION OF PAY ITEMS**

- A. The following sections describe the measurement of and payment for all other work.
- B. Each unit of lump sum price stated in the Bid (form) shall constitute full compensation for each item of the work completed.

**ITEM NO. 1.0: MAINTENANCE OF SEWER FLOWS / BY-PASS PUMPING**

- A. Method of Measurement
  1. Maintenance of sewer flows will be measured as a lump sum item
  2. Measurement will be based on the percentage of work completed as determined by the Engineer.
- B. Basis of Payment
  1. Maintenance of sewer flows will be paid at the contract unit price, complete and in place.
  2. Said payment will be considered full compensation to furnish all materials, tools, equipment and labor required to install all bypass piping and/or pumping systems necessary to construct new piping systems, including testing.
  3. Said payment will also be considered full compensation for all pumps, piping, electrical systems, fuel, alarms, and control systems.
  4. Said payment will also be considered full compensation for completing all temporary connections from new work to existing systems including, excavation, PVC piping, fittings, concrete encasement (as required), and flexible couplings required to complete the connection.

5. Said unit price shall be considered full compensation for the preparation of an approved sewer by-pass plan as specified in Section 01518.
6. Actual payment for this item shall be broken down as follows:
  - a. 10% - Approval and implementation of a sewer by-pass plan
  - b. 90% - Active maintenance and by-pass pumping of sewer flows
  - c. Upon substantial completion, total payment shall equal 100%
7. Payment for this item shall not exceed 1.00 (100%).

**ITEM NO. 1.1.08, 1.1.15, 1.1.18 and 1.1.27: FURNISH AND INSTALL SEWER PIPE  
(ALL SIZES)**

- A. Method of Measurement:
  1. The lengths of pipe to be furnished and installed under these items shall be measured for payment by the linear foot along the centerline of the pipe including service connection fittings as laid from the inside edge of the manhole to the inside edge of the next manhole.
- B. Basis of Payment:
  1. Pipe shall be paid for at the Contract price per foot.
  2. Said unit price shall constitute full compensation for furnishing and installing all materials, sewer main, mainline fittings and adapters, stubs with cap ends, materials, labor, equipment and tools necessary for hauling, handling, laying, jointing, cleaning and testing pipe.
  3. Said unit price shall also include all necessary excavation (except where ledge excavation is paid as a separate item), removal and disposal of existing pipe (unless paid for under another item), bedding, backfill, compaction, and other incidental work including disposal of excess fill material.
  4. Said unit price shall include full compensation for installing and maintaining trench dewatering systems (i.e. trench sump dewatering) required to install the pipe in the dry as specified.
  5. Wellpoint dewatering systems specified under Section 02650 used to pre-drain soils prior to final excavation and to install sewers in the dry will be paid as Item 1.12.
  6. Said price shall also include any corings, fittings, adapters, etc. not covered under a separate bid item, which are required to connect the new sewer to the existing sewer.
  7. Said unit price shall also include any fittings or adapters required to repair existing sewer damaged during construction.
  8. Said unit price shall include demolition of existing SMH's and sewer pipe within the limits of the trench.
  9. Said unit price shall also include full compensation for the relocation of utilities (including but not limited to water less than six (6) inches in diameter, gas, drain, electric and telephone) which interfere with the proposed sewer unless payment is made under another item and also includes the repair of utilities damaged by the Contractor.

## MEASUREMENT AND PAYMENT

10. Payment under this item shall constitute full payment for maintenance of sewage flow in accordance to Section 01518 unless paid for under separate item.
11. Said unit price shall be considered full compensation for loss of production or crew down time due to extended lead times for material delivery.
12. Said unit price shall include excavation and stone aggregate to provide a bedding depth of 6" below the pipe in earth and 12" below the pipe in ledge areas as shown on the drawings. Additional excavation and stone bedding required below 6" for placement of geogrid trench stabilization as shown on the drawings will be paid under Item 1.8B.
13. Additional sheeting/shoring beyond what is required for typical trench excavation operations (i.e. trench boxes) will be paid under item 1.13.
14. Actual payment for this item shall be broken down in accordance with the following percentages:
  - a. Sewer pipe in place and backfilled - 90%
  - b. Sewer pipe successfully cleaned and tested including low pressure test, mandrel, and lamping - 10%
15. Additional work and/or compensation for installation of sewer pipes below 3-24"x40" CMP drainage crossing, within the limits shown on the drawing, will be paid under Item 1.1.18A.

**ITEM NO. 1.1.18A: ADDITIONAL WORK FOR INSTALLATION OF 18" CCFRPM PIPE AT 3-24"X40" CMP DRAINAGE CROSSING:**

- A. Method of Measurement:
  1. Additional work required for the installation of 18" CCFRPM sewer pipe at drainage crossing shall be measured per lump sum, complete and in place within the limits shown on the Drawings (DWG PP2).
  2. Actual installation of new sewer pipe will be paid under Item 1.1.18 and will not be measured for additional payment under this item.
- B. Basis of Payment:
  1. Additional work for installation of 18" CCFRPM sewer pipe at drainage crossing will be paid for at the Contract lump sum price.
  2. Said unit price shall be considered full compensation for the preparation of an approved plan describing the methods selected by the Contractor to complete installation of proposed sewer pipe below the drainage crossing within the limits shown on the drawings.
  3. Said unit price shall be considered full compensation for crew downtime and loss of production incurred during pipe installation in said location.
  4. Additional sheeting/shoring beyond what is required for typical trench excavation operations (i.e. trench boxes) and all other equipment and materials required to provide a safe working conditions while completing the described work will be paid under item 1.13.

5. Said unit price shall include maintenance of existing drainage flows and repairs/restoration to the existing drainage system to remain following installation of sewer.
6. Maintenance of sewer flows will be paid as Item 1.0
7. Wellpoint dewatering systems specified under Section 02650 used to pre-drain soils prior to final excavation and to install sewers in the dry will be paid as Item 1.12.
8. Said unit price shall be full compensation for coordination and execution of all additional work associated with the installation method selected by the Contractor outside of typical open trenching operations (i.e. trenchless installation methods).
9. Flowable fill for backfill below drainage pipes (if required) will be paid under Item 1.11
10. Actual payment for this item shall be broken down in accordance with the following percentages:
  - a. Sewer pipe in place and backfilled - 90%
  - c. Sewer pipe successfully cleaned and tested including low pressure test, mandrel, and lamping - 10%

**ITEM NO. 1.5.4, 1.5.5 and 1.5.6: FURNISH AND INSTALL EPOXY LINED SEWER MANHOLES (ALL DIAMETERS)**

- A. Method of Measurement:
  1. Sewer manholes will be measured in vertical feet from the invert of the lowest sewer pipe in the manhole to the top of the manhole frames.
- B. Basis of Payment:
  1. Manholes shall be paid at the Contract unit price per vertical foot.
  2. Said unit price shall be considered full compensation for furnishing and installing precast sections or cast in place structures with penetrations and boots, frames and covers, screened gravel subbase, concrete and masonry materials, water-proofing as specified, manhole testing, **internal epoxy lining system** and all work incidental thereto.
  3. Said unit price shall be considered full compensation for the furnishing of materials, labor, tools and equipment necessary to complete the above described work.
  4. Said unit price shall constitute full payment to **raise structures once**, to binder course grade or finish elevation.
  5. Said unit price shall also constitute payment for all field core penetrations, sealing devices, (i.e., boots) and stub pipes and caps for future connections of the size and type as shown on the drawings and as specified herein.
  6. Said unit cost shall include full compensation for additional concrete or brick masonry as necessary to construct inverts and special structures as shown on the Drawings.

## MEASUREMENT AND PAYMENT

7. Said unit price shall include required excavation and stone aggregate to provide a bedding depth of 6" below the structure. Additional excavation and stone bedding required below 6" for placement of geogrid trench stabilization as shown on the drawings will be paid under Item 1.8B
8. Maintenance of sewers / by-pass pumping is paid under Item 1.0
9. Said unit price shall include full compensation for installing and maintaining trench dewatering systems (i.e. trench sump dewatering) required to install structures in the dry as specified.
10. Wellpoint dewatering systems specified under Section 02650 used to pre-drain soils prior to final excavation and to install sewers in the dry will be paid as Item 1.12.
11. Removal and disposal of existing structures for the installation of new structures shall be incidental to this item.
12. Additional sheeting/shoring beyond what is required for typical trench excavation operations (i.e. trench boxes) will be paid under item 1.13.
13. Actual payment for these shall be broken down in accordance with the following percentages:
  - a. Manhole in place and backfilled - 40%.
  - b. Manhole successfully tested - 10%.
  - c. Manhole cleaned and invert built – 10%
  - d. Successful application of internal epoxy lining system – 40%

**ITEM NO. 1.5A: ADDITIONAL ADJUSTMENT OF SEWER MANHOLE COVERS (TO FINAL PAVEMENT ELEVATION)**

- A. Method of Measurement
  1. Adjusting new and existing sewer manhole frame and cover assemblies will be measured per each additional adjustment to final pavement elevation.
  2. The initial adjustment of sewer manhole frames and covers to binder grade and/or finish grade, if directed, is subsidiary to sewer manholes, Items 1.5.5 and 1.5.6, and will not be measured for payment.
  3. Sewer manhole frames and covers adjusted for the contractor's convenience will not be measured for payment.
- B. Method of Payment
  1. Payment under this item will be at the contract unit price for each structure that requires a second adjustment to finish elevation.
  2. Said unit price shall constitute full payment for demolition required to uncover the existing frame and cover, removal and replacement of existing brick, mortar and concrete, adjusting frame and cover to line and/or grade, replacement of gravels and pavement, and backfilling structure and compacting as required.
  3. Said unit price shall be considered full compensation for furnishing the tools, materials, labor, and equipment necessary for adjusting sewer manhole frames and cover assemblies.



**ITEM NO. 1.8A and 1.8B: FURNISH AND INSTALL GEOTEXTILE (Fabric & Geogrid),  
WHERE DIRECTED**

- A. Method of Measurement
1. Geotextile fabric and geogrid installed to the limits shown on the drawing, and where directed, shall be measured per linear foot for installations complete and in place as shown on the drawings.
  2. Double layers of geogrid (below catch basin and/or manhole structures) will be measured for each layer (2 times the linear foot measurement)
  3. Note:  
    A = Geotextile fabric around sewer bedding  
    B = Geogrid trench stabilization under pipe or structures
- B. Basis for Payment:
1. Payment of geotextile fabric and geogrid installed to the limits shown on the drawing, and where directed, shall be paid for at the Contract unit price per linear foot, complete and installed as shown on the drawings.
  2. Said unit price shall constitute full compensation for the furnishing of all materials, labor, equipment, and tools necessary for the installation and maintenance of construction fabric.
  3. Said unit price shall constitute full compensation for any "lost production" time incurred as a result of the installation.
  4. Said unit price shall be considered full compensation for additional excavation and crushed stone aggregate required below 6" normal bedding depth to the limits shown on the drawings for the installation of geogrid (trench stabilization).

**ITEM NO. 1.9: FIELD CORE SEWER MANHOLES INCLUDING PIPE CONNECTION  
SYSTEM**

- A. Method of Measurement:
1. The coring shall be measured for each field coring as noted on the Drawings or at the direction of the Engineer.
- B. Basis of Payment:
1. Payment under this item shall be at the Contract unit price for each coring in the appropriate diameter range.
  2. Said unit price will be considered full compensation for furnishing and installing the coring including fittings, stainless steel straps, holes and other modifications to manholes.
  3. Payment under this item shall constitute full compensation for all materials, equipment, labor and tools necessary to complete the work described.

**ITEM NO. 1.10: ABANDON EXISTING SEWER MANHOLES**

- A. Method of Measurement:
1. Abandoned sewer manholes shall be measured for each manhole abandoned at locations shown and in accordance with the details shown on the Drawings or as directed by the Engineer.
  2. Only manholes outside of trench limits shall be paid for under this item.
- B. Basis of Payment:
1. Payment under this item shall be at the Contract unit price for each manhole abandoned in accordance with the details on the Drawings.
  2. Payment under this item shall constitute full compensation for all materials, equipment, labor and tools necessary to complete the work described.
  3. Structures removed and replaced with new structures will not be considered for payment under this item.
  4. Payment shall include plugging existing sewer lines abandoned in place as shown on the drawings.

**ITEM NO. 1.11: FURNISH AND INSTALL FLOWABLE FILL**

- A. Method of Measurement:
1. Flowable fill shall be measured per cubic yards in place, as shown on the Drawings or as ordered.
- B. Basis of Payment:
1. Flowable fill shall be paid for at the Contract unit price per cubic yard.
  2. Said unit price shall constitute full compensation for the furnishing of all material, labor, equipment and tools necessary for pumping flow fill into the cavity of abandoned pipe, to a depth not less than 85% of the pipe depth.
  3. Said unit price shall also be considered full compensation to provide a written narrative and/or schematic describing ports of entry for flow fill and how calculations will be made to determine that pipe is adequately filled.
  4. **Payment for flowable fill** shall be broken down in accordance with the following percentages:
    - a. Flowable fill placed - 80%
    - b. Flowable fill verified in place - 20%

**ITEM NO. 1.12: WELLPOINT DEWATERING SYSTEM**

- A. Method of Measurement:
1. The pre-drained soil dewatering system shall be measured by the linear foot by the Engineer along the projected centerline of the sewer main for the areas in which the dewatering system is effectively installed and operated as approved by the Engineer.
  2. Measurement shall be to the nearest 1.0 foot.
  3. Wellpoint systems installed at locations not receiving prior approval by the Engineer will not be measured for payment.

- B. Basis of Payment:
1. The dewatering system shall be paid for at the contract unit price per linear foot.
  2. The said unit price shall be full compensation for all materials, equipment, tools, and labor to pre-drain soils using a wellpoint dewatering system or other approved methods in accordance with Section 02650 prior to final excavation and installation of proposed mains.
  3. The said unit price shall include installation, operation, and restoration of sheet piling, pumps, wellpoints, temporary pipe, temporary observation levels, discharge controls, and other necessary appurtenances required to complete dewatering operations.
  4. The said unit price shall include preparation, submittal, and approval of a dewatering plan and any necessary environmental discharge permits per Section 02650.
  5. Said unit price shall include full compensation for any loss in production for the sewer installation associated with installation, operation, and maintenance of the pre-drain dewatering system.
  6. Determination of need to pre-drain soils shall be by concurrence of the Engineer and Superintendent based on the following:
    - a. Observed water table > 2' above the proposed invert of the pipe.
    - b. Sufficient hydrostatic groundwater pressure to cause blowup of the trench bottom or sufficient to cause disturbance of the soil in the trench.
    - c. Perched water table above the invert of the pipe that can be addressed by conventional trench dewatering methods will not be considered sufficient to prompt payment under this item.
  7. Payment for this item will be considered only for the sewer installation.
  8. Pre-draining soil for installation of non sewer piping is incidental to those other piping items.
  9. Pre-draining dewatering systems installed solely for the installation of sewer services will not be considered for payment under this item.
  10. **Payment for trench sump dewatering shall not be made under this item and will be subsidiary to the respective item when used.**

**ITEM NO. 1.13: SHEETING**

- A. Method of Measurement:
1. Sheeting, where directed, will be measured by the square foot for sheeting installed, per an approved plan in accordance with Section 02369.
  2. Said measurement will be the nominal width times the depth, from the pipe invert to the ground surface.
  3. Steel plates driven alongside trench boxes, or other conventional excavation shoring systems are subsidiary to pipe installations and will not be measured for payment.

- B. Basis of Payment:
  - 1. Sheeting, where directed, will be paid at the Contract unit price per square foot for sheeting installed per an approved plan in accordance with Section 02369.
  - 2. Said unit price shall be considered full compensation for the design and submittal of an approved sheeting plan to accomplish the objectives described herein and as deemed necessary.

**ITEM NO. 1.15A: HEALTH AND SAFETY PLAN**

- A. Method of Measurement:
  - 1. The Health and Safety Plan (HASP) will be measured as a lump sum unit complete, as described in Section 13710.
- B. Basis of Payment:
  - 1. The Contractor will prepare a HASP which will identify procedures and protocols for handling regulated soils or groundwater, if encountered. The HASP will be paid at the contract unit price in accordance with the following percentages:
    - a. Preparation of the HASP - 70%
    - b. Delivery of the Closeout Safety Report - 30%
  - 2. Said unit price will be considered full compensation for the work as described in Section 13710 - Health and Safety Plan requirements, including air monitoring equipment and Personal Protection Equipment (PPE) identified within Section 13170.

**ITEM NO. 1.15B: MANAGEMENT OF SOILS & MATERIALS**

- A. Method of Measurement:
  - 1. Management of Soils and materials including regulated soils and materials, un-regulated soils, surplus soils, surplus materials and separation of materials will be measured will be measured as a lump sum unit based on the percentage of work complete.
- B. Basis of Payment:
  - 1. Management of Soils including regulated soils and materials, un-regulated soils, surplus soils, surplus materials and separation of materials will be paid for at the contract unit price per lump sum.
  - 2. Said unit price will be considered full compensation for all activities associated with management of soils, including:
    - a. Identification and characterization of soil regulated by the State of New Hampshire Department of Environmental Services (NHDES).
    - b. Segregation of regulated soils from non-regulated soils.
    - c. Incorporating regulated soils back into the project as backfill trenches wherever possible.
    - d. Coordination with 3<sup>rd</sup> party for analytical testing of soils, where directed.
    - e. Maintenance of stockpiles and material staging areas in accordance with applicable state and federal regulations.

- f. Trucking and disposal of non-regulated surplus materials including exempt materials such as pavement, concrete, masonry, stumps, brush, etc.
  - g. Said payment will also be considered full compensation for covering regulated soils and materials to prevent leaching or migration of contaminants into ground water.
3. Trucking and disposal of surplus regulated soils and materials is included in items 1.15C and 1.15D and is not included in this item.

**ITEM NO. 1.15C: LOAD AND HAUL SURPLUS REGULATED SOILS & MATERIALS (WHERE DIRECTED)**

- A. Method of Measurement:
- 1. Load and Haul surplus regulated soils and materials (where directed) will be measured by the ton based on weight slips from a certified scale at a landfill disposal facility that is approved by the Owner. Copies of slips shall be provided.
  - 2. Measurement will include trucking within 30 miles (one way) of the project site (Turnkey, Rochester NH). Measurement for disposal sites less or greater than 30 miles will be based on the proportionate distances as follows:  
$$\text{Ton delivered} \times \text{Actual distance}/30 \text{ miles}$$
  - 3. Loading, Hauling and Disposal of non-regulated soils will not be measured for payment
- B. Basis of Payment:
- 1. Loading and hauling surplus regulated soils and materials (where directed) will be paid for at the Contract Unit Price per ton delivered to disposal location approved by the Owner.
  - 2. Said unit price shall be considered full compensation for all materials, labor and equipment necessary for loading and hauling to the approved disposal site.
  - 3. Said payment will be considered full compensation for decontamination and cleanup of equipment and staging areas if needed.
  - 4. Disposal of regulated soils and materials (where directed) is included in Item 1.15D and is not included in this item.

**ITEM NO. 1.15D: DISPOSAL OF REGULATED SOILS & MATERIALS (WHERE DIRECTED)**

- A. Method of Measurement:
- 1. Disposal of regulated soils and materials will be measured by the ton based on weight slips from a certified scale at landfill disposal facility approved by the Owner. Copies of slips shall be provided.
- B. Basis of Payment:
- 1. Disposal of contaminated soils and materials will be paid for at the Contract Unit Price per ton delivered to the approved disposal location.

**ITEM NO. 1.15E: ANALYTICAL TESTING OF SOILS (WHERE DIRECTED)**

- A. Method of Measurement:
1. Analytical testing of soils (where directed) will be measured as an allowance, based on the dollar amount of invoices from an approved 3<sup>rd</sup> party testing company experienced with NHDES soil disposal regulations, submitted without Contractor markup.
  2. The dollar limit (allowance) prescribed in the Bid Schedule shall not limit the Engineer or Owner in determination of the value of the work.
  3. Analytical testing not approved by the Owner will not be measured.
- B. Basis of Payment:
1. Payment for Analytical testing of soils will be based on actual invoices from approved 3<sup>rd</sup> party testing company experienced with NHDES soil disposal regulations. Payment shall be without markup.
  2. Coordination of 3<sup>rd</sup> party testing (where directed) is included in Item 1.15B and is not included in this item.

**ITEM NO. 1.15F: INSTALLATION OF GROUNDWATER MONITORING WELLS (WHERE DIRECTED)**

- A. Method of Measurement:
1. Installation of groundwater monitoring wells will be measured per each installed in accordance with the Typical monitoring well detail provided in Section 01000 – Prosecution of Work as directed
- B. Basis of Payment:
1. Installation of groundwater monitoring wells will be paid per each installed complete and in place.
  2. Said unit price shall be considered full compensation for providing all labor tools and equipment necessary to complete the described work including overhead costs to coordinate with well installation sub contractors.
  3. Said unit price shall include providing all materials required to install monitoring wells including but not limited to: inlet screen, riser sections, riser caps, protective cap, filter sand pack fill, bentonite fill, common fill as needed to successfully install the well as shown.
  4. Said unit price will be considered full compensation for the de-contamination of all equipment used as required and for the proper disposal of any contaminated ground water resulting from the installation of the wells.
  5. Agreed to unit price shall include compensation for submission to the owner and the engineer boring log and well construction diagrams in accordance with state and federal regulations. Wells installed for which required documentation is not provided will not be considered for payment.

**ITEM NO. 1.15G: ANALYTICAL TESTING OF GROUNDWATER SAMPLES FOR THE 23 PERFLUOROALKYL SUBSTANCES (PFAS) (WHERE DIRECTED)**

- A. Method of Measurement:
  - 1. Analytical testing of groundwater (where directed) by an approved 3<sup>rd</sup> party testing company will be measured per each.
  - 2. Analytical testing not approved by the Owner will not be measured.
- B. Basis of Payment:
  - 1. Payment for analytical testing of groundwater samples by an approved 3<sup>rd</sup> party testing company will be at the Contract unit price per each test complete.
  - 2. Payment under this item shall be considered full compensation for the collection of samples to be analyzed, transportation and documentation of samples in accordance with all local, state, and federal regulations, successful completion of testing for the 23 perfluoroalkyl substances, and providing testing results to the Owner and Engineer with all required documentation.
  - 3. Testing that is not successful due to procedural issues (either by the Contractor or the 3<sup>rd</sup> party testing company) or that is missing documentation will not be considered for payment.

**ITEM NO. 1.15H: PROCURE A TEMPORARY GROUNDWATER DISCHARGE PERMIT (ALLOWANCE) (WHERE DIRECTED)**

- A. Method of Measurement:
  - 1. Procurement of a Temporary Groundwater Discharge Permit will be measured as a lump sum as follows
    - a. 75% upon completion and submittal of the Temporary Groundwater Discharge Permit
    - b. 25% upon receipt of an approved Temporary Groundwater Discharge Permit from NHDES
  - 2. Measurement of this item will not exceed 100%
- B. Basis of Payment:
  - 1. Procurement of a Temporary Groundwater Discharge Permit will be paid at the Contract unit price per lump sum
  - 2. Said unit price shall be considered full compensation for all consulting, tools, labor, equipment and materials needed to complete and submit the permit application
  - 3. Said unit price shall be considered full compensation for providing supplemental information or resubmittals as requested by NHDES for permit approval.
  - 4. Payment will only be considered when evidence of transmittal of the completed application is provided by the Contractor and/or when a copy of the approved permit application from NHDES is provided by the Contractor.

**ITEM NO. 1.15I: PROVIDE A TEMPORARY GROUNDWATER TREATMENT SYSTEM**

- A. Method of Measurement:
1. The Temporary Groundwater Treatment System will be measured per month the system is on-site and available for the Contractor's use to treat dewatering discharge.
  2. A month will be considered 30 calendar days. Partial months will be measured to the next highest quarter (0.25) of a month by dividing the number of calendar days since the previously paid month by the 30 day month.
  3. Measurement will begin no earlier than 5 days prior to the start of excavation operations and will end upon completion of pipe and structure installation.
- B. Basis of Payment:
1. The Temporary Groundwater Treatment System will be paid at the contract unit price per month.
  2. Payment shall be considered full compensation for all labor and coordination required to provide a temporary groundwater treatment system on site on standby at all times while excavation operations are in progress as specified in section 01000 – Prosecution of Work.
  3. Payment shall include all mobilization and demobilization costs of the treatment system.
  4. Payment for work related to day to day operation of the system to accommodate contractor operations will be paid under Item 1.15H.

**ITEM NO. 1.15J: OPERATE AND MAINTAIN THE TEMPORARY GROUNDWATER TREATMENT SYSTEM**

- A. Method of Measurement:
1. Operation of the temporary groundwater treatment system will be measured per week the system is in use during completion of the work
  2. A week will be considered 5 calendar days (Monday through Friday). Partial weeks will be measured to the next highest half (0.5) of a week by dividing the the number in days of operation that week by 5.
  3. Measurement will be considered for each week (or portion of) the system is in use for the purpose of treating all discharge of excavation dewatering operations.
- B. Basis of Payment:
1. Operation of the temporary groundwater treatment system will be paid at the Contract unit price per week.
  2. Said unit price shall include all equipment, tools, and labor required to successfully operate and maintain the system to cover day to day operations including but not limited to: running hoses from the Contractor's dewatering operation to the treatment system, moving the system on site as required, training as required by the supplier to properly operate a function system, system inspection/monitoring of the system as required or specified by the supplier, repairs or maintenance as needed for defective or broken system



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- components, and maintaining the system's discharge location as required in the Temporary Groundwater Discharge Permit from NHDES.
3. Said unit price shall be considered full compensation for the replacement and disposal of filtration/treatment media (granulated activated carbon) and accumulated sediment as required to maintain a properly operating system.
  4. Sampling and analysis of groundwater as specified will be paid under item 1.15G
  5. Procurement of and NHDES Temporary Groundwater Discharge Permit will be paid under Item 1.15H

**ITEM NO. 1.16A: UNKNOWN UTILITY CROSSING**

- A. Method of Measurement:
  1. Unknown utility crossing will be measured as a single unit for each utility pipe crossing that exceeds what normally can be anticipated, defined as follows:
    - a. The Contractor can anticipate that each unit or building has one service lateral each for gas, sewer and water unless additional crossings are shown on the drawings. Additional utility crossings (more than one of each) will be measured for payment under this item.
  2. Unmarked or mismarked utility crossings will not be measured for payment under this item unless they exceed what normally can be anticipated as defined in line 1.a above
  3. Utility crossings, delineated or otherwise, indicated on the drawings will not be measured for payment under this item.
  4. Repair of unknown/unmarked or mismarked utility crossings will be measured and paid under Item 1.16B.
- B. Basis of Payment:
  1. Unknown utility crossing will be paid for at the contract unit price per each crossing as measured in A, above.
  2. Said unit price will be considered full compensation for the Contractor's crew, labor and equipment, and any lost time or production that is associated with the unknown utility crossing as identified in A, above.
  3. Repair of unknown utility will be paid for in accordance with Item 6E and is not included in the payment of this item.
  4. An unknown or mismarked utility will only be considered once for payment.

**ITEM 1.16B: REPAIR OF UNKNOWN UTILITIES OR MISMARKED UTILITIES**

- A. Method of Measurement:
  1. Repair of unknown utilities or mismarked utilities will be measured as a single unit for each utility pipe that requires repair, regardless of the size or material of the utility conduit.
  2. To be eligible for measurement under this item, the Contractor shall review the utility discovered with the Owner's Representative to determine that the utility repairs are required.

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3. Repair of utilities that are marked by Dig-Safe or indicated on the drawings will not be measured for payment, unless they are 6-feet beyond the locations indicated as determined and measured by the Engineer.
- B. Basis of Payment:
1. Repair of unknown utilities or mismarked utilities will be paid for at the contract unit price for each utility repaired as measured in A, above.
  2. To be eligible for payment under this item, the Contractor shall review the utility discovered with the Owner's Representative to determine that the utility repairs are required. Any utility repaired without approval from the Owner's Representative will not be considered for payment.
  3. Said unit price will be considered full compensation for all materials, equipment and labor, necessary to repair unknown or unmarked utilities to original or better condition using similar or compatible materials, as approved by the Engineer or Owner's representatives.
  4. Repairs using dissimilar sizes or materials, or utility repairs that are not properly aligned as determined by the Engineer will not be considered for payment.
  5. An unknown or mismarked utility will only be considered once for payment.

**ITEM NO. 1.17: POST CONSTRUCTION VIDEO OF SEWERS**

- A. Method of Measurement:
1. Post-construction video of sewers, where directed, will be measured per the linear foot.
- B. Basis of Payment:
1. Video inspection will be paid for at the Contract unit price per linear foot upon completion and submittal of DVD video record in accordance with Section 01382.
  2. Payment shall include providing all materials, labor, and equipment required for completing video inspection of the completed sewers, or at locations as directed, and in accordance with Section 01382.
  3. Payment will not be considered for video deemed poor quality by the Owner or the Engineer. The Contractor will be required to re-record and re submit video records at no additional cost to the Owner before payment is authorized.

**ITEM NO. 2.1.12: FURNISH & INSTALL 12" CPE DRAIN PIPE**

- A. Method of Measurement:
1. Drain pipe shall be measured by the linear foot along the horizontal centerline of the pipe, including fittings, as laid from the inside edge of the manhole or catch basin to the inside edge of the next structure.
  2. Restoration/repair of drainage pipes resulting from work completed within the limits described in Item 1.1.18A will be subsidiary to that item and will not be measured for payment.
- B. Basis of Payment:
1. Pipe shall be paid for at the Contract price per linear foot.

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2. Said unit price shall constitute full compensation for furnishing and installing all materials, mainline fittings and adapters, materials, labor, equipment and tools necessary for hauling, handling, laying, jointing and cleaning the pipe.
3. Said unit price shall also include all necessary clearing and grubbing, earth excavation, removal of existing structures, existing (non asbestos) pipe removal and disposal, bedding, backfill, compaction, cleaning and other incidental items, such as, segregation of suitable backfill materials, stockpiling and placement of pavement reclamation materials and roadway gravels, and the disposal of excess fill material.
4. Said unit price shall include full compensation for installing and maintaining trench dewatering systems (i.e. trench sump dewatering) required to install the pipe in the dry as specified.
5. Wellpoint dewatering systems specified under Section 02650 used to pre-drain soils prior to final excavation and to install sewers in the dry will be paid as Item 1.12.
6. Said unit prices for each pipe bid item shall also constitute full compensation for the following:
  - a. Restoration of all property to pre-construction conditions.
  - b. Restoration of curb to pre-construction conditions, unless paid for under separate item.
7. Said price shall also include any corings, fittings, adapters, etc. not covered under a separate bid item, which is required to connect the new drain to the existing drain.
8. Said unit price shall also include any fittings or adapters required to repair existing sewers or drains damaged during construction.
9. Said unit price shall include furnishing and installing "Inserta Tee" connections for storm sewers where not paid for under a separate bid item.
10. Said unit price shall include demolition of existing drain pipe as identified on the plans with the exception of the demolition and disposal of AC pipe which will be paid as a separate item.
11. Said unit price shall also include full compensation for the relocation of utilities (including but not limited to water less than six (6) inches in diameter, gas, drain, electric and telephone) which interfere with the proposed drain unless payment is made under another item and also includes the repair of utilities damaged by the Contractor.

**ITEM NO. 2.6.4: FURNISH AND INSTALL 4' DIAMETER CATCH BASINS**

- A. Method of Measurement:
  1. Catch basins will be measured per each installed complete and in place
- B. Basis of Payment:
  1. Catch basins will be paid at the Contract unit price per each.
  2. Said unit price shall be considered full compensation for furnishing and installing precast sections with penetrations and boots, frames and covers,

- liner assemblies, screened gravel subbase, concrete and masonry materials, water-proofing as specified, construction fabric, catch basin testing, and all work incidental thereto.
3. Said unit price shall be considered full compensation for the furnishing of materials, labor, tools and equipment necessary to complete the above described work.
  4. Said unit price shall constitute full payment to adjust structures to grade as shown on the plans, and for any required adjustments following final placement of pavement.
  5. Said unit price shall also constitute payment for all field core penetrations, sealing devices, (i.e., boots) and stub pipes and caps for future connections of the size and type as shown on the drawings and as specified herein.
  6. Said unit cost shall include full compensation for additional concrete or brick masonry as necessary to construct special structures as shown on the Drawings
  7. Said unit price shall be considered full compensation for maintenance of drain flows through bypass pumping, unless paid for under a separate item.
  8. Said unit price shall include full compensation for installing and maintaining trench dewatering systems (i.e. trench sump dewatering) required to install the structure in the dry as specified.
  9. Wellpoint dewatering systems specified under Section 02650 used to pre-drain soils prior to final excavation and to install sewers in the dry will be paid as Item 1.12.
  10. Removal and disposal of existing structures for the installation of new structures shall be incidental to this item.

**ITEM NO. 2.6A: FURNISH AND INSTALL CATCH BASIN HOODS (12" THROUGH 18" DIAMETER OUTLET PIPES OR AS DIRECTED)**

- A. Method of Measurement:
  1. Catch basin hoods will be measured per each installed into new and existing catch basins.
- B. Basis of Payment
  1. Catch basin hoods shall be paid at the contract unit price per each installed.
  2. Said unit price shall constitute full compensation for the furnishing of all materials, labor, equipment, and tools necessary to install catch basin hoods as recommended by the manufacturer.
  3. Said unit price shall constitute full compensation for any "lost production" time incurred as a result of the installation.

**ITEM NO. 3.1: RELOCATE EXISTING WATER MAIN AT SEWER CROSSING (ALL SIZES)**

- Method of Measurement:
1. Relocation of existing water mains (any size) will be measured per each as shown on the drawings or as directed by the Owner or the Engineer .

B. Basis of Payment

1. Pipe shall be paid for at the Contract price per each relocation completed to the limits as shown on the drawings.
2. Said unit price shall constitute full compensation for furnishing and installing all materials, labor, equipment and tools necessary for hauling, handling, laying, jointing and testing pipe.
3. Said unit price shall include all necessary earth excavation, bedding, sheeting, backfill, compaction, rigid insulation, cleaning and testing and other incidental work.
4. Said unit price shall include full compensation for installing and maintaining trench dewatering systems (i.e. trench sump dewatering) required to install the pipe in the dry as specified.
5. Wellpoint dewatering systems specified under Section 02650 used to pre-drain soils prior to final excavation and to install sewers in the dry will be paid as Item 1.12.
6. Said price shall include any fittings, tees, wyes, adapters, couplings, thrust restraint fittings and thrust blocks, etc. not covered under separate bid items which are required to connect existing pipe to the proposed water main.
7. Said unit price shall include temporary piping, temporary facilities, and temporary services, not included or paid for under separate items, as necessary to maintain water service during construction.
8. Said unit price shall include removal and proper disposal of (non-asbestos) existing water main, in-line valves, and other items that are abandoned and are required to be removed. Unit price shall include caps for pipes abandoned in place.
9. Said unit price shall include sheeting and bracing (if necessary) unless paid for .
10. Said unit price shall include disinfection, de-chlorination, bacteriological, and pressure testing.
11. Said unit price shall include installation and removal of temporary blowoffs, including any corporations, pipes and shut-offs needed to flush lines and chlorinate the system when this cannot be accomplished through an existing hydrant.

**ITEM NO. 4.1A and 4.1B: FURNISH AND INSTALL HOT BITUMINOUS PAVEMENT  
– MACHINE METHOD (BINDER COURSE AND WEARING COURSE)**

A. Method of Measurement:

1. Hot bituminous pavement machine method will be measured per ton of pavement installed within the limits shown on the drawings or as ordered by the Engineer.
2. Two methods of measurement will be considered at the discretion of the Engineer:
  - a. Batch weights (tare slips) may be used. This method will not be acceptable if multiple paving methods (machine and hand methods)

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are being completed simultaneously on the same day. Batch weights (tare slips) must meet the requirements of NHDOT Section 401.4.

- b. Hand calculation using average area, thickness and NHDOT pavement density conversion factors (0.0567 Ton/SY-IN)
- 3. Pavement depth shall be verified through yield computations using pavement tare slips and NHDOT pavement density conversion factors. Paved areas not demonstrating the specified depth will not be considered for payment.
- 4. Note:
  - A – ¾” Binder Course – 50 Gyration
  - B – ½” Wearing Course – 50 Gyration
- B. Basis of Payment:
  - 1. Hot bituminous pavement machine method will be paid for at the Contract unit price per ton.
  - 2. Said unit price shall constitute full compensation for furnishing all materials, labor, equipment and tools necessary for installing machine method hot bituminous pavement.
  - 3. Payment shall include fine grading.
  - 4. Said unit price shall include full compensation for adjustment or restoration to original condition of catch basins, manholes, valve covers, curb stops, signs, fences, shrubs, and/or landscaping, etc. not paid for under separate items.
  - 5. Said unit price shall include full compensation for furnishing and installing pavement markings (i.e. striping) not paid for under separate items.
  - 6. Payment shall be considered full compensation for mobilizing the paving operation multiple times.

**ITEM NO. 4.1C: FURNISH AND INSTALL TEMPORARY TRENCH WIDTH PAVEMENT (3”) REPAIRS**

- A. Method of Measurement:
  - 1. The quantity of temporary pavement repairs to be measured for payment under this item shall be the number of square yards of temporary trench repairs placed.

- B. Basis of Payment
1. Temporary pavement repairs shall be paid for at the Contract unit price per square yard.
  2. Said unit price for constructing trench width temporary pavement repair, as shown on the Drawings, shall constitute full compensation for the furnishing of all materials, labor equipment and tools necessary for mechanically cutting and removing broken pavement; placement of crushed gravel base course and installation of the pavement to the limits shown on the Drawings and as specified.
  3. Said unit price shall include full compensation for adjustment or restoration to original conditions of all manhole covers, catch basins, gate valves, driveways, walks, etc., prior to the replacement of pavement.
  4. Fill soils may have the tendency to slough into trench. (See geotechnical report provided in Appendix.) Payment limits are indicated on the Drawings and no additional payment will be provided for increased trench width as a result of installing trench side slopes.

**ITEM NO. 4.1D: FURNISH AND INSTALL PERMANENT TRENCH WIDTH PAVEMENT (3½") REPAIRS**

- A. Method of Measurement:
1. The quantity of permanent pavement repairs to be measured for payment under this item shall be the number of square yards of permanent trench repairs placed.
- B. Basis of Payment:
1. Permanent pavement repairs shall be paid for at the Contract unit price per square yard.
  2. Said unit price for constructing permanent trench width pavement repairs, to the limits shown on the Drawings, shall constitute full compensation for the furnishing of all materials, labor, equipment and tools necessary for removing existing pavement (including sawcutting) grading the gravel base course, additional gravel base as needed, application of emulsified asphalt tackifiers and constructing the permanent pavement repairs to the depths shown on the Drawings.
  3. Pavement outside the limits shown of the Drawings that is cracked, broken or otherwise damaged, as a result of the Contractor's operations, shall be repaired by the Contractor at no additional cost to the Owner.
  4. Said unit price shall include full compensation for adjustment or restoration to original conditions of all manhole covers, catch basins, gate valves, driveways, walks, etc. prior to the placement of each coarse of pavement.
  5. Permanent trench width pavement installation shall occur one winter season following completion of sewer line installation.
  6. Said unit price shall include replacing all existing striping (centerlines, crosswalks, etc.).

7. Fill soils may have the tendency to slough into trench. (See geotechnical report provided in Appendix.) Payment limits are indicated on the Drawings and no additional payment will be provided for increased trench width as a result of installing trench side slopes.

**ITEM NO. 4.3: FULL WIDTH PAVEMENT RECLAMATION (8" DEPTH)**

- A. Method of Measurement:
  1. The quantity of full width pavement reclamation to be measured for payment under this item shall be the number of square yards of full width payment reclamation from edge of traveled way to edge of traveled way, as specified and as shown on the Drawings or as ordered for Goosebay Drive only.
  2. Pavement reclamation will be measured by multiplying the ordered length by the ordered width of the roadway to the depth specified on the Drawings.
  3. Measurement shall be to the nearest 0.5 SY.
- B. Basis of Payment:
  1. Full width pavement reclamation shall be paid for at the contract unit price per square yard
  2. Said unit price shall constitute full compensation for the furnishing of all materials, labor, equipment and tools necessary for constructing the full width pavement reclamation and all work incidental thereto.
  3. Said unit price shall include full compensation for lowering existing utility structures to a depth below the material to be scarified, scarifying pavement and existing gravel, and pulverizing scarified material.
  4. Said unit price shall also include full compensation for uniformly grading the reclaimed asphalt in a manner that will promote positive drainage along curb lines to drainage receptacles.
  5. Said unit price shall include material testing including asphalt content and additional materials need to meet specified gradation.
  6. Said unit price shall include all sawcutting at limits of reclamation.

**ITEM NO. 4.5: FURNISH AND INSTALL ADDITIONAL CRUSHED GRAVEL (WHERE ORDERED BY THE ENGINEER)**

- A. Method of Measurement:
  1. The quantity of additional crushed gravel to be measured for payment under this item shall be the number of cubic yards of crushed gravel measured in place after compaction, used as roadway subbase below normal depth and shall be the same as that number of cubic yards of additional road bed excavation below normal depth measured for payment under the additional excavation items, which said gravel replaces.
- B. Basis of Payment:
  1. Additional crushed gravel shall be paid for at the Contract unit price per cubic yard.



2. Said unit price shall constitute full compensation for the furnishing of all materials, labor, equipment, and tools necessary for furnishing, placing and compacting crushed gravel as specified.

**ITEM NO. 6A: MOBILIZATION**

- A. Method of measurement:
  1. Measurement for this item shall be by lump sum.
- B. Basis for payment
  1. Said lump sum price shall include full compensation for all bonds, insurances and administrative costs including the costs for maintaining any field office(s) and for the utilities associated therewith.
  2. Said lump sum shall include full compensation for mobilization and demobilization costs including fees associated with transportation, costs necessary to secure a staging area and any other work necessary for the project not paid for under a separate item.
  3. An increase in the scope of work shall not be grounds for increase in the value of the mobilization item. Additional bond, insurance and administrative costs shall be included in the change order value that increased the scope of work.
  4. An increase in the installed quantity of an item measured for payment and described in the Bid Schedule shall not be grounds for increase in the value of the mobilization item.
  5. The mobilization item shall not exceed ten (10%) percent of the Contract price.
  6. Said lump sum shall be as follows:
    - a. When five (5) percent of the original Contract amount is earned, the accumulated total to be paid will be twenty-five (25) percent of the amount bid, or 2 ½ percent of the original Contract amount whichever is the lesser.
    - b. When ten (10) percent of the original Contract amount is earned, the accumulated total to be paid will be fifty (50) percent of the amount bid, or five (5) percent of the original Contract amount, whichever is the lesser.
    - c. When twenty-five (25) percent of the original Contract is earned, the accumulated total to be paid will be sixty (60) percent of the amount bid, or six (6) percent of the original Contract amount, whichever is the lesser.
    - d. When fifty (50) percent of the original amount is earned, the accumulated total to be paid will be 100 percent of the amount bid or ten (10) percent of the original Contract amount, whichever is the lesser.

**ITEM NO. 6.1: LEDGE REMOVAL AND DISPOSAL**

- A. Method of Measurement:
1. Ledge removal and disposal shall be measured per cubic yard of ledge removed within payment limits indicated on the Drawings or as directed by the Engineer.
  2. Measurement beyond the limits indicated on the plans will only be considered if such limits have been authorized in writing by the Engineer, in which case measurement shall be made to the authorized limits.
  3. The field representative shall make field measurements for ledge removal either in place before excavation or by measuring the length and average depth of ledge removed.
  4. Payment width (w) for ledge excavation shall be as follows:
    - a. For pipes 15 inches nominal diameter or less, W shall be no more than 36 inches.
    - b. For pipes greater than 15 inches in nominal diameter, W shall be 24 inches plus pipe outside diameter (O.D.).
  5. Logs for borings taken along the project are recorded in the Appendix of this Contract.
  6. Boulders measuring less than two cubic yards will not be measured for payment.
- B. Basis of Payment:
1. Ledge excavation shall be paid for at the Contract unit price per cubic yard.
  2. Said unit price shall constitute full compensation for the furnishing all labor, equipment, and materials associated with ledge excavation and disposal.
  3. Said unit price shall include full payment of the furnishing and installation of suitable backfill for trench.
  4. Said unit price shall also include full compensation for all permits, insurances, pre-blast surveys, blast monitoring etc. if the use of explosives is the selected method of ledge demolition.
  5. Boulders removed from the trench shall be removed from the work area immediately after measurement.
  6. Rock removal shall be consistent with current City Blasting Ordinance.

**ITEM NO. 6.2: ADDITIONAL EXCAVATION AND EXCAVATION OF UNSUITABLE MATERIALS**

- A. Method of Measurement:
1. Additional excavation below normal depth or excavation of unsuitable material below normal depth shall be measured per cubic yard, as ordered by the Engineer. Unsuitable materials may include but not be limited to: peat, muck, stumps, wood debris, etc.
  2. The volume shall be determined by multiplying the average pay width by the average length by the average depth as measured by the Engineer.
  3. The quantities of additional excavation shall be cumulative; that is an increase on any part of the work shall offset a decrease on any other part of

the work, and the final adjustment shall be based on the net increase or decrease for these items.

4. For changes in line or grade of the sewers or drain as directed by the Engineer, the first 1 foot depth of additional excavation shall be incidental to the pipe installation item. Additional depth exceeding 1 foot shall be measured for payment under this item.
  5. Handling of regulated and non-regulated soils will be as provided in Item 1.15B and will not be measured for payment under this item.
- B. Basis of Payment:
1. Additional excavation and excavation of unsuitable materials shall be paid for at the Contract unit price per cubic yard.
  2. Said unit price shall constitute full compensation for the furnishing of all material, labor, equipment and tools necessary for additional excavation and disposal of all unsuitable materials.
  3. Said unit price shall be considered full compensation for proper disposal of unsuitable materials.

**ITEM NO. 6.3: FURNISH AND INSTALL ADDITIONAL SCREENED GRAVEL (CRUSHED STONE) (WHERE ORDERED BY THE ENGINEER)**

- A. Method of Measurement:
1. Additional screened gravel shall be measured per cubic yard measured in place after compaction, used as backfill below normal depth.
  2. Measurement shall be by multiplying the ordered width by the ordered length by the depth after compaction.
  3. Measured quantity shall be the same as that number of cubic yards of additional earth excavation required below normal depth which said gravel replaces.
  4. Screened gravel used for bedding pipe backfill unauthorized excavations, backfill rock excavations, replacing unsuitable trench material, or as indicated on the Drawings, for which appropriate payment items have been provided, shall not be included for payment under this item.
- B. Basis of Payment:
1. Additional screened gravel shall be paid for at the Contract unit price per cubic yard.
  2. Said unit price shall constitute full compensation for the furnishing of all materials, labor, equipment, and tools necessary for furnishing, placing and compacting screened gravel as specified.

**ITEM NO. 6.4: EXPLORATORY TEST PIT EXCAVATION**

- A. Method of Measurement:
1. Test pits shall be measured per each individual test pit completed.
  2. Test pits will only be measured for payment if shown on the drawings or at locations approved by the Engineer. Test pits or exploratory excavation completed in the absence of the Engineer will not be considered for payment.

## MEASUREMENT AND PAYMENT

3. Locations shown on the drawings are approximated and installation at these locations shall be coordinated with the Engineer.
- B. Basis of Payment:
1. Test pits shall be paid at the Contract unit price per each.
  2. Payment under this item shall be full compensation for furnishing all equipment, labor, and materials for excavation, location of existing utilities, backfill, property restoration and all else incidental for which separate payment is not provided for under other items.
  3. Payment for individual test pits exceeding 10 CY will constitute additional payment based on the proportional increase of the test pit excavation.
  4. Said unit price shall constitute full compensation for any repairs to existing utilities that result from exploratory test pit excavation.

**ITEM NO. 6.5: MAINTENANCE OF TRAFFIC**

- A. Method of Measurement:
1. Maintenance of Traffic will be measured for payment per lump sum, based on the following percentages:
    - a. Approved Traffic Control Plan(s) will be measured incrementally based on the TCP for the different phases of the work up to 25% of the unit item.
    - b. Maintenance of traffic will be measured incrementally based on the number of days traffic is maintained in accordance with Contract Documents and the approved Traffic Control Plan divided by the Contract time for substantial completion.
    - c. Days that traffic or Dust Control is not maintained in accordance with the approved TCP, or project specifications, will not be measured for payment upon notification of non-compliance by the Engineer.
  2. Measurement of this item shall not exceed 1.00 (100%).
- B. Basis of Payment:
1. Maintenance of Traffic will be paid for at the Contract unit price per lump sum.
  2. Payment shall be considered full compensation for maintenance of traffic in accordance with Section 01570 and Dust Control Section 01512.
  2. Said lump sum price shall be considered full compensation for development and approval of a detailed traffic control plan that shows the location of all traffic control devices, detours, road closures etc., necessary to complete the work. The Plan shall include appropriate phases that are keyed to specific project milestones.
  3. Said lump sum price shall be considered full compensation for revisions, modifications or resubmissions necessary to demonstrate safe passage through the work zone consistent with NHDOT and MUTCD standards.
  4. Said unit price shall be considered full compensation for all materials, labor and equipment necessary for the installation of traffic control devices, the maintenance of the same in good working order, replacement of any devices

- damage or stolen and the relocation of devices made necessary by a new phase of the work in accordance with the Traffic Control Plan.
5. Failure to maintain the traffic control devices or failure to fully implement the Traffic Control Plan shall result in a reduction in the compensation for that period.
  6. The City of Portsmouth Public Works Departments or the Pease Development Authority may require modification of the Traffic Control Plan based on actual field conditions. Modification of the approved Traffic Control Plan shall not constitute a claim for additional compensation under this item. Said lump sum shall include full compensation for making the necessary modifications to the Traffic Control Plan.
  7. The Contractor shall maintain Safe Passage through the construction area at the end of each construction day. This shall include work necessary to assure that the full width of the roadway is made useable outside the immediate work zone.

**ITEM NO. 6.6: ALLOWANCE FOR UNIFORMED OFFICER FOR TRAFFIC CONTROL**

- A. Method of Measurement:
  1. This item shall include the allowance identified in the bid schedule.
  2. Measurement for the uniformed police officer shall be based on the actual invoices submitted.
  3. Hours billed to the Contractor for minimum time requirements that are not hours actually on duty are excluded from payment under this item.
- B. Basis of Payment:
  1. Payment for uniformed police officers shall be on the basis of each man-hour on-site and will be based on actual invoices submitted to the Engineer by the Contractor with no mark-up.
  2. Payment shall be at the Contract price as stipulated by the Portsmouth Police Department or designated Department requested by the Portsmouth Police Department.
  3. Payment will only be made if use of uniformed police has been approved by the Owner and the Engineer.

**ITEM NO. 6.7: UNIFORMED FLAGGER FOR TRAFFIC CONTROL**

- A. Method of Measurement
  1. Uniformed flagger measured per actual man-hours on duty directing traffic.
  2. Measurement shall be based on hours listed on the daily flagger detail slips as signed off by the Project Superintendent at the end of each work day.
  3. Hours billed to the Contractor for minimum time requirements that are not hours actually on duty are excluded from payment under this item.
- B. Basis of Payment:
  1. Payment for uniformed flaggers shall be the actual hours on duty directing traffic.

## MEASUREMENT AND PAYMENT

2. Payment for uniformed flaggers shall be at the Contract unit price and shall constitute full compensation for flagger labor including salaries, benefits and incidental costs.
3. Uniform flagger must be employed exclusively as a flagger and dressed in the appropriate attire to be clearly visible to traffic. A laborer or equipment operator performing flagger duties when needed will not be considered for payment under this item.
4. Said unit price will be considered full compensation for additional administrative and coordinating costs required to secure all flagging permits required by the Portsmouth Public Works Department.

**ITEM NO. 6.8A: DEVELOP A STORMWATER POLLUTION PREVENTION PLAN (SWPPP)**

- A. Method of Measurement:
  1. The StormWater Pollution Prevention Plan will be measured as a single unit.
  2. Measurement will be made upon approval of the Plan by the Engineer, the Public Works Department and upon receipt of a NPDES permit for construction.
- B. Basis of Payment:
  1. The StormWater Pollution Prevention Plan will be paid for at the Contract unit price.
  2. Said price shall be considered full compensation for development of a detailed plan that shows the location of all erosion and storm water control devices including sedimentation basins, sediment collections bags, etc., for construction dewatering discharges, etc., necessary to complete the work. The Plan shall include appropriate phases that are keyed to specific project milestones.

**ITEM NO. 6.8B: IMPLEMENT AND MAINTAIN APPROVED STORMWATER POLLUTION PREVENTION PLAN (SWPPP)**

- A. Method of Measurement:
  1. Implementation and maintenance of the Stormwater Pollution Prevention Plan will be measured as a unit.
  2. Measurement will be made based on the percentage of work completed at each payment requisition.
- B. Basis of Payment:
  1. Implementation and maintenance of the Stormwater Pollution Prevention Plan will be paid for at the Contract unit price.
  2. Said price shall be considered full compensation for all materials, labor and equipment necessary for the installation of erosion, sediment control and storm water management devices, the maintenance of the same in good working order, replacement of any devices damaged or filled with sediment and the relocation of devices made necessary by a new phase of the work in accordance with the Erosion and Storm Water Pollution Prevention Plan.

3. Failure to maintain erosion and sediment control and storm water management devices, or failure to fully implement the plan, shall result in a reduction in the compensation for that period.
4. Said price shall include daily dust control using a water truck and sweeping in accordance with Section 01562.

**ITEM NO. 6.9: REMOVE AND DISPOSE OF ASBESTOS CEMENT (AC) PIPE (ALL DIAMETERS) WHERE ENCOUNTERED**

- A. Method of Measurement:
  1. AC pipe removed and disposed under this item shall be measured for per linear foot.
  2. Measurement shall be along the centerline of the pipe, including service connections.
  3. Measurement under this item shall be for asbestos pipe removal and disposal within the trench excavation for the proposed pipe. Measurement shall not be made for asbestos pipe removal and disposal which is outside the limits of trench excavation and does not pose interference to construction if left in place.
- B. Basis of Payment:
  1. Pipe removal and disposal shall be paid for at the Contract price per linear foot.
  2. Said unit price shall constitute full compensation for labor, equipment and tools necessary for handling, earth excavation, existing pipe removal and disposal including all labor necessary for hand excavating around the pipe during removal, hauling, disposal and record keeping.
  3. Said unit price shall include full compensation for all construction dewatering work required Section 02402 or Section 02650 including furnishing, installing, operating and removing of dewatering systems and monitoring wells.
  4. Said unit prices shall also constitute full compensation for the following:
    - a. Removal of the pipe by NHDES certified asbestos abatement personnel.
    - b. Proper packaging of asbestos pipe.
    - c. Transportation and disposal of the asbestos pipe to an approved facility by an approved hauler.
    - d. Analytical sampling required for ultimate disposal.
    - e. Providing copies of all documentation and records to the Engineer and Owner.
  5. Said unit price shall also constitute full compensation for any loss of production resulting from the removal and disposal item.
  6. Said unit price shall include maintenance of existing water service to users through the use of temporary bypass piping and valves, if necessary.
  7. Payment is based on the removal of asbestos pipe within the limits of the existing trench excavation.

8. Capping and abandoning of existing AC pipe outside the limits of trench excavation is incidental.

**ITEM NO. 6.10: ALLOWANCE FOR GEOTECHNICAL TESTING**

- A. Method of Measurement
  1. Field testing of subgrade and fill or backfill layers shall be measured for payment when directed by the Engineer and performed with satisfactory results.
  2. Tests for which results do not meet specified requirements shall not be considered for payment.
- B. Basis of Payment
  1. Payment for field testing shall be based on actual invoices from the testing agency and submitted to the Engineer. Payment shall be without markup.
  2. Work by the Contractor to coordinate and support testing shall be incidental.
  3. Gradation analysis and Proctor tests (i.e., laboratory work) for select aggregates shall be incidental to other items. Engineer may order additional Proctors/Gradations when sampling/test results vary (also incidental).

**ITEM NO. 6.14.0224: FURNISH AND INSTALL 2" INCH THICK x 24" WIDE RIGID POLYSTYRENE INSULATION**

- A. Method of Measurement:
  1. Rigid insulation installed as directed by the Engineer will be measured by the linear foot along the centerline of the pipe to the nearest foot.
  2. Rigid insulation installed in areas other than that shown on the drawings or not previously approved by the Engineer will not be measured for payment.
- B. Basis of Payment:
  1. Rigid polystyrene insulation will be paid at the contract price per linear foot.
  2. Said unit price shall constitute full compensation for furnishing and installing all materials, labor, equipment, and tools necessary for installation of insulation.

**PART 2 – PRODUCTS**

(Not Part of This Section)

**PART 3– EXECUTION**

(Not Part of This Section)

**END OF SECTION**



**a. FIELD REPORT**

<b>Underwood Engineers, Inc.</b>		DATE _____		PROJ. # _____
25 Vaughn Mall, Unit 1		PROJ. _____		
Portsmouth, NH 03801-4012		LOC. _____		
Tel: 603-436-6192 - Fax: 603-431-4733		CONTR. _____		OWNER _____
WEATHER AM Temp _____ <input type="checkbox"/> Fair <input type="checkbox"/> Cldy <input type="checkbox"/> Rain <input type="checkbox"/> Fzg Rain <input type="checkbox"/> Snow <input type="checkbox"/> Windy <input type="checkbox"/> PM Temp _____ <input type="checkbox"/> Fair <input type="checkbox"/> Cldy <input type="checkbox"/> Rain <input type="checkbox"/> Fzg Rain <input type="checkbox"/> Snow <input type="checkbox"/> Windy <input type="checkbox"/>				
NOTES		Workgroups/Equipment		
PRESENT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VISITOR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VISITOR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VISITOR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>PAY ITEMS THIS DATE:</b>				
ITEM NUMBER	DESCRIPTION	QTY	UNIT	COMMENTS
<b>THE FOLLOWING WAS NOTED:</b>				

\_\_\_\_\_  
Contractor Signature

\_\_\_\_\_  
RPR Signature



# Progress Estimate

# Contractor's Application

For (contract):		Application Number:												
Application Period:		Application Date:												
A		B		C		D		E		F		G		
Specification Section No.	Description	Item	Scheduled Value	Work Completed		This Period	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (E) B	Balance to Finish (B - F)				
				From Previous Application (C + D)										
<b>Totals</b>														

SECTION 01045

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included - This Section establishes general requirements pertaining to cutting (including excavation), fitting and patching of the Work required to:
  - 1. Make the several parts fit properly.
  - 2. Uncover work to provide for installation and/or inspection of ill timed work.
  - 3. Remove and replace work not conforming to requirements of the Contract Documents.
  - 4. Remove and replace defective work.
  - 5. Upon the Engineer's request, uncover the Work to provide for inspection by the Engineer and remove samples of installed materials for testing.
- B. Quality Assurance:
  - 1. Perform all cutting and patching in strict accordance with pertinent requirements of these Specifications, and in the event no such requirements are determined, in conformance with the Engineer's written direction.
  - 2. Do not cut or alter the Work performed under a separate Contract without the Engineer's written permission.
- C. Submittals:
  - 1. Request for the Engineer's written consent:
    - a. Prior to cutting which affects structural safety. Submit written request to the Engineer for permission to proceed with cutting.
    - b. Prior to proceeding with Work requiring a change of materials or methods for cutting and patching due to conditions or scheduling.
  - 2. Notices to the Engineer
    - a. Prior to cutting and patching performed pursuant to the engineer's instructions, submit a cost estimate to the Engineer. Secure the Engineer's approval of cost estimates and type of cost reimbursement before proceeding with cutting and patching.
    - b. Submit written notice to the Engineer designating the time and date the Work will be uncovered, to provide for the Engineer's observation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. For replacement of Work removed, use materials which comply with the pertinent sections of these Specifications and/or Drawings.

## 2.2 PAYMENT FOR COSTS

- A. The Owner will reimburse the Contractor for cutting and patching performed pursuant to the Engineer's written request after a claim for such reimbursement is submitted by the Contractor. Perform all other cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.

## PART 3 - EXECUTION

### 3.1 CONDITIONS

- A. Inspection:
  - 1. Inspect and document the existing conditions, including elements subject to movement or damage prior to cutting and patching Work.
  - 2. After uncovering the work, inspect conditions affecting installation of new Work.
- B. Discrepancies:
  - 1. If uncovered conditions are not as anticipated, immediately notify the Engineer and obtain the needed directions.
  - 2. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

### 3.2 PREPARATION PRIOR TO CUTTING

- A. Provide all required protection including but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.

### 3.3 PERFORMANCE

- A. Prior to cutting which may affect structural safety of the Work, submit written request to the Engineer for permission to proceed with cutting.
- B. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, notify the Engineer and obtain written permission prior to proceeding.

END OF SECTION

SECTION 01070

ABBREVIATIONS & SYMBOLS

PART 1 - GENERAL

1.1 DESCRIPTION

- a. Where any of the following abbreviations are used in these Specifications, they shall have the meaning set forth opposite each.

AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating Current
ACI	American Concrete Institute
ACP	Asbestos Cement Pipe
AGA	American Gas Association
AIC	Ampere Interrupting Capacity
AGMA	American Gear Manufacturers Association
AIEE (IEEE)	American Institute of Electrical Engineers (Institute of Electrical and Electronics Engineers, Inc.)
AISC	American Institute of Steel Construction
amp	Ampere
125-16	
Amer. Std.	American Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class 125 (ASA B16 11960)
ANSI	American National Standards Institute
API	American Petroleum Institute
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASH & AE	American Society of Heating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWG	American or Brown and Sharpe Wire Gage
AWWA	American Water Works Association
BOD	Biochemical Oxygen Demand
c.f.	Cubic Foot
c.f.m	Cubic Foot Per Minute
c.f.s	Cubic Foot Per Second
CI	Cast Iron
CIPRA	Cast Iron Pipe Research Association
CSI	Construction Specifications Institute
c.y.	Cubic Yards
DC	Direct Current

## ABBREVIATIONS &amp; SYMBOLS

DEP	Department of Environmental Protection
DES	Department of Environmental Services
DI	Ductile Iron
DOT	Department of Transportation
EDR	Equivalent Directional Radiation
EPA	U.S. Environmental Protection Agency
FmHA	Farmers Home Administration (RD)
fps	Feet Per Second
ft.	Feet
gal.	Gallons
gpd	Gallons Per Day
gpm	Gallons Per Minute
HDPE	High Density Polyethylene
HP	Horsepower
IBR	Institute of Boiler and Radiator Manufacturers
in.	Inches
inter.	Interlock
ISA	Instrument Society of America
kva	Kilovolt-ampere
kw	Kilowatt
lb.	Pound
max.	Maximum
MCB	Master Circuit Board
MGD	Million Gallons Per Day
Min.	Minimum
NBS	National Bureau of Standards
NEC	National Electrical Code, Latest Edition
NEMA	National Electrical Manufacturers Association
NEWWA	New England Water Works Association
NPT	National Pipe Thread
OS&Y	Outside Screw and Yoke
PCA	Portland Cement Association
PE	Polyethylene
ppm	Parts Per Million
%	Percent
psi	Pounds Per Square Inch
psig	Pounds Per Square Inch Gage
PVC	Polyvinyl Chloride
R.D.	Rural Development (Formerly FmHA)
rpm	Revolutions Per Minute
s.f.	Square Foot
STL.W.G.	U.S. Steel Wire, Washburn and Moen, American Steel and Wire Cos., or Roebling Gage
s.y.	Square Yard

ABBREVIATIONS & SYMBOLS

TDH	Total Dynamic Head
USAS	Standards of the United States of America Standards Institute (formerly American Standards Association)
USS GAGE	United States Standard Gage
VC	Vitrified Clay
WSP	Working Steam Pressure
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Service Administration, Washington, D.C.

PART 2 - PRODUCTS

(Not part of this Section)

PART 3 - EXECUTION

(Not part of this Section)

END OF SECTION



SECTION 01090

REFERENCE STANDARDS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on the date of Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.2 SCHEDULE OF REFERENCES

<b>AA</b>	<b>Aluminum Association</b>
<b>AABC</b>	<b>Associated Air Balance Council</b>
<b>AASHTO</b>	<b>American Association of State Highway and Transportation Officials</b>
<b>ACI</b>	<b>American Concrete Institute</b>
<b>ADC</b>	<b>Air Diffusion Council</b>
<b>AGC</b>	<b>Associated General Contractors of America</b>
<b>AI</b>	<b>Asphalt Institute</b>
<b>AIA</b>	<b>American Institute of Architects</b>
<b>AISC</b>	<b>American Institute of Steel Construction</b>
<b>AISI</b>	<b>American Iron and Steel Institute</b>
<b>AITC</b>	<b>American Institute of Timber Construction</b>
<b>AMCA</b>	<b>Air Movement and Control Association</b>
<b>ANSI</b>	<b>American National Standards Institute</b>
<b>APA</b>	<b>American Plywood Association</b>
<b>ARI</b>	<b>Air-Conditioning and Refrigeration Institute</b>
<b>ASHRAE</b>	<b>American Society of Heating, Refrigerating,</b>
<b>ASME</b>	<b>American Society of Mechanical Engineers</b>
<b>ASPA</b>	<b>American Sod Producers Association</b>
<b>ASTM</b>	<b>American Society for Testing and Materials</b>
<b>AWI</b>	<b>Architectural Woodwork Institute</b>
<b>AWPA</b>	<b>American Wood-Preservers' Association</b>
<b>AWS</b>	<b>American Welding Society</b>
<b>AWWA</b>	<b>American Water Works Association</b>
<b>BIA</b>	<b>Brick Institute of America</b>

<b>BOCA</b>	<b>Building Officials and Code Administrators</b>
<b>CDA</b>	<b>Copper Development Association</b>
<b>CLFMI</b>	<b>Chain Link Fence Manufacturers Institute</b>
<b>CRSI</b>	<b>Concrete Reinforcing Steel Institute</b>
<b>DHI</b>	<b>Door and Hardware Institute</b>
<b>EJCDC</b>	<b>Engineers' Joint Contract Documents Committee</b>
<b>EJMA</b>	<b>Expansion Joint Manufacturers Association</b>
<b>FGMA</b>	<b>Flat Glass Marketing Association</b>
<b>FM</b>	<b>Factory Mutual System</b>
<b>FS</b>	<b>Federal Specification</b>
<b>GA</b>	<b>Gypsum Association</b>
<b>ICBO</b>	<b>International Conference of Building Officials</b>
<b>IEEE</b>	<b>Institute of Electrical and Electronics Engineers</b>
<b>IMIAC</b>	<b>International Masonry Industry All-Weather Council</b>
<b>MBMA</b>	<b>Metal Building Manufacturer's Association</b>
<b>MFMA</b>	<b>Maple Flooring Manufacturers Association</b>
<b>MIL</b>	<b>Military Specification</b>
<b>ML/SFA</b>	<b>Metal Lath/Steel Framing Association</b>
<b>NAAMM</b>	<b>National Association of Architectural Metal</b>
<b>NCMA</b>	<b>National Concrete Masonry Association</b>
<b>NEBB</b>	<b>National Environmental Balancing Bureau</b>
<b>NEMA</b>	<b>National Electrical Manufacturer's Association</b>
<b>NFPA</b>	<b>National Fire Protection Association</b>
<b>NFPA</b>	<b>National Forest Products Association</b>
<b>NSWMA</b>	<b>National Solid Wastes Management Association</b>
<b>NTMA</b>	<b>National Terrazzo and Mosaic Association</b>
<b>NWMA</b>	<b>National Woodwork Manufacturers Association</b>
<b>PCA</b>	<b>Portland Cement Association</b>
<b>PCI</b>	<b>Prestressed Concrete Institute</b>
<b>PS</b>	<b>Product Standard</b>
<b>RIS</b>	<b>Redwood Inspection Service</b>
<b>RCSHSB</b>	<b>Red Cedar Shingle and Handsplit Shake Bureau</b>
<b>SDI</b>	<b>Steel Deck Institute</b>
<b>SDI</b>	<b>Steel Door Institute</b>
<b>SIGMA</b>	<b>Sealed Insulating Glass Manufacturers Association</b>
<b>SJI</b>	<b>Steel Joist Institute</b>
<b>SMACNA</b>	<b>Sheet Metal and Air Conditioning Contractors'</b>
<b>SSPC</b>	<b>Steel Structures Painting Council</b>
<b>TCA</b>	<b>Tile Council of America, Inc.</b>
<b>UL</b>	<b>Underwriters' Laboratories, Inc.</b>
<b>WCLIB</b>	<b>West Coast Lumber Inspection Bureau</b>
<b>WWPA</b>	<b>Western Wood Products Association</b>

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 INTRODUCTION

- A. Project meeting requirements

1.2 PROJECT MEETINGS

- A. The Contractor shall attend project meetings throughout the progress of the work.
- B. Meetings shall be held at a frequency no greater than twice per month but a minimum of once per month.
- C. The following representatives of the Contractor shall attend:
1. Superintendent or authorized representative
  2. Representative of major subcontractors (when requested)
  3. Representatives of major suppliers (when requested)
  4. Other representatives as appropriate to agenda topics
- D. The Engineer shall prepare and distribute project meeting notes.
- E. Sample Agenda
1. Work progress
  2. Progress schedule
  3. Delivery schedules
  4. Submittals
  5. Payment applications
  6. Change Orders and Field Orders
  7. Status of Complaints
  8. Other items

1.3 WEEKLY COORDINATION MEETINGS (INFORMAL)

- A. The contractor's superintendent, the owner, and the resident engineer shall meet weekly to informally discuss the project schedule, sequence, and other issues.

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01201

COMMUNITY INFORMATION

PART 1 - GENERAL

1.1 INTRODUCTION

- A. Community information requirements of the Contractor.

1.2 COMMUNITY INFORMATION REQUIREMENTS

- A. The Contractor shall be responsible for keeping the Public informed of the progress of the work on a weekly basis. On Thursday of each week, the Contractor will provide a summary update on the work planned for the following week including:
1. Work zones
  2. Work tasks and disciplines
  3. Traffic conditions, planned interruptions to water service or any other impacts to the public.
- B. On the date of each scheduled formal project meeting, the Contractor shall complete the following (minimum) requirements:
1. Prepare and post a map representing the work locations for the next two week period of each work crew.
  2. Prepare a brief written narrative of upcoming work and deliver to the Owner for public information and for posting on the local Website.
  3. Provide a system for tracking complaints (sample form attached).
- C. The Contractor shall provide a twenty-four (24) hour contact person for emergencies.

1.3 PUBLIC INFORMATION MEETINGS

- A. The Contractor shall schedule and conduct public information meetings to relay project schedules and other pertinent information to the Community.
1. The meeting shall be held each construction season prior to beginning construction.
- B. The meetings shall be scheduled during the evening hours.
- C. There shall be at least a two week advance notice regarding the meetings.
- D. The Owner shall post and advertise for the meetings.
- E. The Owner will provide the site for the meeting.

1.4 RESIDENT COMPLAINTS

- A. The Contractor is responsible for resolution of resident complains that may arise as a result of his work operations.
- B. Verbal complaints should be addressed promptly as they occur. If immediate resolution is not possible, the complaint should be recorded in writing for further follow up and action by the Contractor (sample form attached)

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION



SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Within ten days after the effective date of the Agreement between Owner and Contractor, submit to the Engineer an estimated progress schedule.
- B. Form of Schedules:
  - 1. Narrative: Completely describe the construction methods to be employed.
  - 2. Horizontal Bar Chart (i.e., Gantt chart):
    - a. Provide a separate horizontal bar column for each trade or operation.
    - b. Order: Chronological, for each trade and/or operation.
    - c. Horizontal scale: Identify first work day of each week, allow space for updating and revision.
- C. Content of Schedules:
  - 1. Provide complete sequence of construction by activity:
    - a. Shop Drawings, Project Data and Samples:
      - (1) Submittal Dates
      - (2) Dates reviewed copies will be required.
    - b. Decision dates for:
      - (1) Products specified by allowances.
      - (2) Selection of finishes (when applicable).
    - c. Product procurement and delivery dates.
    - d. Dates for beginning and completion of each element of construction.
  - 2. Identify work of separate phases and logically grouped activities.
  - 3. Show the projected percentage of completion for each item of work as of the first day of each month.
  - 4. Provide separate sub-schedules, if requested by the Engineer, showing submittals, review times, procurement schedules, and delivery dates.
- D. Updating:
  - 1. The schedules shall be updated at least every month and for each project meeting.
  - 2. Show all changes occurring since previous submission.
  - 3. Indicate progress of each activity, show completion dates.
  - 3. Include:
    - a. Major changes in scope.
    - b. Activities modified since previous updating.
    - c. Revised projections due to changes.
    - d. Other identifiable changes.
  - 4. Provide narrative report, including:
    - a. Discussion of problem areas, including current and anticipated delay factors.



- b. Corrective action taken, or proposed.
  - c. Description of revisions that may affect schedules.
- E. Standard Holidays – Holidays observed by the City include:
- New Year's Day
  - Memorial Day
  - Fourth of July
  - Labor Day
  - Columbus Day
  - Veterans Day
  - Thanksgiving
  - Day after Thanksgiving
  - Christmas

Project work will not be permitted on these dates unless approved by advance (72 hours) written request to the Owner.

#### 1.2 SUBMITTALS

- A. Submit periodically updated schedules when requested by the Engineer.
- B. Submit 4 copies of initial and updated schedules to the Engineer.

#### PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

#### PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01340

SUBMITTALS

PART 1 -- GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Submit to the Engineer, Shop Drawings, Operation and Maintenance Manuals, Manufacturers' Certificates, Project Data, and Samples required by the Specification Sections.

B. Alternates

1. If the Contractor elects to submit an Alternate that is considered an alternate, the Contractor will be responsible to make all modifications to the Work resulting from the use of the Alternate at no additional cost to the Owner.
2. If the Contractor elects to submit an Alternate, the Contractor must follow the procedures listed in Section 01630 - Substitutions & Product Options.

1.2 SHOP DRAWINGS

- A. Shop Drawings are required for each and every element of the work. Each shop drawing shall be assigned a sequential number for purposes of easy identification, and shall retain its assigned number, with appropriate subscript, on required resubmission.
- B. Shop Drawings are generally defined as all fabrication and erection drawings, diagrams, brochures, schedules, bills of material, manufacturers data, spare parts lists, and other data prepared by the Contractor, his subcontractors, suppliers, or manufacturers which illustrate the manufacturer, fabrication, construction, and installation of the work, or a portion thereof.
- C. The Contractor shall submit to the Engineer a minimum of six (6) copies of Shop Drawings and approved data. The Engineer will retain three (3) copies (for Owner's, Engineer's and Field Representative's files) and return three (3) copies to the Contractor for distribution to subcontractors, suppliers and manufacturers. If the Contractor requires more than three (3), then the number of copies submitted shall be adjusted accordingly
- D. The Contractor shall provide a copy of a completed submittal certification form which shall be attached to every copy of each shop drawing. Shop Drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for the work.
- E. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings so that there shall be no delay to the work due to the absence of such drawings.

- F. No material or equipment shall be purchased or fabricated especially for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.
- G. Until the necessary review has been made, the Contractor shall not proceed with any portion of the work (such as the construction of foundations), the design or details of which are dependent upon the design or details of work, materials, equipment or other features for which review is required.
- H. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. Shop drawings shall be of standardized sizes to enable the Owner to maintain a permanent record of the submissions. Approved standard sizes shall be: (a) 24 inches by 36 inches; (b) 11 inches by 17 inches, and (c) 8-1/2 inches by 11 inches. Provision shall be made in preparing the shop drawings to provide a binding margin on the left hand side of the sheet. Shop drawings submitted other than as specified herein may be returned for re-submittal without being reviewed.
- I. Only drawings, which have been checked and corrected by the fabricator, should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer.
- J. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.
- K. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires and appurtenances, layout, etc., detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do all work necessary to make such modifications.
- L. A maximum of two submissions of each Shop Drawing will be reviewed, checked, and commented upon without charge to the Contractor. Any additional submissions which are ordered by the Engineer to fulfill the stipulations of the Drawings and Specifications, and which are required by virtue of the Contractor's neglect or failure to comply with the requirements of the Drawings and Specifications, or to make those modifications and/or corrections ordered by the Engineer in the review of the first two submissions of each Shop Drawing, will be reviewed and checked as deemed necessary by the Engineer, and the cost of such review and checking, as determined by the Owner, and based upon Engineer's documentation of time and rates established for additional services in the Owner-Engineer Agreement for this Project, may be deducted from the Contractor to make all modifications and/or corrections as may be required by the Engineer in an accurate, complete, and timely fashion.

1.3 SAMPLES

- A. The Contractor shall submit samples when requested by the Engineer to establish conformance with the specifications, and as necessary to define color selections available.

1.4 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall furnish the Engineer six (6) copies of a complete instruction manual for installation, operation, maintenance, and lubrication of each item specified. At least 3 months prior to the expected substantial completion date, the Contractor shall submit to the Engineer all manuals in accordance with the requirements specified herein.
- B. Manuals shall include operating and maintenance information on all systems and items of equipment. The data shall consist of catalogs, brochures, bulletins, charts, schedules, equipment numbers, shop drawings corrected to as-built conditions, wiring diagrams, and assembly drawings which shall describe location, operation, maintenance, lubrication, operating weight, lubrication charts showing manufacturer recommended lubricants for each rotating or reciprocating unit, and other necessary information for the Engineer to establish a complete maintenance program.
- C. The submittal shall also include details of all replacement parts; "Nameplate" data for all equipment; detailed instructions for start-up, normal operation, shutdown procedures, and control techniques; and a guide to troubleshooting the system.

1.5 MANUFACTURER'S CERTIFICATES

- A. Prior to accepting the installation, the Contractor shall submit manufacturer's certificates for each item specified.
- B. Such manufacturer's certificates shall state that the equipment has been installed under either the continuous or periodic supervision of the manufacturer's authorized representative, that it has been adjusted and initially operated in the presence of the manufacturer's authorized representative, and that it is operating in accordance with the specified requirements, to the manufacturer's satisfaction. All costs for meeting this requirement shall be included in the Contractor's bid price.
- C. Certified performance test data will also be submitted to the Engineer as required by the specifications.

1.6 SUBMISSION REQUIREMENTS

- A. Accompany submittals with transmittal letter, containing:
  - 1. Date.
  - 2. Project title and number.
  - 3. Contractor's name and address.
  - 4. The number of each Shop Drawing, Project Data and Sample submitted.
  - 5. Notification of deviations from Contract Documents.
  - 6. Other pertinent data.
- B. Submittals shall include:
  - 1. Date and revision dates.
  - 2. Project title and number.

3. The names of:
  - a. Engineer.
  - b. Contractor.
  - c. Subcontractor.
  - d. Supplier.
  - e. Manufacturer.
  - f. Separate detailer when pertinent.
4. Identification of product or material.
5. Relation to adjacent structure or materials.
6. Field dimensions, clearly identified as such.
7. Specification section number.
8. Applicable standards, such as ASTM number or Federal Specification.
9. A blank space, 4" x 4", for the Engineer's stamp.
10. Identification of deviations from Contract Documents.
11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.
12. Where specified or when requested by the Engineer, manufacturer's certification that equipment, accessories and shop painting meet or exceed the Specification requirements.
13. Where specified, manufacturer's guarantee.

1.7 RESUBMISSION REQUIREMENTS

- A. Revise initial drawings as required and resubmit as specified for initial submittal.
- B. Indicate on drawings any changes which have been made other than those required by Engineer.

1.8 ENGINEER'S REVIEW

- A. The review of shop and working drawings hereunder will be general only, and nothing contained in this specification shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance specified thereunder.

PART 2 -- PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 -- EXECUTION

(NOT PART OF THIS SECTION)

SUBMITTAL CERTIFICATION FORM

PROJECT: \_\_\_\_\_ CONTRACTOR'S PROJ. NO: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_ ENGINEER'S PROJ. NO: \_\_\_\_\_

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

TRANSMITTAL NUMBER: \_\_\_\_\_ SHOPDRAWING NUMBER: \_\_\_\_\_

SPECIFICATION SECTION OR DRAWING NO: \_\_\_\_\_

DESCRIPTION: \_\_\_\_\_

MANUFACTURER: \_\_\_\_\_

The above referenced submittal has been reviewed by the undersigned and I/we certify that the material and/or equipment meets or exceeds the project specification requirements with

\_\_\_ NO DEVIATIONS

or

\_\_\_ A COMPLETE LIST OF DEVIATIONS AS FOLLOWS<sup>a</sup>:

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

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

Contractor<sup>b</sup>

Manufacturer<sup>c</sup>

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

<sup>a</sup> Any deviations not brought to the attention of the Engineer for review and concurrence shall be the responsibility of the Contractor to correct, if so directed.

<sup>b</sup> Required on all submittals

<sup>c</sup> When required by specifications

END OF SECTION

SECTION 01381

PRE-CONSTRUCTION VIDEO RECORDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Supply three (3) complete sets of video records to the Engineer clearly indicating pre-construction status of all areas where work is to be performed under this contract to include surrounding areas that may be disturbed by the prosecution of the work, roadway pavement condition, curbing, driveway entrances, lawns, sidewalks, buildings, structures and other pertinent features throughout the project area.
2. Video shall be provided in DVD format.
3. Documentation shall include any feature specifically requested by the Engineer.
4. Digital Photographs may be submitted as a substitution with prior approval by the Engineer.
  - a. The number of photos shall be as required to adequately document pre-construction conditions on the entire project length.
5. Video and/or photographs shall include narrative description including time, date, subject feature, etc.

PART 2 - PRODUCTS

2.1 QUALITY

- A. Quality shall be such that the condition of existing items subject to construction damage can be readily determined.

PART 3 - EXECUTION

3.1 SUBMITTAL OF VIDEO RECORDS

- A. Submit all video to the Engineer no later than two weeks prior to construction work.
- B. The quality of the video is subject to approval by the Engineer prior to the start of construction work in the areas shown by the video records.
1. Upon review, the Engineer or the Owner may request additional video or photos which, in their opinion, is required to better document certain existing conditions of the project area.

END OF SECTION

SECTION 01382

VIDEO INSPECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Post Construction Video Recording of new sewers shall include the following work:
1. Television inspection following the completion new sewer mains and service laterals will be required where directed.
  2. Sewer lines shall be cleaned and flushed prior to television inspection.
  3. Pipe shall be inspected for cracks, joint gaps, deformation, and other visual defects.
  4. A written report shall be provided. Condition of the sewer shall be documented.
  5. A video shall be provided in DVD formats, complete with audio narrative. Both video and audio will be reviewed for clarity. Indiscernible portions of the DVD will not be accepted.
  6. Documentation shall include any feature specifically requested by the Engineer.
  7. Finish pavement courses shall not be completed until video is reviewed and accepted.

1.2. SUBMITTALS

- A. Post Construction Video Recording:
1. Submit all reports and video (DVD format) to the Engineer following the completion of the sewer.
  2. TV inspection required prior to substantial completion certification.

PART 2 - PRODUCTS

2.1 QUALITY

- A. Post Construction Video Recording:
1. Quality of video records (DVD format) shall be such that the condition of the sewer following construction can be readily determined. The DVD shall include an audio narrative.
  2. The Video shall be able to verify the quality of the pipe installation and not be limited by poor lighting, poor picture quality, water flow, or pipe length.
  3. Necessary sewer repair identified during the TV inspection shall be corrected by the Contractor at no cost to the owner.
  4. Any video record (DVD format) considered to be poor quality must be re-recorded and re-submitted for review at no additional cost to the Owner.
  5. Payment (if a separate item is provided) may be withheld if video record (DVD format) is considered by the Owner or the Engineer to be poor quality.



PART 3 - EXECUTION

3.1 GENERAL

A. Post Construction Video Recording:

1. The color camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case will the television camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If, during the inspection operation, the television camera will not pass through the entire manhole section, the Contractor shall set up his equipment so that the inspection can be performed from the opposite manhole. If, again, the camera fails to pass through the entire manhole section, the inspection shall be considered complete and no additional inspection will be required.
2. When manually operated winches are used to pull the television camera through the line, telephones, radios or other suitable means of communication shall be set up between two manholes of the section being inspected to insure good communications between members of the crew.
3. The importance of accurate distance measurements is emphasized. Measurement for location of defects shall be above ground by means of a meter device. Marking on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device, and the accuracy shall be satisfactory to the Owner's Representative.
4. Documentation of the television results shall be as follows:
  - a. Television Inspection Logs: Printed location records shall be kept by the Contractor and will clearly show the location in relation to an adjacent manhole of each cracked or offset joint observed during inspection. In addition, other points of significance such as locations of building sewers, cracked or broken pipe, protruding service connections, roots, storm sewer connections, and other discernable features will be recorded and a copy of such records will be supplied to the Owner.
  - b. Videotape Recordings: The Contractor shall furnish all equipment for color video tape recordings. All sewer inspections shall be recorded on DVD formatting and compatible software for viewing on a DVD computer drive.

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Provide and pay for all temporary applicable utilities required to properly perform the Work at no additional cost to the Owner including the placement and removal of the utilities.
2. Completely remove all temporary equipment and materials upon completion of the Work and repair all damage caused by the installation of temporary utilities.
3. Make all necessary applications and arrangements for electric power, light, water, telephone and other utilities with the local utility companies. Notify the local electric power company if unusually heavy loads, such as welders, will be connected.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Obtain permits as required by local governmental authorities.
2. Obtain easements, when required, across private property other than that of the Owner for temporary power service.
3. Comply with the latest National Electrical Code.
4. Comply with all local, State and Federal codes, laws, and regulations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Electrical:

1. Provide all required facilities, including as applicable, but not limited to, transformers, conductors, poles, conduits, raceways, fuses, switches, fixtures, and lamps.
2. Use new or used material adequate in capacity for the purposes intended.
3. Materials must not create unsafe conditions or violate the requirements of applicable codes.
4. Conductors:
  - a. Wire, cable or busses of appropriate type, sized in accordance with the latest National Electrical Code for the applied loads.
  - b. Use only UL approved wire.
5. Conduit:
  - a. Rigid steel, galvanized: ANSI C80.1.
  - b. Electrical metallic tubing: ANSI C80.3.
  - c. Other material approved by NEC

6. Equipment: Provide appropriate enclosures for the environment in which used in compliance with NEMA Standards.
- B. Heating:
1. When heat is required for the protection of the Work, provide and install a non-hazardous type of heating apparatus, and provide adequate and proper fuel.
  2. Use heating equipment and materials that are in proper condition.
- C. Water:
1. Provide drinking water equipment and material that will prevent contamination and health hazards.
- D. Sanitary Accommodations:
1. Comply with all local, State and Federal codes, laws and regulations.

### PART 3 - EXECUTION

#### 3.1 PERFORMANCE

- A. Electrical:
1. Provide electrical energy to:
    - a. All necessary points on the construction site so that power can be obtained at any desired point with extension cords no longer than 100 feet.
    - b. Construction site offices.
    - c. Lighting as required for safe working conditions at any location on the construction site.
    - d. Night security lights.
    - e. When applicable, Owner's present facilities during the changeover of electrical equipment.
  2. Maintain electrical energy throughout the entire construction period
  3. Capacity:
    - a. Provide and maintain adequate electrical service for construction use by all trades during the construction period at the locations necessary.
  4. Installation:
    - a. Install all work with a neat and orderly appearance.
    - b. Have all installations performed by qualified electricians.
    - c. Modify service as job progress requires.
    - d. Locate all installations to avoid interference with construction and materials handling equipment, storage areas, traffic areas and other Work.
- B. Heating:
1. Maintain a heated environment for the Work at the temperature and for the length of time specified and as otherwise needed.
  2. Precaution:
    - a. Operate temporary heating apparatus in a manner that finished Work will not be damaged.

- b. Repair all damage, caused by temporary heating operations, to the complete satisfaction of the Engineer, at no additional cost to the Owner.
- C. Water:
  - 1. Provide and maintain a safe water supply for drinking and construction purposes as required for the proper execution of the Work.
- D. Sanitary Accommodations:
  - 1. Provide and maintain sanitary accommodations for the use of the employees of the Contractor, subcontractors, and Engineer.
  - 2. Sanitary accommodations shall meet the requirements of all local, State and Federal health codes, laws and regulations.

END OF SECTION

SECTION 01518

BYPASS PUMPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Provide all labor, power, equipment, and materials and pay for all temporary systems to assure the uninterrupted flow of Sanitary Sewage around the Work Area at no additional cost to the Owner including the placement, maintenance and removal of these systems.
2. Make all necessary arrangements for power. The type of pump power and refueling requirements are to be outlined in the proposed plan. If 24 hour bypass is needed in residential areas, use only ultra-quiet power sources.

1.2 SUBMITTALS

- A. The Contractor shall submit a detailed description and plan showing the proposed bypass pumping system within ten days after the effective date of the Agreement between Owner and Contractor, and at least seven (7) days prior to commencement of any construction that will affect the existing pump station operation.
- B. The submission shall include the following:
  1. A description of the overall procedure to be used.
  2. Identify the sections to be bypassed.
  3. Type of equipment and materials to be used.
  4. Size of the pumps.
  5. Temporary wet well location.
  6. Backup power source.
  7. Locations of temporary force mains.
  8. Methods of protection of mains at crossings.
  9. The names and telephone and pager numbers for three (3) Contractor contact persons that will be on 24-hour notice to maintain the temporary pumping system.
- C. Submit manufacturer's literature, test reports, and certificates in accordance with the General Conditions and Section 01340 - Submittals.

1.3 QUALITY ASSURANCE

- A. Comply with all Local, State and Federal requirements forbidding the discharge of untreated effluent into other than a functional sanitary sewer facility.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. For each location where temporary bypass systems are employed, the system shall consist of the following:
  - 1. Two operable pumps each of which has a discharge rate sufficient to handle peak flow rates. One to be on line, the other as back-up.
  - 2. Adequate discharge piping, free of leaks, to carry the effluent from source to an adequate sanitary discharge point.
  - 3. Provide adequate plugs to insure that no effluent flows into the work area.

## PART 3 - EXECUTION

### 3.1 PERFORMANCE

- A. Provide power supply from a secure source.
- B. Maintain adequate power at all times, whether by refueling or standby generator.
- C. Maintain and operate the system to assure uninterrupted sewage flow around the work area as long as work requires replacement of active sewers and/or other related systems.
- D. Protect the discharge piping from damage caused by vehicular traffic or other outside influences.
- E. Maintain all system elements in a sanitary working order free of leaks.
- F. All work shall be performed in a manner to insure the health and welfare of the general public from accidental or intentional discharge of untreated effluent into other than a sanitary sewer system.

### 3.2 TEMPORARY FORCE MAIN REQUIREMENTS

- A. If a temporary force main is to be used, the temporary force main shall be installed along the road edge or curb line.
- B. The main shall be secured from movement with approved devices.
- C. Protect the piping from damage caused by vehicular traffic or other outside influences.
- D. Street crossings shall be installed below the pavement. The pipe shall be covered by a minimum of 3" of gravel and 2" of bituminous pavement.
- E. Driveway crossing can be either installed below the pavement (with 3" minimum cover) or over the pavement if a hard-pack ramp (with 3" minimum cover) is constructed on either side of the main. If the ramp creates a problem for vehicles entering the driveway, the crossing shall be moved below the pavement at no cost to the Owner.

### 3.3 MAINTENANCE

- A. Repairs to the system shall be made by the Contractor immediately upon notification of damage or malfunction. During non-business hours, notification shall go to the 3 individuals on the Contractor's contact list. If those individuals

cannot be reached, the repair(s) shall be made by the Owner and the Contractor shall be billed for the time and materials required to make the repair. The minimum charge for the Owner making the repair is \$500.

3.4 REMOVAL

- A. Following completion of work requiring bypassing, the Contractor shall remove the entire temporary bypass pumping system and restore all affected areas to preconstruction condition.
- B. The Contractor shall restore growth to all disturbed areas.
- C. The Contractor shall remove all hard-pack ramps and pave all temporary water trenches (unless they are to be incorporated into the final service patch) in accordance with Section 02555 – Removal and Replacement of Paving.

END OF SECTION

SECTION 01546

USE OF EXPLOSIVES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Provide all materials and perform all work necessary to insure safe use and storage of explosives.
2. Contractor shall be responsible for any and all damage resulting from use of explosives.
3. Blasting, if performed, is subject to City of Portsmouth ordinances (see Appendix). Contractor shall review and consider requirements during preparation of bid for trench ledge removal.

1.2 QUALITY ASSURANCE

- A. Requirements of regulatory agencies: Conduct all blasting in accordance with all applicable local and state laws, ordinances and code requirements.
- B. See Special Conditions for additional requirements.
- C. Blasting reports are to be provided if Contractor elects to use blasting as a means of trench ledge removal.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Explosive charges and detonation devices shall be of a type suitable for the intended use.
- B. Store all explosives in a secure manner, in compliance with all State and local laws and ordinances, and legibly mark all such storage places. Storage shall be limited to such quantity as may be needed for the work underway.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Preparation:

1. Blasting, if required, shall be performed only after approval has been given by the Owner for such operation.
2. Do not bring explosives to the site or use any explosives without obtaining all necessary permits and the written consent of authorities having jurisdiction. Such written consent will not relieve the Contractor of total responsibility for any injury to persons or for any damage to property due to blasting operations.



3. Designate as a BLASTING AREA all sites where electric blasting caps are located and where explosive charges are being placed.
4. Mark all blasting areas with signs as required by law.
5. Place signs, as required by law, at each end of the blasting area and leave in place while the above conditions prevail. Immediately remove signs after blasting operations or the storage of caps is over.
6. The Contractor shall conduct a Pre-blast Condition Survey of all existing structures on the site, or in the vicinity of the site. This survey shall also include such structures as may be affected by the Contractor's construction operations. At a minimum the Survey shall be performed on all structures to include parking deck and other such structures within 500 feet of the construction activity. Further observation may be required at the discretion of the Contractor. Further observation may be required as directed by the Engineer. The completed Survey shall be provided to the Engineer as a written report.
7. Notify each property owner and public utility company having structures in proximity to the site of the work sufficiently in advance to enable them to take such steps as they may deem necessary to protect their property. Such notice shall not relieve the Contractor of any of his responsibility for damage resulting from his blasting operation.
8. Warn all persons within the danger zone of blasting operations and do not perform blasting work until the area is cleared. Provide sufficient flagmen outside the danger zone to stop all approaching traffic and pedestrians.

B. Blasting:

1. All blasting shall be performed in accordance with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc..
2. Provide watchmen during the loading period and until charges have been exploded.
3. Provide adequate protective covering over all charges before being exploded.
4. Blasting Log:
  1. The Contractor shall provide the Engineer with a blasting log for the work. The blasting log shall contain the following information:
    - a. Location.
    - b. Time and date.
    - c. Location of explosives.
    - d. Amount of type of explosives used at each location.
    - e. The names of persons, companies, corporations or public utilities that own, lease or occupy property or structures in proximity to the site of the work and were contacted about the Contractor's intention to use explosives.

C. Vibration Limits:

1. The maximum peak particle velocity (PPV) of ground vibration, in any of three mutually perpendicular components of particle velocity, for above ground, residential structures shall not exceed the following limits:

Type of Structure	Maximum PPV, inches/second	
	Frequencies Below 40Hz	Frequencies 40Hz or Greater
Modern Homes – Drywall Interiors	0.75	2.0
Older Homes – Plaster on Wood Lath for Interior Walls	0.50	2.0
Stone Masonry or Brick Masonry Structures		1.3
Buried Pipe Lines		1.5

2. Deteriorated structures or utilities, structures housing computers or other sensitive equipment, and manufacturing processes that are sensitive to vibrations may require lower PPV limits than stated in this specification.
3. Determine appropriate vibration limits for deteriorated, sensitive structures and/or critical work areas in accordance with Section 01548.

Ground Vibration Limits for New Concrete

Age of Concrete	Maximum PPV, inches/second
Less than 3 days	No blasting
After 3 days	1 in/sec
After 5 days	1.8 in/sec
After 7 days	2.0 in/sec

4. The Contractor shall not conduct blasting operations within 20 feet of newly placed concrete (less than 14 days ). For blasting greater than 20 feet away from new concrete, the following PPV ground vibration limits apply:

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.1 DESCRIPTIONS

- A. Complete dust control to mitigate dust resulting from the Contractor's daily operations.
- B. Work Included: Furnish water truck and apply water to the road surfaces on a daily basis, unless rain is imminent. Use mechanical street sweeper for paved surfaces on a regular basis and as frequently as once daily.
- C. The Contractor shall have a water truck on site at all times.
- D. Calcium chloride may be used in conjunction with watering to control dust generated from unpaved surfaces.
- E. Dust control work shall be incidental to the appropriate items of the Contract unless a separate unit item is provided

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Water for Sprinkling: Clean, free of salt, oil, and other injurious matter.
- B. Calcium Chloride: Meet the requirements of AASHTO M144.
- C. Street Sweeper: Mechanically enclosed street sweeper with watering device able to pick up and haul away debris. Sweeper shall be self-loading, motorized and shall have spray nozzles. Vacuum apparatus may be necessary for certain site conditions where sediment/dust is not being removed by other methods employed by the Contractor.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Water: Use suitable equipment including a tank with gauge equipped pump or spray bar. Apply water 2-3 times a day and on weekends as needed.
- B. Calcium Chloride: Apply at a rate sufficient to maintain a damp surface but low enough to assure non-contamination of water courses.
- C. Street Sweeping:
  - Street sweeping shall be conducted where sediment is likely to be tracked from the work area(s) onto paved roadways and/or as directed by the Engineer.
  - Street sweeping shall start at the beginning of excavation and earth moving operations and continue through project completion (as necessary until disturbed areas are stable and dust/sediment generating activities have ceased), or as directed by the Engineer.
  - Sweep paved surfaces on a daily basis.

3.2 PROTECTION

- A. Perform all Dust Control Work in a manner that will prevent damage to public and private property from dust and the materials used.
- B. Repair, replace or make payment for all damage caused by Dust Control Work at no additional cost to the Owner.

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
  - 1. Provide all materials and perform all work necessary to completely regulate traffic in the area of Work.
  - 2. Perform all work in such a manner as to provide safe passage at all times for the public and with a minimum of obstruction to traffic.
  - 3. Do not close roads or streets to passage of the public without the permission of the proper authorities.
- B. The local Police Department, Public Works Department, and/or the New Hampshire Department of Transportation will decide if safe passage is being maintained and shall have the authority to require the Contractor to take any additional steps necessary to maintain safe passage. If the OWNER furnishes an inspector on the job as a result of poor traffic control by the Contractor, the Contractor shall be responsible for all costs assessed by the OWNER.

1.2 SCHEDULING WORK

- A. Schedule all work so that two adjacent parallel streets are not closed to passage by the public at any one time, if possible.
- B. Revise the plan of work if it will create a traffic hazard or an unreasonably long detour.
- C. Do not start work in any new location without the permission of the Engineer.
- D. Notify all police and fire departments of all scheduled detours and when streets are reopened.

1.3 SUBMITTALS

- A. The Contractor shall provide a Traffic Control Plan for review and approval by the Owner, Engineer and the New Hampshire Department of Transportation (if applicable) prior to any construction or mobilization of equipment or materials on the project site.
- B. The Contractor shall provide any revisions to the Traffic Control Plan or proposed detours in writing for review and approval by the Owner, Engineer and New Hampshire Department of Transportation (if applicable) prior to implementation

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND BARRICADES

- A. Do not perform work without providing adequate warning signs, barricades, signal lights, watchmen and take other necessary precautions for the safety of the public.
- B. Provide and illuminate suitable warning signs to show where construction, barricades or detours exist.

- C. Provide barricades of substantial construction and painted with a finish that increases visibility at night.
- D. Keep signal lights illuminated at all barricades and obstructions from sunset to sunrise.
- E. Maintain all necessary signs, barricades, lights, watchmen and other safety precautions during authorized suspension of the Work, weekends, holidays or other times when the Work is not in progress.
- F. Traffic control signs for construction work shall be located and of the size and type as outlined in Manual on Uniform Traffic Control Devices for Streets and Highways as published by U.S. Department of Transportation.

### PART 3 - EXECUTION

#### 3.1 DETOURS

- A. Provide, identify and maintain suitable detours when the project, or any part thereof, is closed to public travel.
- B. When the closed part of the project is reopened, restore the detour area and any other disturbed areas to the original condition.

#### 3.2 INCONVENIENCE TO RESIDENTS OF VICINITY

- A. Whenever a traveled way is closed, perform the Work in such a manner that local travel and residents in the vicinity of the Work will be inconvenienced as little as possible.
- B. The Contractor shall maintain continuous vehicular access to residents, workers, customers and abutting land owners along the project to driveways and other normal outlets from the individual residences and commercial properties at all times during the duration of the project.
- C. Contractor shall provide and maintain, at a minimum, a path for pedestrian traffic around the construction at all times during the duration of the project.
- D. Contractor shall provide and maintain message boards at each end of the project to notify residents of road closures and the location of construction activities. The message board shall be updated on a weekly basis, at a minimum.

#### 3.3 UNIFORMED POLICE OFFICERS

- A. If needed, employ uniformed police officers to control traffic, as approved by OWNER and ENGINEER.
- B. Arrange police detail with the local Chief of Police.
- C. Any police officers, whether regular, reserve, special or otherwise, shall be employed by the Contractor.

END OF SECTION

SECTION 01590

TEMPORARY FIELD OFFICE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Provide and maintain a field office for the exclusive use of the Engineer during the entire life of the Contract.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Provide a separate structure, such as a mobile field office trailer:
1. Size: Equivalent to 10 feet by 30 feet in area.
  2. A minimum of two windows arranged for cross ventilation with screens.
  3. Door with closer and secure lock.
  4. Adequate lights over all work areas and convenient electrical outlets on each wall.
  5. Adequate heating and air conditioning system with thermostat control.
  6. Sanitary conveniences meeting the requirements of all local and state health codes (portable facilities acceptable).
  7. Provide telephone line service for the exclusive use of the Engineer.
    - a. Provide one line for Internet and Fax service.
    - b. Provide one line for voice.
  8. Potable water supply (bottled water acceptable).
- B. Provide furnishings:
1. One (1) flat top desk, 30 inches by 60 inches, with drawers at each side.
  2. One (1) plywood drawing table with suitable drawing surface, 3 feet by 6 feet.
  3. One (1) desk or table suitable for supporting the copy machine, fax machine and computer.
  4. Eight (8) straight chairs plus one (1) suitable for use with drawing table.
  5. One (1) four-drawer steel filing cabinet with lock and key.
  6. One (1) large wastebasket.
  7. One (1) rack suitable for storing drawings.
  8. One (1) wall mounted fire extinguisher.
- C. Provide equipment:
1. One (1) combination copier/fax/scanner/printer (color) capable of 11" x 17" faxes and copies. Model shall be subject to the approval of the Engineer. Acceptable manufacturers include:
    - a. HP (Hewlett Packard)
    - b. Brother.
    - c. or approved equal.
  2. Provide one (1) new personal laptop computer with Microsoft Office. Model shall be subject to the approval of the Engineer.

3. Provide one (1) phone with answering service (either land line or cellular phone service is acceptable).
4. A microwave oven and refrigerator shall be made available for the Engineer to use as needed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in a location approved by the Owner and properly set up for all anticipated weather conditions.
- B. Provide electric power and heat during the duration of the Work.
- C. The Contractor shall pay all utility charges relating to this Contract.

3.2 CLEANING

- A. Upon completion of the project, remove the Field Office from the site and thoroughly clean the area.
- B. The Field Office and furnishings shall remain the property of the Contractor.

END OF SECTION



SECTION 01611

OWNER'S RIGHT TO MATERIAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
  - 1. The Owner retains the right to claim all suitable and unsuitable material.
  - 2. Deliver all material claimed by the Owner to a location designated by the Owner unless otherwise directed by the Engineer.
- B. Related Work Specified Elsewhere:
  - 1. See Division 2.

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01630

SUBSTITUTIONS & PRODUCT OPTIONS

PART 1 -- DESCRIPTION

1.1 DESCRIPTION

- A. If stated in these Specifications that a substitute that is equal to any material or equipment specified may be furnished, and if the Contractor wishes to furnish or use a substitute, submit a written request to the Engineer for approval of the substitute.
- B. The Engineer shall be the judge of equality.

1.2 SUBMITTALS

- A. Submit approval request promptly after the award of the Contract.
- B. Completely describe the proposed substitution including, as applicable:
  - 1. Manufacturer's catalog data,
  - 2. Illustrations,
  - 3. Specifications,
  - 4. Samples,
  - 5. Copies of previous approvals,
  - 6. List similar projects, date of installation, and names of the engineer and owner for which the product was previously used.
  - 7. Provide an itemized comparison of the proposed product to the specified product. The comparison shall list all variations and reference the appropriate paragraph numbers.
  - 8. Provide quality and performance comparison.
  - 9. Provide cost difference and proposed net change order amount.
  - 10. Provide availability of maintenance service and replacement material.
  - 11. Provide operational and maintenance requirements.
  - 12. State the effects of the substitution on the project schedule and subsequent required changes in work due to the substitution.
  - 13. Other data that may be requested by the Engineer to determine equality.
- C. Submittal shall be sealed by a professional engineer licensed in the State in which the work is being performed, as required.

PART 2 -- PRODUCTS

2.1 CRITERIA

- A. The following criteria will be used by the Engineer in determining the equality of the proposed substitutions:
  - 1. Adaptability to the design,
  - 2. Functional performance,
  - 3. Appearance (when applicable)

4. Quality of materials,
5. Strength of materials,
6. Complexity, frequency and cost of maintenance.

### PART 3 -- EXECUTION

#### 3.1 ORDERING AND INSTALLING

- A. Do not order and do not install any substituted material or equipment without the written approval of the Engineer.

#### 3.2 SUBMITTAL PROCEDURE

- A. The Contractor shall submit 6 copies of each substitution request to the Engineer on the form provided at the end of this Section.
- B. The Engineer will respond to each substitution request within 14 days from receipt of the request.
- C. The Engineer will respond to the Contractor in writing as to the acceptability of the proposed product.
- D. For accepted products, the Contractor shall submit a formal shop drawing in accordance with Section 01340 Submittals.

#### 3.3 RESULTING CHANGES

- A. If proposed substitutions are judged as being acceptable, make all changes to structures, buildings, piping, mechanical, electrical, instrumentation and other items necessary to accommodate substitutions, at no additional cost to the Owner, including costs which may later become apparent.
- B. Whenever it may be written that a manufacturer must have a specified period of experience with his product, a product which does not meet the specified experience period can be considered if the manufacturer is willing to provide a bond or cash deposit for the duration of the specified time period which will guarantee replacement of that product in the event of failure. However, this does not necessarily mean the substitution will be accepted.
- C. There shall be no shortening of the warranty period for the proposed product over the specified product.

#### 3.4 ENGINEERING SERVICES

- A. If the Contractor requests substitutions which require design or other engineering services, the services will be provided only by a Professional Engineer registered in the state in which the project is located.
- B. All engineering services for substitutions shall be performed at the expense of the Contractor.

### SUBSTITUTION REQUEST FORM

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

1. Name of product to be substituted: \_\_\_\_\_
2. Name of product requested as substitute: \_\_\_\_\_
3. Specification Section Reference: \_\_\_\_\_
4. Drawing Number Reference: \_\_\_\_\_
5. Attached to this form are the following:
  - a. Manufacturer's Catalog Data.
  - b. Illustrations,
  - c. Specifications,
  - d. Samples,
  - e. Copies of previous approvals

6. List similar projects using this product (provide at least 4):

Project Name and Location	Date of Installation	Name & Number of Engineer	Name & Number Owner
a. _____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
b. _____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
c. _____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____
d. _____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____

SUBSTITUTIONS & PRODUCT OPTIONS

- 7. Attach itemized comparison by Specification Paragraph, including quality, performance, cost, and O&M requirements.
- 8. Availability of Maintenance and Service and Replacement Material: \_\_\_\_\_  
\_\_\_\_\_
- 9. State effect of substitution on:
  - i. Construction Schedule: \_\_\_\_\_
  - ii. Project Cost: \_\_\_\_\_
  - iii. Changes Required in Other Work: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- 10. Contractor Representations:
  - i. Contractor has complied with Section 01630 in its entirety.
  - ii. Contractor has investigated proposed substitution and has determined that it is equal or superior to the product specified.
  - iii. Contractor will provide same warranty as required for the specified product, as a minimum.
  - iv. Contractor will coordinate installation of substitution through completion.
  - v. Contractor waives all claims for additional costs related to substitution which may later become apparent.
  - vi. Contractor agrees to pay all reasonable fees of the Engineer and other consultants in making an evaluation of this substitution request whether such request is ultimately accepted or not.

11. Certification:

Signature \_\_\_\_\_  
Name & Title \_\_\_\_\_  
Company \_\_\_\_\_  
(Contractor)

END OF SECTION

SECTION 01701

PROJECT CLOSE-OUT PROCEDURES

PART 1 - GENERAL

1.1 INTRODUCTION

- A. Contractor's requirements of the Contract to closeout the project.

1.2 PROJECT CLOSE-OUT REQUIREMENTS

- A. Prior to final payment the Contractor shall submit the following to the Engineer:
1. Contractor's Affidavit
  2. Consent of Surety to final payment.
  3. Certificate of Inspections
  4. Evidence of payment and release of liens including all (public and private) properties used for staging areas.
  5. Project Record Documents (Section 01720)
  6. Submission of warranties

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01710

PROJECT CLEANING

PART 1 -- GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
2. At completion of Work, remove waste materials, tools, equipment, machinery, and surplus materials, and clean all sight-exposed surfaces. Leave project clean and ready for use.

1.2 QUALITY ASSURANCE

- A. Conduct cleaning and disposal operations in accordance with all applicable local and state laws, ordinances, and code requirements.

PART 2 -- PRODUCTS

- A. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

PART 3 -- EXECUTION

3.1 PERFORMANCE

A. Cleaning During Construction (where applicable):

1. Execute cleaning operations to ensure that buildings, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
2. Entirely remove and dispose of material or debris during the progress of the Work that has washed into or has been placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations.
3. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
4. At reasonable intervals during the progress of work, clean the site and dispose of waste materials, debris, and rubbish.
5. Clean interiors of buildings, when applicable, prior to finish painting, and continue on an as-needed basis until buildings are ready for occupancy.
6. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.
7. Where applicable, schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.

- B. Sweep all roads where work had been completed on a daily basis.

- C. Control of Hazards:
  - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
  - 2. Prevent accumulation of wastes which may create hazardous conditions.
  - 3. Provide adequate ventilation during use of volatile or noxious substances.
- D. Disposal:
  - 1. Dispose of all material at an approved disposal area.
  - 2. Do not burn or bury rubbish and waste material on project site.
  - 3. Do not dispose of hazardous wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
  - 4. Do not dispose of wastes into streams or waterways.
  - 5. Do not dispose of waste material in excavations.
- E. Final Cleaning (where applicable):
  - 1. Employ experienced and/or professional cleaners for final cleaning.
  - 2. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from all sight-exposed interior and exterior finished surfaces.
  - 3. Repair, patch and touch up marred surfaces to specified finishes.
  - 4. Broom clean paved surfaces.
  - 5. Rake clean non-paved surfaces on the project site.
  - 6. Restore to their original condition those portions of the site not designated for alterations by the Contract Documents.

END OF SECTION



SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 -- GENERAL

1.1 DESCRIPTION

- A. Work Included: Keep accurate Record Documents of all additions, substitutions of material, variations in work, and any other additions or revisions to the Contract.

PART 2 -- PRODUCTS

2.1 DOCUMENTS

- A. Maintain at the job site, one copy each of:
  - 1. Contract Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Reviewed Shop Drawings.
  - 5. Change Orders.
  - 6. Any other modifications to the Contract.
  - 7. Field Test Reports.
  - 8. Inspection certificates
  - 9. Manufacturer's certificates
  - 10. Manufacturer's operation and maintenance manuals

PART 3 -- EXECUTION

3.1 STORAGE AND MAINTENANCE

- A. Store Record Documents in approved files and racks apart from documents used for construction.
- B. File Record Documents in accordance with Project Filing Format of Uniform Construction Index.
- C. Maintain Record Documents in clean, dry, legible condition.
- D. Do not use Record Documents for construction purposes.
- E. Make Record Documents available at all times for inspection by the Engineer and Owner.

3.2 RECORDING

- A. Label each document "PROJECT RECORD" in large printed letters.
- B. Keep Record Documents current and do not permanently conceal any work until required information has been recorded.
- C. Contract Drawings: Legibly mark to record actual construction (when applicable)

1. Method of locations and recording shall have prior approval of the Engineer.
  2. Depths of various elements of foundations in relation to survey datum.
  3. Horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements.
    - a. Include all water, sewer, steam, air, instrumentation and fuel piping systems and all electrical and communications circuits including all direct burial cables.
    - b. Whenever any existing utility line is uncovered in the course of excavation for new utility installation, record the location dimensions of such lines.
  4. Location of house service connection points with any utility (water, sewer, electrical, telephone, etc.) and the location of capped or plugged ends of these same house service lines.
    - a. Locations shall be recorded by accurate "swing ties" or other methods approved by the Engineer.
  5. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
    - a. Electrical equipment such as conduits, piping, instrumentation located in slabs, walls and ceilings and to include approximate locations and routing.
    - b. Schematic diagram of actual electric conduit or instrument tubing routing between equipment and supply.
  6. Field changes of dimension and detail and changes made by Change Order or Field Order.
  7. Details not on original Contract Drawings.
- D. Specifications and Addenda: Legibly mark up each Section to record:
1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
  2. Changes made by Change Order or Field Order.

### 3.3 SUBMITTALS

- A. At the completion of the project, deliver Record Documents to the Engineer.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
  1. Date, project title and number.
  2. Contractor's name and address.
  3. Title and number of each Record Document with certification that each document is completed and accurate.
  4. Signature of Contractor, or his authorized representative.
- C. Failure to record these locations on the Project Record Drawings shall result in non-approval of the final payment to the Contractor and/or if contract time (as specified in the Contract and/or modified in accordance with the Standard General Conditions of the Construction Contract) has elapsed, this shall be grounds for the assessment of the liquidated damages as specified.

END OF SECTION

Scope of Work

Furnish, install and test all site work and appurtenant work in complete accordance with the Drawings and Specifications.

Contractor's Duties

Except as specifically noted, provide and pay for all labor, materials, equipment, tools, machinery, water, heat, other facilities and services necessary for proper execution and completion of the work.

Contents of Division

<u>Section No.</u>	<u>Section Title</u>
02011	Test Pits
02223	Trench Excavation - Earth
02224	Trench Excavation - Ledge
02226	Horizontal Directional Drilling Casing Pipe
02229	Backfilling and Compaction
02275	Construction Fabrics
02369	Sheeting
02402	Site Dewatering
02431	Catch Basins, Grates and Frames (NH)
02445	Boring and Jacking
02540	Temporary Erosion Control
02551	Bituminous Concrete Paving
02555	Removal & Replacement of Paving (NH)
02557	Pavement Reclamation
02560	Granite Curbing
02601	Manholes, Covers and Frames (NH)
02610	Pipe & Pipe Fittings – General
02622	PVC Pipe & Fittings
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02625	Corrugated Polyethylene (CPE) Pipe & Fittings
02630	Couplings, Connectors, Caps, & Plugs
02650	Dewatering
02651	Final Sewer Testing
02935	Loaming and Seeding
02957	Protective Manhole Coatings

SECTION 02011

TEST PITS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Excavate test pits at the locations and to the depths shown on the Drawings and as directed.

1.2 QUALITY ASSURANCE

- A. The entire test pit excavation and monitoring well installation must be supervised by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall be as shown and specified on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Excavate test pits at the locations and to the depths and widths as directed by the Engineer.
- B. Excavated material shall be stored, transported and disposed of as specified in Section 02223 "Trench Excavation – Earth".
- C. Backfill procedures shall be as specified in Section 02229, "Backfill and Compaction."
- D. Areas where test pits are excavated shall be restored to original condition.

END OF SECTION

SECTION 02223

TRENCH EXCAVATION - EARTH

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Trench excavation work in earth includes the removal of sand, gravel, existing utilities, ashes, loam, clay, swamp muck, trolley tracks, soft or disintegrated rock or hard pan which can be removed with a backhoe, or a combination of such materials, and boulders measuring less than two cubic yards for the installation of pipes and appurtenant structures.
2. All trench excavation shall be classed as earth or ledge.
3. Submit details of proposed temporary lateral support for all excavations exceeding 12-feet in depth.

1.2 JOB CONDITIONS

A. Utilities:

1. The locations of known buried water lines, sewer lines, telephone cables, storm drains, culverts, gas mains, electrical conduits, and other utilities are shown on the Drawings. No guarantee is made as to the correctness of the locations shown and to the completeness of the information given.
2. Discontinue excavation by machinery when the excavation approaches pipes, conduits, or other underground structures of which the approximate locations are known. Use manual excavation methods to locate the obstructions.

B. Existing Structures:

1. Perform excavation in such a manner that will prevent any possibility of undermining and disturbing the foundations of any existing structures and any work previously completed under this Contract.
2. Where existing buildings and other structures are in close proximity to the proposed construction, exercise extreme caution and utilize sheeting, bracing, and whatever other precautionary measures, that may be required.

C. Repairing Damage:

1. Repair, or have repaired, all damage to existing utilities, structures, lawns, other public and private property which results from construction operations, at no additional cost to the Owner, to the complete satisfaction of the Owner, the Engineer, the utility company and the property owner.

D. Backfill of Trenches:

1. Do not leave any trenches open overnight. Unless otherwise approved by the Owner, all trenches shall be completely backfilled at the end of each day

PART 2 – PRODUCTS

- A. Unsuitable Material:
1. If, in the opinion of the Engineer, the material encountered above the indicated grade, shown on the Drawings, for excavation, is unsuitable, remove the material to the widths and depths as directed by the Engineer. Replace this material as specified in the "Backfilling, Compaction, Control & Testing" Section of this Division.
  2. If, in the opinion of the Engineer, the material encountered at or below the indicated invert grade shown on the Drawings, for excavation is unstable, remove the material. Replace this material with thoroughly compacted bank-run gravel, screened gravel or stone bedding material as shown on the drawings, or as directed by the Engineer.
- B. Disposal of Material:
1. All surplus and unsuitable material shall become the property of the Contractor unless specified otherwise in Section 01611 – Owner’s Right to Material.
  2. Disposal of surplus and unsuitable material is the Contractor’s responsibility.
  3. The Contractor shall obtain and provide to the Owner a “Hold Harmless Release” from the owner of the property where of any surplus or unsuitable material will be disposed of.
  4. The Contractor is responsible for complying with all appropriate local, state and federal regulation governing the placement of fill.
- C. Embankment Material: Obtain prior approval and instructions from the Engineer prior to undertaking the excavation for pipe placement of any fill material that has been in an embankment for less than one year.

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. General:
1. Unless otherwise specifically directed or permitted by the Engineer, begin excavation at the low end sewer lines and proceed upgrade.
  2. Perform trench excavation for utilities and structures in a logical sequence, to minimize re-work and prevent damage to surrounding utilities and structures.
- B. Amount of Excavation:
1. Trench width: As shown on the Drawings.
  2. Trench depth: As shown on the Drawings.
  3. Open Excavation:
    - a. The extent of open excavation shall be controlled by prevailing conditions.
    - b. Open excavation shall, at all times, be confined to the limits acceptable to the Owner.
  4. Unauthorized Excavation:
    - a. Backfill to the specified grade, any excavation beyond the limits stated above and as shown on the Drawings (unless specifically

## TRENCH EXCAVATION - EARTH

ordered otherwise by the Engineer) with thoroughly compacted crushed stone or screened gravel.

b. Backfill unauthorized excavation at no additional cost to the Owner.

C. Excavation Protection:

1. The Contractor shall be responsible for selecting and implementing Excavation Protection Systems required by OSHA and State requirements..
2. Trench width on drawings do not apply to excavation necessary for installation of trench shoring and bracing systems.

D. Trench Preparation

1. The Contractor shall take all necessary steps to minimize impacts to surrounding property owners.
2. The Contractor shall segregate gravels and select aggregates for reuse. Contractor shall return select aggregates to existing depths or to the limits shown on the drawings.
3. Contractor shall take all necessary steps to minimize the impact of both surface water and ground water within the trench excavation area.
4. When the Contractor approaches the lower limits of the excavations, the Contractor shall take necessary steps to maintain a smooth undisturbed dry bottom. This may include using a smooth excavator bucket and dewatering the excavation in accordance with Section 02650.
5. Over-excavation below limits indicated on the drawings, shall be filled with crushed stone at the Contractors own expense, unless directed otherwise.

END OF SECTION

SECTION 02224

TRENCH EXCAVATION - LEDGE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Trench excavation work in ledge includes the removal of ledge and rock required for the installation of pipes and/or structures.
2. "Ledge" and "rock" includes any natural compound, natural mixture, and chemical element required to be excavated that, in the opinion of the Engineer, can be removed from its existing position and state only by blasting, drilling and blasting, wedging, drilling and wedging, wedging and breaking with power hand tools, or by extending the use of an approved excavating machine beyond normal and design wear and tear. No boulder, ledge, slab, or other single piece of excavated material less than two cubic yards in total volume shall be considered to be rock unless, in the opinion of the Engineer, it must be removed from its existing position by one of the methods mentioned above.
3. All trench excavation shall be classed as earth or ledge.

1.2 JOB CONDITIONS

A. Utilities:

1. The locations of known buried water lines, sewer lines, telephone cables, storm drains, culverts, gas mains, electric conduits and other utilities are shown on the Drawings. No guarantee is made as to the correctness of the locations shown and to the completeness of the information given.
2. Use manual excavation methods to locate existing utilities.

B. Existing Structures:

1. Perform excavation in such a manner that will prevent any possibility of undermining and disturbing the foundations of any existing structures and any work previously completed under this Contract.
2. Where existing buildings and other structures are in close proximity to the proposed construction, exercise extreme caution and utilize whatever precautionary measure that may be required.

C. Repairing Damage:

1. Repair, or have repaired, all damage to existing utilities, structures, lawns, other public and private property which results from construction operations, at no additional cost to the Owner, to the complete satisfaction of the Owner, the Engineer, the utility company and the property owner.

D. Backfill of Trenches:

1. Do not leave any trenches open overnight. Unless otherwise approved by the Owner, all trenches shall be completely backfilled at the end of each day



## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Disposal of Suitable Material:
  - 1. All material that is, in the opinion of the Engineer, suitable shall remain the property of the Owner.
  - 2. Stockpile all suitable material in locations approved or designated by the Owner.
- B. Disposal of Unsuitable Material:
  - 1. All unsuitable material shall become the property of the Contractor unless specified otherwise in Division 1.
  - 2. Dispose of unsuitable material at the locations acceptable to or designated by the Owner.

## PART 3 - EXECUTION

### 3.1 PERFORMANCE

- A. General:
  - 1. Unless otherwise specifically directed or permitted by the Engineer, begin excavation at the low end of sewer lines and proceed upgrade.
  - 2. Perform excavation for force mains and/or water mains in a logical sequence.
- B. Amount of Excavation:
  - 1. Trench width: As shown on the Drawings.
  - 2. Trench depth: As shown on the Drawings.
  - 3. Open Excavation:
    - a. The extent of open excavation shall be controlled by prevailing conditions.
    - b. Open excavation shall, at all times be confined to the limits acceptable to the Owner.
  - 4. Unauthorized Excavation:
    - a. Backfill to the specified grade, any excavation beyond the limits stated above and as shown on the Drawings (unless specifically ordered otherwise by the Engineer) with thoroughly compacted crushed stone or screened gravel.
    - b. Backfill unauthorized excavation at no additional cost to the Owner.
- C. Shoring and Bracing:
  - 1. As the excavation progresses, install such shoring and bracing (i.e., trench box) necessary to prevent caving and sliding and to meet the requirements of the State and OSHA safety standards.

END OF SECTION

## HORIZONTAL DIRECTIONAL DRILLING (HDD) CASING PIPE

SECTION 02226HORIZONTAL DIRECTIONAL DRILLING (HDD)/CASING PIPEPART 1 - GENERAL1.1 DESCRIPTION

- A. It is the intent of this specification to define the acceptable methods and materials for installing sanitary sewer casing pipe by the horizontal directional drilling method.

1.2 INSTALLATION PLAN

- A. At least 7 days prior to mobilizing equipment Contractor shall submit his detailed installation plan to the Engineer. The plan shall include a detailed plan and profile of the bores and be plotted at a scale no smaller than 1 inch equals 20 feet horizontal and 4 feet vertical.
- B. The plan shall also include a listing of major equipment and supervisory personnel and a description of the methods to be used.

1.3 VARIATIONS IN PLAN OR PROFILE

- A. No variations in profile will be permitted. The Contractor is responsible for installing a sleeve to facilitate the construction of proposed gravity sewer at the elevation and grade as shown on the drawings.

1.4 ALIGNMENT

- A. The alignment shall be as shown on the drawings or as directed by the Engineer. The sleeve shall be aligned so that gravity sewer can be constructed with a bend free alignment between manholes.

1.5 QUALIFICATIONS

- A. Directional drilling and pipe installation shall be done only by an experienced Contractor specializing in directional drilling and whose key personnel have at least five (5) years experience in this work.

PART 2 – MATERIALS2.1 GENERAL

- A. Casing Pipe
  - 1. Material:
    - a. Sleeve shall be of a material that is approved for use for installation using HDD techniques.
    - b. Sleeve shall be of adequate size to provide a clear opening to pass the carrier pipe while accommodating bell joints and provide adequate space to adjust carrier pipe to specified line and grade.
    - c. Minimum wall thickness: 0.54 inches and following Drawings and/or Bid Schedule.

## HORIZONTAL DIRECTIONAL DRILLING (HDD) CASING PIPE

- d. Joints: Fully welded around circumference of pipe with complete penetration weld.
  - i. Weld of sufficient strength to withstand forces at pipe joints without any distortion of pipes.
  - ii. Minimum welds: As recommended by the manufacturer.
- e. Coating: None.
- B. Carrier Pipe.
  - 1. Carrier Pipe: 18" CCFRPM (Section 02624)
- C. Casing Spacers.
  - 1. Pressure treated wood spacer blocks (or approved equal). 2 sets per pipe length
  - 2. Voids shall be filled with dry sand
  - 3. Casing shall be sealed at both ends by brick bulkheads with weeper holes
- D. Grout.
  - 1. Cement: ASTM C150, Type I or Type II.
  - 2. Water: See Section 03300.
  - 3. Sand: ASTM C404, Size No. 1.
  - 4. Mixture: Shall consist of 1 part cement to 6 part sand, which is subject to increase or decrease as necessary to provide the required flow characteristics: Minimum compressive strength of 100 psi, attained within 24 hours, and sufficiently fluid to inject through steel casing and fill voids, with prompt setting to control grout flow.
- E. Washed (filtered) Sand.
  - 1. Shall be used to fill a minimum of 90% of the void between the casing and the carrier pipe.
  - 2. Shall be of uniform size
- F. Surface Settlement Markers.
  - 1. Within Bituminous Concrete Paved Areas: "p.k." nails.
  - 2. Within Nonpaved Areas: Wooden hubs.
- G. Bulkheads.
  - 1. Brick bulkheads, 8-inch wide at both ends of each sleeve.

2.2 PROCEDURES

- A. General
  - 1. Casing sleeve shall be cut, fabricated, and installed in strict conformance with the manufacturer's recommendations.
- B. Transportation
  - 1. Care shall be taken during transportation of the pipe to ensure that it is not damaged.
- C. Storage
  - 1. Pipes shall be stored on level ground, in strict conformance with the manufacturer's recommendations.

## HORIZONTAL DIRECTIONAL DRILLING (HDD) CASING PIPE

2. Where necessary due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such widths as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.
- D. Handling Sleeve
1. Handling shall be in such a manner that the sleeve is not damaged by dragging or other construction related operations.
  2. The sleeve shall be lifted in accordance with manufacturer's recommendations.
  3. Sleeve shall not be dropped onto rocky or unprepared ground.
  4. If installation requires multiple work days, the open ends of the partially installed sleeve shall be plugged at night to prevent animals or foreign materials from entering the sleeve.

PART 3 - INSTALLATION3.1 GENERAL

- A. The Contractor shall install a sleeve by means of horizontal directional drilling.
- B. Horizontal directional drilling shall consist of the drilling of a small diameter pilot hole from one end of the alignment to the other, followed by enlarging the hole diameter for the pipeline insertion. The exact method and techniques for completing the directionally drilled installation will be determined by the Contractor, subject to the requirements of these Specifications.
- C. The Contractor shall prepare and submit a plan to the Engineer for approval for insertion of the steel sleeve into the opened bore hole. This plan shall include pullback procedure, use of rollers, side booms and side rollers, internal cleaning, dewatering, and purging.
- D. The Contractor shall erect temporary barricades as directed by the Engineer to ensure safety of the public and other workers. Open pits will not be acceptable during non-working hours and shall be covered over by using steel plates or other practices approved by the Engineer
- E. Contractor shall be responsible for pre-draining soils as needed to ensure the sleeve is installed under dry soil conditions.

3.2 TOLERANCES

- A. Pipe installed by the directional drilled method must be located in plan and profile as shown on the Drawings, and must be at the grade as shown on the Drawings. The Contractor shall plot the actual horizontal and vertical alignment of the pilot bore at intervals not exceeding 15 feet. This "as built" plan and profile shall be updated as the pilot bore is advanced. The Contractor shall at all times provide and maintain instrumentation that will accurately locate the pilot hole and measure drilling fluid flow and pressure. The Contractor shall grant the Engineer access to all data and readout pertaining to the position of the bore head and the fluid pressures and flows. When requested, the Contractor shall provide explanations of this position monitoring and steering equipment. The Contractor shall employ experienced personnel to operate the directional drilling equipment and, in particular, the position

## HORIZONTAL DIRECTIONAL DRILLING (HDD) CASING PIPE

monitoring and steering equipment. No information pertaining to the position or inclination of the pilot bores shall be withheld from the Engineer.

- B. The alignment of the pilot bore must be approved by the Engineer before sleeve can be pulled. If the pilot bore fails to conform to the above tolerances, the Engineer may, at his option, require a new pilot boring to be made.

### 3.3 REAM AND PULLBACK

#### A. Reaming

1. Reaming operations shall be conducted to enlarge the pilot after acceptance of the pilot bore.
2. The number and size of such reaming operations shall be conducted at the discretion of the Contractor.

#### B. Pulling Loads

1. The maximum allowable pull exerted on the sleeve shall be measured continuously and limited to the maximum allowed by the sleeve manufacturer so that the sleeve or joints are not over stressed.

#### C. Torsion and Stresses

1. A swivel shall be used to connect the sleeve to the drill pipe to prevent torsional stresses from occurring in the sleeve.

#### D. The lead end of the pipe shall be closed during the pullback operation.

#### E. Sleeve Support

1. The sleeve shall be adequately supported by rollers and side booms and monitored during installation so as to prevent over stressing during the pullback operation.
2. Such support/rollers shall be spaced adequately to support the sleeve, and the rollers to be comprised of a non-abrasive material arranged in a manner to provide support to the bottom and bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback.
3. Surface damage shall be repaired by the Contractor before pulling operations resume.

### 3.4 HANDLING DRILLING FLUIDS AND CUTTINGS

#### A. During the drilling, reaming, or pullback operations, the Contractor shall make adequate provisions for handling the drilling fluids, or cuttings at the entry and exit pits. To the greatest extent practical, these fluids must not be discharged into the waterway.

1. When the Contractor's provisions for storage of the fluids or cuttings on site are exceeded, these materials shall be hauled away to a suitable legal disposal site.
2. The Contractor shall conduct his directional drilling operation in such a manner that drilling fluids are not forced through the subbottom into the waterway.
3. After completion of the directional drilling work, the entry and exit pit locations shall be restored to original conditions.
4. The Contractor shall comply with all permit provisions.

## HORIZONTAL DIRECTIONAL DRILLING (HDD) CASING PIPE

- B. Pits constructed at the entry or exit point area shall be so constructed to completely contain the drill fluid and prevent its escape to the beach or waterway.
- C. The Contractor shall utilize drilling tools and procedures which will minimize the discharge of any drill fluids. The Contractor shall comply with all mitigation measures listed in the required permits and elsewhere in these Specifications.
- D. To the extent practical, the Contractor shall maintain a closed loop drilling fluid system.
- E. The Contractor shall minimize drilling fluid disposal quantities by utilizing a drilling fluid cleaning system which allows the returned fluids to be reused.
- F. As part of the installation plan specified herein before, the Contractor shall submit a drilling fluid plan which details types of drilling fluids, cleaning and recycling equipment, estimated flow rates, and procedures for minimizing drilling fluid escape.

PART 4 - DRILLING OPERATIONS4.1 GENERAL

- A. The Contractor shall prepare a plan to be submitted for Engineer approval which describes the noise reduction program, solids control plant, pilot hole drilling procedure, the reaming operation, and the pullback procedure. All drilling operations shall be performed by supervisors and personnel experienced in horizontal directional drilling. All required support, including drilling tool suppliers, survey systems, mud cleaning, mud disposal, and other required support systems used during this operation shall be provided by the Contractor.
- B. Drill pipe shall be API steel drill pipe, Range 2, Premium Class or higher, Grade S-135 in a diameter sufficient for the torque and longitudinal loads and fluid capacities required for the work. Only drill pipe inspected under API's Recommended Practice Specification API RP 7G within 30 days prior to start and certified as double white band or better shall be used. A smoothly drilled pilot hole shall follow the design centerline of the pipe profile and alignment described on the construction drawings.
- C. The position of the drill string shall be monitored by the Contractor with the downhole survey instruments. Contractor shall compute the position in the X, Y and Z axis relative to ground surface from downhole survey data a minimum of once per length of each drilling pipe (approximately 15 foot interval). Deviations from the acceptable tolerances described in the Specifications shall be documented and immediately brought to the attention of the Engineer for discussion and/or approval. The profile and alignment defined on the construction drawings for the bores define the required elevation and grade for the sleeve. The Contractor shall maintain and provide to the Engineer, upon request, the data generated by the downhole survey tools in a form suitable for independent calculation of the pilot hole profile. Between the water's edge and the entry or exit point the Contractor shall provide and use a separate steering system employing a ground survey grid system, such as "TRU-TRACKER" or equal wherever possible.
- D. During the entire operation, waste and leftover drilling fluids from the pits and cuttings shall be dewatered and disposed of in accordance with all permits and

## HORIZONTAL DIRECTIONAL DRILLING (HDD) CASING PIPE

regulatory agencies requirements. Remaining water shall be cleaned by Contractor to meet permit requirements.

- E. Technical criteria for bentonite shall be as given in API Spec. 13A, Specification for Oil Well Drilling Fluids Material for fresh water drilling fluids. Any modification to the basic drilling fluid involving additives must describe the type of material to be used and be included in Contractor's drilling plan presented to the Engineer. The Owner retains the right to sample and monitor the waste drilling mud, cuttings and water.

#### 4.2 ENVIRONMENTAL PROVISIONS

- A. The Horizontal Directional Drilling operation is to be operated in a manner to eliminate the discharge of water, drilling mud and cuttings to the adjacent stormwater swales or land areas involved during the construction process.
- B. The Contractor shall provide equipment and procedures to maximize the recirculation or reuse of drilling mud to minimize waste.
- C. All excavated pits used in the drilling operation shall be lined by Contractor with heavy duty plastic sheeting with sealed joints to prevent the migration of drilling fluids and/or ground water.
- D. The Contractor shall visit the site and must be aware of all structures and site limitations at the directional drill crossing and provide the Engineer with a drilling plan outlining procedures to prevent drilling fluid from adversely affecting the surrounding area.
- E. The general work areas on the entry and exit sides of the crossing shall be enclosed by a berm to contain unplanned spills or discharge.
- F. Waste cuttings and drilling fluids shall be processed and disposed of by the Contractor in accordance with all applicable regulatory agency requirements.
- G. Water from dewatering shall be handled per Section 02402.

END OF SECTION

SECTION 02229BACKFILL, COMPACTION AND TESTINGPART 1 -- GENERAL1.1 DESCRIPTION

## A. Work Included:

1. Work includes backfilling trenches and/or excavation around structures with suitable material removed in the course of excavating and other suitable materials.
2. Testing soils.

1.2 REFERENCE STANDARDS

- A. Sieve Analysis of Fine and Coarse Aggregates: ASTM C136
- B. Sampling Aggregates: ASTM D75
- C. Moisture Density Relations of Soils (Modified Proctor): ASTM D1557
- D. Density of Soil In-Place by Nuclear Methods: ASTM D6938
- E. State of New Hampshire Department of Transportation (NHDOT) Standard Specifications for Road and Bridge Construction (latest edition)

1.3 QC/QA AND MATERIALS TESTING

- A. The Contractor shall obtain and pay for all services of a geotechnical testing firm to perform the necessary soil and compaction tests. The independent soils laboratory shall be approved by the Engineer prior to testing.
- B. The Contractor shall make necessary arrangements to allow compaction testing to be performed at a time, place and elevation determined by the Engineer.
  1. Testing methods and frequencies for construction materials incorporated into the work are specified in sections 1.3.C and 1.3.D below. The Engineer and/or Owner may request additional tests/samples based on conditions observed in the field.
  2. In the event that material testing results reveal non-conforming material has been installed, the Contractor will be required to submit a plan outlining his approach to correcting the non-conforming work. After corrective actions are completed, the material will be retested for acceptance. The Contractor shall bear the cost of any subsequent sampling, testing and evaluation necessary to demonstrate conformance with the Project Specifications. Such costs may be deducted from the monies owed the Contractor under the respective Contract Unit Item for the work being installed.
- C. Pre-placement testing.
  1. The Contractor shall take one sample of each material proposed to be used on the project. The samples shall be taken in the presence of the Engineer and in accordance with ASTM D75 (Standard Practice for Sampling Aggregates).



## BACKFILL, COMPACTION AND TESTING

2. Subgrade Material: Proctor density tests shall be performed on the existing subgrade in accordance with the following schedule and in accordance with ASTM D1557 (Modified Proctor):
    - a. At the bottom of excavations where structures or slabs will be placed.
    - b. One after every 5,000 cubic yards has been relocated on the site.
    - c. Whenever the material has changed in the opinion of the Engineer.
  3. Select and Borrow Materials: Sieve and modified proctor density tests shall be performed on all select and borrow material in accordance with the following schedule and in accordance with ASTM C136 (Sieve Analysis) and ASTM D1557 (Modified Proctor):
    - a. Before any materials are brought to the site.
    - b. One after every 5,000 cubic yards has been brought to the site.
    - c. Whenever the source changes.
  4. The result shall be submitted to the Engineer for approval prior to placement.
  5. The Contractor shall obtain representative samples for ongoing trench backfill operations.
    - a. Samples may be obtained in-situ at time of testing provided they are, in the Engineers opinion, representative of ongoing operations.
    - b. Samples may be obtained from stockpiles provide the stockpiled material is thoroughly mixed to represent ongoing operations.
    - c. Samples shall also be obtained for select materials such as reclaimed asphalt or gravels previously excavated from the trench.
- D. Post-placement testing:
1. The trench and/or excavation shall be prepared using the normal backfill technique employed by the Contractor. No special or additional preparation will be allowed.
  2. Determine in-place density in accordance with ASTM D6938 (Nuclear Method) or by other methods as approved by the Engineer.
  3. Compaction tests shall be made in accordance with the following table:

	Material	Testing Frequency	Percent Compaction
<b>Under Slabs or Structures:</b>			
	Native material or borrow material	One for every 500 s.f. of surface area of the slab for every 2 lifts of material placed.	95% 12" lifts
	Structural fill or crushed gravel	One for every 500 s.f. of surface area of the slab for every lift of material placed	95% 6" lifts
<b>Around Structures:</b>			
	Borrow material or other material noted on the drawings	One for every 500 l.f. of wall for every 2 lifts of material placed.	95% 12" lifts
<b>In Trenches:</b>			

## BACKFILL, COMPACTION AND TESTING

	Native material or borrow material	From the blanket material to the underside of the gravel or loam. See Note #1 Below	95% 24" lifts
	Gravels or loam	See requirements for Under paved Areas and Grassed Areas for requirements below	See below
Under Paved Areas:			
	Select Materials	One for every 10,000 s.f. of surface area for every 2 lifts of material placed.	95% 12" lifts

Under Grassed or Landscaped Areas			
	Native material or borrow material	One for every 20,000 s.f. of surface area for every 2 lifts of material placed.	90% 12" lifts

*Notes:*

1. *The Contractor shall submit his proposed method(s) for material placement and backfill operations two weeks prior to the first day of work. This proposed method will be tested in the field during the course of the work. The Contractor will be responsible for determining modifications required to meet the compaction requirements noted in the above table.*
2. *For trench, backfill operations, the first day of testing will include testing up to 4 lifts. Upon confirmation by satisfactory test results, this compaction method will be accepted until the soil characteristics have changed in the opinion of the Engineer. At that point new compaction tests may be required to determine if the compaction method is still acceptable. If failing test results are reported, the method shall be modified until the compaction requirements are met.*
3. *Even if the soil characteristics have not changed, confirmatory compaction tests may be taken every 3 weeks. Confirmatory testing will include testing of a minimum of 2 lifts. The Engineer will determine the location of all tests.*
4. *Should compaction tests fail to meet the specified densities, the Contractor shall modify backfill methods as necessary to obtain passing results. The modified method shall be used from that point on.*

1.4 SUBMITTALS

- A. The Contractor shall submit at the preconstruction meeting his proposed compaction technique which shall include compaction around field structures (i.e manholes, catch basins, etc.) and valve boxes.

## BACKFILL, COMPACTION AND TESTING

- B. The Contractor shall submit sieve and proctor curves to the Engineer for approval 7 days before any material is brought to the site.
- C. The Contractor shall submit compaction test result sheets to the Engineer no later than 7 days after the test were performed.
- D. When manufacturer supplied copies of aggregate sieve analysis and proctor are provided, tests must have been performed within thirty (30) days of submittal.
- E. NHDOT Control Strip Procedure for Road Construction
  - 1. When proposed by the Contractor, the Engineer may permit density testing using the control strip procedure (Section 304.3.8 NHDOT Standard Specifications).

PART 2 -- PART 2 - PRODUCTS2.1 MATERIALS

- A. Excavated Material Suitable for Reuse:
  - 1. Material shall be friable natural material comprised of gravels, sand, silts, or clayey gravel and sands.
  - 2. Material shall be free from peat, muck, other organic matter, frozen material, ice, and/or snow.
  - 3. Material shall be free from stones, ledge/rock fragments, and asphalt over 8" in the largest dimension.
  - 4. Ledge/Rock fragments from ledge excavation may be used if sufficient material is added to fill the voids. Onsite material or sand may be used to create an acceptable blend. Maximum dimension requirements above shall apply.
  - 5. The material shall not have moisture content over 2% of its optimum moisture content.
  - 6. See Specification Section 13100 for re-using suitable material found to/or suspected of environmental contamination. In general, the accepted approach is to use the excavated material as backfill when the conditions of 1-4 above are met.
- B. Select Materials for Road Construction:
  - 1. Crushed Stone Fine (NHDOT 304.4):
    - a. Well graded granular crushed gravel material for use as a crushed gravel base.
    - b. Material shall be hard and durable, free from frost, organic material, loam, debris and other unsuitable material.
    - c. At least 50% of material retained on the 1 inch sieve shall have a fractured face.
    - d. Sieve Analysis:

## BACKFILL, COMPACTION AND TESTING

<u>Sieve Designation</u>	<u>% Passing by Weight Square Opening</u>
2"	100
1 1/2"	85 - 100
3/4"	45 - 75
No. 4	10 - 45
No. 200	0 - 5 (of the total portion)

2. Crushed Gravel (NHDOT 304.3):
- Well graded granular crushed gravel material for use as a crushed gravel base.
  - Material shall be hard and durable, free from frost, organic material, loam, debris and other unsuitable material.
  - At least 50% of material retained on the 1 inch sieve shall have a fractured face.
  - Sieve Analysis:

<u>Sieve Designation</u>	<u>% Passing by Weight Square Opening</u>
3"	100
2"	95 - 100
1"	55 - 85
No. 4	27 - 52
No. 200	0 - 12 (of the sand portion)

- See 2.1.B.5 for alternative materials to crushed gravel

3. Bank Run Gravel (NHDOT 304.2):
- Well graded granular bank-run gravel material for use as gravel subbase.
  - Material shall be hard and durable, free from frost, organic material, loam, debris and other unsuitable material. Shall not have excess amounts of clay or silt and shall be so sized that the material can be laid out and graded in smooth uniform 8" lifts.
  - Sieve Analysis:

<u>Sieve Designation</u>	<u>% Passing by Weight Square Opening</u>
6"	100
No. 4	25 - 70
No. 200	0 - 12 (of the sand portion)

## BACKFILL, COMPACTION AND TESTING

4. Aggregate Base Course:
    - a. When crushed gravel is specified for road reconstruction, the Engineer may approve use of alternative aggregate base course materials in lieu of crushed gravel provided the following requirements are met:
      - i. A minimum 1' of free draining material (sand or gravel) is provided below the crushed gravel course.
      - ii. The approved material shall be supplied from a homogenous stockpile and be applied across the entire cross section at the depth specified. Short or discontinuous sections will not be permitted.
      - iii. Transitions between materials (crushed gravel and alternate base course) shall be made at the 50:1 taper.
      - iv. The reclaimed stabilized base material meets the project specification (section 02557 or NHDOT section 306). Approval will be based on verification by sieve analysis tests when ordered by the Engineer/Owner. Reclaimed stabilized base material may also be approved in lieu of crushed gravel for sidewalks and driveways.
      - v. Crushed stone meeting the requirements of NHDOT item 304.4 (fine gradation) may be substituted for crushed gravel.
  5. Granular Backfill (NHDOT 304.1):
    - a. Consist of earth suitable for embankment construction; free from frozen material, peat and other unsuitable material.
    - b. The moisture content shall be sufficient to provide the required compaction and stable embankment. In no case shall the moisture content exceed 4 percent above optimum.
    - c. The optimum moisture content shall be determined in accordance with AASHTO T 180, Method C or D.
    - d. 100% shall pass the 3" sieve and 70-100% shall pass the No. 4 sieve.
- C. Backfill and Bedding Materials for Trench Construction:
1. Crushed Stone:
    - a. Crushed stone shall be well graded in size from 1/4 inch to 3/4 inch and conform to ASTM C33 stone size No. 67.
    - b. Clean, hard, and durable particles or fragments.

## BACKFILL, COMPACTION AND TESTING

## c. Sieve Analysis:

<u>Sieve Designation</u>	<u>% Passing by Weight Square Opening</u>
1"	100
3/4"	90 - 100
3/8"	20 - 55
No. 4	0 - 10
No. 8	0 - 5
No. 200	1% Max.

## 2. Sand Blanket:

- a. Clean, hard and durable particles or fragments.
- b. Sieve Analysis:

<u>Sieve Designation</u>	<u>% Passing by Weight Square Opening</u>
3/8"	100
No. 4	95 - 100
No. 16	50 - 85
No. 50	10 - 30
No. 100	2 - 10

## 3. Common Borrow - Sand:

- a. Consist of earth suitable for embankment construction; free from frozen material, perishable rubbish, peat and other unsuitable material.
- b. The moisture content shall be sufficient to provide the required compaction and stable embankment. In no case shall the moisture content exceed 4 percent above optimum.
- c. The optimum moisture content shall be determined in accordance with AASHTO T 180, Method C or D.
- d. 100% shall pass the 3" sieve and 70-100% shall pass the No. 4 sieve.

## 4. Gravel Borrow:

- a. See 2.1 B 5

## D. Structural Fill and Backfill for Structures and Foundations:

1. See 2.1 B 1

PART 3 -- EXECUTION3.1 PERFORMANCE

## A. General:

1. Provide and place all necessary backfill material.

## BACKFILL, COMPACTION AND TESTING

2. Do not allow large masses of backfill to be dropped into the excavation, as from a grab bucket, in such a manner that may endanger pipes and structures.
  3. Place material in a manner that will prevent stones and lumps from becoming nested.
  4. Completely fill all voids between stones with fine material.
  5. Do not place backfill on or against new concrete until it has attained sufficient strength to support loads without distortion, cracking, and other damage.
  6. Deposit backfill material evenly on all sides of structures to avoid unequal soil pressures.
  7. Place backfill material evenly in the trench in an effort to maximize compaction.
  8. Do not backfill with, or on, frozen materials.
  9. Remove, or otherwise treat as necessary, previously placed material that has frozen prior to placing backfill.
  10. Do not mechanically or hand compact material that is, in the opinion of the Engineer, too wet. Fill material that is too wet to be properly placed back in the trench in its current state shall be dried (disced, harrowed, etc.) to within 2% of optimum moisture content. This material shall not be classified as unsuitable material and ineligible for payment as such.
  11. Material made unsuitable by the Contractor's construction methods shall be replaced with Gravel Borrow at no additional cost to the Owner.
  12. Fill that is too dry shall be uniformly watered. The water shall be placed over a loose lift to allow for the water to migrate through the entire lift before compaction.
  13. Do not continue backfilling until the previously placed and/or new materials have dried sufficiently to permit proper compaction.
  14. When original excavated material is, in the opinion of the Engineer, unsuitable, use only approved gravel borrow or suitable material from onsite stockpiled excess materials for backfilling.
  15. Backfill excavation/trench as early as possible to allow for the maximum time for natural settlement.
  16. Slope grade away from structures at a minimum slope of 1.5%.  
The Contractor shall remove excess fill material from the site.
- B. Excavation Protection Systems
1. Contractor is responsible for protecting employees during excavations and backfill operations.
  2. The selection of excavation protection systems should include provisions to assure adequate compaction during system removal or movement.
- Selection of compaction means and methods within the excavation protection system shall be addressed in the submittal required in 1.4.A. above.
- C. Special Engineered Shoring System:
1. When required in the Contract Documents the Contractor shall provide engineered plans and details for shoring systems. The engineering submittal shall include a discussion of compaction methods necessary to eliminate voids during backfill.
  2. See Section 02369 – Sheeting.

## BACKFILL, COMPACTION AND TESTING

- D. Backfilling Around Trench Obstacles
1. Material must be properly compacted around trench obstacles (i.e. manholes, catch basin, valve boxes, etc.). Uncompacted fill will not be allowed to be placed around these obstacles.
  2. The Contractor shall provide adequate excavation supports to allow for a safe work environment in which to properly compact the excavation/trench. The Contractor shall use methods that compensate for the space limitations in the immediate area around these obstacles.
- E. Backfilling in Paved Areas:
1. Backfill trenches in streets and other paved areas by maintaining a moisture content within 2% of optimum.
  2. In an effort to allow the road to heave uniformly, backfill material that was removed from the top portion of the trench shall be replaced back into the top of the trench. Similarly, the material removed from the middle of the trench shall be replaced back into the middle of the trench. Existing material removed from the bottom of the trench (i.e. where the pipe box is located) shall be stockpiled for later use.
  3. Backfill in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide the required bearing value for paving immediately after backfilling is completed.  
Where required, place excavated material, that is acceptable to the Engineer for surfacing or pavement subbase, at the top of the backfill to the depths as needed to adequately support pavement.
- F. Backfilling Trenches in Nonpaved Areas:
1. Grade the ground to a reasonable uniformity.  
Leave the mounding over the trenches in a uniform and neat condition, satisfactory to the Engineer.
- G. Bedding & Backfilling of Pipelines:
1. Install stone bedding on prepared subgrade.
  2. Install pipe
  3. For pipe less than 18" diameter, bedding may be installed in one lift and thoroughly chinked to assure there are no voids below the springline.
  4. For pipe greater than 18" diameter stone shall be installed in 6" to 8" lifts and thoroughly chinked between each lift.
  5. If required, install geotextile fabric between stone and sand blanket.  
Install sand blanket cover and compact with appropriate compaction effort.
- H. Placing and Compacting Backfill:
1. Water Jetting: Shall not be allowed without the approval of the Engineer.
  2. Puddling: Shall not be allowed without the approval of the Engineer.
  3. Tamping:
    - a. Deposit and spread the backfill material in uniform parallel layers not exceeding the lift thicknesses noted herein.
    - b. Tamp each layer as required to obtain a thoroughly compacted mass.



## BACKFILL, COMPACTION AND TESTING

- c. Tamping equipment shall be appropriate for the material and Excavation Protection System and may include plate compactors, jumping jack compactors, remote control roller smooth drum or sheepsfoot roller, excavator mounted compactor or combination thereof as approved in 1.4. above or as required as the result of field testing.
4. Rolling:
- a. Compact material by rolling only when the width and depth of the excavation are sufficient to accommodate the rollers, dozers, mechanical tampers, or other similar powered equipment, as may prove to be acceptable, and when it can be performed without causing damage to pipes and structures installed in the excavation.
  - b. Deposit and spread the backfill material in uniform parallel layers not exceeding the lift thicknesses noted herein.
  - c. Roll each layer as required to obtain a thoroughly compacted mass. Other placing and compacting methods may be employed only when approved by the Engineer.
- I. Improper Backfill
- 1. When, in the opinion of the Engineer, excavation and trenches have been improperly backfilled, and when settlement occurs, reopen the excavation to the depth required, as directed by the Engineer.
  - 2. Refill and compact the excavation or trench with suitable material and restore the surface to the required grade and condition.
  - 3. Excavation, backfilling, compacting work and testing performed to correct improper backfilling shall be performed at no additional cost to the Owner.

END OF SECTION

SECTION 02275

CONSTRUCTION FABRICS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install the appropriate construction fabric at locations shown on the Drawings.
- B. Related Work Specified Elsewhere:
  - 1. Temporary Erosion Control - Section 02540.
  - 2. Pipe and Pipe Fittings - General - Section 02610
  - 3. Earthwork - Section 02200

1.2 SUBMITTALS

- A. Shop drawings for each type of fabric to be used on the project shall be submitted to the Engineer for approval prior to installation. The Contractor will demonstrate that the strength of the chosen fabrics, while meeting the physical characteristics given below, shall withstand without failure the stresses which will be applied by his equipment and activity using his proposed construction techniques.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Construction fabrics shall be divided into four categories:
  - 1. Soil Stabilization - Geogrid (TRIAx)
  - 2. Erosion Control
  - 3. Sediment Control
  - 4. Drainage/Soil Separation (trench)

2.2 SOIL STABILIZATION (GEOGRID)

- A. The geogrid material shall be manufactured from a polypropylene sheet, oriented in three (3) equilateral directions.
- B. The fabric shall be inert to commonly encountered chemicals, liquids and other material, and shall be resistant to ultraviolet light, mildew, rot or other deterioration.
- C. The fabric shall have the following physical characteristics:
  - 1. Rib pitch                      1.6 inches (nominal)
  - 2. Radial stiffenings      20,000 lb/ft at 0.5% strain      ASTM D 6637-01  
(at low strain)
- D. Acceptable manufacturers:
  - 1. Tensar International
  - 2. or equivalent

2.3 PERMANENT EROSION CONTROL

- A. The fabric specified herein is suitable for medium duty applications beneath riprap or revetments.
- B. Material shall be a woven or non-woven fabric made of polypropylene or polyester fabric.
- C. The fabric shall be inert to commonly encountered chemicals, liquids and other material, and shall be resistant to ultraviolet light, mildew, rot or other deterioration.
- D. The fabric shall have the following physical characteristics:

1. Grab Tensile Strength	lbs.	150	ASTM D 4632
2. Apparent Opening Size	US Standard Sieve	100	ASTM D 4751
3. Water Flow Rate	gal/min/SF	100	ASTM D 4491
4. Grab Elongation	%	40	ASTM D 4632
5. Trap Tear Strength	lbs.	90	ASTM D 4533
6. Mullen Burst Strength	psi	300	ASTM D 3786
7. Permittivity	sec. <sup>-1</sup>	1.5	ASTM D 4491
8. Weight	oz./sy	7.0	
- E. Acceptable manufacturers:
  - 1. Amoco
  - 2. Mirafi
  - 3. or equivalent

2.4 SEDIMENT CONTROL

- A. The fabric specified herein is suitable for general purpose siltation fencing.
- B. Material shall be a woven fabric made of polypropylene or polyester mono-filaments.
- C. The fabric shall be inert to commonly encountered chemicals, liquids and other material, and shall be resistant to ultraviolet light, mildew, rot or other deterioration.
- D. The fabric shall have the following physical characteristics:

1. Grab Tensile Strength	lbs.	100	ASTM D 4632
2. Water Flow Rate	gal/min/SF	35	ASTM D 4491
3. Grab Elongation	%	30	ASTM D 4632
4. Trap Tear Strength	lbs.	70	ASTM D 4533
5. Mullen Burst Strength	psi	300	ASTM D 3786
6. Permittivity	sec. <sup>-1</sup>	1	ASTM D 4491
- E. The fabric shall be supported on a 1 1/2 inch hardwood stake spaced a 6 foot (max) intervals.
- F. Fabric may be stapled or fastened to the stake with loops designed to adequately support the weight of the fabric and siltation load.
- G. Acceptable manufacturers:
  - 1. Amoco
  - 2. Mirafi
  - 3. or equivalent

2.5 DRAINAGE AND SOIL SEPARATION (TRENCH)

- A. The fabric specified herein is suitable for medium duty applications to sequester drainage stone or retain bedding stone around a pipe.
- B. Material shall be a non-woven fabric made of polypropylene or polyester fabric.
- C. The fabric shall be inert to commonly encountered chemicals, liquids and other material, and shall be resistant to ultraviolet light, mildew, rot or other deterioration.
- D. The fabric shall have the following physical characteristics:
 

1. Grab Tensile Strength	lbs.	160	ASTM D 4632
2. Apparent Opening Size	US Standard Sieve	70	ASTM D 4751
3. Water Flow Rate	gal/min/SF	130	ASTM D 4491
4. Grab Elongation	%	50	ASTM D 4632
5. Trap Tear Strength	lbs.	80	ASTM D 4533
6. Mullen Burst Strength	psi	350	ASTM D 3786
7. Permittivity	sec. <sup>-1</sup>	2	ASTM D 4491
8. Weight	oz./sy	6.0	
- E. Acceptable manufacturers:
  - 1. Amoco
  - 2. Mirafi
  - 3. or equivalent

PART 3 - EXECUTION

3.1 STORAGE AND HANDLING

- A. The fabric shall be stored and handled in such a way as to prevent any damage and according to manufacturer's recommendations.

3.2 INSTALLATION

- A. The fabric shall be installed to in strict accordance with the manufacturer's recommendations.
- B. The fabric shall be staked, stapled, joined or overlapped, as may be appropriate for the application according to the manufacturer's recommendation or as shown on the drawings.

END OF SECTION

SECTION 02369

SHEETING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, install and maintain sheeting and bracing in the location(s) shown on the Drawings and as required to comply with all applicable State and Federal Regulations including the Occupational Safety and Health Act.
- B. Design: Insure that the sheeting is properly designed and installed to sustain all existing and expected loads to prevent all movement of earth which could in any way cause injury to workmen, delay the work or endanger adjacent structures. Submit details of proposed temporary lateral support systems to the Engineer for review before excavation.

1.2 JOB CONDITIONS

- A. Utilize dewatering devices to facilitate excavation within the sheeted area.
- B. Dewatering shall be considered incidental to excavation and no separate payment for dewatering will be made, unless specified elsewhere.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials shall conform to all applicable State and Federal regulations including the Occupational Safety and Health Act.
- B. Sheeting shall consist of driving timber or steel uprights ahead of open excavation to be held rigidly opposite each other forming the walls of the trench and to be held rigidly by horizontal cross members (braces) and longitudinal members (walers).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install sheeting in accordance with all applicable State and Federal regulations including the Occupational Safety and Health Act.
- B. Backfill as specified in these Specifications. When the level of compacted backfill reaches the location of bracing and wales, remove these items from the trench or other excavation.
- C. Cut the sheeting as shown on the Drawings.
- D. Complete backfilling as specified in these Specifications.

END OF SECTION

SECTION 02402

SITE DEWATERING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. The Contractor shall provide all materials, equipment, and labor necessary for the removal of surface water and as required to provide silt and erosion control devices, in accordance with the approved Storm Water Pollution Prevention Plan (SWPPP)
2. The Contractor shall build all drains and do all ditching, pumping, bailing, and all other work necessary to keep the excavation clear of ground water, sewage, or storm water during the progress of the work and until the finished work is safe from damage.

1.2 RECOMMENDED GUIDES

- A. AASHTO Highway Drainage Guidelines, Volume III, Guidelines for Erosion and Sediment Control in Highway Construction, American Association of State Highway and Transportation Officials, Inc., 444 North Capital St. N.W., Suite 249, Washington, D.C. 20001.
- B. Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire, New Hampshire Department of Environmental Services, Public Information Office, P.O. Box 95, 6 Hazen Drive, Concord, New Hampshire.
- C. Storm Water Phase II Compliance Assistance Guide, Section 5 Small Construction Activity, United State Environmental Protection Agency, Publication No. 833-R-00-003.
- D. USEPA Publication 430/9-73-007 Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity.
- E. New Hampshire Stormwater Manual Volume 3: Erosion and Sediment Controls During Construction, New Hampshire Department of Environmental Services, Public Information Office, P.O. Box 95, 29 Hazen Drive, Concord, New Hampshire.

1.3 SUBMITTALS

- A. The Contractor shall meet submittal requirements for the SWPPP. See Section 02540 Temporary Erosion Control. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.
- B. Prior to the start of construction submit a NOI for Storm Water Discharges Associated with CONSTRUCTION ACTIVITY under a NPDES General Permit. The Contractor shall provide the appropriate National Pollutant Discharge Elimination System (NPDES) permit number prior to the start of construction.

PART 2- PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 – EXECUTION

3.1 REMOVAL OF WATER

- A. Water pumped from excavations shall be piped to points discharging into approved treatment facilities prior to discharging into water courses

3.2 DIVERTING SURFACE WATER

- A. The Contractor shall build, maintain, and operate all cofferdams, channels, flumes, sumps, and other temporary diversion and protection works needed to divert streamflow and other surface water through or around the construction site and away from the construction work while construction is in progress. Unless otherwise specified, stream diversion must discharge into the same natural drainageway in which its headworks are located. Storm runoff from disturbed areas must discharge into a sedimentation pond prior to discharge into a natural drainageway.

3.4 EROSION CONTROL PROVISIONS

- A. The discharge from pumping operations during dewatering operations shall be contained by a device so constructed as to prevent silt from spreading off-site.
- B. Prior to removal of all sediment control devices all retained silt or other materials shall be removed at no additional cost to the Owner.

3.5 REMOVAL OF TEMPORARY WORKS

- A. After the temporary works have served their purpose, the Contractor shall remove them or level and grade them to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

3.6 ENVIRONMENTAL PERMITS (IF APPLICABLE)

- A. All work under this section shall be done in accordance with all federal, state, and local regulations, laws, and rules which may apply and any individual permits that have been obtained for the project.

END OF SECTION

SECTION 02431

CATCH BASINS, FRAMES & GRATES, (NH)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
1. Construct catch basins in conformance with the dimensions, elevations, and locations shown on the Drawings, as specified herein, and/or as directed by the Engineer.
  2. Construct all catch basins throughout the entire project from the same materials.
  3. Furnish and install cast iron catch basin frames and grates on all catch basins unless otherwise shown on the Drawings.
  4. Furnish and install composite hood devices in all catch basins with discharge pipe less than or equal to 18”.

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
1. New Hampshire Department of Transportation Standard Specifications, latest edition.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit Shop Drawings and manufacturer's literature in conformance with the standard General Conditions of the construction contract.

PART 2 - PRODUCTS

2.1 RISERS, TOPS, FRAMES, GRATES AND MASONRY

- A. Sides of catch basins shall be made of precast concrete barrel sections or cast-in-place concrete.
- B. Catch basin bases shall be precast or cast-in-place concrete.
- C. Precast concrete sections shall conform to the N.H.D.O.T. Standard details.
- D. Concrete masonry units shall conform to the requirements of ASTM C139 with a minimum compressive strength of 3000 pounds per square inch when tested by the method in ASTM C116
- E. Cement mortar shall conform to Section 569 of the N.H.D.O.T. Standard Specifications.
- F. Castings shall be gray iron, Class 30, conforming to AASHTO M105, unless otherwise specified.
- G. Catch basin grates shall be N.H.D.O.T. Standard detail type B in pavement areas and Type C in non-pavement areas unless otherwise shown on the Drawings.
- H. Acceptable manufacturers:
1. LeBaron
  2. Neenah



3. East Jordan
4. Deeter

## 2.2 COMPOSITE HOOD DEVICES

- A. Molded High Density Polyethylene (HDPE).
- B. Anti-syphon opening
- C. Multiple piece construction not allowed.
- D. Mounting hardware as needed or provided by manufacturer
- E. Acceptable manufacturer:
  1. Nyloplast Snout Structure

## PART 3 - EXECUTION

### 3.1 PERFORMANCE

- A. Precast Risers and Tops:
  1. Install risers and tops level and plumb.
  2. Construct full mortar joints not more than 1/2" wide, with all exposed joints neatly finished.
  3. Construct masonry to fit neatly and tightly around the pipe.
  4. Set metal frames in a full mortar bed.
  5. Do not permit water to rise over newly made joints until after inspection by the Engineer.
  6. Solidly fill annular spaces around pipes entering the catch basin with non-shrink grout.
  7. When necessary, cut openings carefully to prevent damage to risers and tops. Replace all damaged risers and tops at no additional expense to the Owner.
- B. Adjustment to Grade:
  1. If necessary, adjust the tops of catch basins to grade with brick masonry.
  2. Concrete rings are not acceptable for adjusting to grade.
  3. Temporarily set structures within the limits of pavement at the elevation of the bottom of the binder course or as directed. After the binder course has been compacted, set the structures at their final grade.
- C. Frames and Grates:
  1. Set all frames in a full bed of mortar, true to grade and concentric with the catch basin openings.
  2. Completely fill all voids beneath the bottom flange to make a watertight fit.
  3. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the catch basin all around its circumference.
  4. Clean the frame seats before setting the grates in place.
- D. Composite Hood Devices
  1. Install Composite Hood Device in structures in accordance with manufacturer's instructions. Use manufacturer supplied hardware and supplement as needed to make a complete installation.

- E. Clean up:
1. Upon completion, clean all structures of silt, debris, and other matter.
  2. Keep all catch basins clean until final acceptance of the work.

END OF SECTION

SECTION 02445

BORING AND JACKING

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Furnish all labor, equipment, materials and incidentals required to install casing pipe (steel sleeve) by bore and jack method under the multiple pipe drainage crossing locations shown on the drawings in accordance with these specifications.
2. Engage a Professional Engineer, registered in the State of New Hampshire to prepare design for jacking sleeves. The design shall include but not be limited to jacking pit, reaction blocking, method of grouting, means of blocking or anchoring the carrier pipe against flotation, dewatering plan, a construction sequence and schedule.
3. The boring and jacking operations shall be conducted simultaneously, with continuous installation, until the casing pipe is in the final positions (24 hours a day, 7 days per week). Correct line and grade shall be carefully maintained.
4. Continuously keep the jacking subgrade free from ground and surface waters and be prepared to implement de-watering plan on short notice.
5. Contractor is to be fully responsible for inspecting the location where the pipes are to be installed and familiarize himself with the conditions under which the work will be performed, at with all the necessary details for orderly prosecution of the work. The omission of any details here in shall not relieve Contractor of full responsibility for installation of the work in its entirety
6. If any movement or settlement occurs which has the potential to cause damage to existing structures over or adjacent to the work, immediately stop work and secure work to prevent further movement, settlement or damage. Resume jacking only after all necessary precautions have been taken to prevent movement, settlement or damage. Settlement or damaged areas are to be repaired by the Contractor at his own cost.

1.2 DEFINITIONS

- A. Carrier Pipe: Sewer pipe.
- B. Casing Pipe: Sleeve through which carrier pipe will be placed.
- C. Boring and Jacking: Method of installing casing pipe by cutting, hand mining, or boring an opening in soils material, simultaneously forcing casing pipe through it with hydraulic jacks.
- D. Casing Spacer: Fabricated item for positioning a carrier pipe inside a casing pipe.

1.3 SUBMITTALS

- A. Submit following information in accordance with the requirements of Section 01340.
1. Shop drawings for casing pipe showing sizes and hold down assemblies or casing spacers for carrier pipe.
  2. Shop drawings of bulkheads when shown on Drawings.
  3. Design mixes for grout and flowable fill.
  4. Working drawings and written procedures describing in detail proposed bore and jack method and entire operation, including, but not limited to:
    - a. Working and receiving shafts.
    - b. Dewatering.
    - c. Method of removing soils and installation of casing and carrier pipe.
    - d. Size, capacity, and arrangement of equipment.
    - e. Backstop.
    - f. Shaft base material.
    - g. Type of cutter head.
    - h. Method of monitoring and controlling line and grade.
    - i. Detection of surface movement.
    - j. Procedure for installing pipe supports, anchors, or placement of grout between carrier pipe and casing pipe.
    - k. Bulkhead details and proposed positive method of anchoring carrier pipe to prevent flotation.
    - l. Catalog data for casing spacers when used for temporary support during construction.
    - m. Procedure for monitoring line and grade.
  5. If modifications to methods are required during construction, submit working drawings delineating modifications, including reasons for them.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Unload and handle materials with equipment of adequate capacity.
1. Store materials on site in reasonably level, well drained area free from brush.
  2. Store individual pieces and bundles with safe walking space between to allow full view for inspection purposes.

1.5 PROJECT CONDITIONS

- A. Bore so as not to interfere with, interrupt, or endanger surface and activity thereon.
1. Minimize subsidence of surface, structures, and utilities above and in vicinity of bore
  2. Support ground continuously to prevent loss of ground and keep perimeters stable.
  3. Be responsible for settlement resulting from operations.
  4. Repair and restore damaged property to its original condition before being disturbed at no additional cost to the Owner.

- B. Comply with ordinances, codes, and regulations, Railroad requirements, and applicable regulations of Federal Government, OSHA 29CFR 1926, and applicable criteria of ANSI A10.16-1995 (R2001), "Safety Requirements for Tunnels, Shafts, and Caissons."
- C. Execute railroad agreement and fulfill requirements of the B&M railroad corporation. (A sample railroad agreement is included in the Appendix of these specifications)

#### 1.6 ADDITIONAL CRITERIA FOR WORK UNDER RAILROADS

- A. Do not schedule work within and adjacent to Railroad property until Engineer and Railroad approve submittals, including proper Railroad insurance. Approval does not relieve Contractor of responsibility for adequacy and safety of procedures.
- B. Give Railroad advance written notice copied to Engineer, before entering and working on Railroad property.
- C. Place safety, precautionary, and protective devices and services required by railroad before proceeding with the work.
- D. Adhere to railroad specification and permit requirements. (Refer to the Appendix of these specifications)

### PART 2 PRODUCTS

#### 2.1 MATERIALS

- A. Casing Pipe
  - 1. Material:
    - a. Sleeve shall be of a material that is approved for use for installation using boring and jacking techniques.
    - b. Sleeve shall be of adequate size to provide a clear opening to pass the carrier pipe while accommodating bell joints and provide adequate space to adjust carrier pipe to specified line and grade.
    - c. Minimum wall thickness: 0.54 inches and following Drawings and/or Bid Schedule.
    - d. Joints: Fully welded around circumference of pipe with complete penetration weld.
      - i. Weld of sufficient strength to withstand forces at pipe joints without any distortion of pipes.
      - ii. Minimum welds: As recommended by the manufacturer.
    - e. Coating: None.
- B. Carrier Pipe.
  - 1. Carrier Pipe: Specified elsewhere in specifications.
- C. Casing Spacers.
  - 1. Fusion bond assembled carbon steel bands, risers, and studs with PVC or Epoxy 14 to 20 mils thick.
  - 2. Treat and coat stainless steel metal surfaces and welds in order to reduce chemical reactivity of its surface.

3. Bands and Risers.
  - a. Minimum 2 pieces, stainless steel plate: ASTM A666 Type 304, or hot rolled, pickled carbon steel with a minimum yield strength of 30,000 psi and coat as specified herein.
  - b. Band: Minimum thickness: 14 gage for carrier pipes up to 12 inches diameter and 12 gage for more than 12 inches.
- D. Grout.
  1. Cement: ASTM C150, Type I or Type II.
  2. Water: See Section 03300.
  3. Sand: ASTM C404, Size No. 1.
  4. Mixture: Shall consist of 1 part cement to 6 part sand, which is subject to increase or decrease as necessary to provide the required flow characteristics: Minimum compressive strength of 100 psi, attained within 24 hours, and sufficiently fluid to inject through steel casing and fill voids, with prompt setting to control grout flow.
- E. Flowable Fill.
  1. For Filling Void between Casing and Carrier Pipe: See Section 03300.
- F. Surface Settlement Markers.
  1. Within Bituminous Concrete Paved Areas: "p.k." nails.
  2. Within Nonpaved Areas: Wooden hubs.
  3. On Railroad ties: "p.k." nails.
- G. Bulkheads.
  1. Brick bulkheads, 8-inch wide at both ends of each sleeve.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Site soil investigation reports and data are provided in Appendix A.
  1. Interpret this material and investigate work site soil conditions before bidding.
  2. Encountering rock or water will not entitle Contractor to additional compensation except as provided for in bid schedule.
- B. Notify Engineer immediately if obstruction stopping forward motion of operation is encountered during installation.
  1. When it is impossible to advance bore hole or pipe, discontinue operation, abandon completed portion in place, and fill with grout or plug, unless otherwise directed by Engineer.
- C. Dewatering: See Section 02402.

### 3.2 PREPARATION

- A. Excavate Boring and Jacking Pit per Section 02223.
- B. Perform preliminary work, including constructing backstop, placing guide timbers, and placing boring apparatus.

- C. Surface Settlement Markers.
  - 1. Install and locate surface settlement markers according to a grid, spaced ten feet by ten feet and extending as shown on the drawings, but not less than twenty feet either side of the tunnel centerline.
  - 3. Establish elevation of settlement markers to bench marks unaffected by operations.
  - 4. Take readings and permanently record before start of dewatering operations and/or shaft excavation.
  - 5. Make elevation measurements to nearest 0.01 foot, and furnish report to Engineer.

### 3.3 BORING OPERATION

- A. General.
  - 1. Use removable auger and cutting head arrangement.
  - 2. Control line and grade.
- B. Boring and Jacking.
  - 1. Jack casing pipe with auger rotating within pipe to remove spoil.
    - a. Hand mining may be used for large bore casing pipe, provided method is submitted in detail and is acceptable to Engineer.
  - 2. Maintain face of cutting head to preclude free flow of soft or poor soils material.
  - 3. Overcut of Cutting Head:
    - a. Not to exceed outside diameter of casing pipe by more than 1/2 inch.
    - b. For hand mining no overcut will be permitted.
  - 4. Use positive means for continuous monitoring and controlling grade of casing pipe during boring operation.
  - 5. Join casing pipe as required by manufacturer.
    - a. When coating is required, repair coating damage on each side of weld and recoat complete weld area.

### 3.4 DETECTION OF MOVEMENT

- A. Surface Settlement Markers: Make observations at regular time intervals acceptable to Engineer on markers placed as required herein.
- B. In event of settlement or heave on any marker, immediately cease work and take immediate action to prevent further settlement or heave.
  - 1. Restore surface elevations to that existing before start of bore and jack operations.
- C. Subsurface Indicators.
  - 1. When shown on Drawings, install subsurface settlement indicators following Standard Details before start of dewatering or bore and jack.
  - 2. Monitor movements of indicators to accuracy of 0.01 foot.
  - 3. Whenever bore and jack occurs within 50 feet of indicator, monitor movements of indicator before and after each advance of bore and jack within 50 feet of indicator.

- D. Report any settlement or movement immediately to Engineer and take immediate remedial action, at no cost to the Owner.

3.5 GROUTING AND FILLING

- A. Systems of standard pipe, fittings, hose and special grouting outlets embedded in the test pipe wall shall be provided as specified. Care shall be taken to ensure that all parts of the system are maintained free from dirt. Cement grout shall be forced under pressure into the grouting connections. Grouting shall be started in the lowest connections and shall proceed until grout begins to flow from upper connections, or until cavities are completely filled. Connections shall then be made to those holes and the operation continued to completion.
- B. Apparatus for mixing and placing grout shall be capable of mixing effectively and stirring the grout and then forcing it into the grout connections in a continuous uninterrupted flow.
- C. After grouting is complete, pressure shall be maintained by means of stop cocks or other suitable devices until the grout has sufficiently set. After the grout is set, grout holes shall be completely filled with dense concrete and finished neatly without evidence of voids or projections.

3.6 FIELD QUALITY CONTROL

- A. Maintain line and grade of sleeve to a tolerance that allows carrier pipe to meet required line and grade.

3.7 INSTALLATION OF CARRIER PIPE

- A. Install carrier pipe following Sections, 02610, and 02624, Standard Details, and Drawings.
- B. The carrier pipe shall be installed to the line and grade required by the plan within the sleeve, and after it has been satisfactorily placed and approved by the Engineer, the space between the outside of the pipe and the jacking sleeve or liner plates shall be completely filled with grout in one continuous uninterrupted operation in a manner to prevent occurrence of any voids between pipe and sleeve or liner plates.
- C. Use thermoplastic or other dielectric material (except wood) between carrier pipe and steel sleeve to prevent metal to metal contact and damage to pipe and coating during placement.
  - 1. Each pipe must be blocked or braced to prevent flotation or motion during the placing of grout. A brick bulkhead 8-in wide shall be placed at both ends of the sleeve and tunnel.
  - 2. Gravity sewer.
    - a. Fill annular space between pipe and casing with grout, or flowable fill following Standard Details and Drawings.
    - b. Provide positive means to prevent flotation during placement of fill in casing.

END OF SECTION



SECTION 02540

TEMPORARY EROSION CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Description of Work:

1. Comply with all Federal, State and local regulations pertaining to erosion and sediment control and stormwater management.
2. Prepare an Erosion and Sediment Control and Stormwater Management Plan (Plan) for review and approval prior to the start of any construction activities.
3. Submit NOTICE OF INTENT form to the USEPA for approval prior to construction. Post the appropriate permit number on site.
4. Provide all labor, equipment, materials and maintain temporary erosion control devices as described in the Plan.
5. Provide such erosion control measures as may be necessary to correct conditions that develop prior to the completion of permanent erosion control devices and/or as required to control erosion that occurs during normal construction operations.
6. Provide such sediment control measures as may be necessary to address conditions created by construction dewatering methods and/or stormwater runoff.
7. After award of the Contract, prior to commencement of construction activities, meet with the Engineer to discuss the Plan and develop a mutual understanding relative to.
8. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.
9. Stabilize disturbed earth surfaces in the shortest practical time and employ such temporary erosion control devices as may be necessary until such time as adequate soil stabilization has been achieved.
10. Submit a Notice of Termination (NOT) form to the USEPA at the completion of construction activities.

B. RECOMMENDED GUIDES

1. AASHTO Highway Drainage Guidelines, Volume III, Guidelines for Erosion and Sediment Control in Highway Construction, American Association of State Highway and Transportation Officials, Inc., 444 North Capital St. N.W., Suite 249, Washington, D.C. 20001.
2. Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire, New Hampshire Department of Environmental Services, Public Information Office, P.O. Box 95, 6 Hazen Drive, Concord, New Hampshire.

3. Storm Water Phase II Compliance Assistance Guide, Section 5 Small Construction Activity, United State Environmental Protection Agency, Publication No. 833-R-00-003.

## PART 2 - PRODUCTS

### 2.1 STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

- A. The SWPPP must be prepared in accordance with EPA requirements. A sample SWPPP document can be obtained from the EPA's website at <http://www.epa.gov/npdes/swpppguide>.
- B. Prior to the start of construction submit the SWPPP in accordance with the Shop Drawing review process in Section 01340 – Submittal.
- C. Prior to the start of construction submit a Notice of Intent (NOI) for Storm Water Discharges Associated with CONSTRUCTION ACTIVITY under a NPDES General Permit (Copy of form attached). The NOI must be submitted to the USEPA at least seven (7) days prior to the start of construction.
- D. To assist in the SWPPP preparation, the Engineer will supply the following as available:
  1. Specific Reproducible plan sheet and if available, cross sections of the project.
  2. Drainage calculations as available.
  3. Permits obtained for the project.
  4. Geotechnical reports.
- E. The approved SWPPP document shall remain on-site during construction.
- F. At the completion of construction, submit a Notice of Termination (NOT) to the USEPA.
- G. The SWPPP shall be submitted to the Massachusetts Department of Environmental Protection (DEP) and Department of Conservation and Recreation (DCR) for review per BRP WM-09 approval of NPDES Stormwater Pollution Prevention Plans for Construction or Industrial General Permits Discharging to Outstanding Resource Water (ORW).
- H. The SWPPP shall be revised as necessary pending comments by DEP and DCR.

### 2.2 ACCEPTABLE MATERIALS

- A. Baled Hay: At least 14" x 18" x 30" securely tied and staked twice per bale.
- B. Silt Fence: "Silt Stop" fabric (SF 26) 36" tall to be provided with cured oak posts 54" in length spaced approximately 6-8' apart.
- C. Stone Check Dams: Washed ¾ inch crushed septic system stone free of sand and silts.
- D. Sand Bags: Heavy cloth bags of approximately 1 cubic foot capacity filled with sand or gravel.
- E. Mulches:

1. Asphalt emulsion, gravel, crushed stone, loose hay, straw, peat moss, pine straw or needles, sawdust, wood chips, wood excelsior, or wood fiber cellulose.
  2. Type and use shall be suitable for the Work.
- F. Mats and Netting:
1. Twisted craft paper, yarn, jute, excelsior, wood fiber mats, glass fiber, and plastic film.
  2. Type and use shall be suitable for the Work.
- G. Seed:
1. Standard conservation mix of 100% annual rye grass or field broomgrass.
  2. Equivalent seed mixture may be used, as approved by the Engineer, based on its suitability for use in controlling erosion of the various soil types and slopes.
- H. Sod:
1. Grown from seed of adapted varieties to produce high quality sod, free of any serious thatch, weeds, insects, diseases and other pest problems.
  2. At least one year old and not older than three years. Cut with 1/2" to 1" layer of soil.
- I. Drains:
1. Flexible drains consisting of collapsible neoprene pipe, minimum of 8" in diameter, or an approved equal.
  2. Corrugated metal pipe and inlet of a gauge consistent with the loading conditions. A minimum size of 12 inches in diameter or approved equal.
- J. Catch basin filters

### PART 3 - EXECUTION

#### 3.1 CONSTRUCTION REQUIREMENTS

- A. Temporary Stone Checks:
1. Construct temporary erosion checks in ditches and other locations as needed.
  2. Baled hay and/or sand bags may be used in an arrangement to fit local conditions designated by the Engineer.
  3. Terrace side slopes to retard runoff velocities.
- B. Temporary Berms (When Applicable):
1. Construct temporary barriers along the toe of embankments.
  2. Construct temporary side drains in intervals as needed.
- C. Temporary Slope Drains: Shall be collapsible pipe with corrugated metal pipe inlet with a crescent shaped barrier placed at each slope drain.
- D. Debris Basin:
1. A barrier or dam constructed across waterway or other suitable location to form a silt or sediment basin.

## TEMPORARY EROSION CONTROL

2. Capacity shall be equal to the volume of sediment expected to be trapped at the site during the planned use for life of the structure or, if the periodic removal of debris would be practical, the capacity shall be proportionally reduced.

### 3.2 PERFORMANCE

- A. Install erosion control devices as described in the Plan.
  1. Apply seed for temporary cover at a rate of 40 lbs. per acre.
  2. Apply hay or straw at a rate of 2 tons per acre.
  3. Hydroseed all temporarily seeded areas.
- B. Protection:
  1. Protect streams and channels from fuel, lubricants and other pollutants.
  2. Locate storage of materials in shop yards where erosion and sediment hazards are slight.
- C. Maintenance
  1. Maintain temporary erosion control devices as described in the Plan

### 3.3 REMOVAL AND DISPOSAL

- A. General: When permanent soil stabilization has been achieved, remove all temporary materials and devices that are unsightly.
- B. Reuse: Materials and devices of suitable type and conditions may be reused at other onsite locations. Materials and devices, determined by the Engineer to be unsuitable for reuse, shall become the Contractor's property and shall be disposed of in a manner and location approved by the Owner.
- C. Onsite Disposal when Applicable: The locations and methods of onsite disposal are subject to the Owner's approval. Onsite disposal that results in unsightly conditions,, precludes proper maintenance and is detrimental to the physical environment will not be permitted.

END OF SECTION

NPDES  
FORM



United States Environmental Protection Agency  
Washington, DC 20460  
**Notice of Intent (NOI) for Storm Water Discharges Associated with  
CONSTRUCTION ACTIVITY Under a NPDES General Permit**

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a NPDES permit issued for storm water discharges associated with construction activity in the State/Indian Country Land identified in Section II of this form. Submission of this Notice of Intent also constitutes notice that the party identified in Section I of this form meets the eligibility requirements in Part I.B. of the general permit (including those related to protection of endangered species determined through the procedures in Addendum A of the general permit), understands that continued authorization to discharge is contingent on maintaining permit eligibility, and that implementation of the Storm Water Pollution Prevention Plan required under Part IV of the general permit will begin at the time the permittee commences work on the construction project identified in Section II below. IN ORDER TO OBTAIN AUTHORIZATION, ALL INFORMATION REQUESTED MUST BE INCLUDED ON THIS FORM. SEE INSTRUCTIONS ON BACK OF FORM.

**I. Owner/Operator (Applicant) Information**

Name: \_\_\_\_\_ Phone: \_\_\_\_\_  
Address: \_\_\_\_\_ Status of Owner/Operator:   
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

**II. Project/Site Information**

Is the facility located on Indian Country Lands?  
Yes  No

Project Name: \_\_\_\_\_  
Project Address/Location: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_ County: \_\_\_\_\_  
Has the Storm Water Pollution Prevention Plan (SWPPP) been prepared? Yes  No   
Optional: Address of location of SWPPP for viewing.  Address in Section I above  Address in Section II above  Other address (if known) below:  
SWPPP Address: \_\_\_\_\_ Phone: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Name of Receiving Water: \_\_\_\_\_

\_\_\_\_\_  
Month Day Year      Month Day Year  
Estimated Construction Start Date      Estimated Completion Date

Estimate of area to be disturbed (to nearest acre): \_\_\_\_\_

Estimate of Likelihood of Discharge (choose only one):  
1.  Unlikely      3.  Once per week      5.  Continual  
2.  Once per month      4.  Once per day

Based on instruction provided in Addendum A of the permit, are there any listed endangered or threatened species, or designated critical habitat in the project area?

Yes  No

I have satisfied permit eligibility with regard to protection of endangered species through the indicated section of Part I.B.3.e.(2) of the permit (check one or more boxes):

(a)  (b)  (c)  (d)

**III. Certification**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: \_\_\_\_\_ Date: \_\_\_\_\_  
Signature: \_\_\_\_\_



**Notice of Intent (NOI) for Storm Water Discharges Associated with  
Construction Activity to be Covered Under a NPDES Permit**

**Who Must File a Notice of Intent Form**

Under the provisions of the Clean Water Act, as amended, (33 U.S.C. 1251 et seq.; the Act), except as provided by Part I.B.3 the permit, Federal law prohibits discharges of pollutants in storm water from construction activities without a National Pollutant Discharge Elimination System Permit. Operator(s) of construction sites where 5 or more acres are disturbed, smaller sites that are part of a larger common plan of development or sale where there is a cumulative disturbance of at least 5 acres, or any site designated by the Director, must submit an NOI to obtain coverage under an NPDES Storm Water Construction General Permit. If you have questions about whether you need a permit under the NPDES Storm Water program, or if you need information as to whether a particular program is administered by EPA or a State agency, write to or telephone the Notice of Intent Processing Center at (866) 352-7755.

**Where to File NOI Form**NOIs sent regular mail:

Storm Water Notice of Intent (4203M)  
USEPA  
1200 Pennsylvania Avenue, NW  
Washington, D.C. 20460

NOIs sent overnight/express:

Storm Water Notice of Intent  
US EPA East Building, Rm. 7420  
1201 Constitution Avenue, NW  
Washington, D.C. 20004

Storm Water Pollution Prevention Plans (SWPPPs) should not be sent in with the NOI -- they should remain on-site. For overnight/express delivery of NOIs, add the phone number (202) 564-9545. Please submit original document with signature in ink—DO NOT send copies.

**When to File**

This form must be filed at least 48 hours before construction begins.

**Completing the Form**

OBTAIN AND READ A COPY OF THE APPROPRIATE EPA STORM WATER CONSTRUCTION GENERAL PERMIT FOR YOUR AREA. To complete this form, type or print, using uppercase letters, in the appropriate areas only. Please place each character between the marks (abbreviate if necessary to stay within the number of characters allowed for each item). Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form, call the Notice of Intent Processing Center at (866) 352-7755.

**Section I. Facility Owner/Operator (Applicant) Information**

Provide the legal name, mailing address, and telephone number of the person, firm, public organization, or any other entity that meet either of the following two criteria: (1) they have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or (2) they have the day-to-day operational control of those activities at the project necessary to ensure compliance with SWPPP requirements or other permit conditions. Each person that meets either of these criteria must file this form. Do not use a colloquial name. Correspondence for the permit will be sent to this address.

Enter the appropriate letter to indicate the legal status of the owner/operator of the project: F = Federal; S = State; M = Public (other than federal or state); P = Private.

**Section II. Project/Site Information**

Enter the official or legal name and complete street address, including city, county, state, zip code, and phone number of the project or site. If it lacks a street address, indicate with a general statement the location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for permit coverage to be granted.

The applicant must also provide the latitude and longitude of the facility in degrees, minutes, and seconds to the nearest 15 seconds. The latitude and longitude of your facility can be located on USGS quadrangle maps. Quadrangle maps can be obtained by calling 1-800 USA MAPS. Longitude and latitude may also be obtained at the Census Bureau Internet site: <http://www.census.gov/cgi-bin/gazetteer>.

Latitude and longitude for a facility in decimal form must be converted to degrees, minutes and seconds for proper entry on the NOI form. To convert decimal latitude or longitude to degrees, minutes, and seconds, follow the steps in the following example.

Convert decimal latitude 45.1234567 to degrees, minutes, and seconds.

- 1) The numbers to the left of the decimal point are degrees.
- 2) To obtain minutes, multiply the first four numbers to the right of the decimal point by 0.006.  $1234 \times .006 = 7.404$ .
- 3) The numbers to the left of the decimal point in the result obtained in step 2 are the minutes: 7'.
- 4) To obtain seconds, multiply the remaining three numbers to the right of the decimal from the result in step 2 by 0.06:  $404 \times 0.06 = 24.24$ . Since the numbers to the right of the decimal point are not used, the result is 24".
- 5) The conversion for 45.1234 = 45° 7' 24".

Indicate whether the project is on Indian Country Lands.

Indicate if the Storm Water Pollution Prevention Plan (SWPPP) has been developed. Refer to Part IV of the general permit for information on SWPPPs. To be eligible for coverage, a SWPPP must have been prepared.

Optional: Provide the address and phone number where the SWPPP can be viewed if different from addresses previously given. Check appropriate box.

Enter the name of the closest water body which receives the project's construction storm water discharge.

Enter the estimated construction start and completion dates using four digits for the year (i.e. 05/27/1998).

Enter the estimated area to be disturbed including but not limited to: grubbing, excavation, grading, and utilities and infrastructure installation. Indicate to the nearest acre; if less than 1 acre, enter "1." Note: 1 acre = 43,560 sq. ft.

Indicate your best estimate of the likelihood of storm water discharges from the project. EPA recognizes that actual discharges may differ from this estimate due to unforeseen or chance circumstances.

Indicate if there are any listed endangered or threatened species, or designated critical habitat in the project area.

Indicate which Part of the permit that the applicant is eligible with regard to protection of endangered or threatened species, or designated critical habitat.

**Section III. Certification**

Federal Statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner of the proprietor, or

For a municipality, state, federal, or other public facility: by either a principal executive or ranking elected official. An unsigned or undated NOI form will not be granted permit coverage.

**Paperwork Reduction Act Notice**

Public reporting burden for this application is estimated to average 3.7 hours. This estimate includes time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Director, OPPE Regulatory Information Division (2137), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Include the OMB control number on any correspondence. Do not send the completed form to this address.

SECTION 02551

BITUMINOUS CONCRETE PAVING (NH)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install bituminous concrete pavement courses in accordance with Sections 401 of the NHDOT Standard Specifications for Road and Bridge Construction (latest edition) and as specified in this section.
- B. All reference to NHDOT, NHDOT personnel or the Department may be construed as the Engineer, the City of Portsmouth, their agents and their representatives.

1.2 QUALITY ASSURANCE

- A. Work shall conform to NHDOT Section 401, Tier 2 except as noted herein:
  - 1. Ride Smoothness: Section 401.3.17.3.4.1 shall apply except variations exceeding **3/8** inch in profile or cross slope shall be eliminated.
  - 2. Ride Smoothness: Section 401.3.17.3.4.4 shall apply except high points **0.5** inches in 25 feet shall corrected.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall conform to NHDOT Section 401 except the following:
  - 1. The maximum amount of Total Reused Binder (TRB) in the pavement mix design shall be 0.5% and the mix shall meet all volumetric mix design criteria.
  - 2. Asphalt Cement shall not contain any form of used, recycled or refined oil. Suppliers of PG Binder shall certify that the PG Binder does not contain any used, recycled or refined oil.
  - 3. All 3/4" inch (19mm) and 1 inch (25mm) pavement mixes shall be designed using the 50 gyration N design, unless specified otherwise.
  - 4. Liquid asphalt cement binder shall have a Performance Grade (PG) of PG 64-28 for all standard bituminous and PG 64-E for all high strength bituminous pavements. NHDOT QC/QA Specifications shall be followed for high strength mixes.

2.2 PAVEMENT MIX DESIGNS

Pavement mix designs shall meet NHDOT Section 401.2.5.1 except the following:

- A. Minimum asphalt binder content shall be as follows:

Minimum Binder Content		
Mix Type	50 Gyration	75 Gyration*
3/8-in (9.5 mm)	6.3	*
1/2-inch (12.5 mm)	5.9	*
3/4-inch (19 mm)	5.3%	*

\*

75 Gyration mix not allowed without express written permission of the engineer.

The required minimum asphalt content is based on the use of aggregate with a specific gravity of 2.65 to 2.70. The minimum asphalt content requirement may be adjusted when

aggregate with a higher specific gravity is used, or the minimum may be adjusted at the Engineer's discretion if it is believed to be in the best interest of the Owner. All mix designs shall be submitted to the Engineer for verification and approval.

- B. Method Requirements NHDOT Section 401.2.6 shall apply including the following:
1. Coarse Aggregate: Stockpiled coarse aggregate shall meet the requirements of 2.6.1, Table 2.
  2. Tolerances: All mixtures shall conform within the range of tolerances provided in NHDOT Section 401.2.6.2
  3. When Non-Compliant test result, it shall be the Contractor's responsibility to correct non-compliant pavement. The Contractor may be required to remove non-compliant material that is poorly graded or material exhibiting cracks, open joints or other imperfections (**no payment will be made for this material or its removal**).

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Construction requirements shall be in accordance with Sections 401 of the NHDOT Standard Specifications for Road and Bridge Construction (latest edition) **and** as specified in this section.
1. Prior to placing any mix, a pre-paving conference shall be held with the Owner, Contractor, and Engineer to discuss the proposed paving schedule, source of mix, type and amount of equipment to be used, sequence of paving pattern, rate of mix supply, traffic control, and general continuity of the operation. Special attention shall be made to the paving pattern sequence to minimize cold joints.
  2. The Contractor shall notify the Engineer one week in advance of paving operations to allow sufficient time for scheduling personnel.
  3. Any pavement course four inches (compacted depth) or greater shall be placed and compacted in two lifts.
  4. Sweeping. Existing pavement or previously laid courses shall be thoroughly dry and free from all dust, dirt, and loose material. Sweeping with a power broom, supplemented by hand sweeping, may be necessary.
  5. Tack coat. Surfaces of any pavement course shall have a tack coat of emulsified asphalt applied in accordance with NHDOT Specifications. Application of emulsified asphalt shall be between 0.02 and 0.05 gal/yd<sup>2</sup>.
  6. Unless otherwise noted joint adhesive conforming to NHDOT Section 401.2.12 shall be applied to all longitudinal pavement joints.
  7. Utility covers, frames and grates, valves and other castings shall be set and raised. Contact surfaces of the drainage and utility castings shall be painted with a thin coating of suitable bituminous material. Surface pavement shall be removed from covers and castings immediately following pavement operations.
  8. Method requirements NHDOT Section 401.3.1.2 shall apply.
  9. Per NHDOT Section 401.3.10.7.2, no mix less than 260° measured at delivery to the hopper shall be installed.

END OF SECTION



## REMOVAL &amp; REPLACEMENT OF PAVING (NH)

SECTION 02555REMOVAL & REPLACEMENT OF PAVING (NH)PART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
1. Remove bituminous asphaltic and/or portland cement pavement, and replace pavement, subgrade, base courses and surface courses, including temporary pavement, within the area(s) shown on the Drawings and as directed by the Engineer.
  2. Keep pavement removal to a minimum width suitable for the required construction.
- B. Work Not Included:
1. Removal and replacement of paving for the convenience of the Contractor will not be eligible for payment.

1.2 QUALITY ASSURANCE

- A. Materials: Use only materials furnished by a bulk bituminous concrete producer regularly engaged in the production of hot mixed, hot laid bituminous concrete.
- B. Equipment: Provide, maintain and operate pavers, dump trucks, tandem, 3-wheel and pneumatic tired rollers well suited to the mixtures being placed. Provide, maintain and operate hand equipment as required. When applicable, provide, maintain and operate trimming equipment and materials.
- C. Requirements of Regulatory Agencies:
1. New Hampshire Department of Transportation Standard Specifications, latest edition, herein abbreviated N.H.D.O.T.
  2. N.H.D.O.T. "Measurement" and "Payment" paragraphs shall not apply.
- D. Joint Make-Up:
1. General:
    - a. Exercise extreme care in the removal of pavement so that pavement will not be unnecessarily disturbed or destroyed. Mechanically cut pavement to be removed to a straight line, unless otherwise directed by the Engineer.
  2. Pavement Removal:
    - a. Payment limits for pavement removal shall be as shown on the Payment Limits detail on the Drawings.

## REMOVAL &amp; REPLACEMENT OF PAVING (NH)

PART 2 - PRODUCTS2.1 MATERIALS

- A. Subgrade courses shall be in accordance with Division 300 "Bases"; Section 304, "Sand, Gravel and Crushed Gravel Base Courses" of the N.H.D.O.T. Standard Specifications, latest edition.
- B. Materials shall conform to Division 700, "Material Details"; Section 703, "Aggregates" of the N.H.D.O.T. Standard Specification, latest edition.
- C. Base course of bituminous pavement shall be as shown on the Drawings and shall conform to Division 400, Section 401 "Plant Mix Pavements - General" of the N.H.D.O.T. Standard Specifications, latest edition.
- D. Wearing course of bituminous pavement shall be as shown on the Drawings and shall conform to Division 400, Section 401 "Plant Mix Pavements - General" of the N.H.D.O.T. Standard Specifications, latest edition.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Methods of construction shall be in accordance with Division 400, Pavements; Section 403, Hot Bituminous Pavement of the N.H.D.O.T. Standard Specifications, latest edition. See Drawings for payment limits.
- B. Place the permanent pavement only when the underlying surface is dry, when the atmospheric temperature in the shade is above 40 degrees F, and when the weather is not foggy or rainy, provided however, that the Engineer may permit in case of sudden rain, the placing of the mixture then in transit from the plant, if laid at the proper temperature and if the roadbed is free from pools of water.
- C. Such permission shall in no way relax the requirements for quality of the pavement and smoothness of surface.
- D. Do not lay material upon a frozen base course or when wind conditions are such that rapid cooling will prevent satisfactory compaction.
- E. Temporary Pavement Repairs
  - 1. Temporary pavement repairs will be required where excavation is completed on the roadway.
  - 2. Temporary pavement shall be installed within the limits as described in the Drawings.
- F. Permanent Pavement Repairs - Final Patch at Trench
  - 1. After suitable exposure, the pavement shall be mechanically cut on either side of the trench to provide overlap of final patch on undisturbed material as shown on the Drawings.
  - 2. Within the cut limits of the final patch, the existing pavement and temporary patch or crushed gravel material shall be removed as shown on the Drawings to meet the cut edge exactly.
  - 3. Permanent pavement shall be installed to replace temporary pavement patch or crushed gravel as shown on the Drawings.

## REMOVAL &amp; REPLACEMENT OF PAVING (NH)

- G. Maintaining Permanently Placed Surfaces
1. Maintain permanently placed surfaces under this Contract until expiration of the guarantee period.
  2. Should an area that the Contractor has permanently paved settle:
    - a. Remove the entire pavement in the area.
    - b. Add the necessary subgrade material as specified and shown on the Drawings to the depth of the applicable pavement course.
    - c. Replace the base course as specified
    - d. Replace the surface course as specified.
    - e. Do not feather edges, except where shown on the Drawings.

END OF SECTION

SECTION 02557

PAVEMENT RECLAMATION (NH)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
1. Lower existing utility structures to a depth below the material to be scarified.
  2. Prepare road surface in accordance with reclaimer manufacturer recommendations.
  3. Reclaim roadway to specifications listed below.
  4. Regrade stabilized base according to typical section.
  5. Provide additional material or remove excess material to achieve the required profile and cross-section.
  6. Raise existing utility structures as specified.
- B. Work Not Included:
1. Reclamation of pavement beyond the limit of work for the convenience of the Contractor. Strict attention shall be made to minimize damage to pavement outside the limit of work.
- C. Requirements of Regulatory Agencies
1. The work performed shall conform to the requirements of NHDOT Standard Specifications Division 300 Base Course Section 306, Reclaimed Stabilized Base latest edition.
  2. NHDOT "Method of Payment" and "Basis of Payment", Sections 306.4 and 306.5 shall not apply.

1.2 QUALITY ASSURANCE

- A. Equipment:
1. Use only a self propelled or towed reclaiming machine specifically designed to process the existing asphalt surface and a specified amount of subsurface gravel to the tolerances specified herein.
  2. Rock Crushing Equipment, Road Planers or Cold-Milling machines shall not be considered adequate.
  3. Equipment Needed: Hammer Mill, Bomag type reclaimer or other approved equivalent, grader, water truck, vibratory roller, towing unit for reclaiming unit if not self-propelled.
- B. Testing:
1. If required by the engineer, Contractor shall take samples of the existing pavement and base gravel to determine the need for additional gravel and bituminous asphalt. Samples shall be taken at an interval of not less than one every 200 linear feet of roadway to be reclaimed.
  2. Testing shall be performed at an NHDOT approved laboratory in accordance with AASHTO T 164.

- C. Gravel:
  - 1. Gravel shall be furnished from a supplier whose gravel has been approved for use by the NHDOT.
- D. Additional Asphalt:
  - 1. Additional asphalt may be required to obtain 1.5 percent bitumen content.
  - 2. Additional asphalt shall be from a NHDOT approved supplier.
  - 3. Asphalt shall be added by a liquid distributor at a rate determined by the asphalt testing to provide 1.5 percent bitumen content.
  - 4. Asphalt shall be blended with the stabilized base using an approved mixing method.
  - 5. No asphalt shall be applied if rain is threatening, during rain or when the air temperature is below 50° F.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stabilized Base:
  - 1. The stabilized base shall contain a minimum bitumen content of 1.5 percent of the portion that passes a 3/4" sieve.
  - 2. Gradation shall be measured according to AASHTO T-164. Bitument content shall be measured according to AASHTO T-27
  - 3. The stabilized base material shall meet the following gradation:

<u>Sieve Designation</u>	<u>Percentage by Passing Weight</u>
2"	100
1-1/2"	70 - 100
3/4"	55 - 90
#4	40 - 75
#40	10 - 30
#200	3 - 10

- 4. When field test results indicate additional stone is required to meet the specified gradation, the Contractor shall propose the amount and type of stone to be added for review and approval by the Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Road Preparation:
  - 1. All utility structures shall be lowered to prevent damage by the processing.
  - 2. Where applicable, cut pavement according to Section 02555 of the Specifications.
  - 3. The road surface and an approximately equal thickness of gravel base shall be reclaimed.

## PAVEMENT RECLAMATION (NH)

- B. Reclaiming:
1. Apply water to insure optimum water content.
  2. The reclaimer shall process the material to the specified gradation.
  3. The process shall be repeated until the "Stabilized Base" meets the required specification.
- C. Placement of the Stabilized Base:
1. Where specified remove the stabilized base and perform the necessary regrading of the underlying roadbed in accordance with the plans and profiles, typical specifications or as directed by the Engineer.
  2. The stabilized base shall be compacted in accordance with NHDOT Section 304, "Aggregate Base Course", current edition.
  3. The finish grade shall not vary more than plus or minus a quarter inch (+/- 1/4") from a ten foot (10') straight line applied parallel to or perpendicular to the centerline.
  4. Excess material becomes the property of the contractor unless otherwise specified on the contract drawings or in Section 01611 - Owner's Right to Materials, of this document.
- D. Contractor shall sawcut existing drives in accordance with the standard details on the plans.

END OF SECTION

SECTION 02560

GRANITE CURBING (NHDOT)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:

1. Work shall consist of constructing new or resetting existing curbing as shown on the Drawings or as ordered.

1.2 DELIVERY, STORAGE AND HANDLINGS

- A. The Contractor shall inspect curbing upon delivery. Any damaged, chipped or defective curbing shall not be accepted.
- B. The Contractor shall exercise care during storage and handling of curbing. Broken curb not meeting the dimensions shown on the Drawings shall not be considered for payment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Curb shall be new granite, hard, durable, reasonably uniform in appearance and free of seams. Solid quartz or feldspar veins will not be cause for rejection.
- B. Surfaces of granite shall meet the following requirements:

<u>Type</u>	<u>Surface</u>	<u>Minimum Requirements</u>
Straight or Curved	Top	4" wide or as otherwise shown, sawn true plane. Front and back arris lines pitched straight and parallel.
	Front Face (Exposed)	Right angle to top, approximately true plane. No drill holes showing in top 10" .
	Back Face (Not Exposed)	Plane parallel with front face. Straight split to 1 1/2" below exposed surface. No larger than 1/4" segment of drill holes showing in arris lines.
	Bottom	Approximately parallel to top. Minimum width: 3".
	Ends (Exposed portion)	Square with planes of top and face.
	Joints (Exposed)	Optimum width: 1".
	Joints (Concealed)	To break back no more than 4". Lengths of stones 3' to 10' with 50% of sections to be 5' or greater, or as indicated.
Length of Stones	3' to 10' with 50% of sections to be 5' or greater, or as indicated	

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Construction requirements shall be in accordance with Division 600, Section 609 (Curbs) of N.H.D.O.T. Standard Specifications for Road and Bridge Construction, latest edition.
- B. Excavation for curbing shall be made to the required depth and the base upon which the curb will be set shall be compacted to a firm even surface.
- C. The front top arris line shall conform to the line and grade specified.
- D. Joints shall be pointed with mortar and finished with a jointer.
- E. Curbing to be salvaged and reset shall be carefully removed and stored. The Contractor shall replace any curbing damaged or lost as a result of his failure to remove or store curbing correctly.
- F. The Contractor shall backfill curbing immediately after the curb is set.

END OF SECTION



SECTION 02601

MANHOLES, COVERS AND FRAMES (NH)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install manholes, cast iron frames and covers in conformance with the dimensions, elevations, and locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Construct all manholes in conformance with the New Hampshire Department of Environmental Services - Water Division- Standards of Design and Construction for Sewerage and Wastewater Treatment Facilities.
- B. Construct all manholes of a quality to withstand loads of 8 tons (H-20 loading) without failure for a period of time in excess of 25 years.
- C. Construct all manholes of a quality to prevent leakage in excess of 1 gallon per day per vertical foot of manhole.
- D. Construct all manholes throughout the entire project from the same materials unless otherwise shown on the Drawings.
- E. All castings shall be at least Class 30 conforming to ASTM Standard Specifications for Gray Iron Casting, Designation A40.
- F. All essential details of design shall be as shown on the Drawings.
- G. Frames and covers shall be New Hampshire Standard.
- H. Masonry: See specification Section 04201.
- I. Waterproofing: Shall be with a product with demonstrated five (5) years successful use in similar applications.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit shop drawings in accordance with the General Conditions of the Construction Contract.
- B. A description of all methods of jointing.
- C. All Certificates of Compliance.
- D. Provide Fabrication Schedule that shows:
  - a. Orientation and elevation of opening.
  - b. Section dimensions and assembly order.

1.4 SUPPLEMENTAL INFORMATION

- A. The Contractor shall provide certification that all frames and covers were manufactured in the United States.

PART 2 - PRODUCTS

2.1 PRECAST MANHOLE SECTIONS

A General

1. Risers and tops shall be precast reinforced or non-reinforced concrete, or cast-in-place reinforced or non-reinforced concrete.
2. Manhole bases shall be monolithic to a point 6 inches above the crown of the incoming pipe and shall be constructed of reinforced or non-reinforced concrete.
3. Use concrete that conforms to the requirements of Class A concrete in Section 520 of the N.H.D.O.T. Standard Specifications for manhole bases and cast-in-place manholes.
4. Use reinforcing steel for cast-in-place concrete that conforms to the requirements of the N.H.D.O.T. Standard Specifications for Billet-Steel Bars or Welded Steel Wire Fabric.
5. Construct pipe to manhole joints that are approved by the New Hampshire Department of Environmental Services – Water Division. In general, use approved non-shrinking mortar or elastomeric or mastic like sealants to ensure these joints are watertight.
6. Do not install manhole steps unless shown on the Drawings.
7. Minimum size for sewer manhole covers shall be 30 inches in diameter unless shown otherwise on the Drawings and have the letter "S" or the word "SEWER" in 3-inch letters cast into the top surface.
8. Minimum size for drain manhole covers shall be 30 inches in diameter unless shown otherwise on the Drawings and have the letter "D" or the word "DRAIN" in 3-inch letters cast into the top surface.
9. All castings shall be of good quality, strong, tough, even-grained ductile iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended.
10. Contact surfaces of covers and frame seats shall be machined at the foundry before shipment to prevent rocking of covers in any orientation.
11. All castings shall be thoroughly cleaned and subject to a careful hammer inspection.
12. Prior to being shipped from the foundry, castings shall be sandblasted.
13. Repair all coatings that have been damaged in transit or handling to the satisfaction of the Engineer.

B. Openings:

1. Provide openings in the risers to receive pipes entering the manhole.
2. Make openings at the manufacturing plant.
3. Size: To provide a uniform annular space between the outside wall of pipe and riser.
4. Location: To permit setting of the entering pipes at the correct elevations.
5. Openings shall have a flexible watertight union between pipe and the manhole base.
  - a. Cast into the manhole base and sized to the type of pipe being used.

## MANHOLES, COVERS AND FRAMES (NH)

- b. Type of flexible joint being used shall be approved by the Engineer. Install materials according to the Manufacturer's instructions.
  - 1. Lock Joint Flexible Manhole Sleeve made by Interpace Corporation.
  - 2. Kor N Seal made by National Pollution Control System, Inc.
  - 3. Link Seal by Thunderline Corporation (Wayne, MI).
  - 4. Approved Equal.
- C. Joints:
  - 1. Joint gaskets to be flexible self-seating butyl rubber joint sealant installed according to manufacturer's recommendations. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.  
Acceptable Materials:
    - a. Kent-Seal No. 2
    - b. Ram-Nek
    - c. Or equivalent.
  - 2. Joints between precast sections shall conform to related standards and manufacturer's instructions.
  - 3. All manholes greater than 6 ft. diameter and all manholes used as wet wells, valve pits and other dry-pit type structures shall be installed with exterior joint collars. The joint collar shall be installed according to the manufacturer's instructions. Acceptable materials:
    - a. MacWrap exterior joint sealer as manufactured by Mar-Mac Manufacturing Company.
    - b. Or equivalent.
- D. Waterproofing:
  - 1. The exterior surface of all manholes shall be given two coats of bituminous waterproofing material.
  - 2. The coating shall be applied after the manholes have cured adequately and can be applied by brush or spray in accordance with the manufacturer's written instruction.
  - 3. Sufficient time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.
  - 4. Drain manholes do not require exterior bituminous waterproofing.

## 2.2 FRAMES AND COVERS

- A. Standard Units:
  - 1. Frame and cover assembly shall be hinged.
  - 2. Dimensions and Style shall conform to the Drawings; Standard castings differing in non-essential details are subject to approval by the Engineer:
    - a. Covers - solid 3-inch letters diamond pattern.
    - b. Frame - 32-inch diameter clear opening, with flange bracing ribs.
  - 3. Provide certification that Frames and Cover are "Made in USA".
  - 4. Provide cam locks for all hinged manhole cover assemblies.
  - 5. Hinged Frame and Cover provided will be Model Ego XL as manufactured by East Jordan Iron Works.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Manhole Bases:
1. Place bases on a 6-inch layer of compacted bedding consisting of crushed stone and/or natural stone graded to the following specifications:
    - a. 100 percent passing a 1-inch screen.
    - b. 90 to 100 percent passing a 3/4-inch screen.
    - c. 20 to 55 percent passing a 3/8-inch screen.
    - d. 0 to 10 percent passing a number 4 sieve.
    - e. 0 to 5 percent passing a number 8 sieve.
    - f. Equivalent to Standard Stone Size Number 67, Section 703 of N.H.D.O.T. Standard Specifications.
  2. Properly dewater the excavation while placing the bedding material and placing the structure or concrete.
  3. Use waterstops at the horizontal joint of cast-in-place manholes.
- B. Construct inlet and outlet stubs as shown on the Drawings.
- C. Invert Channels:
1. Construct smooth and semicircular in shape conforming to the inside of the adjacent sewer section.
  2. Make changes in direction of flow with smooth curves having a radius as large as permitted by the size of the manhole.
  3. Stop the pipes at the inside face of the manhole where changes of direction occur.
  4. Form invert channels as shown on the Drawings.
  5. Slope the floor of the manhole outside the flow channel as shown on the Drawings or as directed by the Engineer.
- D. Precast Risers and Tops:
1. Use the appropriate combinations of risers and top lengths.
  2. Seal joints with an approved type mastic as shown on the Drawings.
  3. Test the manhole as soon as practical after installation.
  4. Perform jointing in accordance with the manufacturer's recommendations and as approved by the Engineer.
  5. Install risers and tops level and plumb.
  6. Do not permit water to rise over newly made joints until after inspection by the Engineer.
  7. Make all joints watertight.
  8. Solidly fill annular spaces around pipes entering the manholes with non-shrink mortar or as otherwise shown on the Drawings.
  9. When necessary, core openings carefully to prevent damage to risers and tops. Replace all damaged risers and tops at no additional cost to the Owner.
  10. Cutting opening shall not be allowed without the expressed written permission of the Engineer.
- E. Cast-In-Place Manholes:

## MANHOLES, COVERS AND FRAMES (NH)

1. Place a special plastic waterstop in the joint between the base and the sides of all manholes.
  2. Obtain the Engineer's approval of the type of waterstop and the installation.
  3. Cast all pipes entering the manholes in accordance with pipe manufacture recommendations.
- F. Drop Manholes:
1. No free drop shall be permitted at the pipe inlet.
  2. Where the vertical distance between inlet and outlet pipe inverts exceeds 24 inches, construct a drop manhole as shown on the Drawings.
- G. Adjustment to Grade: If necessary, adjust tops of manholes to grade, a maximum of 12 inches, with brick masonry.
- H. Set manhole frames with the tops conforming accurately to the grade of the pavement or finished ground surface or as shown on the drawings.
- I. Set frames concentric with the top of the masonry and in a full bed of mortar so that the space between the top of the manhole masonry and the bottom flange at the frame shall be completely filled and made watertight.
- J. Place a thick ring of mortar extending to the outer edge of the masonry all around and on the top of the bottom flange.
- K. Finish the mortar so that it will be smooth and have a slight slope to shed water away from the frame.
- L. When the work on each manhole is complete, clean the frame seat and set the cover in place.

### 3.2 LEAKAGE TESTS

- A. General:
1. Perform vacuum tests on all manholes.
  2. Exfiltration tests on manholes shall be performed in case of vacuum test failure or may be submitted as a substitution with approval by the Engineer.
  4. The Engineer shall observe tests.
  5. Repairs to manholes found to leak by any test method shall be performed both inside and outside the structure by a method approved by the Engineer.
- B. Preparation:
1. After manholes have been assembled in place, fill and point all lifting holes.
  2. If the manhole is to be backfilled before testing, fill those exterior joints within 6 feet of the ground surface with an approved non-shrink mortar.
  3. Test all manholes with pipes and or stubs installed. Testing with through pipes to be removed and replaces is not acceptable.
  4. Manholes in which the pipe to manhole connection is disassembled after testing shall be retested at the Contractors expense.
  5. Make the tests prior to placing the shelves and inverts and before filling and pointing the horizontal joints below the 6-foot depth line.
  6. Suitably plug all pipes and other openings into the manholes.
- C. Test Procedure: Vacuum
1. Use only an approved testing machine.
    - a. National Pollution Control, Inc.

## MANHOLES, COVERS AND FRAMES (NH)

- b. Or equal.
  2. Securely brace all plugs.
  3. Check cone section to insure good seal with Test Machine Bladder.
  4. Bring test vacuum to 10 in. Hg gauge.
    - a. Time:
      - Manholes 0'-10' - 2 minutes
      - Manholes 10'-15'- 2.5 minutes
      - Manholes 15'-25'- 3 minutes
    - b. Allowable leakage is 1" Hg or less per times given.
    - c. If pressure drop exceeds 1" Hg in the required time, the manhole shall be repaired and retested.
    - d. If the manhole fails after being repaired, the manhole shall be "Water Exfiltration Tested" according to the criteria of the specification.
  5. When a leak is identified, repair the area from both inside and out by a method approved by the Engineer. Methods to be considered include parging with hydraulic cement and pressure application of polyurethane grout.
- D. Test Procedure: Water Exfiltration Test
1. Lower groundwater below the bottom of the manhole for the duration of the tests.
  2. Fill the manhole with water to the top of the cone section.
  3. If the excavation has not been backfilled and observation indicates no visible leakage (no water visibly moving down the surface of the manhole); the manhole may be considered to be satisfactorily watertight.
  4. If the test is unsatisfactory, in the opinion of the Engineer, or if the manhole has been backfilled, the test shall be continued.
  5. A period of time may be permitted, if the Contractor so wishes, to allow for absorption.
  6. At the end of the absorption time period, refill the manhole to the top of the cone, if necessary, and begin measuring an 8-hour test period.
  7. At the end of the test period, refill the manhole to the top of the cone and measure the volume of water added. This amount shall be extrapolated to a 24-hour rate and the leakage shall be determined on the basis of depth. The leakage for each manhole shall not exceed 1 gallon per vertical foot for a 24-hour period.
  8. If the test fails this requirement, but the leakage does not exceed 3 gallons per vertical foot per day, repairs by approved methods may be made, as directed or approved by the Engineer, to bring the leakage within the allowable rate of 1 gallon per vertical foot per day.
  9. Leakage due to a defective section or joint exceeding the 3-gallon per vertical foot per day shall be cause for the rejection of the manhole.
  10. Uncover all rejected manholes as necessary and disassemble, reconstruct or replace them as directed by the Engineer at no additional cost to the Owner.
  11. All manhole repairs shall be made inside and out.
  12. Retest repaired or replaced manhole and, if satisfactory, fill and finish interior joints.

## MANHOLES, COVERS AND FRAMES (NH)

- E. Backfilling:
1. Manhole testing may be conducted either before or after backfilling around the manhole. However, if the Contractor elects to backfill prior to testing, for any reason, it shall be at Contractor's own risk and it shall be incumbent upon the Contractor to determine the reason for any failure of the test.
  2. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc. It shall be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete.
  3. If the manhole test fails, lower the water table and carry out the exfiltration test specified above at no additional cost to the Owner.
- F. Accident Prevention: Following the satisfactory completion of the leakage test, place the frame and cover on the top, or provide other means of preventing accidental entry by unauthorized persons, children, animals, etc., until ready to make final adjustment to grade.

END OF SECTION

SECTION 02610

PIPE & PIPE FITTINGS - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section includes general specifications for pipe appurtenances and specialty items typical to a wide range of pipe types and application. It also provides general information on pipe inspection, installation, cleaning and testing. This section is not all inclusive and may be supplemented by the Engineer as needed.

1.2 SUBMITTALS TO THE ENGINEER

- A. Submit shop drawings in accordance with the General Conditions of the Construction Contract.
- B. If requested by the Engineer, submit manufacturer's "Certification of Conformance" that pipe and pipe fittings meet or exceed the requirements of these Specifications.
- C. Submit other documents as specified in the appropriate Sections of this Division.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Exercise care during loading, transporting, unloading, and handling to prevent damage of any nature to interior and exterior surfaces of pipe, fittings and appurtenances.
- B. Do not drop pipe and fittings.
- C. Store materials on the project site in enclosures or under protective coverings in accordance with manufacturer's recommendations and as directed by the Engineer.
- D. Assure that materials are kept clean and dry. If appropriate protect from freezing.
- E. Do not store materials directly on the ground.
- F. Follow manufacturer's specific instructions, recommendations and requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. See appropriate specification section for detailed pipe specification.
- B. Ductile Iron Pipe & Fittings
  - 1. Conform to the latest AWWA Standard
    - a. Cement lined class 52 unless otherwise noted
    - b. Mechanical restrained joint
    - c. Standard gaskets
- C. PVC Sewer Pipe
  - 1. Shall conform to the following ASTM as appropriate for the pipe size.

Pipe Size	Generic Material	ASTM
4"-15"	PVC Solid Wall	D3034
18"-60"	PVC Solid Wall	F679
4"-48"	PVC, dual wall Corrugated	F794
All Sizes	PVC Recycled	F1780
All Sizes	PVC Pressure Pipe	D2241 and D1784

- D. High Density Polyethylene



1. Pipe shall be high density polyethylene (PE) conforming to the following standard referenced specifications:
  - a. ASTM: D3035 Polyethylene Pipe SDR-PR design
  - b. ASTM: D1248 Polyethylene Molding & Extrusion materials.
  - c. CSA: 41-GP-25 Standard for polyethylene pipe.
- E. Corrugate Polyethylene Drain Pipe
  - a. Pipe shall be high density polyethylene (HDPE) conforming to the following standard referenced specifications:
  - b. AASHTO M294
  - c. ASTM: D1248 Polyethylene Molding & Extrusion materials.
  - d. ASTM D3350 Polyethylene Plastic Pipes and Fittings.
- F. Copper Service Pipe
  - a. Seamless copper water tube, ASTM B88.
  - b. Type K, soft annealed 3/4" (minimum) through 1".
  - c. Type K, hard tempered, 1-1/4 inches and larger.
- G. Marking Tape
  1. Shall be coded in accordance with the NPWA Standards.
  2. Shall be indelibly marked indicating the type of utility it is placed over.
  3. Shall be six (6) inches wide Terra Tape Sentry Line 1350 (Detectable) by Reef Industries, Houston, TX, or approved equal.
  4. Marking tape is required even in cases when tracer wire is installed.
- H. Pipe Lubricant or glue
  1. Use only lubricants or glues suitable for the type of pipe and application.
  2. For potable water pipe use only lubricants or glues clearly marked "NSF 61 approved For Use with Potable Water."
- I. Geotextile
  1. Unless specified elsewhere, geotextile fabric used to encase pipe and bedding material in the trench shall be Application 2 – Separation, Class 3 – Low Strength, Nonwoven fabric.
  2. Acceptable Manufactures shall be listed in the The National Transportation Product Evaluation Program (NTPEP) for Application, Strength Class and Structure
- J. Tracer Wire:
  1. Tracer Wire shall be No. 10 AWG copper clad steel wire with HDPE insulation.
    - a. Insulation shall be blue for drinking water lines.
    - b. Insulation shall be green for sewers, forcemains and low pressure sewers.
  2. Tracer wire connections will be made with DryConn® by King Innovation waterproof connectors for direct bury, for #22 to #8 AWG wire, part #31556 or approved equal.
  3. Install marking tape even when tracer wire is installed. (See Section G.)
- K. Pipe Insulation:
  1. Where shown on the plans for shallow depth, for separation between pipes or as directed, extruded polystyrene shall be installed.
  2. Insulation shall be Dow® Styrofoam™ Highload 100 or equivalent. Insulation shall be appropriate for direct bury.

3. Thickness shall be as shown on the drawings but in no case less than 2 inches. Insulation thickness shall be appropriate for the actual depth of bury for the pipe.
  4. Width and length shall be as shown or as directed but in no case less than 2 feet wide.
- L. Thrust Restraint is required for all pressure pipe.
1. Mechanical Joint Restraint fittings with the appropriate retainer rings shall be installed at all mechanical joints.
    - a. Additional restraint at pipe bells on either side of the mechanical joint fitting may be required based on thrust restraint calculation available online. Programs are available from Ductile Iron Pipe Association, PVC Pipe Association, Romac Industries, Ebba Iron, etc.
  2. Thrust Blocks of appropriate size and dimensions.
    - a. Thrust blocks shall be cast in place.
    - b. Precast thrust blocks may only be used with the written permission of the Owner and upon approval of supporting calculations relative to size.

### PART 3 - EXECUTION

#### 3.1 INSPECTION

- A. Provide all labor and equipment necessary to assist the Engineer to inspect pipe, fittings, gaskets, and other materials.
  1. This shall include all air quality testing equipment, harnesses and manlifts necessary to comply with the appropriate OSHA regulation.
  2. The Engineer shall comply with the Contractors regulations and policies regarding below grade or confined space entry.
- B. Carefully inspect all materials at the time of delivery and just prior to installation.
- C. Carefully inspect all pipe and fittings for:
  1. Defects and damage.
  2. Deviations beyond allowable tolerances for joint dimensions.
  3. Removal of debris and foreign matter.
- D. Examine areas and structures to receive piping for:
  1. Defects, such as weak structural components, which adversely affect the execution and quality of work.
  2. Deviations beyond allowable tolerances for pipe clearances.
- E. All materials and methods not meeting the requirements of these Specifications shall be rejected.
- F. Immediately remove all rejected materials from the project site.
- G. Start work only when conditions are corrected to the satisfaction of the Engineer.

#### 3.2 INSTALLATION

- A. General:
  1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations and as instructed by the Engineer.
  2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation.
  3. Install adapters, approved by the Engineer, when connecting pipes constructed from different materials.

4. When applicable, support all piping not being installed in trenches in accordance with the "Pipe Hangers & Supports" Section of these Specifications.
- B. Installation and Trenches:
1. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.
    - a. Where, in the opinion of the Engineers, the subgrade material is unsuitable to support the pipe, over-excavate the unsuitable material and replace the same with suitable gravel or granular borrow.
    - b. If the subgrade material encountered consists of saturated clays or silts, the Engineer may direct the installation of the bedding material and pipe inside a construction fabric wrap as shown on the Drawings.
  2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.
  3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.
  4. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement.
  5. Lay each pipe length so it forms a close joint with the adjoining length and bring inverts to the required grade.
  6. Set the pipe true to line and grade. Use a transit for line. Use a laser beam aligner for grade.
  7. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer or any other unyielding object.
  8. Make all pipe joints watertight with no sand, silt, clay or soil of any description entering the pipeline at the joints.
  9. Immediately after making a joint, fill the holes for the joint with bedding material, and compact.
  10. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.
  11. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawings.
  12. Take all necessary precautions to prevent flotation of the pipe in the trench.
  13. Where there is evidence of water or soil entering the pipeline, repair the defects to the satisfaction of the Engineer.
  14. Tracer wire shall be positively attached at 3:00 or 9:00 to the non-metallic buried utilities by plastic wire ties every ten (10) feet.
  15. Ends of the tracer wire shall be exposed either in a manhole, above grade at a curb box or valve box or bonded to the curb box or valve box.
  16. Trace wire shall be continuous between access points and shall be tested for continuity in the presence of the RPR or Owner.
- C. Temporary Plugs:
1. When pipe installation work in trenches is not in progress, close open ends of the pipe with temporary watertight plugs.
  2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.
  3. Do not use the pipe lines as conductors for trench drainage during construction.

- D. Protection of Water Supplies:
1. There shall be no physical connection between a public or private potable water supply system and a sewer.
  2. Sewer shall be a minimum of ten feet horizontally unless shown otherwise on the drawings.
  3. Whenever sewers must cross water mains, the sewer shall be constructed as follows (unless shown otherwise on the Drawings):
    - a. Sewer pipe shall be class 52 ductile iron or PVC pressure rated pipe (DR-25 min. or SDR-32.5 min.) for a minimum distance of 9 feet each side of the crossing.
    - b. Joints shall be mechanical type water pressure rated with zero leakage when tested at 25 pounds per square inch for gravity sewers and 1-1/2 times working pressure for force mains and joints shall not be located within 9 feet of the crossing.
    - c. Vertical separation of sewer and water main shall not be less than 18".

### 3.3 CLEANING AND TESTING

- A. Cleaning and Testing Piping - General:
1. Thoroughly clean all piping prior to testing. Remove all dirt, dust, oil, grease and other foreign material. Exercise care while cleaning to avoid damage to linings and coatings.
  2. When the installation is complete, test all pipelines, including service laterals, in the presence of the Engineer and the plumbing or building inspector in accordance with the requirements of the local and state plumbing codes and the appropriate Sections of these Specifications, at no additional cost to the Owner.
  3. Equipment: Supply all labor, equipment, materials, gages, and pumps required to conduct the tests.
  4. Retesting: Perform all retesting required due to failure at no additional cost to the Owner and to the complete satisfaction of the Engineer.
- B. Outside Potable Water Piping (When Applicable)
1. Pressure Test:
    - a. Perform testing in accordance with Section 5 of AWWA Standard C600.
    - b. Hydrostatic testing is required.
  2. Chlorination of Pipelines:
    - a. Prior to chlorination thoroughly flush the lines at sufficient volume to remove any debris and contamination from the pipe.
    - b. Chlorinate all new potable water lines in accordance with the procedure outlined in AWWA C651 Disinfecting Water Mains, latest revision.
    - c. Locate chlorination and sampling points as approved by the Engineer.
    - d. Use a dosage which will produce not less than 10.0 ppm chlorine residual after a contact period of not less than 24 hours.
    - e. During the chlorination period, exercise care to prevent the contamination of water in existing water mains.
    - f. After chlorination, flush the piping with clean potable water until there is only background chlorine residual.
    - g. Chlorinated effluent shall be dechlorinated prior to release to surface waters.

3. Bacteriological Testing:
  - a. Test all new potable water lines for total Coliform bacteria in accordance with AWWA C651 Disinfecting Water Mains (latest edition) at no additional cost to the Owner.
  - b. Bacteriological samples shall be taken after the chlorinated main has been flushed and allowed to rest for 16 hours minimum prior to sampling.
  - c. The length of pipe to be tested and the time of the test shall be as approved by the Engineer.
  - d. The Engineer will observe the taking of samples.
  - e. Have all samples tested by a laboratory approved by the State and submit test results to the Engineer.
  - f. Any segment of a potable water line shall be considered unsuitable for service if a Coliform bacteria count is obtained from that sample.
  - g. Re-disinfect all segments of piping considered unsuitable and retest. Continue to disinfect and test until no Coliform bacteria are present.
  - h. Place piping into service when it has been successfully tested for pressure, leakage and total Coliform bacteria.
- C. Building Interior Potable Water Lines (When Applicable):
  1. Clean and test in accordance with the "Plumbing General" Section in these Specifications.
  2. Test in accordance with local building codes as applicable.
- D. Sewer Lines:
  1. Outside Sewer Lines: Test with a low pressure air test, a visual inspection, and for PVC or other flexible piping, test with a deflectometer after suitable settling time has elapsed.
  2. Pressure sewers shall be tested in accordance with Section 5 of AWWA C-600 latest edition to 1.5 time maximum operating pressure or 100 psi, whichever is greater.
  3. Building Interior Sewer System: Clean and test in accordance with the "Plumbing General" Section in these Specifications.
  4. Test in accordance with local building codes as applicable.
- E. All Other Piping Systems:
  1. Pressure Test:
    - a. Perform a pressure test for all other piping systems at 1-1/2 times maximum system pressure, or at the maximum working pressure of the piping system, or at a pressure indicated in the appropriate Sections of this Specification.
    - b. Tests shall be hydrostatic water, or air pressure as specified or as approved by the Engineer.
  2. Cleaning: Perform all specialized cleaning as specified or required by system.

END OF SECTION

SECTION 02622

PVC PIPE & FITTINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, install and test PVC pipe of the size(s), type(s) and in the location(s) shown on the Drawings and or specified herein.
- B. Related work Specified Elsewhere (When Applicable):
  - 1. Site work is specified in this Division.
  - 2. Concrete is specified in Division 3.

1.2 QUALITY ASSURANCE

- A. Manufacturer shall have a minimum of five (5) years experience in the manufacture of PVC sewer pipe.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit manufacturer's literature, test reports, and certificates in accordance with the General Conditions of the Construction Contract.

1.4 DELIVERY, STORAGE & HANDLING

- A. Deliver as job progress requires and store on a smooth bed to prevent point loading.
- B. Stack pipe in accordance with manufacturer's instructions.
- C. Exercise extra care when handling.

1.5 OBSERVATION

- A. Provide all labor necessary to assist the Engineer to observe pipe, fittings, gaskets, and other materials.
- B. Carefully observe all materials at the time of delivery and just prior to installation.
- C. Carefully observe all pipe and fittings for:
  - 1. Defects and damage.
  - 2. Deviations beyond allowable tolerances for joint dimensions.
  - 3. Removal of debris and foreign matter.
- D. Examine areas and structures to receive piping for:
  - 1. Defects, such as weak structural components, that adversely affect the execution and quality of work.
  - 2. Deviations beyond allowable tolerances for pipe clearances.
- E. All materials and methods not meeting the requirements of the Contract Documents will be rejected.
- F. Immediately remove all rejected materials from the project site.
- G. Start work only when conditions are corrected to the satisfaction of the Engineer.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Pipe & Fittings:
  - 1. Type - Polyvinylchloride (PVC) plastic pipe with integral bell and spigot joints. Polymer compounding and classification shall be in accordance with ASTM D1784 (Class 12454-B).
  - 2. Gravity Sewers:
    - a. 4" - 15" nominal diameter sizes shall conform to ASTM D3034 and SDR=35.
    - b. 18" - 36" nominal diameter sizes shall conform to ASTM F679 (wall thickness T-1).
    - c. 42" - 48" nominal diameters shall conform to ASTM 794.
  - 3. Pressure Sewers shall conform to ASTM D2241 and D1784, Class 12454-B, with maximum SDR=26. A safety factor of 2.5 shall be used for pressure rating determination.
  - 4. Furnish straight pipe in standard laying lengths, 12.5 and 20 feet for 18" diameter and less, 12 and 19.5 feet for 21", 24" and 27" diameter.
  - 5. Furnish fittings of approved equal to the pipe and having bell and spigot configuration identical to that of the pipe.
- B. Joints:
  - 1. Type - Flexible elastomeric seal conforming to ASTM D3212 with push-on bell and spigot.
  - 2. Gaskets shall conform to ASTM F477.
  - 3. Rubber rings for pressure sewer shall conform to ASTM D1869 and ASTM F477.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with the manufacturer's written instructions and as shown on the Drawings.
- B. Exercise extra care during winter construction as pipes impact strength is lower.
- C. Prior to backfilling, exercise extra care to maintain water level in open excavation below the pipe invert to avoid flotation of pipe already set to line and grade.

### 3.2 CLEANING AND TESTING

- A. Clean and test PVC pipes: Refer to Final Sewer Testing section in these specifications.

END OF SECTION

SECTION 02624

CENTRIFUGALLY CAST FIBER REINFORCED POLYMER MORTAR (CCFRPM) PIPE -  
GRAVITY SEWERS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, install and test CCFRPM pipe of the size(s), type(s) and in the location(s) shown on the Drawings and or specified herein.
- B. Related work Specified Elsewhere (When Applicable):
  - 1. Site work is specified in this Division.
  - 2. Concrete is specified in Division 3.
- C. Pipe shall have a minimum operating temperature rating of 150°F and withstand a pH range of 2-10.

1.2 REFERENCES

- A. ASTM D3262 - Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.
- B. ASTM D4161 - Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.
- C. ASTM D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
- D. ASTM D3681 – Standard Test Method for Chemical Resistance of “Fiber glass” Pipe in a Deflected Condition.
- E. ASTM D638 – Test Method for Tensile Properties of Plastics.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit manufacturer's literature, test reports, and certificates in accordance with the General Conditions of the Construction Contract.

1.4 INSPECTION

- A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets, and other materials.
- B. Carefully inspect all materials at the time of delivery and just prior to installation.
- C. Carefully inspect all pipe and fittings for:
  - 1. Defects and damage.
  - 2. Deviations beyond allowable tolerances for joint dimensions.
  - 3. Removal of debris and foreign matter.
- D. Examine areas and structures to receive piping for:
  - 1. Defects, such as weak structural components, that adversely affect the execution and quality of work.
  - 2. Deviations beyond allowable tolerances for pipe clearances.



- E. All materials and methods not meeting the requirements of the Contract Documents will be rejected.
- F. Immediately remove all rejected materials from the project site.
- G. Start work only when conditions are corrected to the satisfaction of the Engineer.

#### 1.5 PACKAGING, HANDLING, SHIPPING

- A. Packaging, handling, shipping, and storing shall be done in accordance with the manufacturer's instructions.
- B. Pipe damaged due to improper handling or storage will be rejected and immediately removed from the site or clearly labeled as "rejected" by the Engineer.

### PART 2 PRODUCTS

#### 2.1 PRODUCT EVALUATION

- A. This specification has been prepared using Hobas Pipe as a standard for comparison. Products meeting these standards will be considered as equivalent.

#### 2.2 MATERIALS

- A. Resin Systems: The manufacturer shall use only polyester resin systems with a proven history of performance in this particular application. The historical data shall have been acquired from a composite material of similar construction and composition as the proposed product.
- B. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.
- C. Silica Sand: Sand shall be minimum 98% silica with a maximum moisture content of 0.2%.
- D. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally effect the performance of the product.
- E. Elastomeric Gaskets: Gaskets shall be nitrile meet ASTM F477 and be supplied by qualified gasket manufacturers and be suitable for the service intended.

#### 2.3 MANUFACTURE AND CONSTRUCTION

- A. Pipes: Manufacture pipe by the centrifugal casting process to result in a dense, nonporous, corrosion-resistant, consistent composite structure. The interior surface of the pipes exposed to sewer flow shall provide crack resistance and abrasion resistance. The exterior surface of the pipes shall be comprised of a sand and resin layer which provides UV protection to the exterior. Pipes shall be Type 1, Liner 2, Grade 3 per ASTM D3262.

## CCFRPM PIPE (DIRECT BURY INSTALLATION)

- B. Joints: Pipe joints shall utilize flexible elastomeric sealing gaskets as the sole means to maintain joint watertightness. The joints must meet the performance requirements of ASTM D4161. Joints at tie-ins, when needed, may utilize gasket-sealed closure couplings.
- C. Fittings: Flanges, elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays. Properly protected standard ductile iron, fusion-bonded epoxy-coated steel and stainless steel fittings may also be used.

## 2.4 DIMENSIONS

- A. Diameters: The actual outside diameter (18" to 48") of the pipes shall be in accordance with ASTM D3262. For other diameters, OD's shall be per manufacturer's literature.
- B. Lengths: Pipe shall be supplied in nominal lengths of 20 feet. Actual laying length shall be nominal +1, -4 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.
- C. Wall Thickness: The minimum wall thickness shall be the stated design thickness.
- D. End Squareness: Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/8".

## 2.5 TESTING

- A. Pipes: Pipes shall be manufactured and tested in accordance with ASTM D3262.
- B. Joints: Coupling joints shall meet the requirements of ASTM D4161.
- C. Stiffness: Minimum pipe stiffness when tested in accordance with ASTM D2412 shall normally be 36 psi.
- D. Stain Corrosion: The extrapolated 50-year strain corrosion value shall not be less than 0.9% as determined in accordance with ASTM D3681 and ASTM D3262.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Burial: The bedding and burial of pipe and fittings shall be in accordance with the project plans and specifications and the manufacturer's requirements
- B. Pipe Handling:
  - 1. Use textile slings, other suitable materials or a forklift.
  - 2. Use of chains or cables is not permitted.

- C. Jointing:
1. Clean ends of pipe and coupling components.
  2. Apply joint lubricant to pipe ends and elastomeric seals of coupling. Use only lubricants approved by the pipe manufacturer.
  3. Use suitable equipment and end protection to push or pull the pipes together.
  4. Do not exceed forces recommended by the manufacturer for coupling pipe.
  5. Pipes shall be laid true to line in grade as shown on the drawings using laser guided techniques.

### 3.2 CLEANING/TESTING

- A. Clean test all pipes installed as gravity sewer in accordance to Section 02651 – Final Sewer Testing.

## CORRUGATED POLYETHYLENE (CPE) PIPE &amp; FITTINGS

CORRUGATED POLYETHYLENE (CPE) PIPE & FITTINGSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install, anchor, support and test pipe and pipe fittings of the types and sizes in the locations shown on the Drawings and/or as directed by the Engineer.

1.2 QUALITY ASSURANCE

- A. Pipe shall be high density polyethylene (HDPE) conforming to the following standard referenced specifications:
1. AASHTO M252 (4" diameter through 10" diameter).
  2. AASHTO M294 (12" diameter through 60" diameter).
  3. ASTM: D1248 Polyethylene Moulding & Extrusion materials.
  4. ASTM D3350 Polyethylene Plastic Pipes and Fittings.
- B. Pipe and fittings shall be provided by a single manufacturer, and a certificate of compliance will be submitted to the Engineer for approval.

PART 2 - PRODUCTS2.1 MATERIALS

- A. General
1. The prescribed sizes of pipes are nominal inside diameters. Pipes shall be of the size and length shown on the plans.
- B. Smooth Interior Corrugated Polyethylene Pipe
1. The product supplied under this specification shall be high density polyethylene corrugated exterior/smooth interior pipe. Four (4)-inch to 10-inch shall conform to AASHTO #1252 Type 5. Twelve (12) - to 36 - inch diameters shall conform to AASHTO M294 Type S. Forty-two (42) and 48 - inch diameters shall have minimum pipe stiffness of 20 and 17 psi, respectively, at 5% deflection; and shall meet all other requirements of AASHTO M294.
  2. Material shall meet ASTM D1248 Type III, Category 4, Grade P33, Class C; or ASTM D3350 Cell Classification 324420C.
- C. Coupling Bands and Fittings
1. Coupling bands shall cover at least one full corrugation on each section of pipe. When gasketed coupling bands are required, the gasket shall be made of closed-cell synthetic expanded rubber meeting the requirements of ASTM D1056, Type 2. Gaskets shall be installed on the coupling band by the pipe manufacturer. All coupling bands shall meet or exceed the soil-tightness

## CORRUGATED POLYETHYLENE (CPE) PIPE &amp; FITTINGS

requirement of the AASHTO Standard Specification for Highway Bridges, section 23, paragraph 23.3.1.5.4(e).

2. Furnish fittings of approved equal to the pipe and having connection configurations identical to that of the pipe.
  3. Pipe fittings shall conform to AASHTO M294.
- D. Drain Services
1. All drain services shall be 6-inch diameter, single walled, non-perforated, CPE tubing.
- E. Acceptable Manufacturers:
1. Hancor, Inc., Findlay Ohio
  2. Advanced Drainage Systems, Columbus Ohio
  3. Or equal.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Installation shall be in accordance with manufacturer's recommendations and as shown on the drawings.
- B. Prior to backfilling, exercise extra care to maintain water level in open excavation below the pipe invert to avoid flotation of pipe already set to line and grade.
- C. Flared end sections shall be fully supported.
- D. Stones larger than 3 inches in diameter shall not contact the pipe, fittings or appurtenances.

#### 3.2 INSPECTION AND CLEANING

- A. Inspect all drain pipes in the presence of the Owner and the Engineer. All pipes not demonstrating uniform slope and alignment shall be replaced at no additional cost to the Owner.

END OF SECTION

SECTION 02630

COUPLINGS, CONNECTORS, CAPS & PLUGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install couplings and connectors of the type(s) and size(s) in the location(s) shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere: "Pipe & Pipe Fittings - General" is specified in this Division.

1.2 QUALITY ASSURANCE

- A. Minimum pressure rating equal to that of the pipeline in which they are to be installed.
- B. Couplings and connectors, other than those specified herein, are subject to the Engineer's approval.
- C. Cap and plug shop drawing submissions must be accompanied by a manufacturer's written certification that the cap or plug will effectively and permanently seal the inactivated or abandoned utility.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All couplings and Connectors:
  - 1. Gasket Materials: Composition suitable for exposure to the liquids to be contained within the pipes.
  - 2. Diameters to properly fit the specific types of pipes on which couplings and connectors are to be installed.
- B. Sleeve Type Couplings (When Applicable):
  - 1. Exposed Couplings (When Applicable):
    - a. Steel middle ring,
    - b. Two steel follower rings,
    - c. Two wedge-section gaskets,
    - d. Sufficient steel bolts to properly compress the gaskets,
    - e. Acceptable Manufacturers:
      - (1) Dresser Manufacturing Co. - Style 38,
      - (2) Smith-Blair Inc. - Style 411,
      - (3) Baker Allsteel
      - (4) Or approved equal.
  - 2. Buried Couplings (When Applicable):
    - a. Cast or ductile iron middle rings with pipe stops removed,
    - b. Two malleable iron follower rings with ribbed construction,
    - c. Two wedge-section gaskets,
    - d. Sufficient galvanized steel bolts to properly compress the gaskets,

## COUPLINGS, CONNECTORS, CAPS &amp; PLUGS

- e. Acceptable Manufacturers:
  - (1) Romac "501",
  - (2) Smith-Blair Inc. - Style 411,
  - (3) Or approved equal.
- C. Split Type Couplings (When Applicable):
  - 1. Constructed from malleable or ductile iron.
  - 2. For use with grooved or shouldered end pipe with minimum wall thickness as required so as not to weaken pipe.
  - 3. Cast in two sections for 3/4 inch through 14 inch pipe sizes, four segments for 15 inch through 24 inch pipe sizes, and six segments for pipe sizes over 24 inch.
  - 4. Coating: Enamel.
  - 5. Bolts: Carbon steel.
  - 6. Acceptable Manufacturers:
    - a. Victaulic Company of America, Style 77,
    - b. Gustin-Bacon Co.,
    - c. Or approved equal.
- D. Flanged Adapters (When Applicable):
  - 1. For joining plain end or grooved end pipe to flanged pipes and fittings.
  - 2. Adapters shall conform in size and bolt hole placement to ANSI standards for steel and/or cast iron flanges 125 or 150 pound standard unless otherwise required for connections.
  - 3. Exposed Sleeve Type:
    - a. Constructed from steel.
    - b. Coating: Enamel.
    - c. Bolts: Carbon steel.
    - d. Acceptable Manufacturers:
      - (1) Dresser Manufacturing Co. - Style 128 for cast iron, ductile iron and steel pipes with diameters of 2 inches through 96 inches.
      - (2) Or approved equal.
  - 4. Buried Sleeve Type:
    - a. Constructed from cast iron.
    - b. Bolts: Galvanized steel.
    - c. Acceptable Manufacturers:
      - (1) Dresser Manufacturing Co. - Style 127 locking type for cast iron, ductile iron, asbestos cement and steel pipes with diameters of 3 inches through 12 inches.
      - (2) Or approved equal.
  - 5. Split Type:
    - a. Constructed from malleable or ductile iron.
    - b. For use with grooved or shouldered end pipe.
    - c. Coating: Enamel.
    - d. Acceptable Manufacturers:

## COUPLINGS, CONNECTORS, CAPS &amp; PLUGS

- (1) Victaulic Company of America - Style 741 for pipe diameters of 2 inches through 12 inches,
  - (2) Victaulic Company of America - Style 742 for pipe diameters of 14 inches through 16 inches,
  - (3) Or approved equal.
- E. Flexible Joints:
1. Expansion Joints:
    - a. Materials shall be capable of withstanding the temperature, pressure and type of material in the pipeline.
    - b. Shall be the filled arch type that will prevent sediment build up.
    - c. Supplied with control rods to restrict elongation and compression.
    - d. Metal retaining rings shall be split and beveled galvanized steel for placement against the flange of the expansion joint.
  2. Deflection Joints:
    - a. Joints designed to permit a nominal maximum deflection of 3 degrees in all directions from the axis of the adjacent pipe length, will prevent pulling apart, and will remain watertight at any angle of deflection under 3 degrees.
    - b. Material to be manufactured from a composition material suitable for exposure to the liquid, pressure and temperature to be contained within the pipe.
    - c. Supplied with control rods as required.
- F. Caps and Plugs
1. Cap and plug material shall be as indicated on the Drawings and shall be adaptable to the inactive or abandoned utility to be capped or plugged.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Sleeve Type Couplings (When Applicable):
1. Thoroughly clean pipe ends for a distance of 8 inches from the ends prior to installing couplings, and use soapy water as a gasket lubricant.
  2. Slip a follower ring and gasket (in that order) over each pipe and place the middle ring centered over the joint.
  3. Insert the other pipe length into the middle ring the proper distance.
  4. Press the gaskets and followers evenly and firmly into the middle ring flares.
  5. Insert the bolts, finger tighten and progressively tighten diametrically opposite bolts uniformly around the flange to the torque recommended by the manufacturer.
- B. Split Type Flange Adapters (When Applicable): Install in the same manner as Split Type Couplings.



## COUPLINGS, CONNECTORS, CAPS &amp; PLUGS

- C. Buried Couplings, Adapters and Connectors (When Applicable): Thoroughly coat all exterior surfaces, including nuts and bolts, after assembly and inspection by the Engineer with a heavy-bodied bituminous mastic as approved by the Engineer.
- D. Install thrust rods, supports and other provisions to properly support pipe weight and axial equipment loads.
- E. Install caps and plugs in accordance with manufacturer's recommendations to ensure a permanent seal of the inactive or abandoned utility.

END OF SECTION

SECTION 02650  
EXCAVATION DEWATERING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Design, furnish, install, operate, maintain and remove temporary dewatering systems as necessary to lower and control water levels below the excavated depth.
- B. Determination of need to pre-drain soils using a well point system shall be by concurrence of the Engineer and Superintendant in advance of the work based on the following:
  - 1. Observed water table >2' above the proposed invert of the pipe.
  - 2. Sufficient hydrostatic groundwater pressure to cause blowup of the trench bottom or sufficient to cause disturbance of the soil in the trench.
  - 3. Perched water table above the invert of the pipe that can be addressed by conventional trench dewatering methods, such as by sump or trench pumps will not require a well point system.

1.2 DESIGN AND PERFORMANCE RESPONSIBILITY

- A. The Contractor shall be solely responsible for the proper design and execution of methods for controlling surface water and pre-draining groundwater.
- B. Damage to properties, buildings or structures, sewers and other utility installations, pavements, sidewalks, and work resulting from the Contractor's dewatering operations will be the responsibility of the Contractor.
- C. Design review and field monitoring activities by the Engineer shall not relieve the Contractor from their responsibility for the Work.

1.3 SUBMITTALS TO THE ENGINEER

- A. Plan of proposed dewatering method including, the number, type, size, power supply and location of proposed dewatering units; schedule of operation; and method of disposal of water.
- B. Water level readings in observation wells, the well locations, well point tip elevation and elevation of water in the wells.
- C. Include provisions for the dewatering system in the Erosion and Sediment Control and Storm water Management Plan described in Section 02540 – Temporary Erosion Control.

1.4 SUBSURFACE CONDITIONS

- A. When available, locations of test borings and pits are shown on the Drawings. The boring logs are included in the Appendix of these Specifications.
- B. Variations in subsurface conditions should be anticipated by the Contractor when planning and estimating the work. Water levels can be expected to vary with season, precipitation and stages of nearby brooks and, therefore, water levels encountered at the time of construction may differ from any that are shown on the boring and test pit logs.

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

3.1 GENERAL

- A. Control surface water and pre-drain groundwater such that excavation to final grade is made in-the-dry, maintain undisturbed bearing soils and insure that softening and/or disturbance due to the presence of seepage of water does not occur.
- B. Perform all construction and backfilling in-the-dry. Flotation of completed portions of the Work is prohibited.

3.2 SURFACE WATER CONTROL

- A. Construct surface water control measures, including dikes, ditches, sumps and other methods to prevent, as necessary, flow of surface water into excavations.

3.3 EXCAVATION DEWATERING

- A. Construct all pipelines, concrete work, pipe bedding, and backfill in-the-dry. Excavate in-the-dry and not until the water level, as indicated by groundwater observation wells, is a minimum of six inches below the proposed bottom of final excavation within the trench limits.
- B. Provide and maintain, at all times during construction, proper equipment and facilities to promptly and adequately remove and dispose of all water entering excavations. Keep undisturbed subgrade foundation conditions until the fill, structure or pipes to be built thereon have been completed to such an extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.
- C. Conduct dewatering, at all times, in such a manner to preserve the natural undisturbed capacity of the subgrade soils at the bottom of excavations.
- D. Evaluate the impact of the anticipated subsurface soil/water conditions on the proposed method of excavation and removal of water.
- E. Where groundwater level is above the bottom of the proposed excavation level, install and operate a pumped dewatering system, including well points or closely spaced wells. Pre-drain the soils prior to final excavation, and maintain the lowered groundwater level until construction has been completed to such an extent that the structure, pipeline or fill will not be floated or otherwise damaged. The type of system, spacing of dewatering units and other details of the work will vary depending on soil/water conditions at particular locations.
- F. At least two weeks prior to the start of construction in any areas of anticipated dewatering, submit a proposed initial plan for removal of water, method of excavation and support of the excavation to the Engineer for review. Do not proceed with construction in any of these areas until the initial plan has been reviewed and commented upon by the Engineer. Concurrence by the Engineer with the Contractor's initial plan shall be the Engineer's agreement that the plan is satisfactory for initial trial.

## EXCAVATION DEWATERING

It is expected that the initial plan may need modifications to suit the variable soil/water conditions to be encountered along the route.

- G. Dewater and excavate in a manner which does not cause loss of ground or disturbance to the pipe bearing soil or soil supporting overlying or adjacent structures.
- H. Surround well points and other dewatering units with suitable filter sand to prevent fines from being removed by pumping.
- I. Pump the dewatering system continuously until pipe or structure is adequately backfilled, and provide stand-by pumps.
- J. Collect water entering the excavation from precipitation or surface runoff in shallow ditches around the perimeter of the excavation, drain to sump and pump from the excavation to maintain a bottom free from standing water.
- K. Dispose of drainage in an approved area so that backflow, pollution, or public nuisance will not occur.

#### 3.4 TEMPORARY GROUNDWATER OBSERVATION WELLS

- A. The Contractor may install temporary observation wells to monitor groundwater during pipe installation
- B. The wells can be used to determine the effective dewatering techniques as required to achieve the objectives described in Paragraph 3.3 of this section.
- C. Temporary observation wells shall consist of a screened or slotted well point or riser pipe. The well point tip shall be placed at least two feet below the proposed bottom of excavation level.
- D. Contractor is responsible for dewatering as required whether monitoring wells are used or not.

END OF SECTION

SECTION 02651

FINAL SEWER TESTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. All sewers, manholes, and appurtenant work, in order to be eligible for approval by the Engineer, shall be subjected to tests that will determine the degree of watertightness and horizontal and vertical alignment.
2. Final sewer testing work includes the performance of testing and inspecting each and every length of sewer pipe, pipe joints and each item of appurtenant construction.
3. Perform testing at a time approved by the Engineer, which may be during the construction operations, after completion of a substantial and convenient section of the work, or after the completion of all pipe laying operations.
4. Provide all labor, pumps, pipes, connections, gages, measuring devices and all other necessary apparatus to conduct tests.

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

3.1 PERFORMANCE

A. General:

1. Thoroughly clean all sewer lines to be tested, in a manner and to the extent acceptable to the Engineer, prior to initiating test procedures.
2. Perform all tests and inspections only under the direct observation of the Engineer and the plumbing or building inspector and in accordance with the requirements of the local and State plumbing codes.
3. Prior to construction, inform the Engineer of the planned sewer testing pattern.
4. Remedial Work:
  - a. Perform all work necessary to correct deficiencies discovered as a result of testing and/or inspections.
  - b. Completely retest all portions of the original construction on which remedial work has been performed.
  - c. Perform all remedial work and retesting in a manner and at a time approved by the Engineer at no additional cost to the Owner.
5. All testing of pipe in roadways shall be performed prior to installation of final wearing course pavement.

B. Line Acceptance Tests (Gravity sewers):

1. Test all gravity sewer lines for leakage by conducting a low pressure air test conforming to ASTM F1417-11a or Uni-Bell Specification Uni-B-6.

Conduct all tests after the tees or saddles and service connections have been installed to the limit indicated on the Contract Drawings. Conduct all tests after backfilling the sewer line trenches and prior to any road reconstruction or paving.

2. Equipment:
  - a. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.
  - b. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
  - c. All air used shall pass through a single central panel.
  - d. Connect 3 individual hoses:
    - (1) From the control panel to the pneumatic plugs for inflation,
    - (2) From the control panel to the sealed sewer line for introducing the low pressure air.
    - (3) From the sealed sewer line to the control panel for continually monitoring the air pressure rise in the sealed line.
  - e. All bypass pumping equipment needed to maintain main line flows for the entire test procedure.
3. Groundwater Conditions:
  - a. In areas where groundwater exists, and at the time of installing the sewer line, install a 1/2 inch diameter capped pipe nipple, approximately 10 inches long, through the manhole wall on top of one of the sewer lines entering the manhole.
  - b. Immediately prior to performing the line acceptance test, determine the height of groundwater by removing the groundwater test pipe cap, blowing air through the pipe nipple into the ground to clear it, and then connecting a clear plastic tube to the nipple.
  - c. Hold the tube vertically and measure the height in feet. Divide this height by 2.3 to establish the pounds of groundwater pressure to be added to the air pressure test readings. (Example: Height of water is 11-1/2 feet, added groundwater pressure is 5 psig, minimum air pressure is 3.5 psig; therefore, the total minimum acceptable pressure is 8.5 psig.)
4. Testing Pneumatic Plugs:
  - a. Seal test all pneumatic plugs prior to using them in the actual test.
  - b. Lay one length of pipe on the ground and seal both ends with the pneumatic plugs to be tested.
  - c. Pressurize the sealed pipe to 5 psig.
5. Testing Sewer Pipeline:
  - a. After the sewer pipe has been cleaned and the pneumatic plugs checked, place the plugs in the sewer line at each manhole and inflate and brace them as necessary.
  - b. Introduce low pressure air into the sealed sewer pipeline until the air pressure reaches 4 psig greater than the average groundwater pressure.
  - c. Allow a minimum of 2 minutes for the air pressure to stabilize to a minimum of 3.5 psig greater than the groundwater pressure.

- d. After the stabilization period, disconnect the air hose from the control panel to the air supply.
- e. The pipeline will be acceptable if the pressure decrease is not greater than 1/2 psig in the time stated in the following table.

TABLE 1

<u>Pipe Diameter (inches)</u>	<u>Minimum Time (min)</u>	<u>Length for Min. Time (feet)</u>	<u>Time for Longer Lengths* (sec)</u>
4	1:53	597	.190L
6	2:50	398	.427L
8	3:47	298	.760L
10	4:43	239	1.187L
12	5:50	199	1.709L
15	7:05	156	2.671L
18	8:30	133	3.846L
21	9:55	114	5.235L
24	11:20	99	6.837L
27	12:45	88	8.653L
30	14:10	80	10.683L
33	15:35	72	12.926L
36	17:00	66	15.384L

\*Applies to pipe runs greater than those listed in column 3.  
L = Actual length of pipe being tested.

- 6. Test Results:
  - a. If the installation fails the low pressure air test, determine the source of leakage.
  - b. Replace all defective materials and/or workmanship and repeat low pressure test at no additional cost to the Owner.
  - c. Repairs shall only be made with prior approval of the Engineer in accordance with a method acceptable to the Engineer.
- C. Alignment Tests (Gravity Sewers):
  - 1. Perform tests for the correctness of horizontal and vertical alignment on each and every length of gravity sewer pipeline between manholes.
  - 2. Clean and flush the line with water.
  - 3. Beam a source of light, acceptable to the Engineer, through the pipe line and directly observe the light in the manhole at the opposite end of each test section. Note any narrowing or widening of the water in the invert of the pipe. Note any deviation in line.
- D. Deflection Tests:
  - 1. Deflection test all PVC pipe (Deflection test for CCFRPM pipe is not required).

2. Perform test by using an approved deflectometer.
3. Maximum deflection: 5 percent.
4. Testing limits and test gauge diameter for plastic pipe:
  - a. Acceptance limit for deflection tests of installed flexible sewer pipe, listed in Table 2 shall be 5% of Base inside diameter. A test shall be conducted after not less than 30 day and not more than 90 days following installation.

TABLE 2 - PVC Materials

D 3034	Solid Wall	4" - 15"
F 679	Solid Wall	18" - 36"
F 789	Solid Wall	4" - 18"
F 794	Ribbed Wall	18" - 48"
F 949	Corrugated	4" - 8"

- b. The deflection gauge diameter for this test shall be determined in accordance with Uni-B-9 Table 4. The following values are based on that table:

Pipe Size	Base ID from Table 4 Uni-B-9-94 (in)	5% Deflection from Base ID (in)
4	3.864	3.680
6	5.725	5.452
8	7.637	7.273
10	9.525	9.071
12	11.312	10.773
15	13.828	13.170
18	16.923	16.117
21	19.956	19.006
24	22.6	21.524
27	25.446	24.234
30	28.35	27.000
33	31.249	29.761
36	34.106	32.482
39	37.003	35.241
42	39.88	37.981
45	42.762	40.726
48	45.639	43.466

- c. All PVC pipe is to be gauged and the results are to be recorded and the owner is to be provided written results.
  - d. Limits of installed deflection for other flexible pipe materials shall not exceed the above for PVC.
5. Deflection Test shall be omitted on DI Sewer Pipe.



E. Force Main Test:

1. Hydrostatic Test:
  - a. Tests shall be hydrostatic. Air test of any kind shall not be allowed.
  - b. Perform testing in accordance with Section 5 of AWWA Standard C600, latest edition, at a pressure equal to 150 percent of the design operating total dynamic head or at least 100 psi, whichever is greater.
  - c. The section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If blowoffs are not available at high points for releasing air the Contractor shall make the necessary excavations, backfilling and taps at such points and shall plug said holes after completion of the test.
  - d. The section under test shall be maintained full of water for a period of 24 hours prior to the hydrostatic test being applied. Perform a pressure test for all other piping systems at 1-1/2 times maximum system pressure, or at a pressure indicated in the appropriate Sections of this Specification.
  - e. If the section fails to pass the hydrostatic test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test.
2. Connection to Work by Others
  - a. If work involves connection of pipe lines to pipes or structures provided by others, pressure test pipe lines prior to making the connection.
  - b. After successfully passing the hydrostatic test, make the necessary connections to the work by others, and pressure test the connection.
  - c. The connection shall be pressurized to the pipe line test pressure, for a minimum of 4 hours. The connection shall have no visible leakage.
  - d. Correct any leakage at no cost to the Owner and retest until connection passes.
3. Cleaning: Perform all specialized cleaning as specified or required by system.

END OF SECTION

SECTION 02935

LOAMING & SEEDING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, place, and test topsoil, seed, lime, and fertilizer, and protect and maintain seeded areas disturbed by construction work, where shown on the Drawings and as directed by the Engineer.

1.2 SUBMITTALS AND TESTING

- A. Seed:
1. Furnish the Engineer with duplicate signed copies of a statement from the vendor, certifying that each container of seed delivered to the project site is in accordance with these Specifications.
  2. Each lot of seed shall be subject to sampling and testing, at the discretion of the Engineer.
- B. Topsoil:
1. Inform the Engineer, within 30 days after the award of the Contract, of the sources from which the topsoil is to be furnished.
  2. Obtain representative soil samples, taken from several locations in the area under consideration for topsoil removal, to the full stripping depth.
  3. Have soil samples tested by an independent soils testing laboratory, approved by the Engineer, at no additional cost to the Owner.
  4. Have soil samples tested for physical properties and pH (or lime requirement), for organic matter, available phosphoric acid, and available potash, in accordance with standard practices of soil testing.
  5. Use only soil that is suitable as shown by the tests.

1.3 DELIVERY, STORAGE & HANDLING

- A. Seed:
1. Furnish all seed in sealed standard containers, unless the Engineer grants exception in writing.
  2. Containers shall be suitably labeled.
- B. Fertilizer:
1. Furnish all fertilizer in unopened original containers.
  2. Containers shall be labeled with the manufacturer's statement of analysis.

1.4 JOB CONDITIONS

- A. Topsoil: Do not place or spread topsoil when the subgrade is frozen, excessively wet or dry, or in any condition otherwise detrimental to the proposed planting or to proper grading.

- B. Seeding:
1. Planting Seasons: Perform seeding work only between the dates of 15 May to 20 June and 15 August to 15 October, except as otherwise directed in writing by the Engineer.
  2. Weather Conditions:
    - a. Do not perform seeding work when weather conditions are such that beneficial results are not likely to be obtained, such as drought, excessive moisture, or high winds.
    - b. Stop the seeding work when weather conditions are not favorable.
    - c. Resume the work only when conditions become favorable, or when approved alternative or corrective measures and procedures are placed into effect.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Seed shall be in accordance with NHDOT Sections 644 2.2 and 2.3. Measurement and Payment sections will not apply.
1. Park Seed Type 15 (Table 1) shall normally be used on loam areas with a flat or shallow slope as shown on the drawings unless otherwise specified.
  2. Slope Seed Type 44 (Table 2) shall normally be used for slope work where additional erosion control is necessary as shown on the drawings unless otherwise specified.
  3. Provide the grass seed mixture approved by the Engineer, having the following composition:

Table 1 Park Seed Type 15:

Kind of Seed	Minimum Purity (%)	Minimum Germination (%)	Lb./Acre
Creeping Red Fescue	96	85	45
Perennial Rye Grass	98	90	55
Kentucky Bluegrass	97	85	30
Redtop	95	80	5

Table 2 Slope Seed Type 44:

Kind of Seed	Minimum Purity (%)	Minimum Germination (%)	Lb./Acre
Creeping Red Fescue	96	98	40
Perennial Ryegrass	98	90	35
Redtop	95	80	5
Alsike Clover	97	90	5
Birdsfoot Trefoil	98	80	5

4. **Crownvetch** shall be used at a rate of 10 lb./acre on all slopes (with or without slope seed type 44) where shown on the plans or as directed by the Engineer to be seeded with crownvetch because of steep slopes, excessive erosive forces or poor topsoil conditions.
  5. Do not use seed which has become wet, moldy, or otherwise damaged in transit or during storage.
  6. For mixes including Birdsfoot Trefoil or Crownvetch, provide the appropriate inoculum. The inoculum shall be a pure culture of nitrogen-fixing bacteria with a demonstrated ability to transform nitrogen from the air into soluble nitrates and to deposit them into the soil.
- B. Topsoil:
1. Provide the quantity of topsoil necessary to complete the work.
  2. The term as used herein shall mean that portion of the soil profile defined technically as the "A" soil horizon by the Soil Science Society of America.
  3. Provide topsoil that is natural, friable clay-loam possessing the characteristics of representative soils in the vicinity which produce heavy growths of crops, grass, and other vegetation.
  4. Provide topsoil which is reasonably free from subsoil, brush, objectionable weeds, other litter, clay lumps, stones, stumps, roots, objects larger than 2 inches in diameter, and toxic substances which might be harmful to plant growth or be a hindrance to grading, planting, and maintenance operations.
  5. Topsoil shall have the following characteristics:

	<u>Min.</u>	<u>Max.</u>	
a. pH	5.5	7.6	
b. Organic Matter	3%	10%	(determined by loss by ignition)
c. Not more than 65% shall pass a No. 200 sieve as determined by the wash test and in no instance shall more than 20% of that material passing the No. 4 sieve consist of clay size particles.			
  1. Obtain topsoil from naturally well drained areas.
- C. Lime:
1. Provide lime which is ground limestone containing not less than 85% of total carbonate and of such fineness that 90% will pass a NO. 20 sieve and 50% will pass a No. 100 sieve.
  2. Coarser materials will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing a No. 100 sieve. Apply the increased quantity at no additional cost to the Owner.
- D. Fertilizer:
1. Provide a suitable commercial fertilizer.
  2. Provide fertilizer containing the following minimum percentage of plant food by weight:
    - 10% Available phosphoric acid
    - 10% Available potash
    - 10% Available nitrogen (75% of the nitrogen shall be organic).

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Equipment:
  - 1. Use all equipment necessary for the proper preparation of the ground surface and for the handling and placing of all required materials.
  - 2. Use equipment that will apply materials at suitable rates.
- B. Soil: Perform the following work prior to the application of lime, fertilizer or seed:
  - 1. Scarify the subgrade to a depth of 2 inches to allow the bonding of the topsoil with the subsoil.
  - 2. Apply topsoil to the areas to be seeded to the depth specified on the plans.
  - 3. Trim and rake the topsoil to true grades free from unsightly variations, humps, ridges or depressions.
  - 4. Remove all objectionable material and form a finely pulverized seedbed.

### 3.2 PERFORMANCE

- A. Grading:
  - 1. Grade the areas to be seeded within the areas shown on the Drawings or as directed by the Engineer.
  - 2. Leave all surfaces in even and properly compacted condition.
  - 3. Maintain grades on the areas to be seeded in true and even conditions, including any necessary repairs to previously graded areas.
- B. Placing Topsoil:
  - 1. Uniformly distribute and evenly spread topsoil on the designated areas.
  - 2. Spread the topsoil in such a manner that planting work can be performed with little additional soil preparation or tillage.
  - 3. Correct all irregularities in the surface resulting from placing topsoil or other operations to prevent the formation of depressions where water may stand.
  - 4. Thoroughly till the topsoil to a depth of at least 3 inches by plowing, discing, harrowing, or other approved method until the condition of the soil is suitable.
- C. Placing Lime:
  - 1. Uniformly distribute lime immediately following or simultaneously with the incorporation of fertilizer.
  - 2. Distribute lime at a rate determined from the pH test sufficient to raise the loam pH to a minimum 5.5 or as directed by the Engineer.
  - 3. Distribute the lime to a depth of at least 3 inches by discing, harrowing, or other suitable methods.
  - 4. Lime may be distributed by the hydraulic method which includes seed and fertilizer.

D. Placing Fertilizer:

1. Distribute fertilizer uniformly at a suitable rate over the areas to be seeded.
2. Fertilizer may be placed by dry application in accordance with the tillage operation specified above (3.2 B.4.).
3. Distribution by means of a seed drill equipped to sow seed and distribute fertilizer at the same time will be acceptable or by the hydraulic method which includes seed distribution.

E. Seeding:

1. Level out all undulations and irregularities in the surface resulting from tillage, fertilizing, liming and other operations before starting seeding operations.
2. Drill Seeding:
  - a. Drill seeding may be performed with approved equipment having drills not more than 2 inches apart.
  - b. Sow the seed uniformly over the designated areas to a depth of 1/2 inch and at rate specified.
3. Broadcast Seeding:
  - a. Broadcast seeding may be performed with suitable equipment.
  - b. Sow the seed uniformly over the designated areas at the rate specified..
  - c. Sow half the seed with the equipment moving in one direction and the remainder of the seed with the equipment moving at right angles to the first sowing.
  - d. Cover the seed to an average depth of 1/2 inch by means of a brush harrow, spike-tooth harrow, chain harrow, cultipacker, or other suitable devices.
  - e. Do not perform broadcast seeding work during windy weather.
4. Hydraulic Method (Hydroseeding)
  - a. Use an approved spraying machine specifically designed to keep the mixture agitated and applies seed, lime, fertilizer and fiber mulch in one operation.
  - b. The Contractor shall provide for review and approval by the Engineer, coverage calculations specific to the machine being used documenting the application rates. The calculations shall provide the number of pounds to be used per complete tank load. The calculation shall also demonstrate the appropriate coverage per tank load.
  - c. Only complete tank loads will be prepared and applied.
  - d. If the grass seed requires inoculum and remains in the hydroseeder longer than 30 minutes, fresh inoculum shall be added.
  - e. The Contractor, with the approval of the Engineer, shall delineate and prepare the coverage area for each tank load to be applied prior to loading the hydroseeder.
  - f. The hydroseeder shall be completely cleaned at the end of each day.
  - g. Only fiber mulch appropriate for use in a hydroseeder shall be used.

- h. When hydroseeding is used, compaction or rolling may not be required.
  - i. If the results of the hydroseeding are unsatisfactory, the Contractor will be required to abandon the method and use either the drill or broadcasting method, including the rolling or compaction.
- F. Mulching:
- 1. If hydroseeding is the selected seeding method and the Contractor intends to use fiber mulch mixed in the hydroseeder tank:
    - a. The mulch shall be from one manufacturer, with the appropriate documentation that the mulch is designed for use with a hydroseeder.
    - b. Shall be completely biodegradable with no inert or residual byproducts. Natural organic dyes may be factory applied to color the mulch.
  - 2. Dry Distribution methods
    - a. Straw or hay mulch shall be applied immediately following seeding operations.
    - b. Mulch should cover ground enough to shade it but should not be so dense that ground is not visible.
    - c. When hand applied, the Contractor may place light brush over the mulch to prevent blow-away.
    - d. Straw or hay mulch may be applied by use of an appropriate chopper/blower.
    - e. A tackifier approved for use with mulch may be applied with the chopper/blower method.
    - f. Remove all matted mulch.
    - g. Immediately collect and remove from the site all baling wire or rope.
    - h. Bark mulch shall only be used at areas designated on the plans or as directed by the Engineer.
- G. Compacting:
- 1. Compact the entire area immediately after the seeding operations have been completed. (Compaction may not be required for the hydroseed method.)
  - 2. Compact by means of a cultipacker, roller, or other suitable equipment weighing 60 to 90 pounds per linear foot of roller.
  - 3. If the soil is of such type that a smooth or corrugated roller cannot be operated satisfactorily, use a pneumatic roller (not wobbly wheel) that has tires of sufficient size to obtain complete coverage of the soil.
  - 4. When using a cultipacker or similar equipment, perform the final rolling at right angles to the prevailing slopes to prevent water erosion, or at right angles to the prevailing wind to prevent dust.

### 3.3 PROTECTION & MAINTENANCE

- A. Protection:
- 1. Protect the seeded area against traffic or other use.
  - 2. Erect barricades and place warning signs as needed.

B. Maintenance:

1. Properly care for the seeded areas during the period when the grass is becoming established.
2. Protect seeded areas for 12 months after the completion of the entire project, unless the desired cover, in the opinion of the Engineer, is established in a shorter period of time.
3. On slopes, the Contractor shall provide means to protect areas against washout. Any washout which occurs shall be regraded and reseeded at the Contractors own expense until seeded areas are completely stabilized.

END OF SECTION



SECTION 02957

PROTECTIVE MANHOLE COATINGS

PART 1 -- GENERAL

1.01 SCOPE

- A. It is the intent of this contract to install a 100% solids epoxy coating to the walls, benches and inverts of all manholes and the specified surfaces of other structures. This specification covers work, materials, equipment and tools including specially developed application equipment as required for installation of a field applied unique monolithic interior surfacing system. The use of specialized equipment combined with rigorous surface preparation requirements shall be used to apply the products without the use of solvents. The equipment adds high heat and pressure to the monolithic surfacing system resulting in a high build and quick set of the completed system. Product application requirements and procedures described herein include surface preparation, mixing application, material handling and storage, qualification of the applicator and application quality control.
- B. The condition of the structures to receive the protective coating will be classified in accordance with the following criteria:

<b>Condition</b>	<b>Description</b>
New	New structures or structures that have not been exposed to sanitary sewer. No evidence of infiltration.
A	Minimal damage. Minimal evidence of exposure to sanitary sewer gases. No evidence of infiltration.
B	Moderate damage such as missing mortar between bricks in brick manholes, some exposed aggregates in concrete structures. Moderate evidence of exposure to sanitary sewer gases. Evidence of minimal infiltration.
C	Severe damage such as missing bricks in brick manholes, severe exposed aggregates or exposed reinforcing steel in concrete structures. Severe evidence of exposure to sewer gases. Evidence of moderate infiltration.

C. The minimum coating thickness shall be as described in the following table:

Type of Structure	Condition	Minimum Coating Thickness (mils)
Manhole (precast)	New	125
Manhole (precast) with force main discharge and next 3 downstream manholes	New	125
Manhole (precast)	A	150
Manhole (brick)	A	200
Manhole (precast)	B	175
Manhole (brick)	B	250
Manhole (precast)	C	300
Manhole (brick)	C	350
Wetwell or Lift Station	New	125
Wetwell or Lift Station	A	200
Wetwell or Lift Station	B	250
Wetwell or Lift Station	C	350

## 1.02 REFERENCES

- A. The following standards are hereby incorporated into these specifications by reference:
1. ASTM D638 – Tensile Properties of Plastics
  2. ASTM D790 – Flexural Properties of Un-reinforced and Reinforced Plastics
  3. ASTM D695 – Compressive Strength of Rigid Plastics
  4. ASTM D4541 – Pull-off Strength of Coatings Using a Portable Adhesion Tester
  5. ASTM D2584 – Volatile Matter Content
  6. ASTM D2240 – Durometer Hardness, Type D
  7. ASTM D1653 – Water Vapor Transmission of Organic Coating Films
  8. ASTM D543 – Resistance of Plastics to Chemical Reagents
  9. ASTM C297 – Flatwise Tensile Strength of Sandwich Constructions.
  10. ASTM – The published standards of the American Society for Testing and Materials, West Conshohocken, PA.
  11. NACE – The published standards of the National Association of Corrosion Engineers (NACE International), Houston, TX.

1.03 SUBMITTALS

- A. All submittals shall be submitted in accordance with the applicable portions of these specifications.
- B. The Contractor shall submit the following information to the Engineer for approval prior to beginning the installation of the protective coating.
  - 1. Manufactures data sheets for the coating materials
  - 2. Third party test results verifying the physical properties of the coating materials meet or exceed the requirements of these specifications.
  - 3. Applicator's procedures for preparing the surface of the structure and installing the coating system.
  - 4. Documentation that the Applicator of the coating has been trained and certified by the Manufacturer and meets the experience requirements of these specifications.

PART 2 – PRODUCTS

2.01 The coating system shall be a 100% solids epoxy monolithic surfacing system for use in coating new or existing manholes, wetwells, liftstations, treatment plants, and other structures. All products to be used on this project must be pre-approved by the Engineer prior to the bid date. The following products have been pre-approved for use on this project.

- A. S-301 by Warren Environmental, Inc.
- B. CPP by Epoxytec
- C. Or approved equal

2.02 In order to be considered as an equal, a product must have the following minimum physical characteristics as measured by the applicable ASTM Standards referenced herein.

- A. Minimum Compressive Strength 12,000 psi
- B. Minimum Tensile Strength 7,000 psi
- C. Minimum Flexural Strength 11,000 psi
- D. Minimum Bond Strength 500 psi
- E. Minimum corrosion resistance suitable for environments pH of 0.5 or higher.
- F. Minimum operating temperature of 150°F

2.03 Other manufactures or products seeking pre-approval must submit the following documentation to the Engineer a minimum of two weeks prior to bid date. This time frame allows the Engineer ample time to determine if the proposed product is an acceptable alternative.

## PROTECTIVE MANHOLE COATINGS

- A. Documentation that the proposed product meets the above minimum physical characteristics including results of testing performed by a bonded, third party testing company.
- B. An affidavit attesting to the successful use of the product as a protective coating for concrete or masonry structures for a minimum continuous period of five (5) years in wastewater conditions recognized as corrosive or otherwise detrimental to concrete and masonry.
- C. A verifiable list of references that document the successful installation and use of the product in a minimum of 750,000 square feet of sanitary sewer structures.

2.04 All additional products that are pre-approved by the Engineer shall be identified in an addendum issued prior to the bid date.

## PART 3 – EXECUTION

## 3.01 INSTALLER QUALIFICATIONS

- A. All products must be installed by an Installer that has been trained and certified by the manufacturer.
- B. The Installer must provide verifiable documentation of the above certification

## 3.02 QUALITY ASSURANCE

- A. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM standards.
- B. Applicator shall use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts. These workmen shall be completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Applicator shall use approved specialty equipment adequate in size, capacity and number sufficient to accomplish the work of this Section in a timely manner.

## 3.03 SAFETY

- A. Applicator shall perform his work in a manner to protect the health and safety of all workmen and the public.
- B. All work shall be in accordance with standard industry safety practices.
- C. All work, including entry into confined spaces shall be performed in strict compliance with current OSHA regulations.

## PROTECTIVE MANHOLE COATINGS

## 3.04 PRE-COAT INSPECTION

- A. The applicator's vehicles and equipment must be able to access the structures to be coated under their own power.
- B. Active flows shall be dammed, plugged or diverted as required to ensure that the liquid flow is maintained below the surfaces to be coated.
- C. Installation of the protective coating shall not commence on any surfaces containing freshly poured concrete until the concrete substrate has properly cured, and in no case less than 28 days.

## 3.05 SURFACE PREPARATION

- A. Applicator shall inspect all surfaces specified to receive the monolithic surfacing system prior to surface preparation. Applicator shall promptly notify Owner of any noticeable disparity in the surfaces that may interfere with the proper preparation or application of the monolithic surfacing system.
- B. All concrete that is not sound or has been damaged by chemical exposure shall be restored to a sound concrete surface. All contaminants including all oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.
- C. Surfaces to receive protective coating shall be cleaned to produce a sound concrete or masonry surface with adequate profile and porosity to provide a strong bond between the monolithic surfacing system and the substrate. Surface preparation methods shall be based upon the conditions of the substrate and the requirements of the monolithic surfacing system to be applied, but as a minimum, shall be in accordance with the procedures listed below.
  - 1. Clean all surfaces with high pressure water to remove all loose or contaminated debris. Other equipment and methods may be required to remove all unsound material.
  - 2. When all loose, contaminated, and unsound debris has been removed, the surface shall be etched with a solution of 20% muratic acid to clean and open the pores of the substrate.
  - 3. The surface shall be washed again and the wash water shall contain a dilute solution of chlorine to diminish microbiological bacteria growth and to kill any bacteria residing on the surface.
  - 4. The surface shall be tested with litmus paper at various points throughout the structure to ensure that the pH is within acceptable limits (not to exceed 8.5). If the surface does not meet the pH requirements, the above steps shall be repeated until the surface pH is within acceptable limits. All tests results will be retained for review by the Engineer.

## PROTECTIVE MANHOLE COATINGS

5. Active water infiltration shall be stopped by using a cementitious water plug that is compatible and suitable for top coating with the specified monolithic surfacing system.
6. If pre-installation inspection reveals infiltration (defined as visible and consistent movement of water) through the wall of the structure, a collapse in an area of the wall, a bench that needs to be rebuilt/repared, a necessity for sandblasting (if necessary after surface preparation as described in specification) or anything that will require more than typical preparation of the structure, the contractor will advise the Owner's representative. Such extra work will be approved in writing between the Owner and the contractor prior to the commencement of the work and shall be considered as a separate pay item.

## D. APPLICATION

1. The interior surfacing system shall be applied to the chimney, walls, bench, and invert of all manholes and to the specified surfaces of all other structures.
2. The interior surfacing system shall be continuously bonded to all brick, mortar, concrete, chemical sealant, grout, pipe and other surfaces inside the manhole according to ASTM C882 testing and therefore shall be designed for hydrostatic loading.
3. The cured surfacing shall be monolithic with proper sealing connections to all un-surfaced areas and shall be placed and cured in conformance with the recommendations of the monolithic surfacing system manufacturer.
4. When cured, the system shall form a continuous, tight-fitting, hard, impermeable surfacing that is suitable for sewer system service and chemically resistant to any chemicals, bacteria or vapors normally found in domestic sewage.
5. The system shall effectively seal the interior surfaces of the manhole and prevent any penetration or leakage of groundwater infiltration.
6. The system shall be compatible with the thermal conditions of the existing sewer manhole surfaces.
7. Heated, plural component, specially designed equipment for use in the spray or spin-cast application of the specified system approved for use by the monolithic surfacing system manufacturer.
8. Application procedures shall conform to the recommendations of the interior surfacing system manufacturer, including material handling, mixing, and environmental controls during application, safety, and equipment.
9. The equipment shall be specially designated to accurately ratio and apply the specified materials and shall be regularly maintained and in proper working order.

## PROTECTIVE MANHOLE COATINGS

10. The specified materials must be applied by an approved installer of the monolithic surfacing system.
11. The walls and bench and invert of the structure shall be lined with the monolithic surfacing system to provide a thickness as previously specified based on the condition of the existing structure. The cured surfacing shall be monolithic with proper sealing connections to all un-surfaced areas and shall be placed and cured in accordance with the recommendations of the monolithic surfacing system manufacturer.
12. Specially designed spray and/or spin-cast application equipment shall be used to apply each coat of the system.

## E. QUALITY ASSURANCE

1. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM standards.
2. Applicator shall use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts. These workmen shall be completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
3. Applicator shall use approved specialty equipment adequate in size, capacity and number sufficient to accomplish the work of this Section in a timely manner.

## F. TESTING AND INSPECTION

1. During application a wet film thickness gage, such as those available through Paul N. Gardner Company, Inc. meeting ASTM D4414 – Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application.
2. The Engineer and Applicator shall make a final visual inspection. Any deficiencies in the finished system shall be marked and repaired according to the procedures set forth herein by Applicator.

## PART 4 – WARRANTY

- A. All approved products must provide a one-year performance limited warranty that the installed product will:
  1. Stop deterioration of the lined surfaces by sewer gas induced corrosion.
  2. Prevent infiltration of ground water into the collection system through the lined surfaces.
  3. Stop root intrusion through the lined surfaces.

DIVISION 3  
CONCRETE

Scope of Work

Furnish, install and test all concrete work and appurtenant work in complete accordance with the Drawings and Specifications.

Contractor's Duties

Except as specifically noted, provide and pay for all labor, materials, equipment, tools, machinery, water, heat, other facilities and services necessary for proper execution and completion of the work.

Contents of Division

<u>Section No.</u>	<u>Section Title</u>
03000	Concrete General
03300	Cast-In-Place Concrete and Flowable Fill
03604	Non-Shrink Grout



SECTION 03000

CONCRETE - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install all concrete work of the type(s) and size(s) and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Testing:
  - 1. Have tests conducted as specified in the Concrete Testing Section of these specifications.
  - 2. Perform all concrete work in accordance with the latest ACI Code and Manual.

1.3 SUBMITTALS TO THE ENGINEER

- A. Shop Drawings:
  - 1. Submit shop drawings in accordance with the General Conditions of the Construction Contract.
  - 2. Submit schedules and detailed setting diagrams for all reinforcing steel.
  - 3. Submit copies of test results on all aggregates and on all mix design proportions for concrete strengths specified in this Division.
- B. Informational Data:
  - 1. Have informational data available on the site at all times as a standard of reference when applicable.
  - 2. Informational data shall consist of the latest edition of the P.C.A. Manual of Concrete Mix Design.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials to prevent damage of any nature.
- B. Store cement in undamaged condition with seals and labels intact as packaged by the manufacturer.
- C. Store cement in weathertight bins or buildings and keep cement dry at all times.
- D. Store aggregate in separate piles or bins and handle in a manner that will minimize segregation and prevent contamination.
- E. Protect anchors, ties, reinforcement and other hardware from the elements.

1.5 JOB CONDITIONS

- A. Wet Weather Protection:
  - 1. Do not place concrete during rain, sleet, or snow unless adequate protection is provided.
  - 2. Do not allow rain water or other weather conditions to damage the surface finish.

- B. Cold Weather Protection:
  - 1. Do not place concrete in an ambient air temperature below 40 degrees F.
  - 2. When Work must be performed in temperatures below 40 degrees F, make approved provisions for heating materials and the completed work in accordance with A.C.I. 306.
  - 3. The minimum temperature of concrete as placed shall be 50 degrees F.
- C. Hot Weather Protection:
  - 1. During hot weather conditions, place concrete in accordance with A.C.I. 305.
  - 2. Place concrete at a temperature which will not cause difficulty from loss of slump, flash set, or cold joints, usually somewhat less than 90 degrees F.
- D. Metal Protection: Paint metal to be in contact with mortar, concrete or other masonry materials with alkali-resistant coatings, such as heavy bodied bituminous paint.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Materials are specified in the appropriate sections of these Specifications.

## PART 3 - EXECUTION

### 3.1 ACCEPTANCE OF STRUCTURE

- A. Work which meets all applicable requirements will be accepted without qualification.
- B. Work which fails to meet one or more requirements, but which has been repaired to bring it into compliance, will be accepted without qualification.
- C. Work which fails to meet one or more requirements and which cannot be brought into compliance may be accepted or rejected, as determined by the Engineer.
- D. Concrete failing to meet the strength requirements as stated in these Specifications may require additional curing as directed by the Engineer. Modifications may be required in the concrete mix design for the remaining concrete work, at no additional cost to the Owner.
- E. Formed surfaces larger or smaller than dimensional tolerances specified may be rejected. If the Engineer permits the Contractor to correct errors, such corrections shall be as directed and in such a manner as to maintain the strength, function and appearance of the structure.
- F. Concrete members cast in the wrong location may be rejected and shall be removed at no additional cost to the Owner.
- G. Inaccurately formed surfaces exposed to view may be rejected and shall be repaired or removed at no additional cost to the Owner.
- H. Finished flatwork exceeding specified tolerances may be repaired by grinding high spots or patching low spots with an approved epoxy grout.
- I. Concrete exposed to view with defects which adversely affect the appearance of the specified finish may be repaired, if possible. If, in the opinion of the Engineer, the defects cannot be repaired, the concrete shall be removed and replaced at no additional cost the Owner.

- J. The strength of the structures in place will be considered potentially defective if it fails to comply with any of the following requirements:
1. Low concrete strength as evaluated by the requirements of these Specifications.
  2. Reinforcing steel size, quantity, strength, position or arrangement at variance with the Drawings.
  3. Concrete which differs from the required dimensions or locations in such a manner as to reduce the strength.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE & FLOWABLE FILL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install the following, when applicable and as shown on the Drawings and as specified herein.
1. Cast-in-place concrete, including building foundations, walls, slabs, beams, columns, equipment bases, conduit envelopes, concrete stair fill, and other concrete Work shown on the Drawings.
  2. Do all cutting, patching and repairing of concrete which may be required for proper completion of the work.
  3. **Place flowable fill into abandoned pipes/structures (minimum 85% of total void for pipes) where directed by the Owner or the Owner's Representative including narrative summarizing execution and verification of the work.**

1.2 REFERENCE SPECIFICATIONS

- A. "Specifications for Structural Concrete for Buildings" by the American Concrete Institute (ACI-301), latest edition.
- B. "Building Code Requirements for Structural Concrete and Commentary" (ACI-318). latest edition.
- C. NHDOT Standard Specifications for Road and Bridge Construction (Latest Edition)

1.3 SHOP DRAWINGS

- A. Submit complete shop drawings as stated in the General Conditions of the Construction Contract.
- B. Provide shop drawings for fabricating and placing reinforcing steel. Show all required information for cutting, bending and placing reinforcing bars and show all accessories and support bars on placing drawings. Indicate suitable marks for placing bars.
- C. Fabrication of any material or performing of any Work prior to the final approval of the shop drawings will be entirely at the risk of the Contractor.
- D. **For Flowable Fill: Provide narrative to Engineer prior to placement of flowable fill including the following:**
1. **Sequence of placement including fill/pump points and vent locations.**
  2. **Method of verification that all voids (85% minimum for pipes) have been filled.**

## CAST-IN-PLACE CONCRETE &amp; FLOWABLE FILL

1.4 RELATED TRADES

- A. Notify all trades responsible for installing chases, inserts, sleeves, anchors, louvers, etc., when ready for such installation, and for final checking immediately before concrete is placed.
- B. Leave openings in walls for pipes, ducts and other items for mechanical and electrical work, as shown on the Drawings, or required by layout of mechanical and electrical systems.

PART 2 - PRODUCTS2.1 MATERIALS FOR CONCRETE

- A. Cement: Portland cement - ASTM Specification C-150, Type II.
- B. Aggregates:
  - 1. Coarse aggregate: Hard, durable, uncoated crushed stone or gravel conforming to ASTM, Specification C-33 and shall pass through sieves 1-1/2 inch.
  - 2. Fine aggregate: Sand, clean, hard, durable, uncoated grains, free from silt, loam, and clay, to meet ASTM Specification C-33.
- C. Water: Potable from the local municipal supply.
- D. Admixtures:
  - 1. High range water Reducing Agent, ASTM 494 Type F or G, (superplasticizer) by same manufacturer as air-entraining agent.
    - a. Daracem 100 by Grace Construction Products
    - b. Sikament by Sika Corporation
    - c. Or approved equal.
  - 2. Water Reducing Agent, ASTM 494 Type A, by same manufacturer as air-entraining agent.
    - a. WRDA with HYCOL by Grace Construction Products
    - b. Plastocrete 161 by Sika Corporation
    - c. Or approved equal.
  - 3. Air-Entraining Agent, ASTM C-260, to be used to obtain percent air-entrainment specified unless obtained by cement used.
    - a. "Daravair 1000" by Grace Construction Products
    - b. Sika AER by Sika Corporation
    - c. Or approved equal.
  - 4. Water Reducing, Retarding Admixture, ASTM 494 Type D.
    - a. Daratard 17 by Grace Construction Products
    - b. Plastiment 161 by Sika Corporation
    - c. Or approved equal.
  - 5. Non-Corrosive, Non-Chloride Set Accelerating Admixture, ASTM 494 Type C, by same manufacturer as air-entraining agent.
    - a. Polarset by Grace Construction Products
    - b. Sikaset NC by Sika Corporation

## CAST-IN-PLACE CONCRETE &amp; FLOWABLE FILL

- c. Or approved equal.
- 6. No other admixtures may be used without written approval by the Engineer.
- 7. Calcium chloride will not be permitted.
- E. Joint Sealer: Furnish and install as specified in these Specifications.
- F. Floor Hardener: Apply to concrete floors to remain exposed and not receiving floor cover.
  - 1. "Lapidolith" by Sonneborn Building Products,
  - 2. "Hornlith" by A.C. Horn Company,
  - 3. "Saniseal 5" by Master Builders Company,
  - 4. Or approved equal.
- G. Moisture Barrier:
  - 1. Black polyethylene film extruded onto both sides of high quality kraft paper and laminated with asphalt to rot and fungus resistant kraft paper. Kraft paper shall have crossed reinforcing fibers which are embedded in asphalt laminent for high resistance to puncturing and tearing during the application.
  - 2. Moistop, Grade 395.
  - 3. Or approved equal.
- H. Perimeter and Under Slab Insulation as specified in Division 7.
- I. **Flowable Fill materials shall be in accordance with Section 520.2 of the NHDOT Standard Specifications for Road and Bridge Construction (latest edition).**

## 2.2 STORAGE OF MATERIALS

- A. Store all materials to prevent damage from the elements and other causes.
- B. Store cement and aggregates in such a manner as to prevent deterioration or intrusion of foreign matter. Do not use any materials which have deteriorated, or which have been damaged, for concrete.
- C. Store reinforcing steel on wood skids to protect it from weather, oil, earth and damage from trucking or other construction operations. Reinforcement shall be free from loose mill scale, rust, from oil, concrete spatter and other extraneous coatings at the time it is embedded in the concrete.
- D. Store all forms in a neat manner and orderly fashion, protected from the weather and abuse.
- E. Do not store materials which, in the opinion of the Engineer, are not acceptable for the Work and immediately remove them from the site.

## 2.3 CONCRETE MIXTURES

- A. Strength, cement, and water requirements:

Use	Min.Strength @28 day-psi	Max.Size Coarse Agg.	% Air (+/-1%)	Min.-Max Slump	Min Cem.Fac.	Max W/C
Concrete	4,000	3/4"	5	2"- 4"	---	0.40
Concrete	3,000	3/4"	5	2"- 4"	---	0.45
Concrete	2,000	3/4"	5	1"- 3"	---	0.55

## CAST-IN-PLACE CONCRETE &amp; FLOWABLE FILL

- B. If a pumping process is utilized to convey concrete, established concrete mixtures may require increased proportion of cement and fine aggregate and a decreased proportion of coarse aggregate, but these mixtures may not be altered more than:
1. Cement plus 20 lbs./cu.yd.
  2. Fine Aggregate plus 50 lbs./cu.yd.
  3. Coarse Aggregate minus 50 lbs./cu.yd.
- C. Concrete shall contain specified admixtures.
- D. **Flowable fill shall be mixed using the approximate proportions described below (per cubic yard) to create a viscous cement product suitable to flow through pipes:**

<b>Type II Portland Cement</b>	<b>75 lb.</b>
<b>Ground Granulated Blast Furnace Slag</b>	<b>1,590 lb.</b>
<b>Water</b>	<b>100 gal.</b>

- a. **Flowable fill shall have a minimum 28 day compressive strength of 100 psi.**

## 2.4 CURB BARS

- A. Wooster type 150, cast aluminum, or similar by National Guard, Granite State, or McKinley.

## PART 3 - EXECUTION

### 3.1 MIXING PROCESS

- A. Use ready-mix process, ACI 301-72 Par. 7.1.

### 3.2 PLACING

- A. Notify the Engineer at least 24 hours prior to each placement.
- B. Do not place concrete until soil bottoms, reinforcing steel, and inserts, sleeves and other work to be built into the concrete have been completed.
- C. Conveying: Handle concrete from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients and in a manner which will assure that the required quality of the concrete is retained.
- D. Depositing: Program the delivery and placement of concrete so that the time between batching and placement shall not exceed 1-1/2 hours. Do not allow concrete to free fall over 4 feet. Deposit concrete as nearly as practicable in its final position to avoid segregation due to rehandling or flowing.
- E. Deposit concrete continuously, in horizontal layers of such thickness (not deeper than 24 inches) that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. Carry out placing at such a rate that the concrete which is being integrated with fresh

## CAST-IN-PLACE CONCRETE &amp; FLOWABLE FILL

concrete is still plastic. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials. No horizontal construction joints will be allowed in foundation walls.

- F. Vibrate concrete thoroughly to produce a dense, homogenous mass without voids or pockets. Place vibrators in concrete rapidly to penetrate approximately 3 inches to 4 inches into the preceding lift and blend the two layers. Vibrating techniques must assure that when the coarse aggregate reaches the form, it stops and the matrix fills the voids.

### 3.3 FLOOR AND OTHER FLATWORK FINISHES

- A. Use a "troweled finish" ACI 302, Sections 7.2.1 - 7.2.10, including tops of exposed walls, except where otherwise shown on the Drawings.
- B. Screed all floors to establish elevations, then steel trowel level, with allowable tolerance not exceeding 1/8 inch in any direction when tested with a 10 foot long straightedge. Where floors contain drains, pitch the floors to drain as shown on the Drawings.
- C. If either or both of the above requirements are not met, correct the conditions by grinding and filling, as directed by the Engineer, using materials and methods which will be compatible with all finish and surface materials to be installed on floors at no additional cost to the Owner.

### 3.4 MOISTURE BARRIER

- A. Apply specified moisture barriers under all interior and exterior slabs-on-grade, after insuring that gravel subbase or crushed stone base is level and well compacted.
- B. Apply moisture barrier parallel with the direction of the concrete pour. Lap and seal all joints to a minimum width of 6 inches with adhesive provided by the moisture barrier manufacturer. Insure that the moisture barrier lies flat against sides and bottom of wall footing trenches. Trim moisture barrier to fit neatly around column bases; seal to concrete footings for a minimum of 6 inches around base.
- C. Do not damage the moisture barrier at any time; repair any accidental punctures with a patch of the same material extending a minimum of 6 inches in all directions, and seal.

### 3.5 SURFACE REPAIRS

- A. Remove all honeycombed and other defective concrete down to sound concrete. Dampen area to be patched and area around it to prevent absorption of water from patching mortar. Fill areas concealed in the finished work with a trowel.
- B. Make a patching mixture of the same sand and cement as necessary to match color of existing concrete as determined by trial patches in exposed areas.
- C. Limit the amount of mixing water to that necessary for handling and placing. Mix mortar in advance, allow to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.
- D. After surface water has evaporated from the area to be patched, brush area with neat cement grout, let it set until the grout loses its sheen and apply the patching mortar.



## CAST-IN-PLACE CONCRETE &amp; FLOWABLE FILL

Pack the mortar thoroughly into place, strike off to leave the patch slightly higher than surrounding surfaces to permit initial shrinkage. Keep patched area damp for 7 days. Finish exposed surfaces of patch to match adjacent surfaces.

- E. After cleaning and thoroughly dampening, fill all tie holes with patch mortar. Finish off as above specified for all exposed areas.

### 3.6 CUTTING OF HOLES

- A. Cut holes required by all trades in any cast-in-place concrete which did not receive sleeves. Use a core drilling process or sawing process which produces clean sharp edges and the minimum hole size which accommodates the piping, conduit, or equipment requiring the opening.
- B. Obtain written approval from the Engineer before cutting any holes for any trades.

### 3.7 NON-SHRINK GROUT

- A. Grout solid all bearing plates in accordance with manufacturer's recommendations and as specified. Grout mixture for Steel Sleeves to be in accordance with Section 02445.

### 3.8 INSULATION

- A. Under-Slab Insulation: Lay insulation under slabs directly on moisture barrier, tightly butting each sheet of insulation against adjacent piece, where shown on the Drawings.
- B. Perimeter Insulation: Install vertical perimeter insulation dry, against foundation walls in a continuous manner as the backfill is placed, or hold in place with styrofoam mastic #7 or #11, or an approved equal.

### 3.9 STRENGTH OF STRUCTURE

- A. The strength of the structure in place will be considered potentially deficient if it fails to comply with any requirements which control the strength of the structure, as outlined below:
  - 1. Low concrete strength, as evaluated by the requirements of this Section.
  - 2. Reinforcing steel size, quantity, strength, position, or arrangement at variance with the project drawings.
  - 3. Concrete which differed from the required dimensions or locations in such a manner as to reduce the strength.

### 3.10 CONCRETE CURING AND PROTECTION

- A. General:
  - 1. Prevent premature drying of freshly placed concrete, and protect from excessively cold or hot temperatures until concrete has cured.
  - 2. Provide curing of concrete by one of the methods listed and as appropriate to service conditions and type of applied finish in each case.
  - 3. Curing and protection shall be in accordance with ACI 301-12 and ACI 308
- B. Curing Period:
  - 1. Not less than 14 days for slabs.

## CAST-IN-PLACE CONCRETE &amp; FLOWABLE FILL

2. For elements other than slabs, not less than 7 days for standard cements and mixes.
  3. For elements other than slabs, not less than 4 days for high early strength concrete using Type III cement.
- C. Formed Surfaces: Cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed.
1. Keep wooden or metal forms moist when exposed to heat of the sun.
  2. If forms are removed prior to completion of curing process, continue curing by one of the applicable methods specified.
- D. Surfaces Not in Contact with Forms:
1. Start initial curing as soon as free water has disappeared, but before the surface is dry.
  2. Keep concrete slabs continuously moist for not less than 7 days and all other concrete elements continuously moist for not less than 3 days by uninterrupted use of any of the following:
    - a. Water ponding.
    - b. Water-saturated sand.
    - c. Water-fog spray.
    - d. Saturated burlap: Provide 4-inch minimum overlap at joints.
  3. Begin final curing procedures following initial curing and before concrete has dried but not sooner than 1 day after.
  4. Acceptable final curing methods:
    - a. Water ponding.
    - b. Water-saturated sand.
    - c. Water-fog spray.
    - d. Saturated burlap: Provide 4-inch minimum overlap at joints.
    - e. Moisture-retaining sheet.
    - f. Moisture-retaining cover: Lap not less than 3 inches at edges and ends, and seal with waterproof tape or adhesive. Repair holes or tears during curing period with same tape or adhesive. Maintain covering intimate contact with concrete surface. Secure to avoid displacement.
      1. Extend covering past slab edges at least twice the thickness of slab.
    - g. Do not use plastic sheeting on surfaces which will be exposed to view when in service.
    - h. Curing compound: Apply at rate stated by manufacturer to conform with moisture-retention requirements specified, using second, immediate application at right angles to first, if necessary, and reapply if damaged by rain.
    - i. Liquid curing compounds.
      1. Use curing compounds only in locations permitted or required.
      2. Do not apply to surfaces to receive other finishes, coating, coverings unless documentation is provided that the curing compound is compatible with the finish, coating or covering.

## CAST-IN-PLACE CONCRETE &amp; FLOWABLE FILL

3. For curing compounds used in contact with potable water, provide documentation of NSF 61 approval.
  5. Continue final curing to end of curing period.
- E. Avoid rapid drying at end of curing period.
- F. During and following curing period, protect concrete from temperature changes of adjacent air in excess of 5 degrees F per hour and 50 degrees F per 24 hours. Progressively adjust protective measures to provide uniform temperature changes over entire concrete surface.

END OF SECTION

SECTION 03604

NON-SHRINK GROUT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install non-shrink grout of the type and in the location(s) shown on the Drawings and specified herein.

1.2 DELIVERY, STORAGE & HANDLING

- A. Deliver, store and handle materials to prevent damage of any nature.
- B. Store all non-shrink grout materials in undamaged condition with seals and labels intact as packaged by the manufacturers.
- C. Store cement in weathertight bins or buildings and keep cement dry at all times.
- D. Store aggregate in separate piles or bins and handle in a manner that will minimize segregation and prevent contamination.

1.3 JOB CONDITIONS

- A. Wet Weather Conditions:
  - 1. Do not place grout during wet weather unless adequate protection is provided.
  - 2. Do not allow rain water to increase the amount of the mixing water.
- B. Cold Weather Conditions:
  - 1. Do not place grout in an ambient temperature below 40 degrees F., except when written permission is given by the Engineer.
  - 2. When work is permitted by the Engineer in temperatures below 40 degrees F., make approved provisions for heating materials, and the completed Work, to a temperature of between 50 degrees F. and 70 degrees F. for a period of not less than 3 days.
- C. Hot Weather Conditions: When grout placement is permitted by the Engineer in an ambient air temperature of more than 90 degrees F. with a relative humidity less than 50 percent, make arrangements for the installation of windbreaks, shading, fog spraying, or wet covering of a light color.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Non-Shrink Grout: Conform to the following requirements:
  - 1. Manufactured under rigid quality control specifically for grout used in transferring heavy loads.
  - 2. Contain metallic and nonmetallic aggregates especially graded to minimize bleeding.
  - 3. Contain metallic aggregate that is ductile and capable of withstanding impact without fracturing.

4. Have an initial setting time of approximately 1 hour at 70 degrees F.
  5. Produce no settlement or drying shrinkage at 3 days or thereafter.
  6. Have higher strength at all ages than plain cement grout of the same flowability.
  7. Resistant to attack by oil and water and have lower absorption than plain cement grout of the same flowability.
- B. Portland Cement:
1. ASTM C150.
  2. Type I.
- C. Sand:
1. ASTM C33
  2. Fine Aggregate.
- D. Water:
1. Free from injurious amounts of oils, acids, alkalis, or organic matter.
  2. Clean, fresh and potable.
- E. Pea Gravel (for grout thickness greater than 1 inch):
1. ASTM C33.
  2. Coarse aggregate, graded so that at least 90 percent passes a 3/8 inch sieve and 90 percent is retained by a number 4 sieve.

## 2.2 MIXES

- A. For less than 2 inch clearance, or where size or shape of space makes grouting difficult, grout mix shall consist of grout material and water.
- B. For greater than 2 inch clearances where coarse aggregate will not obstruct free passage of the grout, extend grout by adding 50 pounds of pea gravel per 100 pounds of grout material.
- C. Use the minimum amount of water necessary to produce a flowable grout without causing either segregation or bleeding.
- D. Portland cement mortar for raked-out edges of non-shrink grout: 1 part portland cement, 2 parts sand, and 1/2 part water by weight.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Mixing:
  1. Mix non-shrink grouting materials and water in a mechanical mixer for no less than 3 minutes.
  2. Mix grout as close to the work area as possible and transport the mixture quickly and in a manner that does not permit segregation of materials.
  3. After the grout has been mixed, do not add more water for any reason.
- B. Formwork:
  1. Build leakproof forms that are strong and securely anchored and shored to withstand grout pressures.
  2. Provide enough clearance between the formwork and the area to be grouted to permit proper placement of grout.

- C. Surface Preparation:
1. Remove all defective concrete, laitance, dirt, oil, grease, and other foreign material from concrete surfaces by bush-hammering, chipping, or other similar means, until a sound, clean concrete surface is achieved.
  2. Lightly roughen the concrete, but not enough to interfere with the proper placement of grout.
  3. Cover the concrete areas with a waterproof membrane until ready to grout.
  4. Remove foreign materials from all steel surfaces in contact with grout.
  5. Align, level and maintain final positioning of all components to be grouted.
  6. Immediately before grouting, remove waterproof membrane and clean all contaminated surfaces.
  7. Saturate all concrete surfaces with clean water; remove excess water and leave none standing.

### 3.2 PLACING

- A. Place non-shrink grouting material quickly and continuously by the most practical means: pouring, pumping or under gravity pressure.
- B. Do not use either pneumatic pressure or dry packing methods without the written permission of the Engineer.
- C. Apply grout from only one side to avoid entrapping air.
- D. Thoroughly compact final installation free from air pockets.
- E. Do not vibrate the placed grout mixture, or allow it to be placed if the area is being vibrated by nearby equipment.
- F. If applicable, do not remove leveling shims for at least 48 hours after grout has been placed.
- G. After shims have been removed, fill voids with plain cement-sand grout.
- H. After the non-shrink grout has reached initial set, rake out all exposed edges and paint with portland cement mortar.

### 3.3 CURING

- A. Cure grout for 3 days after placing.
- B. Keep grout wet and covered with curing paper or other methods approved by the Engineer.

END OF SECTION

DIVISION 4  
MASONRY

Scope of Work

Furnish, install and test all masonry work and appurtenant work in complete accordance with the Drawings and Specifications.

Contractor's Duties

Except as specifically noted, provide and pay for all labor, materials, equipment, tools, machinery, water, heat, other facilities and services necessary for proper execution and completion of the work.

Contents of Division

<u>Section No.</u>	<u>Section Title</u>
04000	Masonry - General
04201	Manhole Brick Masonry (NH)

SECTION 04000

MASONRY - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
  - 1. Furnish and install concrete masonry units, block reinforcing, ties, anchors, inserts, nailing blocks and appurtenant Work as shown on the Drawings and as specified herein.
  - 2. Clean and remove surplus material and waste.
- B. Other Work Included (When Applicable):
  - 1. Furnish and install:
    - a. Receivers or reglets for flashings.
    - b. Door frames, window frames and lintels with anchors.
    - c. Electrical panel boxes, conduit, grounds and electric fixtures to be set in masonry.
    - d. Miscellaneous hardware including sleeves, anchors, vents, grills, access panels, etc. to be set in masonry.
    - e. Leveling plates, anchor bolts and similar items requiring building into the masonry work.

1.2 REFERENCE STANDARDS

- A. Comply with the following codes for all materials, methods, and workmanship, not otherwise specified.
  - 1. The National Concrete Masonry Association Standard "Specifications for the Design and Construction of Load Bearing Concrete Masonry".
  - 2. "Recommended Practices for Cold Weather Masonry Construction" by the International Masonry Industry All-Weather Council.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Mortar and Joint Materials:
  - 1. Cement - An approved brand of domestic Portland cement, conforming to ASTM C150-02a, Type 1.
  - 2. Sand - Clean, washed, uniformly well-graded, conforming to ASTM C144-03, 100 percent passing a No. 8 sieve with not more than 35 percent passing a No. 50 sieve and with a fineness modulus maintained at 2.25 plus or minus 0.10. Sand shall be light in color and obtained from a single source.
- B. Mortar Mixes:
  - 1. General - In proportioning volumetric mixes, one (1) 94 pound sack of Portland cement and one (1) 50 pound sack of hydrated lime each shall be assumed to



constitute a nominal one (1) cubic foot. For mortar below the exterior grade, reduce lime proportion of (1/4) 50 pound sack.

2. Lime - Approved brand of plastic hydrated, such as New England 4X, conforming to ASTM Specification C207-91(1997), Type "S".
  3. Mortar Colorant (for joints of face brick) - SGS pigments, or approved equal, in color as approved by the Engineer.
  4. Integral Waterproofing for All Exterior Mortar - Rheomix Rheopel, as manufactured by Master Builders Inc., "Drycrete" as manufactured by C.G. Pardee Co., Inc., or approved equal.
  5. Weepholes - Clear plastic tubing, 3/8 inch o.d., by 4 inches long.
  6. Compressible Filler - Rigid glass fiber board, 6 pounds p.c.f. density, 25 percent thicker than joint width.
  7. Waterstops for Control Joints - Extruded rubber, Hohmann and Barnard standard type, or approved equal.
- C. Reinforcement Anchors, Ties and Dowels:
1. Continuous Horizontal Reinforcement for All Exterior Cavity Type Masonry - Truss design, 9 gauge galvanized wire, with all cross members having a V drip over cavity locations of walls where same occurs, in overall width 1-5/8 inches less than the overall wall thickness. Provide preformed reinforcing section at intersections of masonry walls and partitions and whenever walls and partitions change direction. Reinforcement shall be Dur-O-Wal, Hohmann Tru-Mesh, or approved equal. Vertical reinforcement shall be deformed bars with size and spacing as shown on the Drawings.

## 2.2 DELIVERY, STORAGE & HANDLING

- A. Deliver, store and handle materials to prevent damage of any nature.
- B. Store material off the ground to prevent contamination by mud, dust or materials likely to cause staining or other defects.
- C. Cover and protect all materials from the elements.

## 2.3 EXECUTION

- A. Masonry work in general.
  1. Do not deliver cement, lime and similar perishable materials to the site until suitable storage is available. Store such materials in weatherproof structures, and ensure that materials are in perfectly fresh condition when ready for use.
  2. Perform all masonry work with skilled workmen under adequate supervision, and erect all masonry true to lines and levels with joints of uniform thicknesses, all surfaces true, and corners straight and plumb. Lay exposed-to-view masonry block units with an individual unit-to-unit level tolerance not exceeding 1/8 inch and an overall tolerance from true level not exceeding 1/4 inch in 10 feet in any direction. Lay no unit having chipped edges or face in exposed-to-view locations. Remove any such unit, if installed and replace with a new undamaged unit.

3. Examine all Drawings for locations of masonry requiring patching and as required for the accommodation of work of other trades. Provide all required recesses, chases, slots, cutouts, and built-in items, for the accommodation of heating and plumbing pipes, bearing plates, and set loose lintels. Place anchors, bolts, sleeves and other items occurring in the masonry work. Take precautions to minimize future cutting and patching.
- B. Cold Weather Protection:
1. Do not construct masonry in an ambient air temperature below 40 degrees F.
  2. When work is permitted by the Engineer in temperatures below 40 degrees F., make approved provisions for heating and drying materials and protecting the completed work. Heat the materials and maintain a temperature above 50 degrees F. Maintain a minimum temperature of 50 degrees F. on both sides of masonry work for a period of 48 hours or more for type M or type S mortar and 72 hours or more for Type N or Type O mortar. Reduce time periods to 24 and 48 hours respectively, when using high-early-strength cement.
  3. Do not use any material which is frozen or covered with frost or snow.
- C. Hot Weather Protection: Protect masonry work from direct exposure to wind and sun when in an ambient air temperature of more than 90 Degrees F. with a relative humidity less than 50 percent.
- D. Wet Weather Protection:
1. During construction, keep all walls, including partially completed walls not being worked on, dry by covering with a strong waterproof membrane at the end of each day or shutdown period. The membrane shall have a 2 foot minimum overhang on each side of each wall and shall be securely anchored.
  2. Do not allow rain water to increase the amount of the mixing water.
- E. Metal Protection: Metal in contact with mortar or other masonry materials should be painted with alkali-resistant coatings such as heavy bodied bituminous paint.
- F. Batching and Mixing:
1. Proportions:
    - a. For bricks: Mix one part masonry cement 2-1/2 parts sand by volume.
    - b. For concrete masonry units: Mix one part portland cement with 0.25 (25%) part hydrated lime and three parts sand.
  2. Measurement:
    - a. Measure accurately by volume in boxes construction for this purpose. Do not measure by shovel.
    - b. Accurately and uniformly control the quantity of water.
  3. Method:
    - a. Machine mix mortar in a suitable mixer.
    - b. Mix five minutes or more; two minutes for mixing dry materials and three minutes after adding water.
  4. Consistency:
    - a. Add enough water to produce a consistency for satisfactory workability for the material being set in the mortar.
    - b. Mix batches that can be used within two hours after the initial mixing.

- c. Do not retemper mortar in the mortar box.
  - d. Do not use mortar that has greatly stiffened or has started to set.
- G. Reinforcement and Anchorage:
- 1. Install specified continuous reinforcement in all masonry walls, partitions, and in chimney walls, spacing the reinforcing not more than 16 inches on centers, vertical dimension, commencing one course above supporting concrete. Install additional reinforcement over all exterior and interior openings in first joint above opening and extending 36 inches beyond each side of opening. Lap all reinforcement 6 inches minimum. Install preformed units at intersections of all masonry walls and partitions and wherever walls and partitions change directions.
- H. Construction:
- 1. Assist the waterproofing subcontractor and the roofing and flashing subcontractor to install their flashings. Provide soft mortar bed above and below flashings which penetrate the masonry.
  - 2. Clean all receiving surfaces of masonry units free from any loose dry mortar, cement dust, oil and any other matter which might otherwise interfere with the bond of the insulation adhesive.
  - 3. Use same mortar mixture used for laying masonry units wherever cavity in exterior walls is indicated to be filled with mortar.

END OF SECTION

SECTION 04201

MANHOLE BRICK MASONRY (NH)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish all materials and perform manhole masonry Work to construct manhole shelves, inverts and grade adjustments as shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Perform brick masonry work in conformance with the New Hampshire Department of Environmental Services Standards of Design and Construction for Sewerage and Sewage or Waste Treatment Systems.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Brick:
1. Sound, hard, uniformly burned, regular and uniform in shape and size and compact texture.
  2. ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for a Grade SS, hard brick.
  3. Immediately remove unsuitable brick from the work.
- B. Mortar:
1. Composition (by volume):
    - a. 1 part portland cement.
    - b. 1/2 part hydrate lime.
    - c. 3 parts sand.
  2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1"3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.
- C. Cement:
1. Type II Portland Cement.
  2. ASTM C-150, Standard Specifications for Portland Cement.
- D. Hydrated Lime:
1. Type S.
  2. ASTM Standard Specifications for Hydrated Lime for Masonry Purposes, Designation C207.
- E. Sand:
1. Inert and natural.
  2. ASTM Standard Specifications for Concrete (Fine) aggregates, Designation C33 as follow:

Grading:

<u>Sieve</u>	<u>Percent Passing</u>
#3/8	100
4	95-100
8	80-100
16	50-85
50	10-30
100	2-10

Fineness Modulus 2.3 - 3.1

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Laying Brick:

1. Use only clean bricks.
2. Moisten all bricks by suitable means until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
3. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond.

B. Curing:

1. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
2. Protect brick masonry from the weather and frost as required.

END OF SECTION

DIVISION 7  
THERMAL AND MOISTURE PROTECTION

Scope of Work

Furnish, install and test all thermal and moisture protection work and appurtenant work in complete accordance with the Drawings and Specifications.

Contractor's Duties

Except as specifically noted, provide and pay for all labor, materials, equipment, tools, machinery, water, heat, other facilities and services necessary for proper execution and completion of the work.

Contents of Division

<u>Section No.</u>	<u>Section Title</u>
07114	Manhole Waterproofing

SECTION 07114

MANHOLE WATERPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and apply bituminous waterproofing on all outside surfaces of all manholes.

PART 2 - PRODUCTS

- A. Acceptable Products:
  - 1. Minwax Fibrous Brush Coat manufactured by Minwax Company, New York, New York.
  - 2. Tremco 121 Foundation Coating manufactured by the Tremco Manufacturing Company, Newark 5, New Jersey.
  - 3. Or approved equal.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Apply waterproofing only after concrete and mortar have set.
- B. Apply 2 coats of waterproofing allowing time between coats to permit sufficient drying so the application of the second coat has no effect on the first.
- C. Apply waterproofing by brush or spray in accordance with the manufacturer's instructions.
- D. When precast manholes are delivered with a coating of bitumastic, field apply one additional coat of waterproofing.

END OF SECTION

DIVISION 13  
SPECIAL CONSTRUCTION REQUIREMENTS

Scope of Work

Provide safe and effective management of excavated materials throughout the duration of the project. Protect workers, safeguard the interest of the public and conduct work in accordance with NHDES guidelines.

Contractor's Duties

Except as specifically noted, provide and pay for all labor, materials, equipment, tools, machinery, water, heat, other facilities and services necessary for proper execution and completion of the work.

Contents of Division

<u>Section No.</u>	<u>Section Title</u>
13100	Management & Disposal of Soils and Groundwater
13710	Health and Safety Plan Requirements



MANAGEMENT & DISPOSAL OF SOILS AND GROUNDWATERSECTION 13100MANAGEMENT & DISPOSAL OF SOILS AND GROUNDWATERPART 1 - GENERAL1.1 DESCRIPTION

- A. This work shall include the management, transport, treatment and/or disposal of soils and groundwater transported and disposed of at an off site facility.

1.2 REQUIREMENTS

- A. Unless specified or indicated, monitoring, testing, treatment (or disposal) of regulated soils and groundwater, or other materials, including sampling protocols and testing shall conform to applicable regulations, including but not limited to:
1. New Hampshire Hazardous Waste Rules He-P 1905
  2. RSA 146-A, RSA 146-C, and RSA 146-D, (Administered by the NHDES Water Supply and Pollution Control Division).
  3. RSA 147-A, and RSA 147-B, (Administered by the NHDES Waste Management Division).
  4. RSA 125-C (Administered by the NHDES Air Resources Division).
  5. US Laws 29 Code of General Regulations (CRF) 1910 OSHA (Hazardous Materials Training).

PART 2 - PRODUCTS2.1 MATERIALS

- A. Available information pertaining to groundwater and remediation sites is included in Appendix C.
- B. Contractor shall prepare and implement a Health and Safety Plan (HASP) for open excavations. (Section 13710)

PART 3 – EXECUTIONSURPLUS MATERIAL -3.1 CONSTRUCTION REQUIREMENTS

- A. Notify Owner immediately upon encountering soils regulated for disposal (or soils that are suspected to be regulated for disposal).
- B. Segregate regulated soils from non-regulated materials
- C. Incorporate all regulated soils into project backfill wherever possible, and as soon as possible.
- D. The Engineer and the Owner reserve the right (utilizing an environmental consultant) to field screen surplus excavated material and claim material to be incorporated into the project as backfill, whether regulated or un-regulated.

MANAGEMENT & DISPOSAL OF SOILS AND GROUNDWATER

- E. Regulated soils that represent a threat to the environment or groundwater shall be appropriately secured and covered during stockpiling to prevent emissions or leaching of contaminants into groundwater. Covers shall be secured to prevent displacement or damage from wind, rain or other adverse weather conditions.

3.2 REGULATED SOIL DISPOSAL

- A. The method of disposal of soils shall be approved by the Engineer and the Owner's representatives.

3.3 REGULATED GROUNDWATER DISPOSAL

- A. In order to facilitate the treatment of potential contaminated groundwater, the Contractor shall obtain a Temporary Ground Water Discharge Permit from NHDES or authorization to discharge groundwater to the Owner's sanitary sewer system. A Temporary Surface Water Discharge Permit will require obtaining a NPDES permit exclusion from the United States Environmental Protection Agency for this activity.
- B. Review trench dewatering methods and groundwater disposal with the Owner. Obtain owner approval for any special handling of groundwater.
- C. Health and Safety precautions shall conform to the approved Project Health and Safety Plan.

END OF SECTION

## HEALTH AND SAFETY PLAN REQUIREMENTS

SECTION 13710HEALTH AND SAFETY PLAN REQUIREMENTSPART 1 - GENERAL1.1 DESCRIPTION

- A. This work shall consist of preparing and implementing a Health and Safety Plan (HASP) to establish protocols necessary for protecting workers and the general public from potential hazards during excavation, backfill and pipe installations. Excavated soils encountered in urban development areas often include petroleum contaminants from leaking underground storage tanks (UST's), ash and VOC's as well as other naturally occurring or man-made compounds that may be regulated such as arsenic. The HASP is meant for all personnel associated with excavation, pipe laying, backfill and/or trenching operations and other personnel observing the work who could come in contact with regulated soils, compounds, materials and groundwater. The HASP shall be prepared in accordance with 29 CFR 1910.120.

1.2 REQUIREMENTS

- A. The Contractor shall develop a HASP using these requirements as a baseline and incorporating additional requirements where necessary. The HASP must establish in detail the protocols necessary for protecting workers and potential off-site receptors from any potential hazards encountered during construction.
- B. The HASP shall address the safe work practices and engineering safeguards to be employed for the work performed by the Contractor. These shall include but not be limited to the following:
1. Descriptions of personal protective equipment and clothing used as part of the different levels of protection. Respiratory protection shall also be addressed. The Contractor shall maintain an air quality monitor (for VOC detection) and explosimeter, to aid in the quick detection of methane or other potentially explosive gasses.

1.3 SUBMITTALS

- A. The HASP shall be submitted to the Engineer a minimum of fourteen (14) days prior to earthwork.
- B. A Closeout Safety Report shall be submitted by the contractor to the Engineer on completion of the work. This report shall summarize the weekly safety reports and provide an overview of the contractor's performance with regard to the HASP requirements.
- C. Accident Reports.

1.4 LEVELS OF PROTECTION

- A. The Contractor shall include in the HASP a list of tasks and specific levels of protection for each task. Levels of protection may be upgraded or downgraded

## HEALTH AND SAFETY PLAN REQUIREMENTS

during site activities, based upon air monitoring results, meteorological conditions and the professional judgment of the SSHO.

### 1.5 PERSONAL SAFETY EQUIPMENT AND PROTECTIVE CLOTHING

- A. The Contractor shall provide on-site personnel with appropriate safety equipment and protective clothing, when required by the HASP and shall ensure that all safety equipment and protective clothing is kept clean and well maintained. Specific levels of respiratory, and clothing protection shall be established in the HASP.

### 1.6 AIR MONITORING

- A. General Requirements
1. The Contractor shall develop and implement an Air Monitoring Program to detect and quantify any volatilization of soil contaminants or release of soil particles associated with the work and the surrounding air. The program shall be consistent with the requirements of this section and submitted as part of HASP for review by the Engineer.
  2. Information gathered during the air-monitoring program shall be logged and included in the project records and safety and health record file.

## PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

## PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

## **E. APPENDICES**

**APPENDIX A**  
**Geotechnical Report**



## R. W. Gillespie & Associates, Inc.

Geotechnical Engineering • Geohydrology • Materials Testing Services

Revised 09 May 2008

15 February 2008

Terry Desmarais Jr., P.E.  
Underwood Engineers, Inc.  
25 Vaughan Mall, Unit 1  
Portsmouth, New Hampshire 03801

Subject: Geotechnical Evaluation  
Goose Bay and Corporate Drive Sewer Improvements  
Portsmouth, New Hampshire  
RWG&A Project No. 515-66

Dear Mr. Desmarais:

R. W. Gillespie & Associates, Inc., (RWG&A) is pleased to provide this evaluation of construction considerations for the Goose Bay and Corporate Drive Sewer Improvements project at the Pease International Tradeport in Portsmouth, New Hampshire. This report supersedes our report for the project dated 15 February 2008, the revisions address review comments by Underwood Engineers, Inc. (UEI). This work was performed as authorized by UEI in general accordance with RWG&A Proposal No. P-6639GI, dated 06 November 2006. As completed, RWG&A's scope of work for this evaluation included the following:

1. Walked the alignment to view exploration locations pre-marked by UEI, evaluated the appropriate drill rig type, and observed existing conditions and possible utility conflicts.
2. Coordinated with the Pease Development Authority, the Portsmouth Police Department for traffic control, and obtained utility clearance of exploration locations with DigSafe.
3. Drilled, sampled, and logged eleven explorations along the alignment.

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4. Performed laboratory testing consisting of three grain size analyses.
5. Reviewed drawings titled *Goose Bay Drive Plan & Profile, Goose Bay Drive Sewer Improvements*, sheets 2 through 4, prepared by Underwood Engineers, Inc., dated 26 January 2008.
6. Conducted geotechnical engineering evaluations of the subsurface conditions and proposed construction. The evaluations included excavation considerations, trench slope stability, protection of nearby utilities, dewatering methods, backfilling and compaction, and associated aspects of earthwork construction.
7. Prepared this report presenting the results of our evaluation and recommendations.

The primary purpose of this report is to identify potential construction issues, and to aid personnel who would monitor the work and contractors responsible for construction of the project. In summary, subsurface conditions along the alignment consisted of bituminous paving underlain by granular fill soils extending to depths of about 2 to 10 feet below ground surface. Fills were underlain by medium dense to loose silt and stiff to very soft silty clay, underlain, locally, by dense to medium dense sand with varying amounts of silt, over very dense glacial till. Explorations were advanced to depths of about 10 to 22 feet. Refusal was encountered in three explorations at depths of about 11 to 21 feet below local ground surface. Free water was observed in five explorations at depths ranging from approximately 5 to 13 feet below local ground surface.

It is anticipated that excavations can be completed as steep-sided, open cuts combined with a worker protection device (i.e., trench box) provided the soils are adequately dewatered. Excavations adjacent to existing utilities and structures, or at roadway intersections, might require temporary sheet piling and internal bracing with appropriate dewatering. Anticipated excavation depths along the majority of the alignment are above free water levels observed in the explorations. Dewatering would likely be required beyond about Sta. 21+00. Predrainage with wells and/or wellpoints might be necessary between about Sta. 22+00 to Sta. 23+87. Water levels should be measured along the alignment just prior to construction, either by observation wells or test pits, to assess dewatering requirements at that time. Results of our engineering evaluations follow.

## INTRODUCTION

The proposed sewer improvements are along Goose Bay Drive and Corporate Drive in the Pease International Tradeport in Portsmouth, New Hampshire. The proposed improvements



involve replacing approximately 670 linear feet of 15-inch diameter sewer pipe along Corporate Drive with 24-inch diameter pipe. Approximately 1,381 linear feet of 18-inch diameter pipe will replace the 8-inch diameter pipe along Goose Bay Drive. Wastewater will flow by gravity from Sta. 23+87 on Goose Bay Drive to an existing sewer manhole (SMH#1618) along Corporate Drive. The proposed alignment intersects an existing culvert consisting of three 24-inch diameter storm drains located beneath Goose Bay Drive at about Sta. 13+75. It is understood that UEI anticipates trenchless construction methods will be used to install the proposed sewer in this area.

Plans indicate sewer inverts along the alignment will range from approximately 6.6 to 10.3 feet below ground surface. Eleven new manhole structures are proposed, extending approximately 7.5 to 11.5 feet below ground surface. It is anticipated that manhole structures will bear on a minimum of 6 inches of crushed stone. The drawings indicate existing utilities include water, sewer, storm drainage, and electric. Stationing and elevations used in this report are based on the drawings referenced above.

## SUBSURFACE INVESTIGATION

A total of 11 explorations were made for this study, including six test borings (designated B-1, B-4, B-6, B-7, B-9, and B-11) and five test probes (designated P-2, P-3, P-5, P-8, and P-10). It should be noted that alternate exploration locations P-2A and P-9A shown on the plans were not drilled. Exploration location P-10 was not shown on the plans. The explorations were drilled on 17 and 18 December 2007 by Northern Test Boring, Inc., of Gorham, Maine, using a trailer-mounted, rotary drill rig. Test borings were drilled using hollow-stem augers, and test probes were drilled using solid-stem augers. Split-barrel sampling with standard penetration testing (*ASTM D1586, Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils*) was typically performed at 5-foot depth intervals in the borings. Sampling was not performed for the test probes; soil composition and strata changes were inferred from soil cuttings and changes in resistance to auger penetration. Explorations were advanced to depths of about 10 to 22 feet below ground surface. Refusal was encountered in explorations B-7, P-10, and B-11 at depths of about 21, 13, and 11 feet, respectively. Refusals might have been on cobbles, boulders, or bedrock.

Exploration activities were coordinated by an RWG&A field geologist. The soils were described in accordance with *ASTM D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*. Logs of the explorations are attached as Appendix A. Stratification lines shown on the exploration logs represent the approximate boundaries between the different soil types encountered; the actual transitions may be more gradual and vary over short distances. Water levels observed in the borings and probes at the completion of drilling are presented on the exploration logs.

## LABORATORY TESTING

Laboratory testing, consisting of three grain-size sieve analyses and three moisture content determinations, was performed on representative soil samples recovered during drilling. Results of the laboratory tests were used to classify the soils in accordance with *ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)*. Grain-size distribution curves are presented in Appendix B, *Laboratory Test Results*. Moisture content test results are shown on the boring logs. The tests were performed in general accordance with the following methods and procedures:

- *ASTM D422, Standard Test Method for Particle-Size Analysis of Soils*
- *ASTM D2216, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*

Tests were conducted at the RWG&A soils and materials testing laboratory in Saco, Maine, which is accredited by the American Association of State Highway and Transportation Officials (AASHTO) for the tests performed.

## SUBSURFACE CONDITIONS

### Soil

Ground cover along the alignment consisted of bituminous pavement observed to be about 3 to 4 inches thick. Fill below the pavement consisted primarily of medium to fine sand and was observed to be about 1.7 to 9.7 feet thick, and thickest in explorations P-10 and B-11. The fill was underlain by four naturally occurring soil units: silt with varying amounts of sand and clay, silty clay, sand with varying amounts of silt, and silty sand with gravel (Glacial Till). Encountered thicknesses and general descriptions of the soil units are provided below. Reference should be made to the exploration logs for detailed soil descriptions and information at specific locations and depths.

Soil Unit	Encountered Thickness (ft)	Description
Fill	1.7 to 9.7	Dense to medium dense, medium to fine sand; trace silt, trace gravel, moist, brown. Not encountered in B-11.
	3.2	Very dense, medium to fine sand, some to little silt, with fragments of shot rock, moist, gray to brown. Encountered in B-11 only.
	5.0	Very loose, medium to fine sand, trace silt, trace gravel, wet, orange. Encountered in B-11 only.
Silt (ML) / Sandy Silt (ML)	5.0 to 17.6	Medium dense to loose, silt with varying amounts of clay, some to little fine sand, moist to wet, gray.
Silty Clay (ML-CL)	3.5 to 13.5	Stiff to very soft, clay with silt, moist to wet, gray to blue-gray.
Sand (SP) / Silty Sand (SM)	3.0 to 6.5	Dense to medium dense, medium to fine sand, some to trace silt, wet, brown to gray. Encountered in B-6 and B-9 only.
Silty Sand with Gravel (SM)	2.7	Very dense, fine sand, little silt, little to trace gravel, wet, brown. Encountered in B-11 only.

## Water Levels

Free water was observed in five of the explorations ranging from about 5 to 13 feet below ground surface. Water levels measured immediately after drilling likely do not represent stabilized groundwater levels. Due to the relatively low permeability of the naturally deposited silt and clay soils, it is likely water becomes trapped, or perched, above these soils, especially after heavy precipitation events, as well as during the spring due to infiltration of melting snow and ice. In addition, water levels in the project area are anticipated to vary with location, elevation, proximity to wetlands and streams, precipitation, runoff, nearby utility trenches, and local construction activity. Therefore, water levels during and following construction will vary from those observed in the subsurface explorations.

## ENGINEERING EVALUATIONS

### General

Engineering evaluations for this project are based on the subsurface data and proposed construction information currently available to RWG&A. Should differing information become known prior to or during construction, these evaluations should be reviewed by RWG&A to confirm their continued applicability.

Our engineering evaluation focused on three areas as follows: feasibility of excavating by steep-sided, open cut trenching methods; dewatering considerations; and excavation stability. Based on our review of the drawings provided, nearby utilities include water, sewer, storm drainage, and electric. Other utilities might exist that are not shown on the project plans. Care should be taken not to disturb these utilities during construction. It is recommended that utility locations be surveyed and marked in the field prior to undertaking construction activities in a particular area.

### Excavation Stability

Steep-sided, open cutting methods are generally considered appropriate for excavation depths to about 12 to 15 feet in stable soil deposits when combined with a worker protection device such as a trench box and appropriate dewatering. One disadvantage of using open cut methods is that the sides of the excavation are free to slough and deform, usually resulting in settlement of nearby structures, underground utilities, roadways, sidewalks, and ground surface. Sheet piling with or without internal bracing is an alternate excavation support method to reduce ground movements where settlement and/or lateral displacement are concerns.

In accordance with the plans, maximum anticipated excavation depth for new manhole structures is about 12 feet. Soils likely to be encountered within the anticipated excavation depth along the alignment include granular fill soils, silt, silty clay, and glacial till. The existing fill soils and fill from adjacent utility trenches have relatively low or flat, angles of repose compared to the naturally deposited soils. In turn, the use of open cut methods in these soils will require flatter side slopes to reduce sloughing and caving of the trench.

### Dewatering

Free water was observed in five explorations along the alignment at depths ranging from about 5 to 13 feet below local ground surface. Based on these observations, it appears that construction up to about Sta. 21+00 will likely be at, or above, observed free water levels. Beyond

about Sta. 21+00, it is anticipated that construction might extend approximately 1 to 4 feet below observed water levels, increasing towards Sta. 23+87.

Evaluation of grain size analysis conducted on fill soil encountered in boring B-11, at a depth of about 5 to 7 feet, indicates the permeability of this soil will be on the order of  $10^{-2}$  centimeters per second. In RWG&A's opinion, construction dewatering with open pumping and sumps should be practical if water is less than 1 foot above the bottom of excavations conducted in fill or glacial till, and 3 feet above the bottom of excavations conducted in silt or silty clay. If excavations extend deeper, predrainage and/or pressure relief with wells or wellpoints might be necessary to preclude disturbance and heave of the trench bottom.

### **Rock Removal**

Refusals encountered in explorations B-7, P-10, and B-11 occurred below the anticipated local excavation depths. However, due to the relatively wide spacing of the explorations, the potential for shallow bedrock or boulders within the anticipated depths of excavation is uncertain. Significant drilling and blasting for rock removal is not anticipated, although boulders classifying as rock could be encountered.

### **Culvert Crossing**

It is anticipated that the design will require the sewer main at the culvert crossing, located at about Sta. 13+75, to be installed through a protective steel sleeve. Anticipated invert level of the sleeve will be at a maximum depth of about 6.5 to 7 feet. Based on subsurface explorations made on either side of the culvert and the invert depths shown on the plans, it appears the sleeve invert elevation will occur in medium dense silt above observed free water levels. As currently envisioned, directional drilling is considered the most practical trenchless installation method for the crossing.

## **RECOMMENDATIONS**

RWG&A's work has been limited to consideration of excavation, dewatering, and impacts on nearby structures along the proposed project alignment. RWG&A has not considered the work from a safety perspective. Construction site safety is considered the responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. We are providing this information as a service to our client. Under no circumstances should this information be interpreted to mean that RWG&A is assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

## Temporary Lateral Support of Excavations

The recommendations that follow are meant to be used in conjunction with proper dewatering techniques. The Contractor should be aware that ineffective or non-continuous dewatering can jeopardize the stability of excavations. The Contractor should be advised that trapped water in pervious fill and utility trenches might be encountered locally.

Soils encountered in the explorations consisted of dense to medium dense granular fill, medium dense silt, stiff to very soft silty clay, dense to medium dense sand and silty sand, and very dense glacial till. According to project plans, the alignment will intersect existing utilities and their associated backfill.

In general, the zone of influence of an excavation lies above a line extending from the lowest outside corner of the excavation upward and outward on a 1 vertical to 1 horizontal (1V:1H) slope. Structures and utilities located within this zone will be subject to movement as a result of the excavation. In addition, if backfill material in a previous excavation lies within the zone of influence, the backfill material and associated structures or utilities might also experience movement as a result of the proposed excavation.

In general, relatively steep-sided, open cut techniques are considered technically feasible for excavations along most of the alignment. It is anticipated that worker protection devices (i.e., trench boxes/shields) will be necessary in conjunction with these techniques. One disadvantage of using open cut methods is that the sides of the excavation are free to deform, usually resulting in settlement of nearby structures, underground utilities, roadways, sidewalks, and the ground surface. Where it is desirable to reduce trench limits or surface disturbance caused by excavation, then internally braced, temporary sheet piling should be provided.

It is anticipated that temporary lateral support might be needed at roadway intersections, and where the proposed alignment runs along and near other utilities. The stability of the excavation base against heave of subsurface soils should be reviewed and verified by the professional engineer responsible for the design of the temporary lateral support system. Details of proposed temporary lateral support systems should be submitted by the Contractor prior to installation to allow review of its components by the project design engineers.

The Contractor should be aware that slope height, slope inclination, and excavation depths should in no case exceed those specified in local, state, or federal safety regulations (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations). Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

## Dewatering

Construction dewatering should be provided as needed to reduce disturbance of the subgrade soils, maintain stability of the excavations, and to complete the work in-the-dry. It is anticipated that the Contractor will design, install, operate, and maintain the dewatering system. Details of the proposed dewatering system should be submitted to allow review of its components prior to installation. The submittal should provide information on sources of power to be used, as well as the locations of sumps, pumps, wells, and other features, including discharge points.

Dewatering requirements will vary along the alignment depending upon groundwater levels encountered during construction, and the predominant soil exposed on the sides and bottom of excavations. Excavations might encounter pockets or layers of free-draining granular soil or utility bedding which could contribute significant amounts of water into the excavation. This might result in slope and bottom instability. In the event that significant zones of free-draining materials are encountered, it might be necessary to temporarily suspend construction activities until the water drains into the excavations and can be pumped out.

It is recommended that water levels be measured along the alignment just prior to construction, either by observation wells or test pits, to assess dewatering requirements at that time. If necessary, systems such as wells or wellpoints are capable of predraining water to the desired levels. The wells or wellpoints should be filter-protected to prevent pumping of fines during dewatering. In predrainage areas, the excavations should not begin until it is demonstrated (by observation wells or test pits) that water levels are a minimum of 2 feet below the bottom of the proposed excavation. In general, dewatering should be continuous until backfilling activities are completed. It is recommended that excavations be backfilled at the completion of each work day.

## Excavation and Backfill

Excavation of the trench subgrade should be performed with a smooth-edged bucket. Care should be taken to minimize foot traffic and operate dewatering measures so as to reduce disturbance of the trench bottom. Any loose, softened, or disturbed material should be removed prior to placement of the pipe bedding. Due to the presence of silty sand and granular fill at and near invert level along Goose Bay Drive, a geotextile separation fabric might be needed from about STA. 17 + 50 to the end of the alignment at STA. 23 + 87. The purpose of the separation fabric would be to reduce migration of soil and fill into voids in the crushed stone, which might result in loss of pipe support and post-installation settlement of the pipe and trench backfill. Particle-size distribution tests performed on the crushed-stone and soils exposed at trench subgrade should be compared to determine if they are filter compatible with one another or if separation fabric is needed. Similarly, particle-size distribution tests should also be performed on the blanket sand to determine if a separation fabric is needed between crushed stone bedding and blanket sand.

The naturally deposited silt, silty clay, and glacial till soils are moisture sensitive, which means they can be difficult to compact and tend to lose their strength especially when they are wet. The moisture content of moisture sensitive soils needs to be closely controlled for placement and compaction to the required density if used as trench backfill. In addition, the excavated silty clay may occur in large clods that are difficult to backfill trenches in uniform lifts. Use of a sheepsfoot-type roller would facilitate compaction of the moisture sensitive soils and might help break down clods of the silty clay. Soils saturated, either by groundwater or surface runoff, are not considered suitable for use as trench backfill.

Within landscaped or cross-country portions of sewer alignments, settlement at the trench surface can often be accommodated by overfilling and then re-leveling after the backfill has settled. However, along paved roads, overfilling is not practicable, and post-construction settlement of the backfill usually results in a swale over the trench and settlement around the tops of manholes. If the above conditions are not acceptable, a systematic compaction effort must be applied to all the trench backfill.

It is recommended that, at the beginning of backfilling operations, a systematic compaction method be developed for backfilling trenches along the alignment based upon the Test Strip Procedure, *Standard Specifications for Road and Bridge Construction, State of New Hampshire Department of Transportation, Section 3.8.2.1*, modified as necessary for compaction of trench backfill. In particular, backfill and compaction methods should be demonstrated through the test strips with in-place density testing and laboratory moisture-density tests, to evaluate if required compaction can be readily achieved. The test strip should be constructed in the trench with backfill material placed in a nominal lift thickness and compacted with in-place density testing between two coverages with the proposed compaction equipment until the required density is achieved. The compaction effort required to reach this point would become the criteria for the given piece of compaction equipment and backfill material.

The naturally deposited silt, silty clay and glacial till soils are considered frost susceptible. It is not practical to eliminate all differential frost heave between pavement over the backfilled trench and the adjacent pavement section on naturally deposited soil. Alternate techniques to reduce differential frost heave is to backfill the trench with the locally excavated soils, or backfill with trench with low frost susceptible soils and provide transitions at the side edges of the trench. Transitions typically are sloped at 2H to 1V, or flatter. It is noted that transitions would necessarily increase the width of asphalt to be removed and replaced. In any event, frost susceptible soils (i.e., silt, silty clay, and glacial till) should not be used as backfill within the pavement base courses.



## Rock Removal

In the event that controlled blasting is needed, the technical requirements of the *Standard Specifications for Road and Bridge Construction, State of New Hampshire Department of Transportation* are considered appropriate for this project. It might not be possible to blast near other utilities without damaging them. Suspending operation of vulnerable utilities during blasting should be considered; local repairs will likely be needed. Fragmentation of bedrock or boulders with hydraulic hammers (i.e., hoe rams) could also be used where blasting is impractical.

## Geotechnical Observation

Since the geotechnical recommendations used as the basis of design for this project were developed using limited numbers of observations and tests, the Owner and UEI should be sensitive to the potential need for adjustment in the field. It is in the best interest of the Owner and UEI to retain RWG&A to observe geotechnical construction aspects of the project, observe general compliance with the design concepts, specifications, and recommendations, and to assist in development of design changes should subsurface conditions differ from those anticipated prior to the start of construction. Such observation increases the likelihood of the design intent being carried out during construction and will allow RWG&A to confirm its design recommendations. Geotechnical review and observation of the following aspects is recommended:

- Temporary bracing and shoring
- Construction dewatering
- Fill placement and compaction

## CLOSURE

This report has been prepared for specific application to the Goose Bay and Corporate Drive Sewer Improvement Project in Portsmouth, New Hampshire, and for the exclusive use of UEI. This work has been completed in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. In the event that any changes are made in the nature, alignment, or depth of the project, the conclusions and recommendations of this report should be reviewed by RWG&A.

The recommendations presented are based on the results of widely spaced explorations. The nature of variations between explorations may not become evident until construction. If variations are encountered, it will be necessary for RWG&A to re-evaluate the recommendations presented in

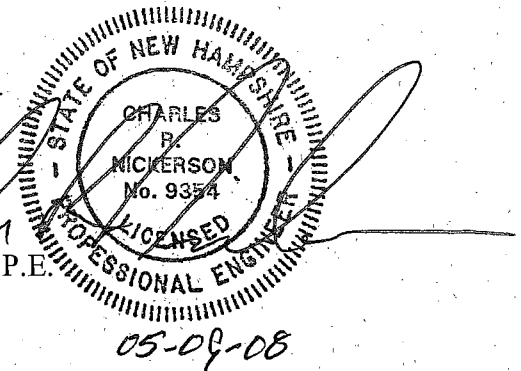
this report. RWG&A requests an opportunity for a general review of the final design and specifications in order to determine that earthwork and dewatering recommendations have been interpreted in the manner in which they were intended. In addition, RWG&A is available to provide review of the Contractor's submittals for construction.

We have enjoyed working with UEI on this project. If you have any questions or if we may be of further service, please contact us.

Very truly yours,  
R. W. GILLESPIE & ASSOCIATES, INC.

David R. Brogan, P.E.  
Geotechnical Engineer

Charles R. Nickerson, P.E.  
Principal Engineer



DRB/CRN:mb  
In triplicate (one unbound)

Attachments:  
Appendix A. Exploration Logs  
Appendix B. Laboratory Test Results

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**R.W. Gillespie & Associates, Inc.**

Geotechnical Engineering • Geohydrology • Materials Testing Services

Project Name:  
Location:  
Client:  
RWG&A Project No.

Goose Bay & Corporate Drive Sewer Improvements  
Portsmouth, New Hampshire  
Underwood Engineers, Inc.  
515-66

Log:  
Surface Elevation:  
Observed Water Depth:  
Date Completed:

B-1  
Not Obs.  
12/17/07

Depth (ft.)	Symbol	Sample No.	Description of Material	Sample Recovery (in.)	Blows per 6"	SPT-N Blows per foot	Moisture Content (%)	Lab Tests
0		S-1	ASPHALTIC PAVEMENT (4 inches).	16	5 16 21 21	37		
			FILL; Sand, dense, medium to fine sand, trace coarse sand, trace silt, moist, brown.					
5		S-2	SILT (ML); Medium dense, silt with clay, slight plasticity, moist then wet, gray with occasional mottling.	24	5 5 7 9	12		
10		S-3	Becomes loose.	20	3 3 3 7	6		
15		S-4	SILTY CLAY (ML-CL); Very soft, clay with silt, wet, gray.	24	WOH/24"	WOH		
			Bottom of Exploration at 17'; Not refusal.					



# R.W. Gillespie & Associates, Inc.

Geotechnical Engineering • Geohydrology • Materials Testing Services

Project Name:  
Location:  
Client:  
RWG&A Project No.

Goose Bay & Corporate Drive Sewer Improvements  
Portsmouth, New Hampshire  
Underwood Engineers, Inc.  
515-66

Log:  
Surface Elevation:  
Observed Water Depth:  
Date Completed:

P-2  
Not Obs.  
12/17/07

Depth (ft.) Symbol Samples	Sample No.	Description of Material	Sample Recovery (in.)	Blows per 6"	SPT-N Blows per foot	Moisture Content (%)	Lab Tests
		<b>ASPHALTIC PAVEMENT (4 inches).</b> FILL; Sand, medium to fine sand, trace coarse sand, trace silt, moist, light brown.					
		<b>SILT (ML);</b> Silt with clay, moist, gray.					
		Bottom of Exploration at 15'; Not refusal.					













**R.W. Gillespie & Associates, Inc.**

Geotechnical Engineering • Geohydrology • Materials Testing Services

Project Name:  
Location:  
Client:  
RWG&A Project No.

Goose Bay & Corporate Drive Sewer Improvements  
Portsmouth, New Hampshire  
Underwood Engineers, Inc.  
515-66

Log: B-7  
Surface Elevation:  
Observed Water Depth: 8.0  
Date Completed: 12/17/07

Depth (ft.)	Symbol Samples	Sample No.	Description of Material	Sample Recovery (in.)	Blows per 6"	SPT-N Blows per foot	Moisture Content (%)	Lab Tests
0	X	S-1	ASPHALTIC PAVEMENT (4 inches). FILL; Silty sand, medium dense, fine sand, some silt, slight organic odor, moist, brown to gray.	12	6 10 10 8	20		
5	X	S-2	SILT (ML); Medium dense, silt with clay, moist, olive gray.	20	5 6 9 18	15	23	GS
10	X	S-3	SILT WITH SAND (ML); Medium dense, silt, little fine sand, wet, gray.	20	3 3 7 9	10	29	GS
15	X	S-4	Trace clay.	11	3 5 7 13	12		
20	X	S-5	Bottom of Exploration at 21.1'; Auger and spoon refusal.	11	4 8 50/1"	58+		







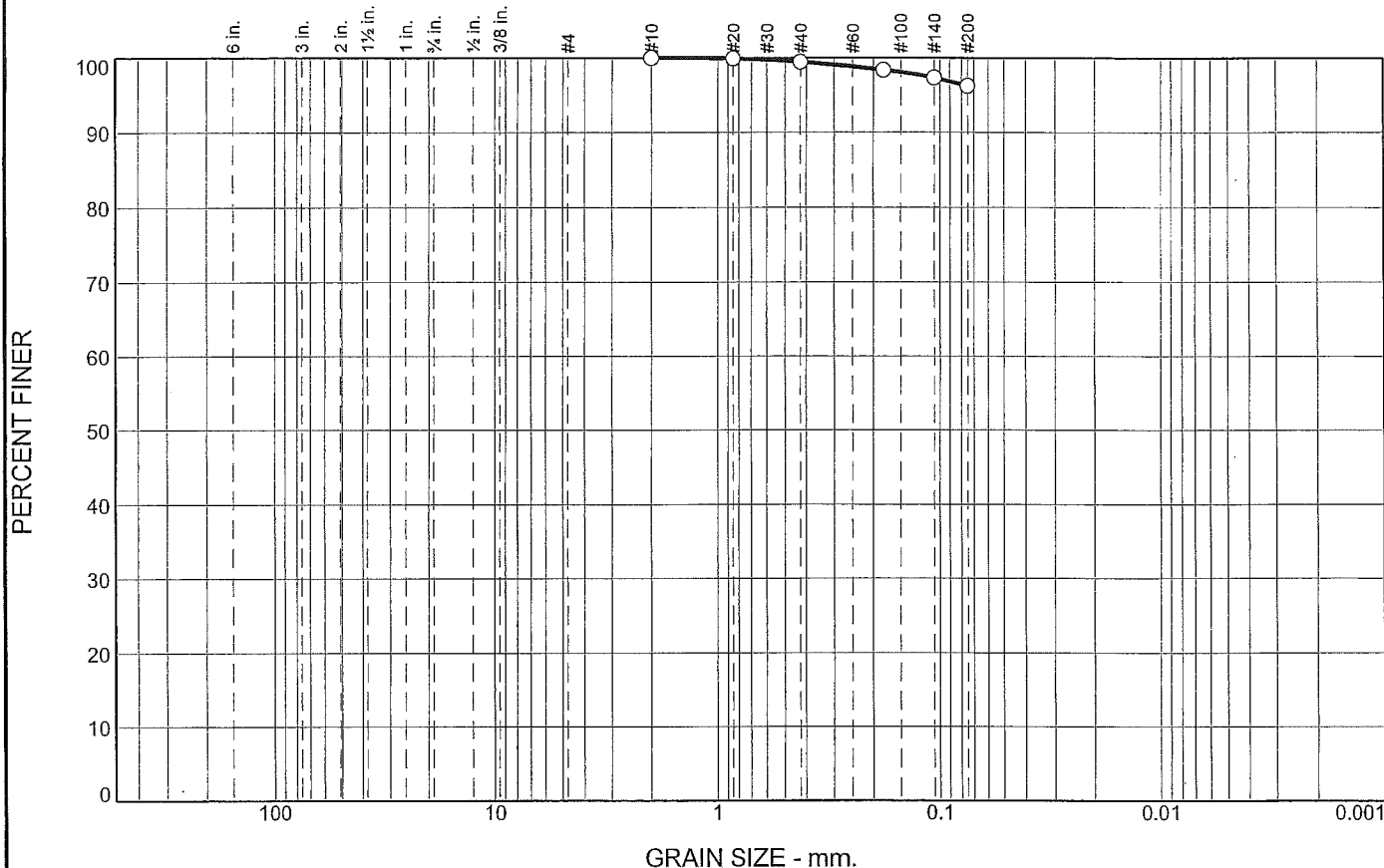


**APPENDIX B**

**LABORATORY TEST RESULTS**

Geotechnical Evaluation  
Goose Bay and Corporate Drive Sewer Improvements  
Portsmouth, New Hampshire

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.6	3.2	96.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.4		
#80	98.3		
#140	97.3		
#200	96.2		

**Soil Description**  
silt

**Atterberg Limits**  
PL= np      LL= nv      PI=

**Coefficients**  
D<sub>85</sub>=      D<sub>60</sub>=      D<sub>50</sub>=  
D<sub>30</sub>=      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
USCS= ML      AASHTO= A-4(0)

**Remarks**  
Moisture content: 22.7%

\* (no specification provided)

Sample No.: S-2  
Location: Portsmouth, NH

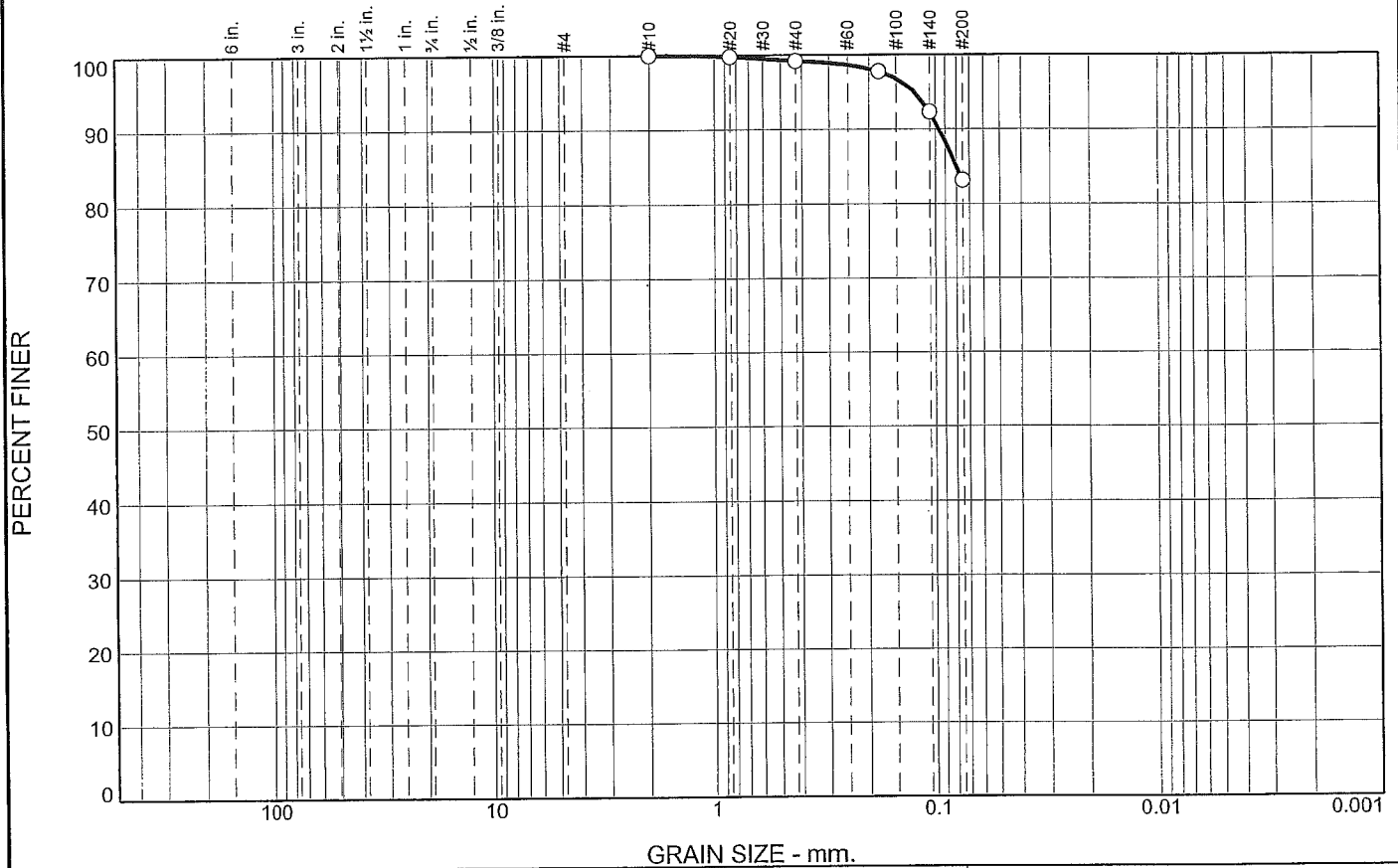
Source of Sample: B-7

Date: 2/6/08  
Elev./Depth: 5'-7'

<b>R.W. Gillespie &amp; Associates, Inc. Saco, Maine</b>	Client: Underwood Engineers, Inc. Project: Goose Bay & Corporate Drive Sewer Project No: 515-66      Lab # 10039a
--	---

Tested By: MJK/DCH      Checked By: MTG *MTG*

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.8	16.0	83.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.8		
#40	99.2		
#80	97.7		
#140	92.3		
#200	83.2		

**Soil Description**  
silt with sand

**Atterberg Limits**  
 PL= np      LL= nv      PI=

**Coefficients**  
 D<sub>85</sub>= 0.0798      D<sub>60</sub>=      D<sub>50</sub>=  
 D<sub>30</sub>=      D<sub>15</sub>=      D<sub>10</sub>=  
 C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS= ML      AASHTO= A-4(0)

**Remarks**  
 Moisture content: 29.2%

\* (no specification provided)

Sample No.: S-3  
 Location: Portsmouth, NH

Source of Sample: B-7

Date: 2/6/08  
 Elev./Depth: 10'-12'

**R.W. Gillespie  
 & Associates, Inc.  
 Saco, Maine**

Client: Underwood Engineers, Inc.  
 Project: Goose Bay & Corporate Drive Sewer

Project No: 515-66

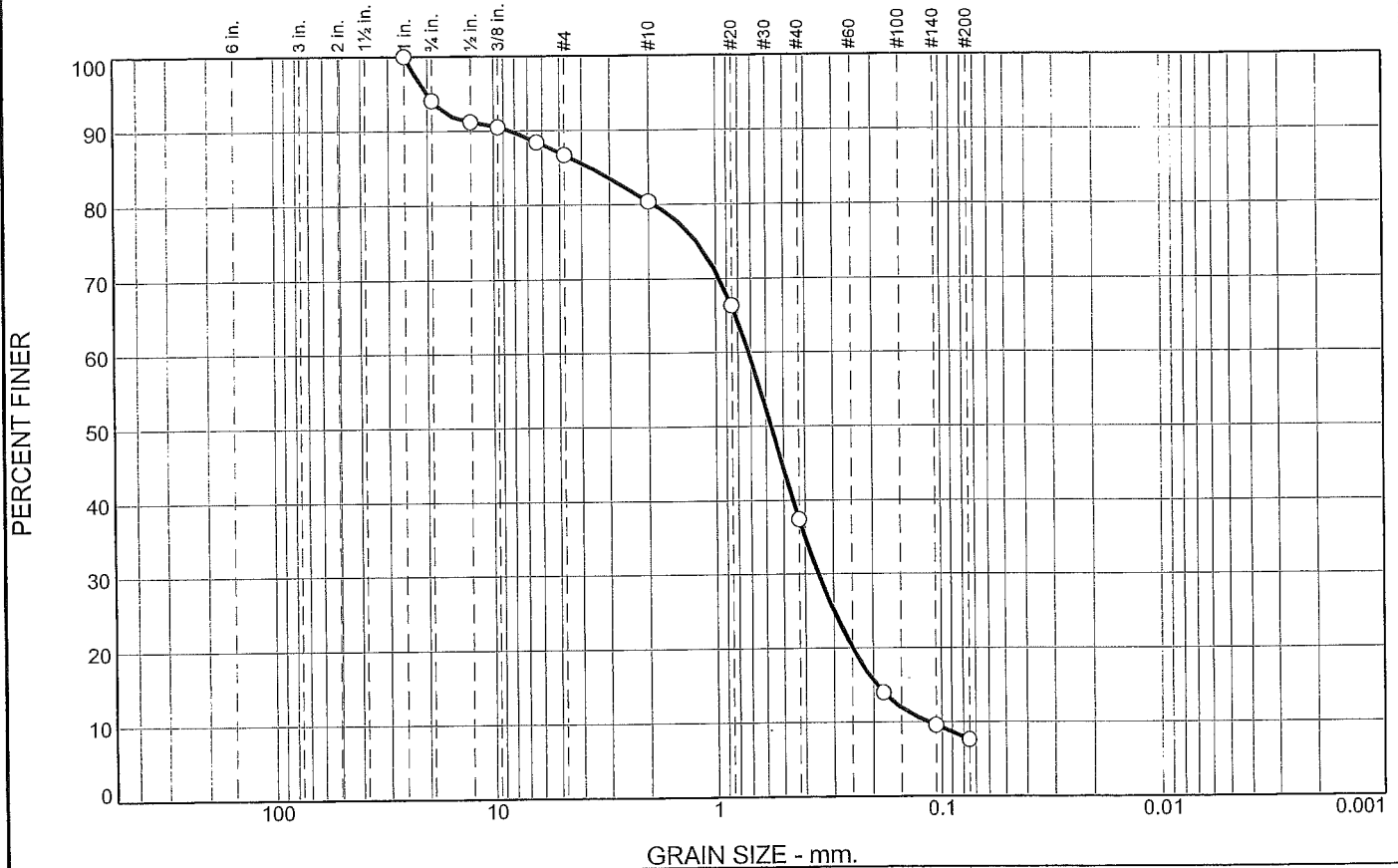
Lab # 10039b

Tested By: MJK/DCH

Checked By: MTG *MTG*



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.0	7.3	6.3	43.0	29.8	7.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	94.0		
1/2"	91.2		
3/8"	90.5		
1/4"	88.5		
#4	86.7		
#10	80.4		
#20	66.4		
#40	37.4		
#80	14.0		
#140	9.6		
#200	7.6		

**Soil Description**

well-graded sand with silt

**Atterberg Limits**

PL= np      LL= nv      PI=

**Coefficients**

D<sub>85</sub>= 3.6575      D<sub>60</sub>= 0.7146      D<sub>50</sub>= 0.5667  
D<sub>30</sub>= 0.3492      D<sub>15</sub>= 0.1931      D<sub>10</sub>= 0.1147  
C<sub>u</sub>= 6.23      C<sub>c</sub>= 1.49

**Classification**

USCS= SW-SM      AASHTO= A-1-b

**Remarks**

Moisture content: 10.6%

\* (no specification provided)

Sample No.: S-2  
Location: Portsmouth, NH

Source of Sample: B-11

Date: 2/6/08  
Elev./Depth: 5'-7'

**R.W. Gillespie  
& Associates, Inc.  
Saco, Maine**

Client: Underwood Engineers, Inc.  
Project: Goose Bay & Corporate Drive Sewer  
Project No: 515-66      Lab # 10039c

Tested By: MJK/DCH      Checked By: MTG *MTG*

**APPENDIX B**

**City of Portsmouth Blasting Ordinance**



# PUBLIC WORKS DEPARTMENT

CITY OF PORTSMOUTH  
680 Peeverly Hill Road  
Portsmouth N.H. 03801  
(603) 427-1530 FAX (603) 427-1539

## CITY OF PORTSMOUTH BLASTING RULES AND PROCEDURES

### 1.0 General

All blasting work shall comply with the following regulations:

- City Ordinance Article VII: Section 5:02;
- State of New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction – 1997
- Storage and Transportation of explosives shall be in accordance with State of New Hampshire Code of Administrative Rules: Chapter/Part Saf-c 1600. In case of conflict, the more stringent regulation shall govern

### 2.0 Insurance

- 2.1 The blasting contractor shall procure and maintain \$5,000,000 of personal injury & property damage liability insurance covering the permitted blasting operations, or such an amount as may be determined necessary by extraordinary circumstances.
- 2.2 The Certificate shall name the City as an additional insured.

### 3.0 Permit Process

- 3.1 The blasting contractor shall apply in person at the Department of Public Works for a permit to perform blasting operations before commencing the pre-blast survey procedure.
- 3.2 At the time of application, the blasting contractor shall provide the following items:
  - a) Plan showing location and extent and purpose of proposed blasting operations
  - b) Copy of valid Use and Transportation License for the blasting company as required by Article VII, Section 5:702.
  - c) Copy of valid Insurance Certificate as required by Article VII, Section 5:702 and defined in Section 2 of these rules and procedures.

#### 4.0 Pre-Blast Condition Surveys

- 4.1 Pre-blast surveys shall be performed as required in City Ordinance Article VII: Section 5:02 and the following procedures.
- 4.2 The pre-blast condition survey shall consist of a written description of the interior and exterior condition of each of the structures examined. Descriptions shall locate any existing cracks, damage or other defects and shall include such information so as to make it possible to determine the effect, if any, of the construction operations on the defect. Where significant cracks or damage exist, or for defects too complicated to describe in words, photographs shall be taken. A good quality videotape survey with appropriate audio description of locations, and conditions, and defects can be used.
- 4.3 The Pre-Blast Contractor shall send a pre-blast survey letter by regular mail to all abutters within a 500 foot radius of the blasting site, with copies of the letter sent also to:
- |  |   |
|--|---|
| Deputy Director of Public Works<br>680 Peverly Hill Rd.<br>Portsmouth, NH 03801                              | City Manager<br>1 Junkins Avenue<br>Portsmouth NH 03801                           |
| Fire Chief<br>170 Court Street<br>Portsmouth, NH 03801   | Chief of Police<br>3 Junkins Avenue<br>Portsmouth NH 03801                        |
| Zoning Officer, Housing Code Inspector<br>City Hall, Legal Dept.<br>1 Junkins Avenue<br>Portsmouth, NH 03801 | Chief Building Inspector<br>City Hall<br>1 Junkins Avenue<br>Portsmouth, NH 03801 |
- 4.4 The pre-blast survey company shall make at least three attempts over a minimum 1-week period to contact a property owner before that property is listed as non-respondent.
- 4.5 Copies of the Pre-blast Condition Survey shall be made available to the Department of Public Works and/or the property owner upon request. The blasting company shall maintain copies of all pre-blast survey records for a period of no less than one year from the completion of the blasting operations.
- 4.6 Before the issuance of a Blasting Permit, The blasting contractor shall submit to the Department of Public Works a list of all properties within the 500-foot radius of the blasting. The list shall include names, addresses, with tax map and lot numbers of all abutters within the 500-foot radius and the status of the survey, whether completed, refused or non-respondent.

## **5.0 Blasting Permit**

- 5.1 The blasting contractor shall submit to the Engineering Division of the Public Works Department all items described in sections 2, 3 and 4 of these procedures. The blasting contractor will be authorized to proceed with the mailing blasting notification letter described in Article VII Section 5: 702 B upon approval of the submitted material.
- 5.2 A copy of the certified mail recipients of the blasting notification letter shall be submitted prior to issuance of the permit. Copies of the certified letter shall also be sent the Deputy Director of Public Works, Chief of Police, Building Inspector, and Fire Chief, indicating when the blasting is scheduled to begin.

## **6.0 Blasting Operations**

- 6.1 All blasting operations shall be conducted in accordance with State of New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction – 1997.
- 6.2 All blasting operations shall require vibration measuring equipment meeting the following minimum requirements:
  - a) Measure, display, and provide a permanent record on a strip chart of particle velocity components.
  - b) Measure three mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source.
  - c) Have a velocity frequency response of 2Hz to 150 Hz and be capable of measuring Peak Particle Velocity (PPV) of up to 250 mm/s (10 in/s)
  - d) All seismographs used shall display the date of the most recent calibration.
  - e) Calibration must have been performed within the last 12 months and must be performed to a standard traceable to the National Institute of Standards and Technology.
- 6.3 The blasting contractor shall maintain daily logs of all blasting activities. Those records, including seismic monitoring records shall be made available to the City of Portsmouth for a period of 5 Years.

**ARTICLE VII: BLASTING**

**Section 5:702 BLASTING PERMIT REQUIRED**

No person shall perform or cause to be performed any blasting within the City limits unless a Blasting Permit is obtained from the City Engineer. This permit shall not be issued until the following terms and conditions have been satisfied by the applicant:

- A. All abutters within five hundred (500) feet of the area where the blasting will occur shall receive notice by certified mail two full business days (excluding Saturday, Sunday and holidays) in advance of the blasting. The term "abutter" shall be defined in the manner used for the notification of zoning abutters. (Amended 9/17/2001)
- B. That the City Engineer's office as well as the Building Inspector shall receive the same notice, also sent by certified mail, at least two full business days (excluding Saturday, Sunday and holidays) in advance of the blasting.
- C. The name and address of the blasting company be provided.
- D. The name of a company representative be provided and the twenty-four (24) hour telephone number of the representative; such representative being a person who is capable of responding to claims and issues arising from the blasting performed.
- E. A pre-blast survey shall be completed by the blasting company for an area within five hundred (500) feet of the proposed blasting. (Amended 9/17/2001)
- F. Any reports, measurements or video tapes made in connection with this pre-blast survey or with the subsequent blasting shall be made available upon request to all abutters within five hundred (500) feet of the area. (Amended 9/17/2001)
- G. That the cost of such a pre-blast survey shall be borne by the blasting company.
- H. The Use and Transport License of the hauler shall be designated.
- I. The route of removing blasting material shall be designated.
- J. The location of the blasting shall be designated.
- K. The blasting shall take place within the hours of 8:00 A.M. to 5:00 P.M. Monday through Friday.
- L. An Insurance Certificate shall be posted with the City Engineer in an amount and type deemed appropriate by the City Engineer and the City Attorney. (Amended 9/20/93)
- M. The Public Works Director is hereby authorized to promulgate blasting rules consistent with the intent of this ordinance, such rules shall become effective on acceptance by the City Council. (Item M. adopted 9/17/2001)

## **APPENDIX C**

### **NHDES One Stop Data (Remediation Sites)**

### Corporate Drive and Goose Bay Drive Sewer Reconstruction

#### Legend

- \* Remediation Sites
- Underground Storage Tank :



Map Scale

1: 6,494

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Map Generated: 4/13/2017



#### Notes

Empty box for notes

Empty box for notes





**Hazardous Waste Project Report**

Site Number: 199707005  
 Name and Address: LONZA BIOLOGICS INC  
 101 INTERNATIONAL DR  
 PORTSMOUTH  
 MapIt

Project Number: 0007113  
 Responsible Party: PEASE DEVELOPMENT AUTHORITY.  
 Pease Development Authority  
 PORTSMOUTH NH 03801-2833  
 PHONE: 603-433-6088

Wellhead Protection Area: Unknown

Risk Level: NO SOURCES/NO AGQS VIOL FROM ONSITE

Assigned To: CLOSED

Discovery Date: 07/04/1997

Eligible:

Eligibility Determined on:

MTBE: N

Brownfield: N

**Activities (7)**

Submittal Date	Submittal Description	Staff Assigned	Action Date	Action Description	Comments
10/01/1999	Additional Information Received	MINICUCCI	07/25/2002	Regulatory Action Compl.-DES File Closed	
06/22/1999	Additional Information Received	WIMSATT	06/22/1999	Additional Information Requested	
02/17/1999	Additional Information Received	WIMSATT	02/22/1999	Additional Information Requested	
08/19/1998	Additional Information Received	WIMSATT	01/14/1999	Additional Information Requested	
04/30/1998	Additional Information Received	WIMSATT	08/05/1998	Additional Information Requested	
11/24/1997	Additional Information Received	WIMSATT	12/01/1997	Additional Information Requested	
06/25/1997	Additional Information Received	WIMSATT	10/30/1997	Additional Information Requested	

### Hazardous Waste Project Report

Site Number: 199707005  
Name and Address: LONZA BIOLOGICS INC  
101 INTERNATIONAL DR  
PORTSMOUTH  
Main

Project Number: 0007113  
Responsible Party: PEASE DEVELOPMENT AUTHORITY  
Pease Development Authority  
PORTSMOUTH NH 03801-2833  
PHONE: 603-433-6088

Wellhead Protection Area: Unknown  
Assigned To: CLOSED  
Eligible:  
MTBE: N

Risk Level: NO SOURCES/NO AGQS VIO'S FROM ONSITE  
Discovery Date: 07/04/1997  
Eligibility Determined on:  
Brownfield: N

No Vapor Recovery Information

### Leaking Underground Storage Tank Project Report

Site Number: 199408039

Project Number: 0005065

Name and Address: BRACKETT SCHOOL  
RYE STREET, FORMER PEASE AFB  
PORTSMOUTH

Responsible Party: USDHHS  
NEW YORK NY 10278  
PHONE: 212-264-9848

Mapit

Wellhead Protection Area: Unknown

Risk Level: NO SOURCES/NO AGQS VIO'S FROM ONSITE

Assigned To: CLOSED

Discovery Date: 08/30/1994

Eligible: PERMANENTLY ELIGIBLE

Eligibility Determined on: 08/14/1997

MTBE: N

Brownfield: N

#### Project Related Documents (1)

	Document Type	Name/Title	Date Submitted	File Size
4325235	CORRESPONDENCE	CORRESPONDENCE 08/25/1994 TO 05/04/1999	08/25/1994	2.23 MB

Leaking Underground Storage Tank Project Report

Site Number: 199408039

Project Number: 0005065

Name and Address: BRACKETT SCHOOL  
 RYE STREET, FORMER PEASE AFB  
 PORTSMOUTH

Responsible Party: USDHHS  
 NEW YORK NY 10278  
 PHONE: 212-264-9848

Wellhead Protection Area: Unknown

Risk Level: NO SOURCES/NO AGQS VIOS FROM ONSITE

Assigned To: CLOSED

Discovery Date: 08/30/1994

Eligible: PERMANENTLY ELIGIBLE

Eligibility Determined on: 08/14/1997

MTBE: N

Brownfield: N

Activities (5)

Submital Date	Submittal Description	Staff Assigned	Action Date	Action Description	Comments
05/16/1997	Additional Information Received	KIRBY	06/02/1997	Regulatory Action Compl.-DES File Closed	

Activity Documents (2)

Document ID	Document Type	Document Title	Document Date	File Size
4325230	CORRESPONDENCE-FROM	CERTIFICATE OF NO FURTHER ACTION & FILE CLOSE OUT MEMO	06/11/1997	.04 MB
4325231	MONITORING NONPERMIT	SECOND ROUND OF GROUND WATER SAMPLING RESULTS 12-MAY-1997	05/16/1997	.37 MB

02/03/1997	Site Investigation Report Received	KIRBY	03/17/1997	Additional Information Requested	
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Activity Documents (1)

Document ID	Document Type	Document Title	Document Date	File Size
4325232	REPORT TO DES	SITE INVESTIGATION REPORT 27-JAN-1997	02/03/1997	.98 MB

07/18/1996	Work Scope Submitted	MUZZEY	08/06/1996	Work Scope Approved	
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Activity Documents (2)

Document ID	Document Type	Document Title	Document Date	File Size
4325233	WORKSCOPE/BUDGET	WORKSCOPE APPROVAL FOR INITIAL SITE CHARACTERIZATION	08/06/1996	.09 MB
4325234	WORKSCOPE/BUDGET	WORKSCOPE & BUDGET FOR INITIAL SITE CHARACTERIZATION 09-JUL-1996	07/12/1996	.19 MB

07/12/1996	Facility Comp. Determination Required	GIUNTA	07/17/1996	Facility (UST, AST, etc) in Compliance	
02/03/1995	Additional Information Received	KARNAUKH-S	02/13/1995	Site Investigation Report Requested	

Leaking Underground Storage Tank Project Report

Site Number: 199408039

Project Number: 0005065

Name and Address: BRACKETT SCHOOL  
RYE STREET, FORMER PEASE AFB  
PORTSMOUTH

Responsible Party: USDHHS  
NEW YORK NY 10278  
PHONE: 212-264-9848

MapIt

Wellhead Protection Area: Unknown

Risk Level: NO SOURCES/NO AGGS VIO'S FROM ONSITE

Assigned To: CLOSED

Discovery Date: 08/30/1994

Eligible: PERMANENTLY ELIGIBLE

Eligibility Determined on: 08/14/1997

MTBE: N

Brownfield: N

No Vapor Recovery Information