

PROJECT MANUAL

**PORTSMOUTH,
NEW HAMPSHIRE**

FOR CONSTRUCTION

MCDONOUGH STREET AREA PROJECT

3B

Bid Number 38-17

January 2017



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A. BIDDING REQUIREMENTS

**ADVERTISEMENT FOR BIDS
Brewster Street Area Project 3B**

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

Will be accepting separate sealed BIDS for the construction of:

Brewster Street Area Project 3B

The project includes the construction of new sanitary and storm sewers, modifications to existing sanitary and storm sewers, roadway reconstruction, sidewalk and curbing installation and property restoration. Sealed Bids will be received by the City of Portsmouth at the office of **Purchasing Department** until **2:00 PM**, (local time) on **February- 21, 2016** and then publicly opened and read aloud.

1. Bids will only be received by Contractors who have been pre-qualified by the State of New Hampshire for Road Construction.
2. Completion time for the project will be as follows:
140 Calendar Days and no later than November 1, 2017 for **Substantial Completion**
(which excludes final pavement, markings and cleanup.

June 1, 2018 for **Total Project Completion**

Liquidated damages for this project will be in accordance with the following schedule:

- a. **\$300.00** for each day of delay from the date established for **Substantial Completion**.
- b. **\$300.00** for each calendar day of delay from the date established for **Contract Completion**.
3. **Winter shutdown period will begin November 30, 2017 and extend to April 15, 2018.**
Work during winter shutdown period is subject to the City's approval.
4. Each General Bid shall be accompanied by a bid security in the amount of 5% of the Total Bid Price.
5. 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.
6. Bid award is contingent upon available funds.
7. No Bidder may withdraw a Bid within 60 days after the actual date of opening thereof.
8. The owner reserves the right to reject any and all bids, to accept any bid, to waive any informality on bids received

9. 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 **10:00 AM**, (local time) on **February 10, 2017**

Representatives of the City will be present to discuss the project.

10. Inquiries as to availability of Contract Documents and technical questions regarding the plans and specifications shall be directed to David Desfosses, City of Portsmouth @ djdesfos@cityofportsmouth.com or 603-766-1411.

The CONTRACT DOCUMENTS may be examined at the following location: Public Works Department, 680 Peverly Hill Road, Portsmouth, New Hampshire.

Copies of the Contract Documents may be obtained from the City's website.

INFORMATION FOR BIDDERS

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

until 2:00 PM on February 21, 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 **Brewster Street Area Project 3B** and the

envelope should bear on the outside the BIDDER's name and address 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 reserves the right to reject any and all bids, to accept any bid, or to waive any informalities or minor defects. 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.

Bid award is contingent upon available funding.

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.

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 Responsible bidder is one who can satisfy the Qualifications set forth herein and who has been **prequalified** by the NHDOT.

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 (pre-qualified) bidders will be held at the:

Portsmouth Public Work Department
680 Peverly Hill Road
Portsmouth, New Hampshire

at **10:00 AM**, (local time) on **February 10, 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.

COPIES OF THE CONTRACT

There shall be at least three (3) executed copies of the Contract to be distributed as follows:

- a) One (1) copy each to the Owner, Contractor, and Purchasing Department.

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.

BIDDERS QUALIFICATIONS

Award will not be made to Bidders who are not prequalified by the NHDOT for Road Construction.

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 McDonough Street Area Project 3B 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 BY:

140 Calendar Days and no later than November 1, 2017 for **Substantial Completion** (which excludes final pavement, markings and cleanup.

June 1, 2018 for **Total Project Completion**

Liquidated damages for this project will be in accordance with the following schedule:

- c. **\$300.00** for each day of delay from the date established for **Substantial Completion**.
- b. **\$300.00** for each calendar day of delay from the date established for **Contract Completion**

Winter shutdown period will begin December 15, 2016 and extend to April 1, 2017. Work during winter shutdown period is subject to the City's approval.

BIDDER acknowledges receipt of the following ADDENDUM:

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 anticipated completion date.)
8. List your major equipment available for this contract.
9. Identify the Project Superintendent and foreman for this contract.
10. List any subcontractors whom you would expect to use for the following (unless this work is to be done by your own organization):
 - a. Rock removal _____
 - b. Materials Testing _____
 - c. Sewer Testing _____
 - d. Paving _____
 - e. Other Work _____
 - f. Curbing _____
 - g. Sidewalk _____

Bid Schedule: Fill out form submitting prices for every item that is not already filled out

BID ITEM	EST. QNT.	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS	Unit	UNIT PRICE	EXTENDED TOTAL
1.0	1	LS	Maintenance of Sanitary and Storm Sewer Flows during construction, including all temporary pumping and piping systems necessary to by-pass live sewers around the work area : _____ Dollars and _____ Cents	LS		
1.1.06	640	LF	Furnish and install 6" PVC SDR 35 sewer service connection all depths including earth excavation, fittings, backfill, dewatering and property restoration: _____ Dollars and _____ Cents per	LF		
1.1.06A	30	EA(*)	Furnish and install cast iron covers for sewer service cleanouts when cleanouts are located in paved or concrete areas : _____ Dollars and _____ Cents per	EA(*)		
1.1.08	830	LF	Furnish and install 8" PVC SDR 35 sewer pipe all depths, including earth excavation, fittings, backfill, and dewatering: _____ Dollars and _____ Cents per	LF		
1.1.12	550	LF	Furnish and install 12" PVC SDR 35 sewer pipe all depths, including earth excavation, fittings, backfill, and dewatering: _____ Dollars and _____ Cents per	LF		
1.5.4	78	VF	Furnish and install standard 4' diameter sewer manholes With Pamrex Covers including excavation and backfill: _____ Dollars and _____ Cents per	VF		

1.5A	11	EA	Additional Adjustment of SMH Covers for final paving (and where directed): _____ Dollars and _____ Cents per	EA		
1.8A	20	LF (*)	Furnish and install geotextile fabric around sewer bedding stone and pipe (in trench) where directed in accordance with the standard details: _____ Dollars and _____ Cents per	LF (*)		
1.8B	20	LF (*)	Furnish and install Geogrid Trench Stabilization where directed in accordance with the standard details: _____ Dollars and _____ Cents per	LF (*)		
1.9A	1	EA (*)	Field core sewer manholes and foundation penetrations for sewer service relocations (4" - 15" diameter pipe) including pipe connection system: _____ Dollars and _____ Cents per	EA (*)		
1.9C	1	EA (*)	Field core foundation penetration (6" to 8") through stone or granite foundations for sewer service relocations including pipe connection system: _____ Dollars and _____ Cents per	EA (*)		
1.10	4	EA	Remove sewer manholes including backfill, disposal of structure, and salvage of frames and covers to City: _____ Dollars and _____ Cents per	EA		

1.15A	1	LS	Health and Safety Plan (if deemed needed) : _____ Dollars and _____ Cents per (Limit of \$5,000.00)	LS		
1.15B	1	LS	Management of Soils & Materials _____ Dollars and _____ Cents (Limit of \$10,000.00)	LS		
1.15C	20	Ton(*)	Load and Haul Surplus Regulated Soils & Materials (where directed): _____ Dollars (MINIMUM FIVE DOLLARS/Ton) and _____ Cents per	Ton(*)		
1.15D	1	Allow	Disposal of Regulated Soils & Materials (where directed): <u>Five Thousand</u> Dollars and <u>Zero</u> Cents per	Allow	\$5,000	\$5,000
1.15E	1	Allow	Analytical Testing of Soils (where directed): Five Thousand Dollars and no Cents (Allowance) <u>Five Thousand</u> Dollars and <u>Zero</u> Cents per	Allow	\$5,000	\$5,000
1.15F	1	Allow	Disposal of Regulated Groundwater (where directed): Five Thousand Dollars and no Cents (Allowance) <u>Five Thousand</u> Dollars and <u>Zero</u> Cents per	Allow	\$5,000	\$5,000

1.17	1,400	LF	Post Construction Video of Sewers where directed (Section 01382): _____ Dollars and _____ Cents per	LF		
1.18	12	EA	Locate existing sewer services by Video Inspection or transmitter and locator (Section 01382) : _____ Dollars and _____ Cents per	EA		
2.1.1.06A	800	LF (*)	Furnish and install 6" CPDT drain service connection all depths, including earth excavation, fittings, backfill, dewatering and property restoration: _____ Dollars and _____ Cents per	LF (*)		
2.1.1.06B	200	LF (*)	Furnish and install 6" perforated CPDT underdrains including earth excavation, fittings, stone backfill, dewatering: _____ Dollars and _____ Cents per	LF (*)		
2.1.1.12	445	LF	Furnish and install 12" CPE, all depths, including earth excavation, fittings, backfill, and dewatering: _____ Dollars and _____ Cents per	LF		
2.1.1.15	43	LF	Furnish and install 15" CPE, all depths, including earth excavation, fittings, backfill, and dewatering: _____ Dollars and _____ Cents per	LF		

2.1.118	335	LF	Furnish and install 18" CPE, all depths, including earth excavation, fittings, backfill, and dewatering: _____ Dollars and _____ Cents per	LF		
2.1.1.21	79	LF	Furnish and install 21" CPE, all depths, including earth excavation, fittings, backfill, and dewatering: _____ Dollars and _____ Cents per	LF		
2.1.1.24	244	LF	Furnish and install 24" CPE, all depths, including earth excavation, fittings, backfill, and dewatering: _____ Dollars and _____ Cents per	LF		
2.1.5.24	139	LF	Furnish and install 24" DI for drain, all depths, including earth excavation, fittings, backfill, and dewatering: _____ Dollars and _____ Cents per	LF		
2.4	8	EA(*)	Furnish and install cast iron covers for drain services or underdrain cleanouts when cleanouts are located in paved or concrete areas : _____ Dollars and _____ Cents per	EA(*)		
2.5.4	26	VF	Furnish and install 4' diameter drain manhole with Pamrex Cover including excavation and backfill: _____ Dollars and _____ Cents per	VF		

2.5.5	6	VF	Furnish and install 5' diameter drain manhole with Pamrex Cover including excavation and backfill: _____ Dollars and _____ Cents per	VF		
2.5.7	10	VF	Furnish and install 7' square drain manhole with Pamrex Cover including excavation and backfill: _____ Dollars and _____ Cents per	VF		
2.5A	20	EA(*)	Additional Adjustment of DMH Covers for final paving (and where directed): _____ Dollars and _____ Cents per	EA(*)		
2.6.4	115	VF	Furnish and install standard 4' diameter catch basin including excavation, backfill and polyliner: _____ Dollars and _____ Cents per	VF		
2.6A	10	EA	Furnish and install catch basin hood (12" diameter outlet pipe): _____ Dollars and _____ Cents per	EA		
2.8	100	LF (*)	Furnish and install geotextile wrap around drain bedding stone and pipe (in trench) where directed : _____ Dollars and _____ Cents per	LF (*)		
2.9A	2	EA (*)	Field core drain manholes or catch basins, 4-15" dia. pipe: _____ Dollar s and _____ Cents per	EA (*)		

2.9B	2	EA (*)	Field core drain manholes or catch basins, 18"-24" pipe: _____ Dollars and _____ Cents per	EA (*)		
2.10	10	EA (*)	Remove drain manholes or catch basins including fill materials and disposal and salvage of frames and cover or grate to DPW: _____ Dollars and _____ Cents per	EA (*)		
2.10A	300	LF (*)	Remove old drain pipes that are not in new trenches as directed including fill materials and disposal: _____ Dollars and _____ Cents per	LF (*)		
2.11	10	CY (*)	Furnish and install flowable fill in old drains or sewers where directed: _____ Dollars and _____ Cents per	CY (*)		
2.12	1	EA	Furnish and install Vortechincs 11000 complete including excavation, backfill and cover adjustments: _____ Dollars and _____ Cents per	EA		
3.1.06	8	LF (*)	Furnish and install, 6" diameter ductile iron water main including earth excavation, fittings not paid for under another item, backfill, insulation, poly wrap, dewatering and testing: _____ Dollars and _____ Cents per	LF (*)		

3.1.08	1,200	LF	Furnish and install, 8" diameter ductile iron water main including earth excavation, fittings not paid for under another item, backfill, insulation, poly wrap, dewatering and testing: _____ Dollars and _____ Cents per	LF		
3.2A	1	LF(*)	Furnish and install, ¾" copper water service pipe including earth excavation, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	LF(*)		
3.2B	430	LF (*)	Furnish and install, 1" copper water service pipe including earth excavation, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	LF (*)		
3.2C	15	LF (*)	Furnish and install, 2" copper water service pipe including earth excavation, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	LF (*)		
3.3A	1	EA(*)	Furnish and install, ¾" water service connections, including earth excavation, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	EA		
3.3B	24	EA(*)	Furnish and install, 1" water service connections, including earth excavation, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	EA(*)		

3.3C	1	EA(*)	Furnish and install, 2" water service connection, including earth excavation, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	EA(*)		
3.4.04	1	EA(*)	Furnish and install, 4" gate valve assembly including earth excavation, fittings not paid for under another item, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	EA(*)		
3.4.06	1	EA	Furnish and install, 6" gate valve assembly including earth excavation, fittings not paid for under another item, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	EA		
3.4.08	12	EA	Furnish and install, 8" gate valve assembly including earth excavation, fittings not paid for under another item, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	EA		
3.4.08A	2	EA	Furnish and install, 8" tapping valve assembly including earth excavation, tapping sleeve, fittings not paid for under another item, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	EA		
3.4A	2	EA (*)	Additional Adjustment of gate valve boxes and shutoffs not installed as part of this project (to final pavement elevation): _____ Dollars and _____ Cents per	EA (*)		

3.5	3	EA	Furnish and install, hydrant assembly including anchoring tee, gate valve, pipe extension, backfill, insulation, dewatering and testing: _____ Dollars and _____ Cents per	EA		
3.6	1	EA (*)	Removal of existing hydrant assembly including excavation, backfill, capping existing branch piping for abandonment: _____ Dollars and _____ Cents per	EA (*)		
3.7	800	LF(*)	Temporary Water System (potable): _____ Dollars and _____ Cents per	LF(*)		
4.1A	610	TON	Furnish and install bituminous pavement - Machine Method (Binder Course 3/4" 50gyr winter binder): _____ Dollars and _____ Cents per	TON		
4.1B	333	TON	Furnish and install bituminous pavement - Machine Method (Wearing Course): _____ Dollars and _____ Cents per	TON		
4.2A	100	TON	Hot bituminous pavement, hand worked: _____ Dollars and _____ Cents per	TON		

4.3	3,850	SY	Full width pavement reclamation remove and rehandle-8" depth: _____ Dollars and _____ Cents per	SY		
4.4A	1925	CY	Common excavation (For Roadway Box): _____ Dollars and _____ Cents per	CY		
4.4B	500	CY (*)	Excavation for existing sidewalks including disposal of concrete, paved or brick sidewalk materials and old base materials to 12" below finished grade or as directed.: _____ Dollars and _____ Cents per	CY (*)		
4.4C	240	CY (*)	Excavation and rehandling and/or removal of RR yard material for new porous pavement for any material not paid for under item 1.15 and as approved by the Engineer: _____ Dollars and _____ Cents per	CY (*)		
4.5.1A	700	CY (*)	Furnish and install crushed gravel (Roadway): _____ Dollars and _____ Cents per	CY (*)		
4.5.1B	325	CY(*)	Furnish and install crushed gravel (Drives and Sidewalks): _____ Dollars and _____ Cents per	CY(*)		
4.5.2	50	CY	Furnish and install bank-run gravel (where shown or as directed): _____ Dollars and _____ Cents per	CY		

4.6	100	SY(*)	Furnish and install construction geotextile fabric (where directed): _____ Dollars and _____ Cents per	SY(*)		
4.7	60	SY(*)	Cold planning existing pavement: _____ Dollars and _____ Cents per	SY(*)		
4.8	1	Allow	Asphalt Escalation: <u>FIVE THOUSAND</u> Dollars and <u>ZERO</u> Cents per (ALLOWANCE)	Allow	\$2,000.	\$2,000.00
4.9	500	LF(*)	Mechanical (saw) cutting where directed : _____ Dollars and _____ Cents per	LF(*)		
4.10	10	Ton(*)	Furnish and install temporary pavement repairs where shown as directed _____ Dollars and _____ Cents per	Ton(*)		
5.1.4	1,050	SY	Furnish and install 4" concrete sidewalk (4000# fiber reinforced) : _____ Dollars and _____ Cents per	SY		
5.1.6	60	SY	6" concrete sidewalk curb ramps (4000# wire and fiber reinforced): _____ Dollars and _____ Cents per	SY		

5.2	15	SY (*)	Replace/patch in brick walkways to individual houses (as appropriate and where directed) (areas not impacted by utility work which are incidental): _____ Dollars and _____ Cents per	SY (*)		
5.3.1	650	LF(*)	Furnish and install vertical straight granite curb (5" x 18"): _____ Dollars and _____ Cents per	LF(*)		
5.3.2	20	LF (*)	Furnish and install vertical straight granite curb for Islington (6" x 24"): _____ Dollars and _____ Cents per	LF (*)		
5.3.3	300	LF	Furnish and install vertical radius granite curb (5" x 18"): _____ Dollars and _____ Cents per	LF		
5.3.4	60	LF	Furnish and install vertical radius granite curb for Islington (6" x 24"): _____ Dollars and _____ Cents per	LF		
5.3.5	180	LF	Furnish and install sloped granite curb (6"x12"): _____ Dollars and _____ Cents per	LF		

5.3.6	70	LF	Furnish and install sloped radius granite curb (6"x12"): _____ Dollars and _____ Cents per	LF		
5.4	1,400	LF(*)	Reset vertical straight granite curb salvaged from onsite: _____ Dollars and _____ Cents per	LF(*)		
5.5	84	SF	Armortile brand ADA compliant detectable warning panels: _____ Dollars and _____ Cents per	SF		
6A	1	LS	Mobilization (not to exceed 10% of total bid) : _____ Dollars and _____ Cents per	LS		
6B	1	Allow	Vibration Monitoring: <u>TWO THOUSAND</u> Dollars and <u>ZERO</u> Cents per (ALLOWANCE)	Allow	\$2,000.	\$2,000.00
6C	1	Allow	Archeological monitoring and delays: <u>TWO THOUSAND</u> Dollars and <u>ZERO</u> Cents per (ALLOWANCE)	Allow	\$2,000.	\$2,000.00
6D	2	EA (*)	Unknown utility crossing: _____ Dollars and _____ Cents per	EA (*)		

6E	2	EA (*)	Repair of unknown or mismarked utility: _____ Dollars and _____ Cents per	EA (*)		
6.1	15	CY (*)	Rock Structure Ledge removal including disposal (MIN \$80/CY, MAX \$140/CY): _____ Dollars and _____ Cents per	CY (*)		
6.2A	20	CY (*)	Additional excavation below grade (where ordered by Engineer) : _____ Dollars and _____ Cents per	CY (*)		
6.2B	20	CY (*)	Excavation and disposal of unsuitable materials, where ordered by Engineer (includes peat, muck, stumps and misc. wood debris): _____ Dollars and _____ Cents per	CY (*)		
6.3	20	CY (*)	Furnish and install additional screened gravel (crushed stone) (where ordered by Engineer): _____ Dollars and _____ Cents per	CY (*)		
6.4	4	EA (*)	Exploratory test pit excavation (as shown <u>and</u> where directed by Engineer): _____ Dollars and _____ Cents per	EA (*)		
6.5A	1	UNIT	Prepare a Traffic Control Plan: _____ Dollars and _____ Cents per	UNIT		

6.5B	1	UNIT	Maintenance of Traffic in accordance with the Traffic Control Plan (\$5,000.00): _____ Dollars (LS UNIT) and _____ Cents per	LS		
6.6	1	Allow	Uniformed officer (Allowance): TWO THOUSAND Dollars and ZERO Cents per (ALLOWANCE)	Allow	\$2,000.	\$2,000.00
6.7	1,000	HRS (*)	Uniformed flagger for traffic control: <u>eighteen Dollars and fifty Cents per</u>	HRS (*)	\$18.50	\$18,500.00
6.9	10	LF (*)	Remove and dispose of Asbestos Cement pipe, all diameters including earth excavation, backfill, disposal, and dewatering: _____ Dollars and _____ Cents per	LF (*)		
6.10	1	Allow	Allowance for geotechnical testing: TWO THOUSAND FIVE HUNDRED Dollars and ZERO Cents per (ALLOWANCE)	Allow	\$2,500.	\$2,500.00
6.11	1	Allow	Replace deciduous trees (as requested by the Owner): FIVE HUNDRED Dollars and ZERO Cents per (ALLOWANCE)	Allow	\$500.00	\$500.00
6.12B	1	EA (*)	Remove small trees (less than 24" dia.) where directed: _____ Dollars and _____ Cents per	EA (*)		
6.13B	1	EA (*)	Remove small stumps (smaller than 24" dia. at the cut face) where directed: _____ Dollars and _____ Cents per	EA (*)		

6.14.0224	200	LF (*)	Furnish and install 2" thick x 24" wide rigid polystyrene insulation: _____ Dollars and _____ Cents per	LF (*)		
6.15	1,000	lbs (*)	Calcium chloride for dust control: _____ Dollars and _____ Cents per	lbs (*)		
6.16	200	SY(*)	Turf Establishment including preparation and fine grading of sub grade, loam placement and grading, seeding & mulch: _____ Dollars and _____ Cents per	SY(*)		
6.19	100	CY	Temporary roadway stabilization stone (as directed) (MIN \$10/CY): _____ Dollars and _____ Cents per	CY		
632.0104	200	LF	Retroreflective paint marking, 4" line: _____ Dollars and _____ Cents per	LF		
632.3118	400	LF	Retroreflective Thermoplastic marking, 12" line: _____ Dollars and _____ Cents per	LF		

TOTAL BASE BID PRICE \$ _____.

Bid Add-Alternate: Provide the amount to be deducted from the Base Bid amount if the City provides a disposal site within 3 miles of the work site for all extraneous earthen non-regulated materials. (This item must be filled out)

\$ _____.

Total Bid (Base Bid + Bid Add Alternate) and Basis of Bid Award

\$ _____ . _____

1. The Contractor must be prequalified. Bids from unqualified Contractors will not be accepted.
2. The **lowest bid and basis of award** will be based on Engineers Estimate of Quantities.
3. (*) means indeterminate quantity
4. The owner reserves the right to waive any informalities or minor defects or reject any and all bids and to take any other action that is in the best interest of the Owner.

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.

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

_____ a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the _____

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.

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 DOCUMENTS

NOTICE OF AWARD

Dated _____, 20 ____

TO: _____
(BIDDER)

ADDRESS: _____

OWNER'S PROJECT NO: 7146 3B

PROJECT: McDonough Street Area Project 3B

OWNER'S CONTRACT NO: _____

CONTRACT FOR: _____

(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 have been awarded a contract for:

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

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

_____ copies of each of the proposed Contract Documents (except Drawings) accompany this Notice of 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 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.

3. (List other conditions precedent).

PROOF OF INSURANCE

Failure to comply with these conditions within the time specified will entitle **OWNER** to consider your bid abandoned, to annul this Notice of 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.

By

(OWNER)

(AUTHORIZED SIGNATURE)

(TITLE)

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF 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 _____, 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

McDonough Street Area Project 3B
(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 _____ 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 as follows:

140 Calendar Days and no later than November 1, 2017 for **Substantial Completion** (which excludes final pavement, markings and cleanup.

June 1, 2018 for **Total Project Completion**

Liquidated damages will be in the amount of \$ 300 for each calendar day of delay from the date established for substantial completion and \$ 300 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.

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

- (A) ADVERTISEMENT FOR BIDS
- (B) INFORMATION FOR BIDDERS
- (C) BID
- (D) BID BOND
- (E) NOTICE OF AWARD
- (F) AGREEMENT
- (G) LABOR AND MATERIAL PAYMENT BOND
- (H) PERFORMANCE BOND
- (I) MAINTENANCE BOND
- (J) NOTICE TO PROCEED
- (K) CHANGE ORDER(S)
- (L) CERTIFICATON OF SUBSTANTIAL COMPLETION
- (M) CERTIFICATION OF FINAL COMPLETION
- (N) CONTRACTOR'S AFFIDAVIT
- (O) CONTRACTOR'S RELEASE
- (P) GENERAL CONDITIONS
- (Q) SUPPLEMENTAL GENERAL CONDITIONS
- (R) SPECIAL CONDITIONS
- (S) DRAWINGS prepared by:

City of Portsmouth, NH

numbered 1 through 9 , and revised January 11 , 20 17

(U) SPECIFICATIONS prepared or issued by:

City of Portsmouth and attached hereto

_____ , and dated _____ , 20 _____

(V) ADDENDA:

No. _____ , dated _____ , 20 _____

No. _____ , dated _____ , 20 _____

No. _____ , dated _____ , 20 _____

No. _____ , dated _____ , 20 _____

No. _____ , dated _____ , 20 _____

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 _____ copies, each of which shall be deemed an original on the date first above written.

OWNER: _____

By: _____

Name: _____
(Please type)

(SEAL)

ATTEST: _____

Name: _____

Title: _____

CONTRACTOR: _____

By: _____

Name: _____

Address: _____

(SEAL)

ATTEST: _____

Name: _____

Title: _____

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 _____, 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 McDonough Street Project Area 3B in accordance with drawings and specifications prepared by City of Portsmouth, NH, 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.

(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

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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:

_____ BY: _____
(Witness) (Principal) (Seal)

(Surety Company)

_____ BY: _____
(Witness) (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.

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 South Dakota 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 _____, 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 McDonough St Project Area 3B in accordance with drawings and specifications prepared by the City Of Portsmouth, NH, 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.

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:

_____ BY: _____
 (Witness) (Principal) (Seal)

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B-4.2

(Surety Company)

_____ BY: _____
(Witness) (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.

MAINTENANCE BOND

At the Owner's election, a maintenance bond may be substituted for retainage at the completion of the project. If the Owner permits a maintenance bond, it shall be in the amount of **Twenty Percent (20%)** of the contract price with a corporate surety approved by the Owner. Such bond shall be provided at the time of Contract completion and shall guarantee the repair of all damage due to faulty materials or workmanship provided or done by the Contractor. This guarantee shall remain in effect for a period of one year after the date of final acceptance of the job by the Owner.

NOTICE TO PROCEED

Dated _____, 20 _____

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

ADDRESS: _____

OWNER'S PROJECT NO. _____

PROJECT: **McDonough Street Area Project 3B**

OWNER'S CONTRACT NO. _____

CONTRACT FOR: _____

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.

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:

(add other requirements)

Copy to ENGINEER
(Use certified Mail, return Receipt Requested)

(owner)
By _____
(Authorized Representative)

(Title)

ACCEPTANCE OF NOTICE

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

(Contractor)

this the _____, 20 _____
By: _____
Employer Identification Number: _____

B-7.1

CHANGE ORDER

No. _____

PROJECT: McDonough Street Area Project DATE OF ISSUANCE: _____
 OWNER: _____

 (Address)
 CONTRACTOR: _____ OWNER's Project No. _____
 CONTRACT FOR: _____

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

Description:

Purpose of Change Order:

Justification:

Attachments: (List documents supporting change)

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIME
Original Contract Price \$ _____	Original Contract Time _____ (days or date)
Previous Change Orders \$ _____	Net change from previous Change Orders _____ (days)
Contract Price prior to this Change Order \$ _____	Contract Time prior to this Change Order _____ (days or date)
Net Increase (Decrease) of this Change Order \$ _____	Net Increase (decrease) this Change Order _____ (days)
Contract Price with all approved Change Orders \$ _____	Contract Time with all Change Orders _____ (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: APPROVED: APPROVED: APPROVED:
 By: _____ By: _____ By: _____ By: _____
 PW Director Finance Director Contractor Owner

 Date Date Date Date

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 _____ calendar days of the above date of Substantial Completion.

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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 _____

(Engineer)

By: _____

CONTRACTOR accepts this Certificate of Substantial Completion on _____, 20 _____

(Contractor)

By: _____

OWNER accepts this Certificate of Substantial Completion on _____, 20 _____

(Owner)

By: _____

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 _____
(Owner)

and _____ of _____
(Contractor) (Address)

dated _____ for the construction of the _____
(Project Name)

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 FINAL RELEASE AND WAIVER OF LIEN

Project/Owner

Contractor

Project: _____

Name _____

Address: _____

Address: _____

City State Zip

City State Zip

Owner _____

Contractor License: _____

Contract Date: _____

TO ALL WHOM IT MAY CONCERN:

For good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the undersigned Contractor hereby waives, discharges, and releases any and all liens, claims, and rights to liens against the above-mentioned project, and any and all other property owned by or the title to which is in the name of the above-referenced Owner and against any and all funds of the Owner appropriated and available for the construction of said project, and any and all warrants drawn upon or issued against any such funds or monies, which the undersigned Contractor may have or may hereafter acquire or process as a result of the furnishing of labor, materials, and/or equipment, and the performance of Work by the Contractor on or in connection with said project, whether under and pursuant to the above-mentioned contract between the Contractor and the Owner pertaining to said project or otherwise, and which said liens, claims or rights of lien may arise and exist.

The undersigned further hereby acknowledges that the sum of

_____ Dollars (\$ _____) constitutes the entire *unpaid* balance due the undersigned in Connection with said project whether under said contract or otherwise and that the payment of said sum to the Contractor will constitute payment in full and will fully satisfy any and all liens, claims, and demands which the Contractor may have or assert against the Owner in connection with said contract or project.

Dated this ___ day of _____ 20__

Contractor

Witness to Signature

By _____

By _____

Title _____

Title _____

C. GENERAL CONDITIONS

GENERAL CONDITIONS

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- 50. [Reserved]**
- 51. [Reserved]**
- 52. Project Sign**
- 53. [Reserved]**
- 54. Public Convenience and Traffic Control**
- 55. Pre-Construction Conference**
- 56. Maintenance During construction**
- 57. Cooperation with Utilities**
- 58. Work Performed at Night, and on Sundays and Holidays**
- 59. Laws to be Observed**
- 60. Permits**
- 61. Control of Pollution**
- 62. Use of Explosives**
- 63. Arbitration by Mutual Agreement**
- 64. Taxes**
- 65. Separate Contracts**

GENERAL CONDITIONS

1. Contract and Contract Documents. 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.
 - 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.

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. Additional Instructions and Detail Drawings. 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. Shop or setting drawings shall be in accordance with the following:

4.1 The Contractor shall furnish 3 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.

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, 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. Contractor's Title To Materials. 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.

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 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 Options.

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 to indicate the preferred choice of the City and 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, may be considered equally acceptable provided the material, article, or equipment so proposed is, in the opinion of the Engineer, of equal quality and function.

8.1 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.

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

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

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

9. Patents. 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. 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 and other utility work, the Engineer will provide Autocad drawings for the Contractor's use for stake out 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. 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 for the Engineer's review and approval.

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 Obligations are 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. Weather Conditions. 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. Time For Completion and Liquidated Damages. 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:

- 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. 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. Differing Site Conditions. 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. 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 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 Contractor. 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 Final 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. Payments by Contractor. 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. Insurance. The Contractor and any Subcontractor shall obtain all the insurance required under this article and such insurance shall be approved by the Owner.

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.

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.

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.

27.4 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.

27.5 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.

27.6 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.

27.7 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. Contract Security. 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. Additional or Substitute Bond. 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. Assignments. 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. Mutual Responsibility of Contractors. 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. Subcontracting. 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.
 - 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. Authority of the Engineer. 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. Stated Allowances. 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. Use of Premises, Removal of Debris, Sanitary Conditions. 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. Quantities of Estimate. 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 affected 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 of lands and rights-of-way 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. General Guarantee. 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. Errors and Inconsistencies. 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. Required Provisions Deemed Inserted. 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. Protection of Lives and Health. 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. OSHA Construction Safety Program.

43.1 Pursuant to NHRSA 277:5-a, the Contractor shall provide an Occupational Health and Safety Administration (OSHA) 10-hour construction safety program for its on-site employees. All employees are required to complete the program prior to beginning work. The training program shall utilize an OSHA-approved curriculum. Graduates shall receive a card from OSHA certifying the successful completion of the training program.

43.2 Any employee required to complete the OSHA 10-hour construction safety program, and who cannot within 15 days provide documentation of completion of such program, shall be subject to removal from the job site.

43.3 The following individuals are exempt from the requirements of the 10-hour construction safety program: law enforcement officers involved with traffic control or jobsite security; flagging personnel who have completed the training required by the Department of Transportation; all relevant federal, state and municipal government employees and inspectors; and all individuals who are not considered to be on the site of work under the federal Davis-Bacon Act, including, but not limited to, construction and non-construction delivery personnel and non-trade personnel.

44. Equal Employment Opportunity. 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. Interest of Federal, State or Local Officials. 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. Other Prohibited Interests. 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 Prior to Acceptance. 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. Suspension of Work. 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. Project Sign. NIC

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. Pre-Construction Conference. 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 If the 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. Laws to be Observed. 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. 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. Taxes. The Contractor shall 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

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>
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 GC27	C-2.2, 2.3, 2.4
SC-28	Contract Security	C-2.4
SC-44.2	Non-Discrimination	C-2.4
SC-59.2	Indemnification, Special Condition to GC 59.2	C-2.4
SC 62.5	Use of Explosives	C2.4

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. Following recommendations by the Engineer, the Contractor and Owner will enter into negotiations to modify the contract in writing.”

SC-24.2 Delete paragraph 24.2 (a). Delete the last sentence of paragraph 24.2 (b). Change the last sentence of paragraph 24.2 (c) by substituting “retained amount” for “escrow account”. Add to the end of the last sentence of paragraph 24.2 (d) the following “unless owner agrees to allow the substitution of a maintenance bond”.

SC – 24.6 Replace “after approval by the Engineer” with “of any disputed amounts claimed due”.

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.”

Add the following to Article 27.2:

“Coverage amounts may be satisfied by excess or umbrella policies provided the City of Portsmouth is listed as an additional insured on the excess/umbrella policy as well as the general liability policy. The City of Portsmouth shall be named as additional insured as follows:

City of Portsmouth
Attn: Legal Department
1 Junkins Avenue
Portsmouth, NH 03801”

Change the following in paragraph two, Article 27.3:

“Limits of liability: ~~\$1,000,000~~ \$2,000,000 combined single limit for bodily injury and property damage.”

“Contractor will indemnify Owner and Engineer against all suits, claims, judgments, awards, loss, cost or expense (including without limitation attorney’s fees) arising in any way out of the Contractor’s negligence or breach of its obligations or warranties under this Contract. Contractor will defend all such actions with counsel satisfactory to the Owner at Contractor’ expense, including attorneys’ fees and will satisfy any judgment rendered against Owner in such action.”

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. See Appendix E for City of Portsmouth Blasting Ordinance.

D. TECHNICAL SPECIFICATIONS

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>
POW	Prosecution of Work
01010	Summary of Work
01020	Coordination
01025	Measurement and Payment
01045	Cutting and Patching
01070	Abbreviations and Symbols
01090	Reference Standards
01100	Alternates
01200	Project Meetings
01201	Community Information
01310	Construction Schedules
01340	Submittals
01381	Pre-Construction Video Records
01382	Video Inspection
01500	Temporary Facilities and Controls
01510	Temporary Utilities
01515	Temporary Water (Potable)
01520	Maintenance of Sewer Flows
01546	Use of Explosives
01548	Vibration Monitoring
01562	Dust Control
01570	Traffic Regulation
01580	Project Identification
01590	Temporary Field Office
01611	Owner's Right to Material
01630	Substitution 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:

- Brewster St (575 LF)
- Langdon St: (575 LF)
- McDonough St: (420 LF)
- 'RR' Street: (200 LF)
-

Work to be completed for this project includes the following:

- **New Sanitary Sewers:**
 - 8" to 12" PVC, with manholes, all depths
 - Replacement of all sanitary sewer service laterals to homes as directed
 - Maintenance of combined sewer (sanitary and storm drainage) flows

- **New Storm Sewer Drains**
 - 6" to 24", all depths with manholes and stormwater unit
 - Modifications to the existing combined sewer system, to separate combined flows
 - Installation of storm sewer laterals whether public or private (for inflow removal)
 - Maintain drainage until completion of new systems

- **Water Distribution Improvements**
 - 8" CLDI 52 water mains
 - Replacement of all water service laterals
 - Maintenance of water system without interruption to service to users
 - Temporary Water systems

- **Roadway & Property Restoration**
 - Roadway gravel replacement & fine grading to elevations shown on the plans or as directed

- Pavement & Curb Installations
 - Concrete sidewalk installation
 - Complete Restoration of all properties, public and private
 - Perform testing of systems prior to paving
- **Coordination and Protection of Utilities**
 - Coordinate utility relocation work (by others) with utility companies
 - Coordinate protection of existing gas mains with Unitil. **Note** that Unitil has replaced and/or relocate existing cast iron gas mains. However, some conflicts may remain with existing plastic (PE) gas mains. Contact for Unitil is Phil Johnson (603-294-5157)
 - Coordinate temporary water shutdowns with Portsmouth Water Department (427-1552)
 - Coordinate with Eversource regarding the shoring up of poles during excavation.
- **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. PROJECT TIME

This Contract includes two separate substantial completion dates:

1. **Substantial completion** of work includes sewer mains and manholes, sewer services, drain pipe, manholes and catch basins, drain services, water mains and services, road box out and gravel, binder level pavement, curb installation, binder on driveway aprons and sidewalks.
November 1, 2017 for **Substantial Completion**
2. **Final completion for the remaining work**
June 1, 2017 for **Total Project Completion**

3. 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:

3.1 Road Reconstruction

Reclaim roadway to reclaimed stabilized road base for use as a surface during pipe installation. Once the pavement is ground or removed, the contractor must maintain a passable travel way surface. *The Contractor will be responsible for maintaining traveled way in a stable condition (free of rutting) for the duration of the project*

Upon completion of all pipe installation and testing, roadway reconstruction/restoration can be completed, including any additional excavation, placement of gravel and bituminous binder course placement. Raise all structures/castings to binder elevation, unless otherwise directed.

Following one (1) winter season, adjust castings & install pavement wearing course and striping.

3.2 Utility Installation

This project consists of complex pipe sequencing issues. It will be necessary to maintain all existing sewage/drainage (combined flows), gas lines and water systems throughout the duration of the Project. The Contractor shall review sewer, water, and drainage sequencing with the Owner and Engineer. The existing combined sewer system will need to be maintained to prevent flooding and/or surcharging until new systems are operational. Water and gas systems will also be maintained and/or protected from damage while other utilities are installed. The need for temporary utilities will depend on the contractor's operations. Temporary systems (water and sewer) installed by the Contractor to maintain or protect utilities from damage will be measured for payment only to the amounts identified in the Bid Schedule. Additional systems are subsidiary and will not be measure for payment, and the Contractor will need to consider this in the preparation of their bid. In addition, the Contractor will need to consider the following anticipated project sequencing for utility installation during their bid preparation.

3.3 Testing

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

3.4 Property Restoration

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

4. 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 (excepting local traffic) are anticipated. Construction warning signs must conform to MUTCD standards, as applicable. Trenches will be backfilled (plates may be used occasionally with prior approval from the Owner) and roads shall be re-opened to provide safe vehicular and pedestrian traffic at the end of each working day. The Plan shall also include the anticipated number of flaggers to be used for a given work area. Police details shall only be used at major intersections (Islington St). 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. The Contractor shall coordinate implementation of detours with the DPW. However, the Contractor shall maintain access to properties and driveways throughout construction, to the extent that is possible.

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.

5. CONSTRUCTION LAYOUT

Work is to be generally constructed as shown on the drawings. The Contractor will be responsible for all construction layouts. An AutoCAD drawing containing horizontal control points (and coordinates) and TBM's will be provided by the Engineer and confirmed by the Contractor, for reference throughout the project. 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. The Engineer will provide an electronic copy of plans and coordinates to the Contractor upon request to facilitate the Contractor's layout, providing the Contractor executes a release concerning the information transmitted.

6. REUSE OF MATERIALS

Re-use of crushed concrete and/or reclaimed pavement can be used for sidewalk base or drive way restoration, but will only be allowed if it meets the specified gradation for crushed gravel and does not include silt, clay, loam, humus, woody or other non-granular or material considered unsuitable by the engineer.

7. WATER

The use of a temporary water system will be necessary for the contractor to sequence his work, to prevent damage to existing water systems or to minimize interruptions to water services to the public. Payment will be made for temporary water systems up to the quantity provided for in the bid schedule. Temporary water systems exceeding the quantities provided for in the bid schedule are subsidiary to the Contractor's operations and will not be measured for payment. Temporary service connections shall be made at the curb stop. Bypass of water meters and back flow preventers will not be allowed. It is expected that the Contractor has taken the need for temporary water systems into account in preparation of his bid.

The Contractor will be required to submit a plan for temporary water systems to the Engineer for review. Plans for water installations and/or temporary systems are subject to and approval by the City Water Department. Interruptions to homeowners and businesses need to be scheduled one week (5 business days) in advance and be conducted in manners that will not inconvenience or impact

property owners. Two (2) business days (48-hours) verbal and written notice shall be given to homeowners and businesses prior to scheduled interruptions in service.

8. CONFLICTS AND COORDINATION WITH EXISTING UTILITIES

It will be the Contractor's responsibility to coordinate with the utility companies 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.

Gas Lines to be replaced

Unitil has replaced and moved lines within the project area that were identified by the Engineer as conflicting. The Contractor will review locations of the gas lines and coordinate the scheduling of their work with the gas company.

9. OTHER BURIED UTILITIES AND SERVICE PIPES

Service pipes for gas, sewer and water utilities are not necessarily shown on the drawings but are to be expected for each building unit. Where buildings have multiple units, multiple services can be expected. Additional or unknown utility crossings will be measured for payment as described in Item 6D. The Contractor is expected to coordinate utility markings through Dig Safe, Unitil and the City of Portsmouth, Water and Sewer Department before proceeding with this work. Utility Markings for sewer and water are based on information on file and should be considered approximate. Repairs to unknown, unmarked or mismarked utilities will be measured for payment as described in item 6E. Repairs to damaged utilities either shown on the plans or through markings on the ground will not be measured for payment. Direct conflicts with utilities resulting in the need for relocation of utilities will be measured for payment, utilizing contract unit items, as deemed appropriate by the Engineer. Additional compensation beyond unit items for loss of production, delays or downtime will not be considered.

10. MEETINGS

Public Information Meetings (Also, see Section 01201):

The Contractor, together with City Officials and the Engineer, shall schedule and attend one public information meeting with residents and business owners prior to the start of construction and at the beginning of construction following any temporary disruptions of the work (i.e., winter shutdown).

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 will be held at a maximum frequency of twice monthly, unless weekly meetings is 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.

11. TEMPORARY EROSION CONTROL

The Contractor's attention is directed to the provisions of Sections 02540 and 02402 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 North Mill Pond. Sediment and erosion controls shall be operational prior to commencing trench de-watering operations.

12. CONSTRUCTION DEWATERING (Also, refer to Section 02402)

Trench dewatering may be required to complete the work. The Contractor 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 Shelley Puleo at (617) 918-1545. The DES contact for this permit is Amy Clark at (603) 271-0671.

Appropriate sediment and erosion controls shall be operational prior to commencing trench dewatering operations. Construction dewatering is incidental. See specification Sections 02402 and 02650 for additional information.

13. SIDEWALKS

The project includes the construction of new sidewalks; however, all sidewalks will not be replaced.

The Contractor shall protect from damages sidewalks designated to remain, to the extent that is possible. Sidewalks damaged as a result of the Contractor's operations or equipment will be repaired at the Contractor's own cost. Cross sections are provided for grading of sidewalks. Sidewalks will slope towards the curb line, unless otherwise shown or directed. Careful grading around doorways and steps is required to prevent puddling. Sidewalk grading shall be in accordance with ADA requirements. Review sidewalk grading with the Resident Project Representative before concrete is placed.

14. GRANITE CURBING

Granite curbing over 3.5' long shall be carefully removed, stockpiled offsite and reset. New curbing shall be installed as necessary to supplement. All 8" granite curbing removed and not reset will remain property of the Owner and shall be delivered to a location as directed by the Owner.

15. RAISING STRUCTURE COVERS AND GRATES

The Contractor shall include one initial structure and casting (sewer and drainage) adjustment to be considered subsidiary to the bid items. The City may request an additional adjustment of structures prior to placement of the pavement wearing course. This second adjustment, if requested, will be paid under adjustment bid items included in the bid schedule. Water and gas valves will be set to binder and final grade as a subsidiary item to the work.

16. GEOTECHNICAL INFORMATION (refer to Appendix B)

To assist the Contractor in preparing a bid, borings logs are included in Appendix B of the Project Manual. Fluctuations in groundwater may exist and may be tidal in the lower areas.

17. 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. Regulated soils are anticipated throughout the project area, particularly in the rail yard area. Unit items are provided to facilitate payment for varying site conditions that may exist.

17.1 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.
- It shall be the Contractor's responsibility to document and track all excavated materials (regulated and non-regulated) in accordance with all applicable local, state and federal regulations and will provide said documentation to the owner at the completion of the project or upon request.

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 (i.e., exceed NHDES SRS S-1 Standards). 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.

Regulated Groundwater

Defined: Groundwater requiring special treatment (or offsite disposal) that cannot be discharged to sewers or surface waters utilizing normal turbidity and erosion control BMPs **and** requires specialized treatment systems such as filtration tanks, carbon contactors, water stripping towers, etc. The Owner, in cooperation with the permitting authority, will maintain the right to determine protocols and procedures for disposal of regulated groundwater.

17.2 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 un-regulated 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 3rd party testing company, approved by the Owner, for analytical soil testing. An allowance for Contractor re-imburement is provided.

Item 1.15F: Disposal of Regulated Groundwater)

Where directed, the Contractor shall dispose of regulated groundwater, in cooperation with the Owner and regulatory agency. Work for this item includes special handling and does not include discharge to existing sewers, infiltration beds or sediment control devices. An allowance for Contractor re-imburement is provided.

18. DUST CONTROL (refer to Section 01562)

Due to the close proximity of businesses and homes to the work zone, 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.

19. PEDESTRIAN TRAFFIC

The work areas are in residential neighborhoods and pedestrian traffic corridors need to be maintained on a daily basis. The Contractor will need to separate work zones from pedestrian corridors.

20. WORK HOURS (Refer to Section 01010)

It is anticipated that the Work will be completed Monday through Friday during daylight hours (7 AM to 5 PM) unless specifically noted otherwise. Requests to perform nighttime or weekend operations 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. Holiday work will not be allowed unless permission is granted from the Department.

21. 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.

With City approval, the Contractor may use the side of the roadway for staging of pipe and structures (CB's and manholes) 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 and a minimum of 20 feet of roadway is maintained as a smooth traveling surface for vehicular traffic.
- C. That the Contractor will relocate structures upon notification by the City, if deemed necessary to maintain public relations and/or public safety.
- D. The contractor shall not park in individual driveways or parking areas not owed by the City. Any damage to private areas will be paid for entirely by the contractor.

22. 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.

23. WINTER MAINTENANCE SEASON

Prior to the winter shutdown season, the Contractor shall meet with the Owner and the Engineer relative to the condition of the project site that is to remain for the winter shutdown period. This is to ensure that the roadways and sidewalks are in a condition which is satisfactory from a maintenance and functionality standpoint for the winter season.

24. 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 if determine appropriate by the Engineer. 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.

25. ABANDONMENT OF EXISTING PIPE

All pipes to be abandoned (water, sewer, drain, etc.) 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.

26. VIBRATION MONITORING

Vibration Monitoring in addition to the vibration monitoring for blasting, required by state and local ordinances, will be provided by the Contractor upon request, if deemed necessary to monitor vibration resulting from the Contractor's equipment, compaction efforts or operations. Vibration monitoring for blasting operations is provided at the Contractors own expense.

27. ARCHEOLOGICAL SENSITIVITY

No archeologically sensitive areas are identified within the project area. However, in the event that archaeological resources are discovered, then the Contractor and the Owner's Representatives will meet to discuss protocols to be employed by the Contractor. Should delays occur during access and observation of these areas the Contractor will be compensated as stipulated by Item 6C.

28. WORK ON PRIVATE PROPERTY

The City will obtain homeowner authorization for work on private property. The Contractor will review all sewer and/or drain connection work, pipe locations and grades with the City in advance. Work on private property will need to be scheduled in advance, and the homeowner shall be notified of the Contractor's schedule a week in advance. The City reserves the right to request additional sanitary sewer or storm sewer work, with homeowner's approval, if the work is considered necessary to re-route flows from sewers that will be abandoned by the City. Property restoration, excluding any approved tree removal that may be necessary, is subsidiary to the work and will not be measured for payment. Property restoration will be completed by the Contractor to the existing or better condition.

Work requiring access to buildings will need to be coordinated with the Owner of the property, the Engineer and/or the Portsmouth Sewer Department. Plumbing modifications at building interior, pipe penetration and materials through foundation, and connection outside the foundation, will need to be inspected by the City's Plumbing Inspector. Materials and workmanship shall meet all local ordinances. Refer to Section 01020 for additional coordination efforts.

29. TREE REMOVAL

The Contractor will remove them during the completion of the work (Items 6.13A and 6.13B). No trees will be removed without prior approval from the Mayor's Trees and Public Greenery Committee (City of Portsmouth). This approval will be obtained by the City.

30. TRIMMING OF TREES

Tree trimming shall be completed by the City. Prior to the start of the project, or a particular phase of the project, the Contractor shall walk the site and mark all the limbs that will require trimming in order to complete the work and minimize further damage to the tree. Upon approval for all the limbs

to be cut by the Engineer and the Owner, the Contractor shall then coordinate with the City to have the required limbs cut. This work shall be incidental and shall not be measured for payment.

31. PROTECTION OF TREES

The Contractor will endeavor to prevent damage to all trees that are designated to remain. Tree limbs that impede normal construction operations will be removed as described in Paragraph 30 above. Trees to be removed are shown on the drawings or in Appendix I of these specifications. Additional limb or tree removal is subject to Owner approval. A penalty will be assessed to the Contractor for damage to trees as follows:

- Limbs damaged following trimming (Paragraph 29): \$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.

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 WORK UNDER THIS CONTRACT

- A. The work to be completed under this Contract includes all work as shown on the drawings or identified in the contract documents, including but not limited to:
1. Construction of new Sanitary Sewer System
 2. Construction of new Storm Sewers
 3. Construct new Water Distribution mains and service connections.
 4. Maintenance of sanitary and storm sewer flows (by-pass pumping as necessary), and potable water system (temporary water system used as required).
 5. Traffic control planning and maintenance of roadways, driveways and trenches.
 6. Piping and structure modifications necessary to tie into existing systems.
 7. Roadway and sidewalk reconstruction.
 8. Complete restoration of all properties both public and private. Restoration shall be performed continuously as the work progresses.

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 and submit to the City of Portsmouth Department of Public Works, a Traffic Control Plan for review and approval (see Prosecution of Work and Section 01570 of these specifications).
 3. Furnish all labor, materials, equipment and incidentals required to complete all work in accordance with the bid 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 City of Portsmouth Department of Public Works, including securing any required permits (i.e., excavation and flagging 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. 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.
 9. Contractor shall provide Temporary water in accordance with Section 01515 Temporary Water (Potable) where needed to maintain uninterrupted service.
 10. Contractor shall maintain sanitary and storm flow during construction.

11. The work zone is located in residential neighborhoods with high volumes of pedestrian traffic. The Contractor shall conduct work in a professional manner. Any unprofessional conduct (i.e., foul language and use of excessive speed) will not be tolerated.
12. Contractor shall maintain access to all homes and businesses while completing the work.

1.3 ENUMERATION OF DRAWINGS

- A. The following drawings which form a part of this contract are:
 1. Sheet No's 1 through 9, sheets entitled McDonough Street Area Project 3B

1.4 ENUMERATION OF SPECIFICATIONS

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

- A. Bidding Requirements
- B. Contract
- C. Conditions of Contract
- D. Technical Specifications
- E. NHDOT Standard Specifications and Amendments

Appendix Geotechnical Information
 City Tie Sheets for water services

All Addenda issued during the bidding process also form a part of this Contract.

PART 2 - PRODUCTS

2.1 STANDARDS

- A. The contractor shall meet the requirements of the following:
 1. City of Portsmouth standards for water and sewer construction
 2. NHDES standards for water and sewer construction

PART 3 - EXECUTION

3.1 WORK SEQUENCE

- A. No work may commence until a Traffic Control Plan has been approved in writing by the Public Works Department in accordance with Section 01570 – Traffic Regulation and Prosecution of Work.
- 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 can 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 Project Drawing and those property owners will be able to tie-in to the new sewer system. 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 sewer 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 the lowest elevations to the highest elevations for each street or as otherwise approved by the Engineer.

3.2 SPECIAL REQUIREMENTS

- A. Contractor shall maintain existing utilities to all existing users at all times. Exceptions will be considered; however, the service interruptions to water and sewers shall not exceed 2 hours.

- B. Where possible the Contractor shall maintain access to all properties during construction. Advance notification shall be provided otherwise.
- C. The Contractor shall schedule and construct pipe installations in such a manner that will minimize the need for temporary pavement repairs. Temporary pavement will be installed only where directed.
- 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.
- F. Asbestos cement sewer pipe if encountered in areas requiring sewer replacement will require special handling. The Contractor shall comply with all local, state and federal requirements governing the handling, removal, transport and disposal of this material.
- G. The Contractor shall maintain one-lane traffic unless road closures are approved by the Public Works Department or noted in the Contract Documents, and all necessary detour signs are in place in accordance with the Traffic Control plan required in Section 1570 – Traffic Regulation.
- H. Contractor shall determine the location of existing water and sewer service connections in the field.
- I. If requested by the Owner, the Contractor shall provide a sewer video inspection (Section 01382) of all completed sewer lines installed or rehabilitated in this project.

3.3 WORK RESTRICTIONS

- A. Hours of Construction - Work on the project shall be conducted between the hours of 7:00 a.m. and 5:00 p.m., excluding weekends and holidays.

3.4 CONTRACTOR SCHEDULE

- A. Contractor shall provide an updated schedule as necessary but no less than every 90 days.
- B. Provided schedule shall be Gantt chart, Critical Path Method, or other tabular form approved by the Engineer.

END OF SECTION

SECTION 01020

COORDINATION

PART 1 – GENERAL

- 1.1 DESCRIPTION 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. 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. The Contractor, by nature of this project, will be working in close proximity to residents, businesses and traveled ways. Portions of the service work will extend onto private property. 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.
- A. 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.
 - B. 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.
 - C. The contractor shall be responsible for the maintenance of sanitary and storm flows during construction
 - D. The Owner will be responsible for the operation of all existing facilities and any new facilities accepted during the construction period.
 - E. 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.
 - F. 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.
 - 2. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
 - 3. The Contractor will be responsible for coordinating all required internal and external plumbing inspections for work completed re-routing internal plumbing with the City of Portsmouth Inspection Department.

Plumbing Inspector
Brian Kiely
(603) 610-7264

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 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.
2. The following is a list of contacts for utilities in the project area:

Eversource (PSNH)
Mark Collins 332-4227 ext 5555325
mark.collins@eversource.com

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. 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.

F. Gas

1. 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

- G. The Contractor shall sequence daily operations to accommodate school bus schedules and weekly trash and recycling pickup. The day and time of pick-up may vary based on location of work.

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.
- 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 replace 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 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.
- 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 Paragraph 24.2 of the General Conditions as modified by the Supplemental General Conditions. The Owner shall pay the Contractor within 45 days of receipt of the Engineer approved invoiced amount.

1.6 PAYMENT FOR MATERIAL DELIVERED ON LUMP-SUM PROJECTS

- 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, nonperishable materials and equipment which are to be incorporated into lump sum type contracts, and 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 an 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 OR SUBSIDIARY WORK

- A. Incidental work items for which separate payment is not measured includes the following items:
1. Clearing, Grubbing and Stripping.
 2. Clean Up.
 3. Sod or Loam and Seeding unless paid for under other items.
 4. Restoration of property or repairs to any facilities that are impacted from construction performed by the Contractor unless otherwise paid for.
 5. Cooperation with utility companies, Owner's representatives, or other Contractors employed by the Owner.
 6. Utility crossings, unless otherwise paid for.
 7. Utility relocation unless otherwise paid for.
 8. Minor items - Such as replacement/relocation of mailboxes, guard rails, rock walls, etc.
 9. Dewatering, unless otherwise paid for.
 10. 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.
 11. Repair to utilities damaged as a result of Contractor operations
 12. **Temporary water systems exceeding the quantity provided for on the Bid Schedule**, necessary for the Contractor to perform the work without disruption to the existing facilities, will not be measured for payment.
 13. Maintenance of Sanitary/Storm Sewerage flows (by-pass pumping) is subsidiary to sewer construction, unless otherwise included in the bid schedule for payment.
 14. Temporary roadway stabilization materials (crushed gravel or reclaimed asphalt product) unless paid for under separate items.
 15. Prosecution of Work in accordance with project specifications.
 16. Dust control is included in Item 6.5B and is required on a daily basis.
 17. Any work shown or described on the drawings or in the Contract Documents, for which no pay item exists, shall be considered subsidiary to the project and will not constitute additional payment.

1.9 DESCRIPTION OF PAY ITEMS

- A. The following sections describe the measurement of and payment for the work to be done under the respective items listed in the Bid (form).
- B. Each unit or lump sum price stated in the Bid (form) shall constitute full compensation, as herein specified, for each item of the work completed.
- C. **Refer to NHDOT Standard Specification for Road and Bridge Construction (Latest Edition) and necessary special provisions for unit items not described in this section.**

ITEM NO. 1.0: MAINTENANCE OF COMBINED SANITARY AND STORM SEWER FLOW

- A. Method of Measurement
1. Maintenance of combined 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 combined 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.

ITEM NO. 1.1. XX: FURNISH AND INSTALL SEWER PIPE (ALL SIZES)

- A. Method of Measurement:
 1. The length of pipe **for sewer mains** shall be measured by the linear foot along the horizontal 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.
 2. The length of pipe **for service laterals** shall be measured horizontally along the top of the completed pipe over its centerline within the limits indicated on the drawings or as ordered. Vertical cleanout pipe and fittings will be considered subsidiary to the service lateral items and will not be measured for additional payment.
 - a. **Lateral work shall be paid under Item 1.1.06A** (generally to behind the proposed sidewalk, including the clean out).
 3. Note: XX=pipe diameter in inches
- 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, fittings and adapters, stubs with cap ends, sewer lateral cleanouts, materials, labor, equipment and tools necessary for hauling, handling, laying, jointing and testing pipe, complete and in place as shown on the drawings.
 3. Said unit price payment will also be considered full compensation for all necessary clearing and grubbing, earth excavation, removal of existing structures, existing (non asbestos) pipe removal and disposal, bedding, backfill, compaction, rigid insulation (as directed), 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 also be considered full compensation for all construction dewatering work required to pre-drain soils prior to final excavation unless paid otherwise through well-point dewatering, and to install the pipe in the dry as specified under Section 02402 and/or Section 02650 including furnishing, installing, operating and removing of dewatering systems unless paid for under separate unit item.
 5. Said unit prices for each pipe bid item shall also constitute full compensation for the following:
 - a. Maintenance of existing sewer service through temporary connections or bypass pumping, unless paid for under a separate item.
 - b. Restoration of all property to pre-construction conditions.
 - c. Restoration of curb to pre-construction conditions (unless expressly shown as paid for under a separate bid item).
 6. Said price shall also include manhole corings, fittings, adapters, and joining not covered under a separate bid item.
 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 furnishing and installing "Inserta-Tee" connections for Sewer Services on mains greater than or equal to 15 inches (all types).
 9. Maintenance of existing sewer flows will be paid under Item 1.0

10. Said unit price shall also include full compensation for coordination with utility companies, for the relocation of utilities, including but not limited to water service pipes (less than 6 inch in diameter), gas, drain, electric and telephone, which interfere with the proposed sewer, unless payment is provided for under another item.
11. Said unit price shall also constitute full compensation for the removal and replacement of bushes, plantings, sod, loaming and reseeding of grassed areas disturbed by the Contractor's operations, and replacement of curb, unless payment is provided for under another item.
12. **Payment for sewer mains** shall be broken down in accordance with the following percentages:
 - a. Sewer main line in place and backfilled - 90%
 - b. Sewer main line successfully cleaned and tested - 10%. A sewer main will only be considered tested when pressure, deflection and lamping tests have all been completed and accepted by the Owner, Engineer and NHDES.
13. **Payment for service laterals** shall be broken down in accordance with the following percentages:
 - a. Service lateral in place and backfilled - 90%.
 - b. Service laterals successfully cleaned, tested and re-connected to the existing service (for live connections), and restoration complete - 10%.

ITEM NO. 1.1.06A: CAST IRON COVERS FOR SEWER SERVICE CLEANOUTS

- A. Method of Measurement:
 1. Cast iron covers for sewer service cleanouts in paved areas will be measured by each cover successfully installed and approved by the engineer to line and grade of the final surfaces.
- B. Basis of Payment:
 1. Cast iron covers for sewer service cleanouts in paved areas shall be paid for at the contract price per each
 2. Said unit price shall constitute full compensation for the furnishing of all materials including labor, equipment and tools necessary for hauling, handling and installing covers complete and in place.
 3. Said unit price shall constitute full compensation for all necessary excavation, backfill, compaction, sheeting, bracing, cleaning and other incidental work not specifically included for payment under other items.
 4. Said unit price shall constitute full compensation for the removal and replacement of curbs, bushes, plantings, sod, loaming and reseeding of grassed areas disturbed by the Contractor's operations, unless otherwise paid for.

ITEM NO. 1.5. X: FURNISH AND INSTALL 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.
 2. Note: X=inside diameter in feet
- 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, construction fabric, manhole 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 **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.
7. Said unit price shall be considered full compensation for maintenance of sewer flows through bypass pumping, unless paid for under a separate item.
8. Said unit price shall include full compensation for all construction dewatering work required to pre-drain soils prior to final excavation and to install the manholes in the dry as specified under Section 02402 and/or Section 02650 including furnishing, installing, operating and removing of dewatering systems unless paid for under separate items.
9. Removal and disposal of existing structures for the installation of new structures shall be incidental to this item.
10. Actual payment for these shall be broken down in accordance with the following percentages:
 - a. Manhole in place and backfilled - 75%.
 - b. Manhole successfully tested - 10%.
 - c. Manhole cleaned and invert built – 15%

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

- A. Method of Measurement
 1. Adjusting new and existing sewer manhole frame and cover assemblies to 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, Item 1.5.X, 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. 1.6: FURNISH AND INSTALL INSIDE DROP STRUCTURE FOR SEWER MANHOLE

- A. Method of Measurement:
 1. Drop structures for all diameter pipes will be measured by the vertical foot from the invert in to the lower invert, of the constructed drop connection.
- B. Basis of Payment:
 1. Payment under this item shall be at the Contract unit price per vertical foot.
 2. Said unit price will be considered full compensation for furnishing and installing internal drop structure, including pipe and fittings, stainless steel straps, holes and other modifications to manhole base and risers, and other features as shown on the drawings.

ITEM NO. 1.8X: 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: X shall be the following:
 - 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.

ITEM NO. 1.9X: FIELD CORE SEWER MANHOLES AND FOUNDATIONS (FOR RELOCATED SERVICES) 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.
 - 2. Note: X shall be the following:
 - A = 4” through 15” field cores
 - B = 18” through 30” field cores
 - C = Field core through stone or granite foundation
 - 3. Foundation cores shall only be measured for payment after successful inspection by the City of Portsmouth Plumbing Inspector.
- 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.
 - 4. Said payment shall be considered full compensation for coordination with homeowners to schedule work and to coordinate inspection of foundation core by the City of Portsmouth Plumbing Inspector.

ITEM NO. 1.10: REMOVE SEWER MANHOLES

- A. Method of Measurement:
 - 1. Removal of sewer manholes, outside normal excavation limits (for any new utility), shall be measured as a single unit for each manhole removed as shown on the drawings, or as directed (i.e. if any part is within pay limits of adjacent work, it will not be measured for payment).
 - 2. Manholes removed within the limits of excavation for any proposed utility are subsidiary and will not be measured for payment.
- B. Basis of Payment:

1. Payment under this item shall be at the Contract unit price for each manhole removed in accordance with the drawings and specifications.
2. Payment under this item shall constitute full compensation for all materials, equipment, labor and tools necessary to remove and properly dispose of existing structures
3. Payment shall also be considered full compensation for granular backfill to the limits shown on the drawing or as directed.
4. Structures removed and replaced with new structures (or pipe) will not be considered for payment under this item.
5. Payment shall include cutting and capping (or plugging) existing lines where abandoned.

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.
- 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 based on percent complete.
 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 3rd 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. Said payment will also be considered full compensation for covering regulated soils and materials to prevent leaching or migration of contaminants into ground water.
 - g. Said unit price shall be considered full compensation for documenting and tracking all excavation materials (regulated and non-regulated) in accordance with applicable local, state and federal regulations. Said documentation shall be provided to the owner at the completion of the project or upon request.

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:

Ton delivered x Actual distance/30 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 based on fees charged to the contractor charged by the disposal location. No markup will be allowed for this item. Delivery of the material to the final location will be paid under item 1.15C.

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 3rd 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 3rd party testing company experienced with NHDES soil disposal regulations. Payment shall be without markup.
 2. Coordination of 3rd party testing (where directed) is included in Item 1.15B and is not included in this item.

ITEM NO. 1.15F: DISPOSAL OF REGULATED GROUNDWATER (WHERE DIRECTED)

- A. Method of Measurement:

1. Disposal of regulated groundwater will be measured in accordance with General Conditions Article 17, the same manner as extra work. An allowance has been included in the Bid Schedule.
 2. Groundwater that can be discharged to sanitary or storm sewers using temporary erosion and silt control measures will not be measured for payment.
- B. Basis of Payment:
1. Disposal of regulated groundwater will be on a dollar amount basis in accordance with General Conditions Article 17. The dollar limit (allowance) prescribed in the Bid Schedule shall not limit the Engineer or Owner in determination of the value of the work.

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.

ITEM NO. 1.18: LOCATION OF SEWER SERVICES BY VIDEO INSPECTION

- A. Method of Measurement:
1. Location of sewer services by video inspection and locator shall be measured for each service located.
 2. Video location, if completed by the City of Portsmouth, will not be measured for payment.
- B. Basis of Payment:
1. Location of sewer services shall be paid at the Contract unit price for each service successfully located and staked on the ground.
 2. Said unit price shall constitute full compensation for coordinating with the homeowner to access the sewer service, securing a point of entry, televising to determine location and depth at the specified points, recording specified measurements and providing the information as required by the Engineer, removal of television equipment, performing any necessary cleanup on private property as a result of televising, restoring the point of entry to the existing condition.
 3. Said unit prices shall also constitute full compensation for the maintenance of existing sewer service flow.
 4. This work does not include cleaning, jetting, or other methods required to remove obstructions from the sewer service. If it is not possible to televise the sewer service, the Contractor will notify the Engineer of this and other means of locating the sewer service may be necessary (including but not limited to test pits under Item 6.4, as approved by the Engineer).
 5. If it is not possible to gain access, the Contractor will notify the Engineer of this and other means of locating the sewer service may be necessary (including but not limited to test pits under Item 6.4, as approved by the Engineer).

ITEM NO. 2.X.XX: FURNISH & INSTALL DRAIN PIPE (SIZES)

- 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. Note: 2.1.X.XX : 2.1=Drainage Pipe
X=type (1=CPE, 2=RC, 3=Vylon PVC, 4=PVC, 5=DI
XX=pipe diameter in inches
- B. Basis of Payment:

1. Pipe shall be paid for at the Contract price per linear foot.
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 all construction dewatering work required to pre-drain soils prior to final excavation and to install the pipe in the dry as specified under Section 02402 and/or Section 02650 including furnishing, installing, operating and removing of dewatering systems not paid for under separate unit items.
5. 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.
6. 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.
7. Said unit price shall also include any fittings or adapters required to repair existing sewers or drains damaged during construction.
8. Said unit price shall include furnishing and installing "Inserta Tee" connections for storm sewers where not paid for under a separate bid item.
9. 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.
10. 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.
11. Actual payment for this item shall be broken down in accordance with the following percentages:
 - a. Drain pipe in place and backfilled - 90%
 - b. Drain pipe successfully cleaned - 10%

ITEM NO. 2.4: CAST IRON COVERS FOR DRAIN CLEANOUTS

- A. Method of Measurement:
 1. Cast iron covers for drain cleanouts in paved areas will be measured by each cover successfully installed and approved by the engineer to line and grade of the final surfaces.
- B. Basis of Payment:
 1. Cast iron covers for drain cleanouts in paved areas shall be paid for at the contract price per each
 2. Said unit price shall constitute full compensation for the furnishing of all materials including labor, equipment and tools necessary for hauling, handling and installing covers complete and in place.
 3. Said unit price shall constitute full compensation for all necessary excavation, backfill, compaction, sheeting, bracing, cleaning and other incidental work not specifically included for payment under other items.
 4. Said unit price shall constitute full compensation for the removal and replacement of curbs, bushes, plantings, sod, loaming and reseeded of grassed areas disturbed by the Contractor's operations, unless otherwise paid for.

ITEM NO. 2.5.X: FURNISH AND INSTALL DRAIN MANHOLES (ALL DIAMETERS)

- A. Method of Measurement:
1. Drain manholes will be measured in vertical feet from the invert of the lowest drain pipe in the manhole to the top of the manhole frames.
 2. Note: X=inside diameter in feet
- 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, waterproofing as specified, construction fabric, manhole 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 raise structures once** to binder course grade.
 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
 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 all construction dewatering work required to pre-drain soils prior to final excavation and to install the manholes in the dry as specified under Section 02402 and/or Section 02650 including furnishing, installing, operating and removing of dewatering systems not paid for under separate unit items.
 9. Removal and disposal of existing structures for the installation of new structures shall be incidental to this item.
 10. Actual payment for these shall be broken down in accordance with the following percentages:
 - d. Manhole in place and backfilled - 90%.
 - e. Manhole cleaned and invert built – 10%

ITEM NO. 2.5A: ADDITIONAL ADJUSTMENT OF DRAIN MANHOLE COVERS (TO FINAL PAVEMENT ELEVATION)

- A. Method of Measurement
1. Adjusting new and existing drain manhole frame and cover assemblies to will be measured per each additional adjustment to final pavement elevation.
 2. The initial adjustment of drain manhole frames and covers to binder grade and/or finish grade, if directed, is subsidiary to drain manholes, Item 2.5.X, and will not be measured for payment.
 3. Drain 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 shall 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 drain manhole frames and cover assemblies.

ITEM NO. 2.6.X: FURNISH AND INSTALL CATCH BASINS (ALL DIAMETERS)

- A. Method of Measurement:
 1. Catch basins will be measured in vertical feet
 - a. Catch basins six (6) feet in diameter or smaller shall be measured from the bottom of the sump to the top of the grate.
 - b. Catch basins larger than six (6) feet in diameter shall be measured from the deepest invert to the top of the grate and shall be constructed similar to drain manholes (formed inverts and no sumps).
 2. Note: X=inside diameter in feet
- B. Basis of Payment:
 1. Catch basins 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, CB liner, frames and covers, screened gravel subbase, concrete and masonry materials, waterproofing 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 all construction dewatering work required to pre-drain soils prior to final excavation and to install the pipe and catch basins in the dry as specified under Section 02402 and/or Section 02650 including furnishing, installing, operating and removing of dewatering systems not paid for under separate unit items.

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. 2.8: FURNISH AND INSTALL GEOTEXTILE WRAP (WHERE DIRECTED)

- A. Method of Measurement
 1. Construction fabric installed as wrap around the bedding and pipe shall be measured per linear foot.

2. Measurement shall be made along the centerline projection of the installed pipe.
- B. Basis for Payment:
1. Payment for construction fabric installed as wrap around the bedding and pipe, as shown on the drawings shall be at the Contract unit price per linear foot.
 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. Payment shall also include providing geotechnical fabric wrap according to details shown on the drawings.

ITEM NO. 2.9X: FIELD CORE DRAIN MANHOLES OR CATCH BASINS INCLUDING PIPE CONNECTION SYSTEM

- A. Method of Measurement:
1. The coring shall be measured for each field coring shown on the drawings or as ordered.
 2. Note: X shall be the following:
A = 4" through 15" field cores
B = 18" through 30" field cores
- B. Basis of Payment:
1. Payment under this item shall be at the Contract unit price for each coring for the diameter indicated on the drawing or as ordered.
 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 or catch basins.
 3. Payment under this item shall constitute full compensation for all materials, equipment, labor and tools necessary to complete the work described.

ITEM NO. 2.10: REMOVE DRAIN MANHOLES OR CATCH BASINS

- A. Method of Measurement:
1. Removal of drain manhole s or catch basins, outside normal excavation limits (for any new utility), shall be measured as a single unit for each drain manhole or catch basin removed as shown on the drawings, or as directed (i.e. if any part is within pay limits of adjacent work, it will not be measured for payment).
 2. Drain manholes or catch basins removed within the limits of excavation for any proposed utility are subsidiary and will not be measured for payment.
- B. Basis of Payment:
1. Payment under this item shall be at the Contract unit price for each drain manhole or catch basin removed in accordance with the drawings and specifications.
 2. Payment under this item shall constitute full compensation for all materials, equipment, labor and tools necessary to remove and properly dispose of existing structures. Payment shall also be considered full compensation for granular backfill to the limits shown on the drawings or as directed.
 3. Structures removed and replaced with new structures (or pipe) will not be considered for payment under this item.
 4. Payment shall include cutting and capping (or plugging) existing lines where abandoned.

ITEM NO. 2.10A: REMOVE DRAIN LINES

- A. Method of Measurement:

1. Removal of drain pipes, outside normal excavation limits (for any new utility), shall be measured by the linear foot of pipe removed as shown on the drawings, or as directed (i.e. if any part is within pay limits of adjacent work, it will not be measured for payment).
 2. Drain pipes removed within the limits of excavation for any proposed utility are subsidiary and will not be measured for payment.
- B. Basis of Payment:
1. Payment under this item shall be at the Contract unit price for each linear foot of pipe removed in accordance with the drawings and specifications.
 2. Payment under this item shall constitute full compensation for all materials, equipment, labor and tools necessary to remove and properly dispose of existing structures. Payment shall also be considered full compensation for granular backfill to the limits shown on the drawings or as directed.
 3. pipe removed and replaced with new pipe will not be considered for payment under this item.
 4. Payment shall include cutting and capping (or plugging) existing lines where abandoned.

ITEM NO. 2.11: 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. 2.12: VORTECHNICS 11000 STORMWATER UNIT

- A. Method of Measurement:
1. Will be measured per each complete unit installed complete per manufactures guidelines.
- B. Basis of Payment:
1. Unit shall be paid for by each unit complete in place.
 2. Actual payment shall be broken down in accordance with the following percentages:
 - a. Unit in place and backfilled - 90%.
 - b. Unit cleaned and covers installed – 10%

ITEM NO. 3.1.XX: FURNISH AND INSTALL DUCTILE IRON WATER PIPE (ALL SIZES)

- A. Method of Measurement:
1. Ductile iron pipe shall be measured per linear foot.
 2. Pipe shall be measured along the horizontal centerline of the pipe as laid.
 3. No deduction shall be made for the space occupied by fittings.
 4. Note: XX=pipe diameter in inches
- B. Basis of Payment:
1. Pipe shall be paid for 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 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 including removal, stockpiling and replacement of select reclaimed pavement and roadway gravels.
4. Said unit price shall include full compensation for all construction dewatering work required to pre-drain soils prior to final excavation and to install the pipe in-the-dry as specified under Section 02402 and/or Section 02650 including furnishing, installing, operating and removing of dewatering systems not covered under separate unit items.
5. Said price shall include any fittings, tees, wyes, adapters, couplings, thrust restraint fittings and thrust blocks, poly wrap, etc. not covered under separate bid items which are required to connect existing pipe to the proposed water main.
6. Said unit price shall include full compensation for the relocation of utilities (including but not limited to gas, electric and telephone) which interfere with the proposed water main as shown on the Drawings, and for the repair of utilities damaged by the Contractor.
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 restoration of existing improvements including, but not limited to driveways (paved and gravel), lawns, curbs, drainage, etc., unless specifically paid under a separate pay item.
10. Said unit price shall include sheeting and bracing (if necessary).
11. Said unit price shall include disinfection, de-chlorination, bacteriological, and pressure testing.
12. 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.
13. Actual payment for this item shall be broken down in accordance with the following percentages:
 - a. Water pipe in place and backfilled - 90%
 - b. Water pipe successfully cleaned and tested, and cleanup and/or corrections completed - 10%

ITEM NO. 3.2X: FURNISH AND INSTALL COPPER SERVICE PIPE (ALL SIZES)

- A. Method of Measurement:
 1. Copper service pipe shall be measured per linear foot.
 2. Measurement shall be along the centerline of the pipe including the tapping saddle (if necessary), corporation stop, through the curb stop to the connection to the existing service line.
 3. Note: X=pipe diameter in inches
A=3/4"
B=1"
C=2"
- B. Basis of Payment:
 1. Pipe shall be paid for 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 hauling, handling, laying, jointing and testing pipe.

3. Said unit price shall also include all necessary earth excavation, dewatering, bedding, backfill, sheeting/bracing, compaction, cleaning and testing, and other incidental work.
4. Said unit price shall also constitute full compensation for the removal and replacement of curbs, drives (paved and gravel), bushes, plantings, sod, and all necessary grading and reseeding of grassed areas disturbed by the Contractor's operations.
5. Said unit price shall also constitute full payment for the relocation of copper service pipes relocated or replaced because of sewer or drain interferences.

ITEM NO. 3.3X: FURNISH AND INSTALL WATER SERVICE CONNECTIONS

- A. Method of Measurement:
 1. Measurement for these items shall be for each service connection completed.
 2. Note: X=size in inches
A=3/4", B=1", C=2"
- B. Basis of Payment:
 1. Water service connections complete in place shall be paid at the Contract price for each.
 2. Said unit price shall constitute payment for tapping water main wet or dry; furnishing and installing corporation, curb stop, curb box; cleaning, testing and connection to the existing service as shown on the Drawings and as specified herein.
 3. Said price shall be considered compensation for furnishing any fittings, tees, adapters, couplings, etc. not covered under separate bid items which are required to connect the proposed water main to the existing house service, where indicated on the Drawings.
 4. Said unit price shall also constitute full compensation for all necessary excavation, dewatering, backfill, compaction, sheeting, bracing, cleaning and other incidental work not specifically included for payment under other items.
 5. Said unit price shall also include removal and proper disposal of existing curb stops and boxes except for salvage quantity identified in Section 01611.
 6. Said unit price shall also constitute full compensation for the removal and replacement of curbs, drives (paved and gravel), bushes, plantings, sod, and all necessary grading and reseeding of grassed areas disturbed by the Contractor's operations.

ITEM NO. 3.4.XX: FURNISH AND INSTALL GATE VALVE ASSEMBLIES (ALL SIZES)

- A. Method of Measurement:
 1. Gate valves shall be measured per each valve and valve box assembly installed.
 2. Note: XX=diameter in inches; XXA=use tapping valve assembly complete
- B. Basis of Payment:
 1. Gate valves shall be paid at the Contract unit price per each valve and valve box assembly installed.
 2. Said unit price shall be full compensation for furnishing all materials, labor, equipment, and tools; for installing, setting, joining; for restraining joints and/or thrust blocks; for testing all valves; and for all other incidental work and expenses.
 3. Said unit price shall also include adjustment of all boxes to pavement elevation (both binder and wearing course elevations).

ITEM NO. 3.4A: ADDITIONAL ADJUSTMENT OF GATE VALVE BOXES AND WATER SHUTOFFS (TO FINAL PAVEMENT ELEVATION)

- A. Method of Measurement:
 1. Valve box adjustment for box risers not payed for under item 3.4 shall be measured per each adjusted to final pavement grade.

2. Existing valve boxes shall be adjusted to binder pavement grade and to final pavement grade and will only be measured for payment once. The initial adjustment is subsidiary and will not be measured for payment.
 3. New riser sections shall be measured for payment under another item.
- B. Basis of Payment:
1. Payment under this item shall be at the contract unit price for each valve box adjusted.
 2. Payment shall be considered full compensation for excavation, raising existing top section, cutting, removal and replacement of pavement to facilitate adjustment to the final elevation.
 3. Said unit price shall be considered full compensation for furnishing the tools, materials, labor, and equipment necessary for adjusting valve boxes and shut-off valves.

ITEM NO. 3.5: FURNISH AND INSTALL HYDRANT ASSEMBLIES

- A. Method of Measurement:
1. Hydrant assemblies shall be measured each assembly installed in the field as indicated on the Drawings or in a location as directed by the Engineer.
- B. Basis of Payment:
1. Hydrant assemblies shall be paid at the Contract price per each assembly, including tee at main, 6" ductile iron branch piping from the main gate valve, valve box, mechanical joint fittings, and thrust restraint as specified.
 2. Said unit price shall also constitute payment for tools, labor, materials, and equipment necessary to furnish and install hydrant, ductile iron branch piping from the main line regardless of the length of branch piping installed, anchoring tee, gate valve, mechanical joint retainer glands, valve box, thrust block, cleaning, testing, and painting as shown on the Drawings and as specified herein.
 3. Said unit price shall also constitute full compensation for tools, materials, labor and equipment necessary for excavation, dewatering, backfill, compaction, sheeting, bracing, cleaning and other incidental work not specifically included for payment under other items.
 4. Said unit price shall also constitute full compensation for the removal and replacement of curbs, drives (paved and gravel), bushes, plantings, sod, and all necessary grading and reseeding of grassed areas disturbed by the Contractor's operations, not paid for under separate unit items.
 5. Said unit price shall also constitute payment for removal and disposal of existing hydrant as indicated on the Drawings. Existing hydrant assemblies including valves shall remain the property of the Owner and be delivered to the Owner, when requested.
 6. Actual payment for this item shall be broken down in accordance with the following percentages:
 - a. Hydrant assembly in place and backfilled - 70%
 - b. Hydrant assembly successfully cleaned and tested, and cleanup and/or corrections completed - 30%

ITEM NO. 3.6: REMOVE EXISTING HYDRANT ASSEMBLIES

- A. Method of Measurement:
1. Existing fire hydrants removed shall be measured per each.
 2. Existing hydrants removed for replacement with new hydrants in same or nearly same position will not be measured for payment under this item.
- B. Basis of Payment:
1. Hydrant removal shall be paid for at the Contract unit price per each.
 2. Said unit price shall also constitute payment for removal and disposal of existing hydrant as indicated on the Drawings. Existing hydrant assemblies including the valves shall remain the property of the Owner and be delivered to the Owner, when requested.

3. The said unit price for hydrant assemblies removed shall include furnishing and installing caps or plugs necessary to facilitate abandonment in place of existing main.
4. Said unit price shall also constitute full compensation for all necessary excavation, dewatering, backfill, compaction, sheeting, bracing, cleaning and other incidental work not specifically included for payment under other items.
5. Said unit price shall also constitute full compensation for the removal and replacement of curbs, drives (paved and gravel), bushes, plantings, sod, and all necessary grading and reseeding of grassed areas disturbed by the Contractor's operations.

ITEM NO. 3.7: TEMPORARY WATER SYSTEM (POTABLE)

- A. Method of Measurement:
 1. Measurement for payment shall be by linear foot of street serviced by temporary systems, up to the quantity provided for in the bid schedule, for furnishing, installing, maintaining, and removing the temporary water system as measured along the roadway as described.
 2. **Temporary water systems or piping exceeding the quantity provided for on the Bid Schedule will not be measured for payment.**
 3. Measurement shall be to the nearest foot.
 4. Parallel temporary water mains will not be measured separately for payment.
- B. Basis of Payment:
 1. The temporary water system shall be paid for at the Contract unit price per linear foot of roadway where temporary systems are used.
 2. Said unit price shall constitute full compensation for the furnishing of all labor, equipment and materials associated with installing, maintaining, and removing the temporary water system in accordance with the Contract Drawings and Specifications.
 3. Said unit price shall include, but not be limited to; furnishing a detailed temporary water system design (including required submittals or re-submittals); excavating and backfilling to install mains and services across streets and driveways, including furnishing and installing temporary pavement; furnishing, installing, and removing hard-pack for driveway crossings; furnishing, installing, disinfecting, and maintaining the system; providing 24-hour maintenance of the system; removing of the system; furnishing and installing bituminous pavement for street and driveway crossings; restoring all surfaces to their original condition; and all other work required for or incidental to the satisfactory completion of this item.
 4. Twenty-five percent of the unit price shall be held until the entire system has been removed and all surfaces have been successfully restored.

ITEM NO. 4.1X: FURNISH AND INSTALL HOT BITUMINOUS PAVEMENT – MACHINE METHOD (BINDER COURSE AND WEARING COURSE)

- A. Method of Measurement:
 1. Machine method hot bituminous pavement shall 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) 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: X = Base or Wearing Course
A – Binder Course
B – Wearing Course

B. Basis of Payment:

1. Machine method hot bituminous pavement shall 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. Asphalt escalation, if requested, shall be paid under Item 4.8.
6. Said unit price shall include full compensation for furnishing and installing pavement markings (i.e. striping) not paid for under separate items.

ITEM NO. 4.2X: FURNISH AND INSTALL HOT BITUMINOUS PAVEMENT HAND METHOD.

1 Note: X = Normal or Porous A=Normal asphalt pavement, B=Porous Asphalt Pavement

A. Method of Measurement:

1. Hand method hot bituminous pavement shall be measured per ton of pavement installed for driveway within the limits shown on the drawings, sidewalk repairs as directed, along new and reset curbing (1' wide x depth of binder course), or as ordered by the Engineer.
2. Two methods of measurement will be considered by the Engineer:
 - a. Batch weights (tare slips) may be used providing pay limits and pavement depths are in accordance with the drawings or authorized by the Engineer. This method will not be acceptable if multiple paving methods (machine and hand methods) 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 will be used if work is completed simultaneously with machine paving or if tare slips do not correlate with the approved pavement depth as shown or directed by the Engineer.

B. Basis of Payment:

1. Hand method hot bituminous pavement shall be paid for at the Contract unit price per ton.
3. Said unit price shall constitute full compensation for furnishing all materials, labor, equipment, and tools necessary to install hand method bituminous pavement (base or wearing course).
4. Said unit price shall include full compensation for adjustment or restoration to original condition of catch basins, gate valve covers, driveways (beyond pre-determined limit of paving), walks, signs, fences, shrubs and landscaping not paid for under separate bid items.
5. Said unit price shall include saw cutting or grinding existing driveway pavement.
6. All paving shall be performed in accordance with the approved schedule.
7. Asphalt escalation, if requested, shall be paid under Item 4.8.
8. Said unit price shall include any striping necessary to match existing roadway not paid for under separate items.

ITEM NO. 4.3: FULL WIDTH PAVEMENT RECLAMATION REMOVE AND REHANDLE- 8” DEPTH

- A. Method of Measurement:
 - 1. Pavement reclamation (removed and re-handled) shall be measured per square yard of roadway pavement reclamation performed (to the specified depth) as shown of the Drawings or as directed by the Engineer. If the reclaimed material is not suitable for reuse, this item will be considered subsidiary. If some but not all of the material is appropriate for reuse, the amount suitable for reuse shall be paid on a prorated basis.
 - 2. Measurement shall be by multiplying the ordered length by the ordered width of the roadway to the depth specified on the Drawings for all areas considered appropriate for reuse.
- B. Basis of Payment:
 - 1. Full width pavement reclamation removed and re-handled shall be paid for at the Contract unit price per square yard.
 - 2. Said unit price shall include full compensation for protection of existing structures or utilities, or lowering existing utility structures to a depth below the existing pavement and gravel materials to be pulverized.
 - 3. Said unit price shall also include full compensation for uniformly grading the reclaimed asphalt to the depth and grades shown on the drawings.

ITEM NO. 4.4X: ROADWAY EXCAVATION

- A. Method of Measurement:
 - 1. Roadway excavation shall be measured per cubic yard.
 - 2. Excavation will be measured by multiplying the length by the width by depth to the limits shown on the plans or as directed by the Engineer (Item 4.4A).
 - 3. Note: X=type of excavation
 - A – Common excavation (roadway)
 - B – Excavation of concrete or brick walkways and gravels to subgrade
 - C - Work on ‘RR Street’
 - 4. Additional excavation for roadway work ordered by the Engineer will be measured for payment under Item 4.4A.
 - 5. Work on RR street is defined as the area not currently roadway now, parallel to the RR tracks.
- B. Basis of Payment:
 - 1. Excavation shall be paid for at the Contract unit prices per cubic yard.
 - 2. Said unit price shall constitute full compensation for the furnishing of all materials, labor, equipment and tools necessary to windrow, load and transport the excess material to a location designated or approved by the Owner.
 - 3. Said unit price shall also include full compensation for uniformly grading and compacting the excavated material in a manner that will promote positive drainage along curb lines to drainage receptacles.

ITEM NO. 4.5.IX: FURNISH AND INSTALL CRUSHED GRAVEL FOR ROADWAY AND DRIVEWAY RECONSTRUCTION

- A. Method of Measurement
 - 1. Crushed gravel shall be measured by the cubic yard.
 - 2. Measurement shall be by multiplying the length by the depth by the width, as shown on the drawings, or as directed.
 - 3. Note: X = designation of use for roadway or driveway
 - A – Gravels for roadways
 - B – Gravels for driveways and sidewalks
- B. Basis of Payment

1. 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.
3. Said unit price shall include all materials, labor, tools, and equipment required to establish final grading so that bituminous pavement can be constructed to the grades and elevations shown on the drawings.

ITEM NO 4.5.2: FURNISH AND INSTALL BANK-RUN GRAVEL (WHERE SHOWN OR AS DIRECTED)

- A. Method of Measurement
 1. Bank run gravel borrow shall be measured per cubic yard.
 2. Measurement shall be by multiplying the length by the depth by the width as shown on the drawings, or as directed.
 3. Bank run gravel used to replace excavated material in trench, or rock excavation shall not be included for payment under this item.
 4. Additional bank run gravel used to backfill additional roadway excavation ordered by the Engineer shall be measured for payment under this item and shall be equivalent to the volume of additional roadway excavation ordered.
- B. Basis of Payment
 1. Bank run gravel shall be paid at the Contract unit price per cubic yard.
 2. Said unit price shall be considered full compensation for the furnishing of all materials, labor, equipment and tools necessary for furnishing, placing, and compacting bank run gravel.
 3. Said unit price shall include all labor, tools, materials, and equipment necessary to properly grade and compact gravel to accommodate proper installation, grading, and compaction of crushed gravel.
 4. Additional bank run gravel used to backfill additional roadway excavation ordered by the Engineer shall be paid under this item and shall be equivalent to the volume of additional roadway excavation ordered.

ITEM NO. 4.6: FURNISH AND INSTALL CONSTRUCTION FABRIC (AS DIRECTED)

- A. Method of Measurement
 1. Construction fabric shall be measured per square yard installed as shown on the drawings or as directed by the Engineer.
- B. Basis for Payment:
 1. Payment for construction fabric shall be 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 the installation and maintenance of construction fabric.

ITEM NO. 4.7: COLD PLANING EXISTING PAVEMENT

- A. Method of Measurement:
 1. Cold Planing shall be measured for payment per square yard of surface area of pavement planed as shown on the Drawings or as ordered by the Engineer.
 2. Measurement shall be by multiplying the average ordered width by the average ordered length.
- B. Basis of Payment:
 1. Cold Planing shall be paid for at the Contract unit price per square yard for Planing the existing asphalt to the limits shown on the drawings or as directed by the Engineer.
 2. Said unit price shall constitute full compensation for the furnishing of all materials, labor, equipment, and tools necessary for Planing roadway surfaces to the required depth in order to ensure a smooth surface transition at the interface of the new and existing pavement.

ITEM NO. 4.8: ASPHALT ESCALATION

- A. Method of Measurement
 - 1. The amount asphalt measured for any eligible escalation will be based on the ton of asphalt placed during that pay period.
- B. Basis of Payment
 - 1. Asphalt escalation shall be paid as described in the paragraphs below.
 - a. Escalation for asphalt placement (all types) is subject to change based on the NHDOT's monthly published price for Asphalt Cement (AC) at the time the asphalt pavement is placed.
 - b. The fixed base price of Asphalt Cement will be as published by NHDOT for the month the bid is opened.
 - c. The increase/decrease will be calculated per the NHDOT specification at the time of the bid opening.

ITEM NO. 4.9: MECHANICAL (SAW) CUTTING

- A. Method of Measurement
 - 1. Mechanical cutting shall be measured per linear foot.
 - 2. Mechanical cutting completed for trench excavations shall not be measured for payment and will be incidental to the respective item.
- B. Basis of Payment
 - 1. Mechanical cutting shall be paid at the Contract unit price per linear foot.
 - 2. Said unit price shall be considered full compensation for furnishing the tools, materials, labor, and equipment necessary for saw cutting
 - 3. Any saw cutting not directed by the Engineer is not eligible for payment.

ITEM NO. 4.10: FURNISH AND INSTALL TEMPORARY PAVEMENT REPAIRS WHERE DIRECTED (INCLUDING TRENCH, SIDEWALKS AND TEMPORARY BITUMINOUS ASPHALT CURB).

- A. Method of Measurement
 - 1. The quantity of temporary pavement repairs to be measured for payment under this item shall be the number of tons of temporary pavement repairs completed and in place, to the limits shown on the drawing and where directed.
- B. Basis of Payment
 - 1. Temporary pavement repairs will be paid for at the contact unit price per ton of asphalt placed, completed and in place, to the limits shown on the drawing and where directed. Prepping of the repair to grade is subsidiary.
 - 2. Said unit price shall constitute full compensation for all materials, labor, equipment and tools necessary for installation of temporary pavement and underlying gravel unless provided for under a separate item.
 - 3. Pavement outside the limits shown on 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.

ITEM NO. 5.1.X: FURNISH AND INSTALL CONCRETE SIDEWALK (4" AND 6" THICK)

- A. Method of Measurement:
 - 1. Concrete sidewalks shall be measured per square yard as shown on the drawings or as ordered by the Engineer.
 - 2. Measurement shall be by multiplying the ordered width by the ordered length.

3. Note: X= thickness of concrete sidewalk in inches
- B. Basis of Payment:
1. Concrete sidewalk 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 furnishing and installing sidewalks in accordance with NHDOT Section 608. Fine grading, forming, Class AA concrete (4000# fiber reinforced), backfill and all property restoration are subsidiary.
 3. For 6" thick concrete curb ramps, said unit price shall also be considered full compensation for:
 - a. Providing additional reinforcing (as required).
 - b. Preparation of the curb ramp for the application of the detectable warning plate (Item #5.5).
 - c. Removal and re-placement of curb ramps found to not have been constructed in compliance with the Construction Drawings

ITEM NO. 5.2: PATCH IN BRICK SIDEWALK (FOR PRIVATE WALKS AS DIRECTED)

- A. Method of Measurement:
1. Brick sidewalks shall be measured per square yard.
 2. Measurement shall be by multiplying the average width by the length as shown on the drawings or as directed by the Engineer.
- B. Basis of Payment:
1. Brick sidewalk 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 furnishing and installing brick to match adjoining brick, brick edging, excavation & backfilling, bedding material (granular backfill), loam & seed or gravel backing, and any other work required for or incidental to the completion of this item.

ITEM NO. 5.3.X: VERTICAL GRANITE CURB

- A. Method of Measurement:
1. Vertical curb shall be measured per linear feet.
 2. Measurement shall be along the centerline of the curb, to the nearest linear foot installed as show on the plans or where directed by the Engineer.
 3. Note: X = Type of vertical granite curb
 - 1 – Vertical Straight Granite Curb (5" X 18")
 - 2 – Vertical Straight Granite Curb (6" X 24")
 - 3 – Curved Vertical Granite Curb (radius as shown or directed).
 - 4 - Curved Vertical Granite Curb (6" X 24") (radius as shown or directed).
 - 5 - Sloped Granite Curb
 - 6 – Sloped Granite Radius Curb
- B. Basis of Payment:
1. Granite curb shall be paid for at the Contract unit price per linear foot.
 2. Said unit price shall include all granite required at tip downs and radial curb installed around the curb ramps as shown on the drawings.
 3. Said unit price shall constitute full compensation for the furnishing of all materials, labor, equipment, and tools necessary for furnishing and installing the vertical granite curb including, excavation, bedding (gravel and/or concrete) material, alignment controls, cutting and fitting, backfilling and other work required for or incidental to the completion of this item.
 4. Said unit price shall be considered full compensation for furnishing and installing concrete backfill as shown on the drawings and providing all necessary tools, equipment, labor, and materials required to complete said work.

ITEM NO. 5.4: RESET VERTICAL GRANITE CURB

- A. Method of Measurement:
 - 1. Reset granite curb will be measured per linear foot of vertical, radial or sloped granite curb removed, regardless of type or size, protected and reset as shown on the drawings or where directed by the Engineer.
 - 2. Measurement shall be along the centerline of the curb, to the nearest linear foot.
- B. Basis of Payment:
 - 1. Reset granite curb shall be paid for at the Contract unit price per linear foot.
 - 2. Said unit price shall constitute full compensation for the furnishing of all materials, labor, equipment, and tools necessary for carefully removing, stockpiling, sorting and re-installing the vertical granite curb including, excavation, bedding (gravel and concrete) material, alignment controls, cutting and fitting, backfilling and other work required for or incidental to the completion of this item.
 - 3. Said unit price shall be considered full compensation for furnishing and installing concrete backfill as shown on the drawings unless otherwise paid for, and providing all necessary tools, equipment, labor, and materials required to complete said work.
 - 4. Said unit price shall be considered full compensation for installation of used curbing, if provided by Owner.

ITEM NO. 5.5: FURNISH AND INSTALL ADA COMPLIANT DETECTABLE WARNING PLATES

- A. Method of Measurement
 - 1. Detectable warning plates shall be measured per square foot installed in accordance to the drawings
- B. Basis of Payment
 - 1. Detectable warning plates shall be paid at the Contract unit price per square foot.
 - 2. Said unit price shall be considered full compensation for furnishing all materials, equipment, tools and labor required to install detectable warning in accordance with Section 608.52 (See Part E, NHDOT Specifications and Amendments).
 - 3. Said price shall be considered full compensation if a detectable warning plates must be reset if it has not been installed in accordance to the plans and ADA specifications as.
 - 4. Installation of 6" thick concrete curb ramps is included under Item #5.1.6 and will not be paid under this item.

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 the field office if needed and for the utilities associated therewith.
 - 2. Said lump sum shall include full compensation for mobilization and demobilization costs including fees associated with transportation, rental fees 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 value.
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 item, or 2 ½ percent of the original Contract amount whichever is the lesser.
 - b. When ten (10) percent of the original contact 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 ninety (90) percent of the amount bid or nine (9) percent of the original Contract amount, whichever is the lesser.
 - e. Upon substantial completion of all the work, the remaining amount bid, for this item, will be paid.

ITEM NO. 6B: CONSTRUCTION VIBRATION MONITORING

- A. Method of Measurement:
 1. Construction vibration monitoring for this item will be measured for any additional monitoring ordered by the Engineer that is beyond what is required by state and local ordinances, for blasting.
 2. Vibration monitoring for blasting will not be measured for payment under this item.
 3. Engineer must approve use of vibration monitoring prior to installation of monitoring devices. Vibration monitoring initialized prior to Engineer's approval will not be eligible for payment.
- B. Basis of Payment:
 1. Payment for vibration monitoring shall be based on actual invoices from the subcontractor and submitted to the Engineer. Payment shall be without markup.
 2. Said allowance shall constitute full compensation for the furnishing of all labor, equipment and materials associated with providing vibration monitoring services in accordance with the Contract Drawings and Specifications.
 3. Said unit price shall include, but not be limited to; coordinating, scheduling, and paying for all services; providing support services for the vibration monitoring firm; and all other work required for or incidental to the satisfactory completion of this item.

ITEM NO. 6C: ARCHAEOLOGICAL MONITORING AND DELAYS

- A. Method of Measurement:
 1. This item is intended to provide and pay for certain measures and delays which may be required during construction due to archaeologically sensitive areas within the project limits. Engineering judgment indicates that a reasonable estimated dollar allowance is appropriate in setting up the contract.
 2. This item will be measured in terms of delay and potential remobilization within the project limits.
 3. A delay of one hour will be measured as a single occurrence which will require a payment of \$800.00 lump sum.
 4. Reimbursement cost for Archaeological Consultant (consultant to be approved by the City) will be at cost with 10% mark-up allowance for administration.
- B. Basis of Payment:
 1. The Contractor may be required to delay or cease operations in the archaeologically sensitive areas of the project as identified on the plans, under the direction of the Archaeological Representative.

2. A qualified representative from an archaeological consulting firm shall be present during the removal of any existing materials. This person has the authority to instruct the Contractor to discontinue the work operation for the investigation and assessment of potential archaeological resources. Reimbursement cost for Archaeological Consultant (consultant to be approved by the City) will be at cost with 10% mark-up allowance for administration.
3. The Contractor is to provide aid and assistance in assessing the potential resource, as practicable.
4. The Contractor shall provide all necessary aid, assistance, traffic control, and maintenance of traffic measures necessary to make the assessment of significance and during the documentation period.
5. If a delay is to occur, payment for work authorized under this section will be made as an \$800.00 lump sum payment per occurrence. The Contractor may need to provide a man (laborer), the piece of equipment performing the excavation activities, the operator of that piece of equipment, and employee of sufficient authority over the worksite to assist during these delays for as long as necessary.
6. Work associated with providing aid and assistance in making an assessment and potential documentation will be subsidiary to the lump sum payment.
7. All costs associated with mobilization and remobilizations associated with these delays are subsidiary to the payment per occurrence.
8. Payment of traffic control and maintenance of traffic measures required will be paid under the appropriate item numbers.
9. If the assessment and documentation of an occurrence requires that a man (laborer), a piece of equipment, and/or foreman be present following the initial hour delay period, these time and material costs will be paid for as stipulated in the General Conditions.
10. No allowance for overtime pay will be allowed during the assessment and documentation period.
11. The Bidder's attention is called to the dollar amount inserted in the proposal under these items, which dollar amount is the allowance set up for the special work. This figure must not be altered by the Bidder on the proposal, and must be included to obtain the grand total.
12. Payment shall also include cost to retain the City's independent project archeologist to monitor work. Invoices shall be submitted for payment with no mark-up.

ITEM NO. 6D: 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. There are known abandoned utility lines in this project area. **Only lines both active and unknown qualify for payment under this item. Multiple unknown utilities in the same excavation area will be paid for as one occurrence.**
 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 6E.
 5. Crossing excavations, backfill, and protection of new gas lines, not shown on the drawings but proposed by the gas company (Unitil), as described in the P-O-W, Paragraph 8, is subsidiary and will not be measured for payment under this item.
- 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 6E: 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.
 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.
 4. Excavation, backfill, or any other work associated with repairs of the new gas mains or service laterals to be installed, described in P-O-W, Paragraph 8, will not be measured for payment under this item.
- 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. 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.).

- c. For structures, ledge payment will be within 12” of the structure both the bottom and sides.
- 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. 6.2X: 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. Note: X shall be:
 - A – Additional excavation of unsuitable materials below normal depth
 - B – Excavation and disposal of unsuitable materials
 - 6. Additional excavation for roadway work shall be paid for under Item 4.4A.
 - 7. Handling of contaminated soils will be as provided in Items 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.
 3. Locations shown on the drawings are approximated and installation at these locations shall be coordinated with the Engineer.
 4. Test pits completed to locate individual sewer services shall not be paid for under this item unless previously approved by the Engineer. Unit Item 1.17 has been provided to locate individual sewer services
- 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. 6.5A: TRAFFIC CONTROL PLAN(S) (TCP's)

- A. Method of Measurement:
1. Traffic Control Plan(s) will be measured incrementally based on the percentage of the TCP's approved and accepted by the Portsmouth DPW.
- B. Basis of Payment:
1. The Traffic Control Plan(s) will be paid for at the Contract unit price, based on approval of submitted plans measured as described in A.1 above.
 2. Said lump sum price shall be considered full compensation for development 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.

ITEM NO. 6.5B: MAINTENANCE OF TRAFFIC & TRAFFIC REGULATIONS (SECTION 01510)

- A. Method of Measurement:
 - 1. Maintenance of Traffic will be measured for payment, based on the percentage of work completed calculated as follows:
 - a. The number of days traffic maintained in accordance with Contract Documents and the approved Traffic Control Plan divided by the Contract time for substantial completion.
 - b. Days that traffic or Dust Control is not maintained in accordance with TCP's approved under Item 6.5A, 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 shall be paid for at the Contract unit price and shall be considered full compensation for maintenance of traffic, traffic regulation, (Section 01570) and Dust Control Section 01512).
 - 2. 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.
 - 3. 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.
 - 4. The City of Portsmouth Public Works Departments 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.
 - 5. 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: 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.
 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. 6.9: 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: GEOTECHNICAL FIELD 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. 6.11: REPLACE DECIDUOUS TREES (AS REQUESTED BY THE OWNER)

- A. Method of Measurement
1. This item shall include the Allowance specified in the Bid Schedule
 2. Measurement shall be based on actual invoices submitted for work completed to install new deciduous trees.
- B. Basis of Payment
1. This item shall be paid for actual invoices submitted by the Contractor for work completed to install new deciduous trees.
 2. Payment shall only be considered for trees which have been furnished and installed by a pre-approved reputable nursery.
 3. Said allowance shall be considered full compensation for coordination efforts between the nursery and the Contractor. No additional payment shall be made for crew downtime as a result of poor work coordination.
 4. Said allowance shall be considered compensation for submittal of types of trees to be furnished and planting plans a minimum of 3 weeks prior to the completion of work.

ITEM NO. 6.12X: REMOVAL OF LARGE AND SMALL TREES

- A. Method of Measurement
1. Trees removed shall be measured per each tree removed including stumps
 2. Note: X = Designation for size of tree
A – Large trees, 24” diameter or larger
B – Small trees, smaller than 24” diameter
 3. The diameter for each tree shall be measured at a point 4 feet above the ground.
 4. All trees shall be removed by the City’s tree removal sub-contractor. Trees not removed by an approved entity shall not be measured for payment. See Section 01010 – Prosecution of Work for contact information
- B. Basis of Payment
1. Payment for tree removal will be at the unit price as provided by Urban Tree Service ((603) 332-1246), the City’s Contractor for tree removal.
 2. Payment shall be considered full compensation for all tools, materials, labor, equipment, and administrative needs to coordinate and schedule the removal of trees with the City’s sub-contractor.
 3. Removal of stumps for trees removed shall be paid for under Item #6.13X and will not be paid for under this item.
 4. Payment shall also include removal of stumps or grinding stumps to a depth 24” below final grade. Stumps are not to be buried on site.

ITEM NO. 6.13X: REMOVAL OF LARGE AND SMALL STUMPS

- A. Method of Measurement
 - 1. Stumps removed shall be measured per each stump removed as shown on the drawings or as directed
 - 2. Note: X = Designation for size of stump
 - A – Large Stumps, 24” diameter or larger
 - B – Small Stumps, smaller than 24” diameter
 - 3. The diameter for each stump shall be measured at the cutoff
 - 4. All stumps shall be removed to a minimum depth of 24” below grade to be considered for payment.
- B. Basis of Payment
 - 1. Stumps removed shall be paid at the Contract unit price per each.
 - 2. The unit price shall be considered full compensation for all tools, materials, labor and equipment to remove the stumps to the depth specified above or grinding stumps to a depth 24” below final grade.
 - 3. Said unit price shall include full compensation for stump disposal. It will not be acceptable to bury stumps on site. .

ITEM NO. 6.14.0224 – 2” INCH THICK x 24” WIDE RIGID POLYSTYRENE INSULATION

- A. Method of Measurement:
 - 1. Rigid insulation installed as directed by the Engineer shall 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 shall 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.

ITEM NO. 6.15: CALCIUM CHLORIDE FOR DUST CONTROL

- A. Method of Measurement
 - 1. The quantity of calcium chloride to be measured for payment shall be on a per pound basis as ordered and approved by the Engineer.
 - 2. Water applications and street sweeping for dust control are included in Item 6.8B and will not be measured under this item.
- B. Basis of Payment:
 - 1. Dust control shall be paid for at the Contract per unit price.
 - 2. Said unit price shall constitute full compensation for the furnishing of all labor, equipment and materials associated with providing dust control in accordance with the Contract Drawings and Specifications.
 - 3. Said unit price shall include, but not be limited to; furnishing and placing calcium chloride and all other work required for or incidental to the satisfactory completion of this item.

ITEM NO. 6.16: TURF ESTABLISHMENT

- A. Method of Measurement

1. Turf establishment will be measured by the square yard complete and in place including preparation of sub-grade, placing & fine grading loam, and application of seed & mulch.
 2. Measurement of material will be limited to the following:
 - a. In areas with new curb and new sidewalk; all areas between new curb and new sidewalk and within 3 feet of back of sidewalk.
 - b. In areas with new/reset curb only; within 3 feet of back of new/reset curb or as directed by the Engineer or the Owner to adequately grade the finished area.
 - c. In areas with gravel shoulder (no curb); within 3 feet of the edge of pavement or as directed by the Engineer or the Owner to adequately grade the finished area.
 - d. For areas of sewer service installation on private property; within 4 feet of the center line of pipe installed.
 3. Areas disturbed outside the limits specified above will not be measured for payment.
- B. Basis of Payment:
1. Turf establishment will be paid for at the Contract unit price per square yard.
 2. The unit includes full compensation for furnishing, placing and maintaining loam and seed as shown on the Drawings, as directed by the Engineer and as herein specified.
 3. Item shall include, but is not limited to: grading; preparation of subgrade and surface; placement, spreading, and grading of loam; application of seed & mulch (hydraulic); and all work required for turf establishment.
 4. Actual payment shall be broken down into the following percentages:
 - a. Subgrade prepared, loam placed and graded, seed and mulch placed (hydraulic) – 75%
 - b. Turf has been established and growth is reasonably thick, uniform, and free from sizable thin areas or bare spots – 25%
 5. The Contractor will re-seed and mulch any thin areas or bare spots as directed at no additional cost to the owner.

ITEM NO. 6.19: TEMPORARY GRAVELS FOR ROADWAY STABILIZATION

- A. Method of Measurement
 1. Temporary gravels used for roadway stabilization, where directed, by the Engineer, will be measured per cubic yard.
 2. Measurement will be completed by multiplying the horizontal length by the average width by the average depth.
 3. Temporary gravels installed without prior consultation and authorization of the Engineer will not be measured for payment.
 4. Temporary gravel needed to provide and maintain smooth surfaces for pedestrian circulation (sidewalks) and driveways is subsidiary and will not be measured for payment.
- B. Basis of Payment:
 1. Temporary gravels for roadway stabilization will be paid at the Contract unit price per cubic yard.
 2. Said unit price shall be considered full compensation for all materials, labor, and equipment necessary for the installation, maintenance and removal of temporary gravels used, in order to maintain a passable, smooth and rut free roadway surface for vehicular and pedestrian traffic during the completion of the work.
 3. Temporary gravel needed to provide and maintain smooth surfaces for pedestrian circulation (sidewalks) and driveways is subsidiary and will not be paid for under this item.

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

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. Fittings, Class 125 (ASA B16 11960)	American Standard for Cast Iron Pipe Flanges and Fittings, Class 125 (ASA B16 11960)	Flanged
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	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	
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. Wire Cos., or Roebling Gage	U.S. Steel Wire, Washburn and Moen, American	Steel	and
s.y.	Square Yard		
TDH	Total Dynamic Head		
USAS (formerly American Standards Association)	Standards of the United States of America Standards	Institute	
USS GAGE	United States Standard Gage		
VC	Vitrified Clay		
WSP	Working Steam Pressure		
Fed. Spec. General Service Administration,	Federal Specifications issued by the Federal Supply	Service of the	
	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

AA	Aluminum Association
AABC	Associated Air Balance Council
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ADC	Air Diffusion Council
AGC	Associated General Contractors of America
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
APA	American Plywood Association
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating,
ASME	American Society of Mechanical Engineers
ASPA	American Sod Producers Association
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BIA	Brick Institute of America
BOCA	Building Officials and Code Administrators
CDA	Copper Development Association
CLFMI	Chain Link Fence Manufacturers Institute
CRSI	Concrete Reinforcing Steel Institute
DHI	Door and Hardware Institute

EJCDC	Engineers' Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association
FGMA	Flat Glass Marketing Association
FM	Factory Mutual System
FS	Federal Specification
GA	Gypsum Association
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
IMIAC	International Masonry Industry All-Weather Council
MBMA	Metal Building Manufacturer's Association
MFMA	Maple Flooring Manufacturers Association
MIL	Military Specification
ML/SFA	Metal Lath/Steel Framing Association
NAAMM	National Association of Architectural Metal
NCMA	National Concrete Masonry Association
NEBB	National Environmental Balancing Bureau
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NSWMA	National Solid Wastes Management Association
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturers Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	Product Standard
RIS	Redwood Inspection Service
RCSHSB	Red Cedar Shingle and Handsplit Shake Bureau
SDI	Steel Deck Institute
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors'
SSPC	Steel Structures Painting Council
TCA	Tile Council of America, Inc.
UL	Underwriters' Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WWPA	Western Wood Products Association

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01100

ALTERNATES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
1. Each General Bidder and each filed Sub-Bidder shall be held fully responsible for examining the scope of the Alternates generally defined herein and for recognizing any modifications to their work caused by any Alternate whether or not their particular trade SECTION is mentioned therein.
 2. Filed Sub-Bidders, when required, shall enter only the amount of the addition or subtraction necessitated by the scope of the Alternate which pertains to the work of their trade in the FORM FOR SUB-BID.
 3. ALL SECTIONS of work which are affected by the Alternates but which are not considered as Filed Sub-Bid Sections will be considered work to be performed by the General Contractor.
 4. General Bidders shall enter a single amount in the appropriate space provided in the PROPOSAL FOR GENERAL CONTRACTOR which total amount shall consist of the Filed Sub-Bidders' amounts and the amount for all work to be performed by the General Contractor.
 5. The work of the various trades to be performed under Alternates shall be in strict accordance with the requirements of the particular trade Section in these Specifications.
 6. The Owner reserves the right to accept or reject any or all Alternates, and to award the Contract on the basis of the Proposed Contract Price as it is affected by the Owner's disposition regarding Alternates.
- B. Alternates:
1. To enable the Owner to compare total costs where alternate materials and methods might be used, Alternates have been established as shown on the Drawings and stated in these Specifications.
- C. Related Work Specified Elsewhere:
1. Materials and methods to be used in the Base Bid and in the alternatives have been shown on the Drawings and stated in pertinent Sections of these Specifications.
 2. Method for stating the proposed Contract Sum is described in the Bid Form.
- D. Submittals:
1. All Alternates described in this Section are required to be reflected on the Bid Form as submitted by bidders. However, do not submit alternates other than as described in this Section, except as provided for "substitutions" under the General Conditions.

PART 2 - PRODUCTS

2.1 PRODUCT HANDLING

- A. If the Owner elects to proceed on the basis of one or more of the described Alternatives, make all modifications to the Work required in furnishing and installing the selected Alternative or Alternatives to the approval of the Engineer and at no additional cost to the Owner other than as proposed on the Bid.

PART 3 - EXECUTION

3.1 ADVANCE COORDINATION

- A. Immediately after award of the Contract, or as soon thereafter as the Owner has made decision on which if any Alternates will be selected, thoroughly and clearly advise all necessary personnel and suppliers as to the nature and extent of Alternates selected by the Owner. Use all means necessary to alert those personnel and suppliers involved as to all changes in the work caused by the Owner's selection or rejection of Alternates.

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 INTRODUCTION

- A. Project meeting requirements

1.2 PROJECT MEETINGS (FORMAL)

- 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.
- 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. 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 progress/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.
- 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 Community Access Channel and/or 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.

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.
 - 3. Provide electronic copies of updated schedules upon request.
- C. Content of Schedules:
 - 1. Provide complete sequence of construction by activity. Include sequencing of utilities as identified in the Prosecution of Work (POW) Item 3, Temporary Water Systems and/or other utilities will be dependent on the Contractor's sequencing for work that is in the Owner's best interest, as determined by the Engineer. Other items requiring special consideration, to be identified in schedules include:
 - 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.
 - 4. Include:
 - a. Major changes in scope.
 - b. Activities modified since previous updating.
 - c. Revised projections due to changes.
 - d. Other identifiable changes.
 - 5. 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.

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

SUBMITTAL CERTIFICATION FORM

PROJECT: _____

CONTRACTOR'S PROJ. No: _____ ENGINEER'S PROJ. No: _____

CONTRACTOR: _____ ENGINEER: _____

TRANSMITTAL No: _____ SHOP DRAWING No: _____

SPECIFICATION OR DRAWING NUMBER: _____

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

By: _____ By: _____
Contractor^b Manufacturer^c

a. Any deviations not brought

Date: _____ Date: _____

to the attention of the Engineer for review and concurrence shall be the responsibility of the Contractor to correct, if so directed.

- b. Required on all submittals
- c. When required by specifications

SECTION 01381PRE-CONSTRUCTION VIDEO RECORDSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
1. Supply a set of video records to the Engineer clearly indicating pre-construction status of homes and buildings, roadway pavement condition, curbing, driveway entrances, lawns, sidewalks, and other pertinent features throughout the project area.
 2. Video may be provided in DVD format.
 3. Documentation shall include any feature specifically requested by the Engineer.
 4. Photographs may be submitted as a substitution with prior approval by the Engineer.

PART 2 - PRODUCTS2.1 QUALITY

- A. Quality shall be such that the condition of existing items subject to construction damage can be readily determined.

PART 3 - EXECUTION3.1 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.

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.
- B. Location of Existing Sewer Services by Video Inspection shall include the following work:
1. Coordinating with the property owner/homeowner to gain access to the sewer service from inside a home or business.
 2. Trace the location and depth of the service lines by television inspection.
 3. Record the location and depth of the service lines.
 4. A video shall be provided in DVD formats. If VHS recording equipment is used for the work, the Contractor must then convert the video to DVD format before submitting to the City.
 5. Restore all private property and sewer service access point to existing conditions.
 6. Obtain City photo identification badges from City Resources Department, prior to entering properties.

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.
- B. Location of Sewer Services by Video Inspection:
1. Before the work begins:
 - a) Submit the names of all personnel completing the work.
 - b) Submit the schedule and procedure for entering properties (photo identification badges required).
 2. After the work is completed:
 - a) Submit location information, include on Record Drawings.
 - b) Submit video record (DVD format) of services that are located with property locations clearly identified. (Payment may be withheld until video record is submitted to the Engineer.)

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.
- B. Location of Sewer Services by Video Inspection:
1. The camera must have a transmitter that can be traced by a locator outside the house.
 2. Equipment shall be capable of locating the sewer line within twelve inches (12") of its actual horizontal and vertical.

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.
- B. Location of Sewer Services by Video Inspection:
1. Cleaning of the existing sewer service is not considered part of this work. If the sewer service cannot be televised due to obstructions, or if the sewer service is not accessible from the basement (i.e. no cleanout), it may be necessary to use other means to locate the sewer service, such as test

- pits. The use of test pits to locate a sewer service will be considered with approval of the Engineer if sewer service is not accessible.
2. The sewer service must be located on the ground and recorded on the plans, both horizontally and vertically at the following locations:
 - a. As it exits the foundation (or passes the vertical plane of the foundation if sewer exits below basement floor level)
 - b. The property line
 - c. At the sewer main
 - d. At bends
 3. Ties and depth shall be recorded by the Contractor at each of the above listed locations and provided to the Engineer on an approved form. The Engineer will provide a sample format for the required documentation.
 4. This work shall be coordinated well in advance of sewer installation so that wye connections can be installed at the appropriate location

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

This is not a needed item for this contract.

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Not required

END OF SECTION

SECTION 01515

TEMPORARY WATER (POTABLE)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Summary

1. Water service must be maintained to the customers. The Contractor may, after review of the project documents, determine that temporary bypass piping during construction is the most cost effective method of maintaining water service to the construction area.
2. The local Fire Department must review and approve any plan to interrupt fire suppression system services.
3. Temporary water systems are subject to approval by the City of Portsmouth DPW and the Fire Department

B. Work Included:

1. Provide and pay for all temporary systems to assure the uninterrupted flow of safe drinking water around the Work Area at no additional cost to the Owner including the placement, maintenance and removal of these systems.
2. Provide temporary services.
3. Make all necessary arrangements for power.
4. Furnish, install, maintain and remove bypass piping, appurtenances and temporary connections to water users, where necessary.
5. Excavate and backfill for connection to service pipes or branches at streets which are not otherwise served.
6. Provide forty-eight (48) hour notices to all users regarding any disruption of service.
7. Disinfect the temporary piping in accordance with Section 02160, Part 3.3.
8. If the source of water for the temporary water system creates a higher pressure than is normally provided to the user, a pressure reducing valve shall be installed, if necessary, to maintain pressures at or below the normal pressure for all downstream services. Temporary main-line pressure reducing valves shall be incidental.
9. Temporary lines are to be buried below surface at roadway and driveway crossings. Avoid placing temporary piping in high traffic areas, walkways etc.

1.2 QUALITY ASSURANCE

- A. Comply with all Local, State and Federal requirements.

1.3 RELATED SECTIONS

- A. Section 01020 - Coordination
- B. Section 01310 - Construction Schedule
- C. Section 02610 - Pipe & Pipe Fittings - General

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The temporary main shall be:

1. Class 160 Yelomine PVC pipe as manufactured by Certainteed.
 2. Or approved equivalent.
- B. Size shall be equal to or larger than existing water main to be bypassed.
- B. Coupling between pipes shall be solid PVC with rubber splines to restrain the pipe.
- C. Adequate piping, free of leaks, to bypass water around the work area.
- D. The Contractor shall take necessary steps to protect the temporary water main and services from freezing.
- E. Contractor shall submit certification that the pipe is either new or has been used exclusively for potable water only.
- F. Services shall consist of the following:
1. Service saddle.
 2. A shutoff at the main.
 3. Polyethylene tubing running to the sill cock, to the existing service below grade or other approved tie-in location.
 4. A wye connection at the sill cock to allow the sill cock to be used by the homeowner.
 5. Fire Service Connections shall be 6-inch minimum and shall connect to the existing fire lines below grade.

PART 3 - EXECUTION

3.1 SUBMITTALS

- A. The Contractor shall submit a detailed description and plan showing the proposed temporary water service main and services at least fourteen (14) days prior to the planned start of the work.
- B. The submission shall include the following:
1. Identify the sections to be bypassed.
 2. Type of materials.
 3. Locations of mains, services, and connections.
 4. Methods of protection of mains and services at crossings.
 5. Method of filling temporary water line and evacuating air.
 6. The names and telephone and pager numbers for three (3) contact persons that will be on 24-hour notice to maintain the temporary water system.
 7. Methods to provide fire flows if necessary.

3.2 PERFORMANCE

- A. The Contractor shall be responsible for providing temporary connections and valving for all components in bypass piping.
- B. If hydrants are used, a valve shall be installed to the connection of the bypass piping to isolate hydrant.
- C. Maintain and operate the system to assure water flow around the work area as long as work requires replacement of active water mains.
- D. Protect the 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 contamination of the water supply.
- G. The Contractor shall maintain access and operation of all hydrants, branches, and services where bypass pipes are used.
- H. The Contractor shall take all necessary steps to protect the temporary water main and services from freezing.
- I. Where taps are made into existing pipes, place 12" of sand over all exposed components.
- J. All services shall be adequately valved and meet the approval of the Engineer.
- K. Services may be tied into existing exterior sill cocks, if existing. If a sill cock does not exist, or in the case where a fire service line connection is needed, the Contractor shall make the connection, below grade, at the property line where the existing water service is located.
- L. The Contractor shall make all necessary modifications to existing water meters, backflow preventers, pressure reducers, etc. in order to make the temporary connection. All modifications shall have to be approved by the Owner.
- M. If any service connection bypasses an individual pressure reducing valve, the Contractor shall install a pressure reducing valve on the temporary service lines for that building.
- N. The interior of the temporary water system shall be chlorinated and bacteria tested in accordance with Section 02610 - Pipe & Pipe Fittings – General when it is initially installed and after each subsequent breakdown and relocation of the system.

layout requirements

General Requirements:

A valve shall be installed at all source locations (i.e. hydrants).

In-line valves shall be installed at 500 foot intervals.

Manual air releases shall be installed at the end of all dead-end branches and at high points.

Temporary water mains shall be installed along the road edge or curb line and buried at driveways and street crossings.

The main shall be secured from movement with sand bags or other approved devices.

END OF SECTION

SECTION 01518BYPASS PUMPINGPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
1. Provide and pay for all temporary systems to assure the uninterrupted flow of Sanitary Sewage or Drainage 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 or fuel.

1.2 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.
- B. Contractor is to provide plans detailing by-pass pumping piping and operations. Plans shall include, at a minimum, pump sizes, locations, backup pump provisions, backup power provisions for unattended pumps, piping, flow diversion options or other means of directing flows around the work area.
- C. If By-Pass Pumping is proposed for non-work hours, provide plans and details for operation including automatic dial out for pump failure, automatic operation of backup equipment and an emergency response plan for the Contractor's personnel. Under no circumstances will the Contractor rely on City personnel to operate or maintain operation of the By-Pass Pumping system.

PART 2 - PRODUCTS2.1 MATERIALS

- A. 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.
- B. Adequate discharge piping, free of leaks, to carry the effluent from source to an adequate sanitary discharge point.
- C. Provide adequate plugs to insure that no effluent flows into the work area.

PART 3 - EXECUTION3.1 PERFORMANCE

- A. Provide power supply from a secure source.
- B. Maintain and operate the system to assure uninterrupted sewage flow around the work area as long as work requires replacement of active sewers.
- C. Protect the discharge piping from damage caused by vehicular traffic or other outside influences.

- D. Maintain all system elements in a sanitary working order free of leaks.
- E. All work shall be performed in a manner to insure the health and welfare of the general public from accidental or intentional discharge of into other than a sanitary sewer system.

END OF SECTION

SECTION 01520

MAINTENANCE OF SEWER FLOWS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
1. Provide and pay for all temporary systems to assure the uninterrupted flow of Sanitary Sewage or Drainage 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.

1.2 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.
- B. Contractor is to provide plans detailing by-pass piping and pumping operations. Plans shall include, at a minimum, pipe and pump sizes, locations, backup pump provisions, backup power provisions for unattended pumps, flow diversion options or other means of directing flows around the work area.
- C. If By-Pass Pumping is proposed for non-work hours, provide plans and details for operation including automatic dial out for pump failure, automatic operation of backup equipment and an emergency response plan for the Contractor's personnel. Under no circumstances will the Contractor rely on City personnel to operate or maintain operation of the By-Pass Pumping system.

PART 2 - PRODUCTS

2.1 PUMPS

- A. 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.
- B. Adequate discharge piping, free of leaks, to carry the effluent from source to an adequate sanitary discharge point.
- C. Provide adequate plugs to insure that no effluent flows into the work area.

2.2 PIPING

- A. Piping shall be sufficiently sized to carry combined storm flows (or match existing pipe sizes).

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Provide power supply from a secure source.
- B. Maintain and operate the system to assure uninterrupted sewage flow around the work area as long as work requires replacement of active sewers.
- C. Protect the discharge piping from damage caused by vehicular traffic or other outside influences.
- D. Maintain all system elements in a sanitary working order free of leaks.
- E. All work shall be performed in a manner to insure the health and welfare of the general public from accidental or intentional discharge of into other than a sanitary sewer system.

3.2 EXISTING FLOWS

- A. Combined sewer flow will vary on storm events. Contractor should size piping and pump equipment for pipes flowing full. Anticipated storm flows as follows (based on a slope of 0.01 ft/ft and a Mannings n value of 0.012):

<u>Pipe Size</u>	<u>Peak Capacity</u> (gpm)
12"	1,750
15"	3,150
18"	5,150
24"	11,000
30"	19,950
36"	32,450
48"	69,850

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.

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. (See City of Portsmouth Blasting Ordinance in Appendix E).
- B. See Supplemental General Conditions for additional requirements.
- C. See Section 01540 for additional requirements.

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 Survey of all structures within the blasting area and provide the Engineer a written report of the Pre-blast Survey.
 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.

END OF SECTION

SECTION 01548VIBRATION MONITORINGPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Provide all materials and equipment to perform all work necessary to protect and prevent damage of existing structures due to vibrations generated from construction activities.
2. Monitor construction related vibrations and set vibration limits to avoid damaging nearby structures, properties and utilities located on or near the project.
3. Sources of construction related vibrations include compaction equipment, hoe ram, sheeting and other construction activities resulting in vibrations to adjacent properties and/or structures.
4. Contractor shall secure the services of a qualified Vibration Consultant who shall consult with the Contractor, to mitigate effects from vibration related to construction activities.
5. Contractor shall be responsible for any and all damage resulting from construction activity vibrations.

PART 2 - PRODUCTS2.1 MATERIALS

- A. All and any equipment necessary for monitoring seismic activity as part of vibration monitoring activities.

PART 3 - EXECUTION3.1 PERFORMANCE

A. Preparation:

1. Prior to initiating any activity, which in the opinion of the Vibration Consultant requires vibration monitoring, a Vibration Monitoring Plan shall be prepared by the Vibration Consultant and submitted to Contractor to support their methods of construction. The plan may be modified as work progresses based on monitoring results.
2. The Vibration Monitoring Plan shall identify:
 - a. Proposed construction activity
 - b. The anticipated vibration limits for the construction activity
 - c. Historic or significant structures of concern including structures in poor condition, structures supported by vibration sensitive materials which could cause settlement or loss
 - d. Procedures, techniques and equipment to be employed by the Contractor to guard against damage to structures in the vicinity of the work area.
3. Vibration monitoring equipment shall meet the requirements of 203.3.2.5.6 of the NHDOT Standard Specifications (included by reference).
4. The Contractor shall conduct a Pre Construction Condition Survey of existing structures on the site identified in the Vibration Monitoring Plan including but not limited to brick and masonry structures, stone retaining walls and other sensitive areas. Further observation may be required at the discretion of the Contractor's Vibration Consultant. The completed Survey shall be provided to the Engineer as a written report.
5. The frequency and duration of vibration monitoring for construction activities shall be identified in the Vibration Monitoring Plan.

6. Vibration Monitoring Reports shall be furnished to the Engineer upon request and shall include the following information:
 - a. The name of the Contractor and/or Subcontractors responsible for the particular construction activity.
 - b. The name of the approved Vibration Consultant.
 - c. The name of the operator of the vibration monitoring equipment.
 - d. A sketch indicating the location of the vibration monitors and the particular construction activity.
 - e. Results of monitored vibrations for the particular construction activity. This information should include the frequencies of the measured peak particle velocities.
 - f. Identification of any activity that caused the vibration limits to be exceeded and the time of day that the limits were exceeded.
 - g. A summary of vibration related complaints received.
7. If the monitoring data indicates that the ground vibration limits for any of the three mutually perpendicular components have been exceeded, alternate construction methods will need to be considered by the Contractor to safeguard against damage to adjacent structures. It will be the Contractor's responsibility to implement construction methods and techniques in a manner which will mitigate the effects of construction. Damage to existing structures or properties as a result of the Contractor's operations shall be resolved by the Contractor at no additional cost to the Owner.
8. The Engineer and/or Owner will notify the Contractor of any complaints concerning vibrations resulting from construction activities.

END OF SECTION

SECTION 01562DUST CONTROLPART 1 - GENERAL1.1 DESCRIPTIONS

- A. This project is in an urban residential area and daily dust control utilizing a water truck and mechanical street sweeper is required.
- 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 on paved surfaces or sweep paved surfaces on a daily basis.
- C. The Contractor shall have a water truck on site at all times.
- D. Dust control operations will be required multiple times daily and on weekends when needed.
- E. Dust control work shall be incidental to the appropriate items of the Contract unless a separate unit item is provided

PART 2 - PRODUCTS2.1 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: Mechanical street sweeper with watering device able to pick up and haul away debris.

PART 3 - EXECUTION3.1 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.

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.
- C. Street sweeping: Minimum of once per week and as needed or requested by the Engineer.

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
1. Contractor shall provide a Traffic Control Plan for approval by the Engineer and the Owner. A schematic of project areas is provided at the end of this section for the Contractor's benefit.
 2. Provide all materials and perform all work necessary to completely regulate traffic in the area of Work.
 3. Provide Dust Control in accordance with Section 01562.
 4. 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.
 5. Do not close roads or streets to passage of the public without the permission of the Public Works Department.
- B. The City of Portsmouth DPW will decide if adequate Traffic Control is being maintained and shall have the authority to require the Contractor to take any additional steps necessary to maintain safe passage. If the State 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 State.

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.

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND BARRICADES

- A. An overview plan of the work area has been provided following this specification for the Contractor's use in developing the traffic control plan.
- B. Do not perform work without providing adequate warning signs, barricades, signal lights, watchmen and take other necessary precautions for the safety of the public.
- C. Provide and illuminate suitable warning signs to show where construction, barricades or detours exist.
- D. Provide barricades of substantial construction and painted with a finish that increases visibility at night.
- E. Keep signal lights illuminated at all barricades and obstructions from sunset to sunrise.
- F. 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.
- G. 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 (latest edition) 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. Allow access to residents and abutting land owners along the project to driveways and other normal outlets from their property.

3.3 UNIFORMED POLICE OFFICERS

- A. The Contractor shall only use uniformed police officers in locations required by the Owner.
- 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.

3.4 PEDESTRIANS

- A. Maintain safe pedestrian corridors throughout project area.
- B. Protect and/or barricade uneven or irregular surfaces impacted by construction.

END OF SECTION

SECTION 01580

PROJECT IDENTIFICATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Not in Contract

END OF SECTION

SECTION 01590

TEMPORARY FIELD OFFICE

PART 1 - GENERAL

- 1.1 DESCRIPTION
Not in contract.

END OF SECTION

SECTION 01611OWNER'S RIGHT TO MATERIALPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. The Owner retains the right to claim all suitable and unsuitable material.
 - 2. Load and transport to a location specified by the Owner all reclaimed asphalt product removed to meet existing road plan and section.
 - 3. Deliver all material claimed by the Owner to a location designated by the Owner.
- B. Related Work Specified Elsewhere:
 - 1. See Division 2.
- C. Schedule of Materials claimed by Owner:
 - 1. Reclaimed Asphalt Material (surplus).
 - 2. Manhole and Catch Basin frames, covers and grates.
 - 3. Granite curb removed and not reset.

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. Other data that may be requested by the Engineer to determine equality.

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 RESULTING CHANGES

- A. If proposed substitutions are judged as being acceptable, make all changes to structures, buildings, piping, electrical, and other items necessary to accommodate substitutions, at no additional cost to the Owner.
- 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.

3.3 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.

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
 5. Project Record Documents (Section 01720)
 6. Operation and Maintenance data (Section 01730)
 7. Submission of warranties

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01710PROJECT CLEANINGPART 1 - GENERAL1.1 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 - EXECUTION3.1 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. 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.
- C. Disposal:
1. Do not burn or bury rubbish and waste material on project site.
 2. Do not dispose of hazardous wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
 3. Do not dispose of wastes into streams or waterways.
- D. 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.

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.

- b. Prior to substantial completion, the Contractor shall provide tie forms for all water and sewer service connections.
 - 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 enactment of the liquidated damages as specified.

END OF SECTION

SECTION 01730OPERATION AND MAINTENANCE MANUALSPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Submit to the Engineer, Operation and Maintenance Manuals required by the Specification Sections.

1.2 SUBMISSION REQUIREMENTS

- A. Submit three (3) copies of draft manuals to the Engineer for review
- B. Following Engineers review and approval, furnish six (6) copies of a complete instruction manual for installation, operation, maintenance, and lubrication of each item specified.
- C. 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.

1.3 CONTENTS

- A. Table of contents
- B. Operating and maintenance information on all systems and items of equipment. The data shall consist of:
 1. catalogs, brochures and bulletins of parts
 2. charts and graphs
 3. "Nameplate" data for all equipment including equipment serial and model number
 4. wiring diagrams
 5. assembly drawings of location
 6. schedule of maintenance
 7. lubrication requirements
 8. lubrication charts showing manufacturer recommended lubricants for each rotating or reciprocating unit
 9. operating weight
 10. name, address and telephone number of subcontractors, manufacturers and suppliers for each piece of equipment.
 11. shop drawings corrected to as-built conditions
 12. operation descriptions
 13. Warranties
 14. list of replacement parts;
 15. detailed instructions for start-up, normal operation, shutdown procedures, and control techniques
 16. guide to troubleshooting the system.
 17. Description of controls including sequencing, diagrams, charts of valve tag numbers, etc.
 18. other necessary information for the Engineer to establish a complete maintenance program.
- C. Materials and Finishes. The data shall consist of:
 1. Building products
 2. Instructions for care and maintenance
 3. Additional requirements

1.4 FORMAT

- A. Provide binders with covers identifying detail title.
- B. Provide tabs for each separate product and system
- C. Provide drawings bound in with text or folded to text size pages.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

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>
02110	Clearing
02118	Stripping & Stockpiling Topsoil
02223	Trench Excavation - Earth
02224	Trench Excavation - Ledge
02229	Backfilling, Compaction Control & Testing
02275	Construction Fabrics
02369	Sheeting
02402	Site Dewatering
02431	Catch Basins, Frames & Grates (NH)
02540	Temporary Erosion Control
02551	Bituminous Pavement
02557	Pavement Reclamation
02560	Granite Curbing (NHDOT)
02601	Manholes, Covers and Frames (NH)
02610	Pipe & Pipe Fittings – General
02611	Ductile Iron Pipe and Fittings
02622	PVC Pipe & Fittings
02624	Corrugated Polyethylene Drainage Tubing (CPDT)
02625	Corrugated Polyethylene (CPE) Pipe and Fittings
02626	Copper Service Pipe
02630	Couplings, Connectors, Caps & Plugs
02641	Resilient Seated Gate Valves
02642	Corporation Stops
02643	Curb Stops
02644	Hydrant Assemblies
02646	Valve Boxes
02649	Service Saddles
02650	Excavation Dewatering
02651	Final Sewer Testing
02935	Loaming and Seeding (Hydraulic)
02950	Trees, Plants and Groundcover

SECTION 02110CLEARINGPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Clearing work, when applicable, includes but is not limited to, removal of trees, brush, stumps, wooded growth, grass, shrubs, poles, signs, fences, culverts and other vegetation and minor structures; the protection of designated wooded growth; the storage and protection of minor structures and materials which are to be replaced; and the disposal of nonsalvagable structures and materials, and necessary preliminary grading.
- B. Limits of Work:
 - 1. Perform clearing work within the areas required for construction or as shown on the Drawings and to a depth of 12 inches below the existing grade.
 - 2. Perform additional clearing work within areas and to depths which, in the opinion of the Engineer, interfere with excavation and/or construction.
- C. Work Not Included: Clearing and/or grubbing work performed for the convenience of the Contractor will not be considered for payment.

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Dispose of combustible material by burning only when permitted by and in accordance with all applicable local and state laws, ordinances, and code requirements.
- B. Remove and dispose of nonsalvagable structures and material in accordance with all applicable local and state laws, ordinances, and code requirements.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Provide all materials required to complete the Work.
- B. Timber and Wood:
 - 1. All timber and wood greater than 4" in diameter within the limits of clearing for easements across all private property shall become the property of the private property owner. Such timber and wood shall be stacked in log lengths on the private property just beyond the construction easement boundary.
 - 2. All timber and wood removed from within the limits of clearing for construction across the property of the Owner shall become the property of the Contractor.
- C. Restore materials and structures to be replaced to their original condition and location.
- D. Repair all damage to structures using the same materials contained in the structures, to the complete satisfaction of the Owner, Engineer, and the property owner.

PART 3 - EXECUTION3.1 PREPARATION

- A. Carefully preserve and protect from injury all trees and shrubs not to be removed.
- B. Right-of-Way
 - 1. Where excavation is required on public or private rights-of-way containing trees, shrubs, other growth, or any structure or construction, obtain the Engineer's direction concerning the extent to which such obstacles can be cleared or stripped prior to performing the Work.

2. In all rights-of-way, remove only those particular growths or structures which are, in the opinion of the Engineer, essential for construction operations.
3. Replace all other removals and repair all damage at no additional cost to the Owner.

3.2 PERFORMANCE

A. Clearing:

1. Remove and dispose of all trees, brush, slash, stumps, bushes, shrubs, plants, debris and obstructions within the area to be cleared, except as otherwise on the Drawings or as directed by the Engineer.
2. Remove all stumps unless otherwise directed by the Engineer.
3. Dispose of material to be removed daily as it accumulates.
4. Take special care to completely dispose of all elm trees and branches immediately after cutting either by burial in approved locations or, when permitted, by burning in areas well removed from standing elm growth.
5. Dispose of all brush and trees, not otherwise removed from cleared right-of-way, by chipping.

B. Protection of Wooded Growth:

1. Fell trees toward the center of the area being cleared to protect trees and shrubs to be left standing.
2. Cut up, remove, and dispose of trees unavoidably falling outside the area to be cleared.
3. Employ skilled workmen or tree surgeons to trim and repair all trees that are damaged and are to be left standing and paint all cut surfaces with a suitable bituminous paint.

C. Disposal:

1. Remove from the site and dispose of material in locations approved or designated by the Owner.
2. Burning of trees, brush, slash, stumps, bushes or other combustible materials on the construction site is not allowed under this Contract.

3.3 REPLACEMENT OF MATERIALS

- A. Paving, Curbing and Miscellaneous Material:
 - 1. Remove and replace all paving, subpaving, curbing, gutters, brick, paving block, granite curbing, flagging and minor structures over the areas to be excavated.
 - 2. Remove and replace bituminous asphaltic and portland cement concrete in accordance with the appropriate Sections of these Specifications.
 - 3. Properly store and preserve all material to be replaced in a location approved or designated by the Owner.
- B. Shrubs and Bushes: Remove, store, and replace ornamental shrubs and bushes to be preserved in accordance with accepted horticultural practices.
- C. Topsoil: When applicable, carefully remove, store and protect topsoil in accordance with the appropriate Section of this Division.
- D. Responsibility: Replace, at no additional cost to the Owner, all materials lost or damaged because of careless removal or neglectful or wasteful storage, disposal or use of these materials.

END OF SECTION

SECTION 02118STRIPPING AND STOCKPILING TOPSOILPART 1 - GENERAL1.1 DESCRIPTION

- A. Segregate topsoil prior to excavation, trenching and grading operations and stockpile it for use in the Work.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Topsoil shall consist of friable loam, reasonably free of subsoil, clay lumps, brush, roots, weeds, and other objectionable vegetation, stones and similar objects larger than two (2) inches in any dimension, litter and other materials unsuitable or harmful to plant growth.
- B. The quality of the topsoil material to be used shall be suitable to perform the Work.

PART 3 - EXECUTION3.1 PERFORMANCE

- A. Remove topsoil from the areas that are likely to be disturbed as a result of construction operations.
- B. Remove topsoil from all designated areas prior to the performance of normal excavation.
- C. Replace all lost topsoil with new suitable material.

3.2 STORAGE

- A. Transport topsoil and deposit in storage piles convenient to the areas which are subsequently to receive the application of topsoil.
- B. Stockpile topsoil separate from other excavated materials.
- C. Take all necessary precautions to prevent other excavated material and objectionable material from becoming intermixed with the topsoil before, during and after stripping and stockpiling operations.
- D. Neatly trim and grade stockpiles to provide drainage from surfaces and to prevent depressions where water may become impounded.
- E. Construct temporary erosion control devices for all stockpiled material, subject to the Engineer's approval.
- F. Any excess topsoil shall become the property of the Owner.

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 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 - EXECUTION3.1 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 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 02224TRENCH EXCAVATION - LEDGEPART 1 - GENERAL1.1 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 - PRODUCTS2.1 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

SECTION 02229BACKFILL AND COMPACTION

GENERAL

DESCRIPTION

Work Included:

Work includes backfilling trenches and/or excavation around structures with suitable material removed in the course of excavating and other suitable materials.

Testing soils.

Work Specified Elsewhere. This Section is not a stand-alone Section. Other requirements which relate to this Section are noted elsewhere in these documents. The Contractor and all Subcontractors are required to review this entire document along with the Drawings in an effort to identify all requirements.

REFERENCE STANDARDS

Sieve Analysis of Fine and Coarse Aggregates: ASTM C136

Sampling Aggregates: ASTM D75

Moisture Density Relations of Soils (Modified Proctor): ASTM D1557

Density of Soil In-Place by Nuclear Methods: ASTM D2922

State of New Hampshire Department of Transportation (NHDOT) Standard Specifications for Road and Bridge Construction (latest edition)

QUALITY ASSURANCE

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.

The Contractor shall make necessary arrangements to allow compaction testing to be performed at a time, place and elevation determined by the Engineer.

Pre-placement testing.

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.

Subgrade Material: Proctor density tests shall be performed on the existing subgrade in accordance with the following schedule and in accordance with ASTM D1557:

At the bottom of excavations where structures or slabs will be placed.

One after every 5,000 cubic yards has been relocated on the site.

Whenever the material has changed in the opinion of the Engineer.

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 and ASTM D1557:

Before any materials are brought to the site.

One after every 5,000 cubic yards has been brought to the site.

Whenever the source changes.

The result shall be submitted to the Engineer for approval prior to placement.

The Contractor shall obtain representative samples for ongoing trench backfill operations.

Samples may be obtained in-situ at time of testing provided they are, in the Engineers opinion, representative of ongoing operations.

Samples may be obtained from stockpiles provide the stockpiled material is thoroughly mixed to represent ongoing operations.

Samples shall also be obtained for select materials such as reclaimed asphalt or gravels previously excavated from the trench.

Post-placement testing:

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.

Determine in-place density in accordance with ASTM D2922 or by other methods as approved by the Engineer.

Compaction tests shall be made in accordance with the following table:

	Material	Testing Frequency	Percent Compaction
Under Slabs or Structures:			
	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
Around Structures:			
	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
In Trenches:			
	Native material or borrow material	From the blanket material to the underside of the gravel or loam. See Note #1 Below	95% 12" lifts
	Gravels or loam	See requirements for Under paved Areas and Grassed Areas for requirements below	See below
Under Paved Areas:			
	Native material or borrow material	One for every 10,000 s.f. of surface area for every 2 lifts of material placed.	95% 12" lifts
	Gravel	One for every 10,000 s.f. of surface area for every lift of material placed.	95% 6" lifts
	Crushed Gravel	One for every 10,000 s.f. of surface area for every lift of material placed.	95% 6" 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:

- The Contractor shall propose a method for backfill on the first day of work. This proposed method will be tested and modified as required to meet the compaction*

requirements noted in the above table. The first day of testing shall include testing of a minimum of 4 lifts. This compaction method shall be used until the soil characteristics have changed in the opinion of the Engineer. At that point new compaction tests shall be performed to determine if the requirements are still being met. If they are, the method shall continue, if they are not, the method shall be modified until the requirements are met. Even if the soil characteristics have not changed, confirmatory compaction tests shall be taken every 3 weeks. Confirmatory testing shall include testing of a minimum of 2 lifts. The Engineer shall determine the location of all tests.

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.

Submittals

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. The Contractor shall submit sieve and proctor curves to the Engineer for approval 7 days before any material is brought to the site. The Contractor shall submit compaction test result sheets to the Engineer no later than 7 days after the test were performed.

G. PRODUCTS

MATERIALS

Excavated Material Suitable for Reuse:

Material shall be friable natural material comprised of gravels, sand, silts, or clayey gravel and sands.
 Material shall be free from peat, muck, other organic matter, frozen material, ice, and/or snow.
 Material shall be free from stones, ledge/rock fragments, and asphalt over 8” in the largest dimension.
 The material shall not have a moisture content over 2% of its optimum moisture content.

Select and Borrow Materials:

Crushed Stone (Bedding Material):

*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.
 Clean, hard, and durable particles or fragments.
 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.

Sand (Sand Blanket or Bedding):

*Clean, hard and durable particles or fragments.
 Sieve Analysis:*

Sieve	% Passing by Weight
-------	---------------------

<u>Designation</u>	<u>Square Opening</u>
3/8"	100
No. 4	95 - 100
No. 16	50 - 85
No. 50	10 - 30
No. 100	2 - 10

Crushed Gravel or Structural Fill (Crushed Gravel Base Course):

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)

Bank Run Gravel or Granular Gravel Borrow (Gravel Subbase Course):

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)

Common Borrow (i.e. Sand):

Consist of earth suitable for embankment construction; free from frozen material, perishable rubbish, peat and other unsuitable material.

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.

The optimum moisture content shall be determined in accordance with AASHTO T 180, Method C or D.

100% shall pass the 3" sieve and 70-100% shall pass the No. 4 sieve.

Gravel Borrow (i.e. Gravel):

*Well graded granular material suitable for placement in authorized excavations below the bottom of the bedding layer to replace deficient excavated material, for road construction, pipeline construction, and other designate uses.
95-100% shall pass the 3" sieve and 25-70% shall pass the No. 4 sieve.*

EXECUTION

PERFORMANCE

General:

- Provide and place all necessary backfill material.
- 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.
- Place material in a manner that will prevent stones and lumps from becoming nested.
- Completely fill all voids between stones with fine material.
- Do not place backfill on or against new concrete until it has attained sufficient strength to support loads without distortion, cracking, and other damage.
- Deposit backfill material evenly on all sides of structures to avoid unequal soil pressures.
- Place backfill material evenly in the trench in an effort to maximize compaction.
- Do not backfill with, or on, frozen materials.
- Remove, or otherwise treat as necessary, previously placed material that has frozen prior to placing backfill.
- 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.
- Material made unsuitable by the Contractor's construction methods shall be replaced with Gravel Borrow at no additional cost to the Owner.
- 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.
- Do not continue backfilling until the previously placed and/or new materials have dried sufficiently to permit proper compaction.
- When original excavated material is, in the opinion of the Engineer, unsuitable, use only approved gravel borrow for backfilling.
- Backfill excavation/trench as early as possible to allow for the maximum time for natural settlement.
- Slope grade away from structures at a minimum slope of 1.5%.
- The Contractor shall remove excess fill material from the site.

Sheeting:

- Leave sheeting in place when damage is likely to result from its withdrawal. This shall only be allowed with written approval of the Engineer.
- Completely fill with suitable material and thoroughly compact all voids left by the removal of sheeting.
- Sheet shall be left in-place and incrementally moved up to allow for a safe work environment in which to properly compact the excavation/trench.
- See Section 02369 – Sheeting.

Backfilling Around Trench Obstacles

- 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.
- 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.

Backfilling in Paved Areas:

Backfill trenches in streets and other paved areas by maintaining a moisture content within 2% of optimum. 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. 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.

Backfilling Trenches in Nonpaved Areas:

Grade the ground to a reasonable uniformity.
Leave the mounding over the trenches in a uniform and neat condition, satisfactory to the Engineer.

Bedding & Backfilling of Pipelines:

Install pipe bedding and cushion and primary backfill in accordance with the requirements noted herein, in the specific pipe Specification Section, and on the Drawings.
Deposit and thoroughly compact the remainder of the backfill as noted herein.

Placing and Compacting Backfill:

Water Jetting: Shall not be allowed without the approval of the Engineer.

Puddling: Shall not be allowed without the approval of the Engineer.

Tamping:

Deposit and spread the backfill material in uniform parallel layers not exceeding the lift thicknesses noted herein.

Tamp each layer as required to obtain a thoroughly compacted mass.

If necessary, furnish and use an adequate number of power driven tampers, each weighing at least 150 lbs.

Rolling:

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.

Deposit and spread the backfill material in uniform parallel layers not exceeding the lift thicknesses noted herein.

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.

Improper Backfill

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.

Refill and compact the excavation or trench with suitable material and restore the surface to the required grade and condition.

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 02275CONSTRUCTION FABRICSPART 1 - GENERAL1.1 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 - PRODUCTS2.1 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 (at low strain)	20,000 lb/ft at 0.5% strain	ASTM D 6637-01
- 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. ⁻¹ | 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. ⁻¹ | 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. ⁻¹	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 02369SHEETINGPART 1 - GENERAL1.1 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 - PRODUCTS2.1 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 - EXECUTION3.1 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

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.
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.

1.3 SUBMITTALS

- A. The Contractor shall furnish to the Engineer and the USEPA, in writing, the Erosion and Sediment Control and Stormwater Management Plan (ESCSMP) plan for dewatering and diverting surface water before beginning the construction work for which the diversion is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.
- B. The Contractor shall provide the appropriate National Pollutions 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 extend 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.

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 (except proposed square structures) or cast-in-place concrete. **Pipe connections will be made with rubber boot connections.**
- 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. **All Catch Basins shall be provided with polyethylene liners**
- G. Castings shall be gray iron, Class 30, conforming to AASHTO M105, unless otherwise specified.
- H. 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.
- I. Acceptable manufacturers:
1. LeBaron
 2. Neenah
 3. East Jordan

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. Kleanstream

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 as directed.
 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. Unreinforced 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. Prior to final paving, set the structures at their final grade.
- C. Frames and Grates:
1. Set all frames on polyliner using caulk per manufacturer, 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. 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. Only install hoods as directed by Engineer.
- 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 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. Provide all labor, equipment, materials and maintain temporary erosion control devices as described in the Plan.
 3. 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.
 4. Provide such sediment control measures as may be necessary to address conditions created by construction dewatering methods and/or stormwater runoff.
 5. 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.
 6. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.
 7. 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.

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 Plan

- A. Prior to the start of construction submit the Plan in accordance with the Shop Drawing review process in Section 01340 – Submittal.
- B. Prior to the start of construction submit a Notice of Intent for Storm Water Discharges Associated with CONSTRUCTION ACTIVITY Under a NPDES General Permit (Copy attached).
- C. To assist in Plan 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.

2.2 ACCEPTABLE MATERIALS

- A. Baled Hay: At least 14" x 18" x 30" securely tied and staked twice per bale.
- B. Stone Check Dams: Washed $\frac{3}{4}$ inch crushed septic system stone free of sand and silts.
- C. Sand Bags: Heavy cloth bags of approximately 1 cubic foot capacity filled with sand or gravel.
- D. 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.
- E. 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.
- F. 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.
- G. 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.
- H. 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.

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.
 - 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.

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

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 .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.
 - 5. All high strength asphalt, when specified, shall be 50 gyration unless otherwise directed.

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 Asphalt Binder Content		
Mix Type	50 Gyration	75 Gyration*
3/8-in (9.5 mm)	6.3	5.9
1/2-inch (12.5 mm)	5.9	*
3/4-inch (19 mm)	5.3%	*

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.

*75 Gyration mix not allowed without express written permission of the engineer.

- 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 - EXECUTION3.1 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 mix design shall be submitted for approval and 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 brooming, 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 0.03 and 0.05 gal/yd².
 6. **Joint adhesive shall be used for all transverse and lateral seams when placing more than 100 tons of asphalt or more. This item is subsidiary unless a separate pay item is provided.**
 6. 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.
 7. Method requirements NHDOT Section 401.3.1.2 shall apply.
 8. In addition to 3.1.A.7 above, the following performance requirements shall apply:
 - a). Tier 2 QA/QC performance requirements shall apply.
 - b). Ride Smoothness: NHDOT Section 401.3.17.3.4.1 shall apply except variations exceeding **3/8** inch in profile or cross slope shall be eliminated.
 - c). Ride Smoothness: Section 401.3.17.3.4.4 shall apply except high points 0.5 inches in 25 feet shall corrected.

END OF SECTION

SECTION 02557PAVEMENT RECLAMATION (NH)PART 1 - GENERAL1.1 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.
- C. 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.
- D. 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. Additional crushed gravel shall meet the requirements of crushed gravel or crushed stone base course (fine gradation) Section 304 -2.9 or 2.10 of the NHDOT Standard specification latest edition.
- B. Stabilized Base:
 - 1. May be required to contain a minimum bitumen content of 1.5 percent of the portion that passes a ¾” sieve, measured according to AASHTO T-164. The crushed material shall meet the following gradation:

Sieve Designation	Percentage by Passing Weight
3"	100
1-1/2"	80 - 100
¾"	55 - 90
#4	40 - 70

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.
- 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	5" or 6" wide as appropriate 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 Ends (Exposed portion)	Approximately parallel to top. Minimum width: 3". 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.
- B. Test manholes upon installation, prior to paving.

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 for sewer manholes shall be purchased at cost from the Department of Public Works.** The manholes have the City's seal on them and are hinged type similar to those made by Pamrex.
- 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. For work performed in the City of Portsmouth, New Hampshire 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. All 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. All 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 cast 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.
 - 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.

2.2 FRAMES AND COVERS

- A. Standard Units:
 1. **Shall be Hinged**
 2. Constructed to support an HS-20 wheel loading.
 6. 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 - 30-inch diameter clear opening, with flange bracing ribs.
 7. Minimum weight of frame and cover shall be 430 lbs.
 8. Hinged Drain Manhole Covers shall be manufactured by PAMREX or approved equal.

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:
 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. The Engineer shall observe tests.
 3. 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. Test all manholes with pipes and or stubs installed. Testing with through pipes to be removed and replaces is not acceptable.
 3. 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.
 - 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.
- E. Backfilling:
1. Manhole testing shall be conducted before 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 during the test is a result of leaks through the joints or through the concrete.
- F. All repairs to manholes shall be performed to the exterior of the structure.
- G. 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. Work Included: Furnish, install, support and test pipe and pipe fittings of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

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 and fittings.
- 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.
- 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. 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 three (3) inches wide Terra Tape Sentry Line 1350 (Detachable) by Reef Industries, Houston, TX, or approved equal.
- B. 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 "For Use with Potable Water".

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 Contractor's 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 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 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 and 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.
- 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:
1. Pressure Test:
 - a. Perform testing in accordance with Section 5 of AWWA Standard C600.
 - b. Pressure and leakage tests are required.
 2. Chlorination of Pipelines:
 - a. Chlorinate all new potable water lines in accordance with the procedure outlined in AWWA C600, latest revision.
 - b. Locate chlorination and sampling points as approved by the Engineer.
 - c. Use a dosage which will produce not less than 10.0 ppm chlorine residual after a contact period of not less than 24 hours.
 - d. During the chlorination period, exercise care to prevent the contamination of water in existing water mains.
 - e. After chlorination, flush the piping with clean potable water until there is only background chlorine residual.

- f. 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 at no additional cost to the Owner. The Contractor shall coordinate all testing with the City. Bacteriological testing services of new water mains will be completed by the City of Portsmouth Water Department and reimbursed by the Contractor. The Contractor shall be remain responsible for coordination and sampling in advance.
 - b. The length of pipe to be tested and the time of the test shall be as approved by the Engineer.
 - c. The Engineer will observe the taking of samples.
 - d. Have all samples tested by a laboratory approved by the State and submit test results to the Engineer.
 - e. Any segment of a potable water line shall be considered unsuitable for service if a Coliform bacteria count is obtained from that sample.
 - f. Re-disinfect all segments of piping considered unsuitable and retest. Continue to disinfect and test until no Coliform bacteria are present.
 - g. Place piping into service when it has been successfully tested for pressure, leakage and total Coliform bacteria.
- 4. Services:
 - a. After a new main has been energized and the new service has been completed, it shall be the responsibility of the Contractor to confirm with the property owner that all water systems in the building are working properly. This will include removing any air from the water service and confirmation with the property owner that interior plumbing is functioning properly.

C. Building Interior Water Lines (When Applicable):

- 1. Clean and test in accordance with the "Plumbing General" Section in these Specifications.

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. Building Interior Sewer System: Clean and test in accordance with the "Plumbing General" Section in these Specifications.

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 02611

DUCTILE IRON PIPE & FITTINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install ductile iron pipe and ductile iron fittings of the type(s) and size(s) in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Standards:
 - 1. Cement-mortar lining for water: ANSI A21.4/AWWA C104.
 - 2. Rubber gasket joints: ANSI A21.11/AWWA C111.
 - 3. Ductile iron pipe thickness: ANSI A21.50/AWWA C150.
 - 4. Ductile iron pipe, centrifugally cast: ANSI A21.51/AWWA C151.
 - 5. Threaded flanges: ANSI A21.15/AWWA C115.
 - 6. Ductile iron fittings: ANSI 21.53/AWWA C153.
 - 7. Pipe flanges and fittings: ANSI B16-1, ANSI A-21.12.
 - 8. Bolts: COR-TEN ASTM A588.
 - 9. Polyethylene encasement: ANSI/A21.5/AWWA C105

1.3 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 fittings meet or exceed the requirements of these Specifications.
- C. If joint restraints are to be used in place of thrust blocks, submit restraint calculations for review by the Engineer. Restraint calculation shall be in accordance with DIPRA and AWWA standards.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Exercise extra care when handling pipe and fittings.
- B. Exercise extra care when handling cement lined pipe and fittings because damage to the lining will render it unfit for use.
- C. Protect the spherical spigot ends and the plain ends of all pipe during shipment by wood lagging securely fastened in place.

1.5 INSPECTION

- A. Provide all labor necessary for 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.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pipe:
 - 1. All pipes shall conform to the latest AWWA specification C151. Unless otherwise shown on the Drawings, the minimum thickness of ductile iron pipe shall be:
 - a. All ductile iron pipe shall be Class 52, double cement lined.
 - b. Pipe with flanges: Class 53 (formerly Class 3).
 - c. All ductile iron pipe shall have cement lining of double thickness.
 - 2. Pipe for use with sleeve type couplings shall have plain ends (without bells or beads) cast or machined at right angles to the axis.
 - 3. Pipe for use with split type couplings shall have ends with cast or machined shoulders or grooves that meet the requirements of the manufacturer of the couplings.
 - 4. Factory applied bituminous coatings, as approved by the Engineer, shall be furnished for all underground piping.
 - 5. Each ductile iron pipe shall have conspicuously marked on the exterior the pressure, class, and weight of the pipe.
 - 6. All ductile iron pipe furnished to the project shall be one uniform length, either 18 feet or 20 feet.
- B. Joints (as shown on the Drawings, specified and applicable):
 - 1. General: All joints shall be the same pressure class as the pipe unless otherwise shown on the Drawings.
 - 2. All rubber joints between pipes shall be supplied with 3 brass wedges per connection in order to provide continuity.
 - 3. Flanged:
 - a. Provide specially drilled flanges when required for connection to existing piping or special equipment.
 - b. Flanges shall be long-hub screwed tightly on pipe by machine at the foundry prior to facing and drilling.
 - c. Gaskets:
 - (1) Ring type of rubber with cloth insertion.
 - (2) Thickness of gaskets 12 inches in diameter and smaller: 1/16 inch.
 - (3) Thickness of gaskets larger than 12 inches in diameter: 3/32 inch.
 - d. Fasteners:
 - (1) Make joints with bolt, stubs with a nut on each end, or one tapped flanged with a stud and nut.
 - (2) The number and size of bolts shall meet the requirements of the same American National Standard as the flanges.
 - (3) Nuts, bolts and studs shall be Grade B meeting the requirements of ASTM A307.
 - (4) After jointing, coat entire joint with bituminous material compatible with pipe coating.
 - e. When applicable, provide and install flange clamps as shown on the Drawings.
 - f. Uniflange type connection shall be positively restrained by use of threaded rods (2) or other approved restraint device.

3. Push-on and Mechanical Joint:
 - a. The plain ends of push-on pipes shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.
 - b. Provide gaskets manufactured from a composition material suitable for exposure to the liquid to be contained within the pipe.
4. Grooved split ring couplings, sleeve couplings, flexible joints and couplings: As specified and shown on the Drawings.
5. Joint Restraint:
 - a. Provide both Mega-lug type joint restraint and thrust blocks as indicated on drawings details.
 - b. Types of joint restraint:
 - (1) Mechanical joint ductile iron pipe shall have “Mega-lug Type” restrained ductile iron glands and thrust blocks of sufficient size in accordance with DIPRA and AWWA standards for thrust restraint.
 - (2) Pipe and fittings with approved lugs or hooks cast integrally for use with socket pipe clamps, tie rods, or bridles. Bridles and tie rods shall be a minimum of 3/4 inch diameter except where they replace flange bolts of a smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The clamps, tie rods, and bridles shall be coated with an approved bituminous paint after assembly or, if necessary, prior to assembly.
 - (3) Other types of bracing as shown on the Drawings.

- C. Standard Fittings:
 1. All joints shall conform to the latest AWWA specification C-153.
 2. Class 350, Ductile Iron, Cement Lined except as shown on the Drawings or as specified.
 3. Joints the same as the pipe with which they are used or as shown on the Drawings.
 4. Provide fittings with standard bases where shown on the Drawings.
 5. Provide retainer glands on all fittings.
 6. Outside surface coated to specifications applicable to pipe.
- D. Non-Standard Fittings:
 1. Fittings having non-standard dimensions shall be subject to the Engineer's approval.
 2. Non-standard fittings shall have the same diameter and thickness as standard fittings and shall meet the specification requirements for standard fittings.
 3. The laying lengths and types of joints shall be determined by the particular piping to which they connect.
 4. Flanged fittings not meeting the requirements of ANSI A21.10 (i.e., laterals or reducing elbows) shall meet the requirements of ANSI B16.1 in Class 125.
- E. **Polyethylene encasement is required and shall be 8 mil thick.**

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations.
 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.
- B. Installation in Trenches:
 1. After bagging pipe with plastic, firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.
 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 the inverts up to the required grade.
 6. Set the pipe true to line and grade. Use a transit and level or a laser beam aligner as appropriate to the pipe application.
 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 visible leakage and 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 joints 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.
- C. Temporary Plugs:
1. When pipe installation work in trenches is not in progress, close the 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 pipelines as conductors for trench drainage during construction.
- D. Assembling Joints:
1. Push-on Joints:
 - a. Insert the gasket into the groove of the bell.
 - b. Uniformly apply a thin film of special lubricant over the inner surface of the gasket that will contact the spigot end of the pipe.
 - c. Insert the chamfered end of the plain pipe into the gasket and push until it seats against the bottom of the socket.
 - d. Where electromagnetic type pipe locators are used or as directed, **insert 3 serrated brass wedges at all joints to assure continuity**. Use two wedges per joint for 2" through 12" diameter pipe and four wedges for pipes greater than 12" diameter. Each wedge shall be driven into the opening between the plain end and the bell end. Wedges may be omitted with use of Field Lok 350™ gaskets.
 2. Bolted Joints:
 - a. Remove rust preventive coatings from machined surfaces prior to assembly.
 - b. Thoroughly clean and carefully smooth all burrs and other defects from pipe ends, sockets, sleeves, housings and gaskets.
 3. Flanged Joints:
 - a. Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension.
 - b. Execute care when tightening joints to prevent undue strain upon valves, pumps, and other equipment.
 4. Mechanical Joints:
 - a. Thoroughly clean, with a wire brush, surfaces that will be in contact with the gaskets.
 - b. Lubricate the gasket, bell, and spigot.
 - c. Slip the gland and gasket, in that order, over the spigot and insert the spigot into the bell until properly seated.
 - d. Evenly seat the gasket in the bell at all points, center the spigot, and firmly press the gland against the gasket.
 - e. Insert the bolts, install the nuts finger tight, and progressively tighten diametrically opposite nuts uniformly around the joint to the proper tension with a torque wrench.
 - f. The correct range of torque (as indicated by a torque wrench) and the length of wrench (if not a torque wrench) shall not exceed:
 - (1) Range of Torque: 60-90 Ft.-lbs.
 - (2) Length of Wrench: 10 inches.
 - g. If effective joint sealing is not attained at the maximum torque specified above, disassemble, thoroughly clean, and reassemble the joint. Do not overstress the bolts to tighten a leaking joint.
 5. Bell and Spigot Joints:
 - a. Thoroughly clean the bell and spigots and remove excess tar and other obstructions.
 - b. Apply a liberal coat of manufacturer supplied lubricant to both the gasket and the spigot end. Lubricant shall be appropriate for the pipe application.

- c. Insert the spigot firmly into place and hold securely until the joint has been properly completed.
- E. Fabrication:
 - 1. Tapped Connections:
 - a. Make all tapped connections where shown on the Drawings or where directed by the Engineer.
 - b. Make all connections watertight and of adequate strength to prevent pullout.
 - c. Drill and tap normal to the longitudinal axis of the pipe.
 - d. The maximum sizes of taps in pipes and fittings without busses shall not exceed the sizes listed in the appendix of ANSI A21.51 based on 3 full threads for cast iron and 2 full threads for ductile iron.
 - 2. Cutting:
 - a. Perform all cutting with machines having rolling wheel cutters or knives designed to cut cast or ductile iron. Do not use a hammer and chisel to cut pipe.
 - b. After cutting, examine all cut ends for possible cracks.
 - c. Carefully chamfer all cut ends to be used with push-on joints to prevent damage to gaskets when pipe is installed.
- F. Polyethylene encasement shall be installed in agreement with ANSI/AWWA C105/A21.5 and per manufacturers recommendations. Tube end shall be overlapped and secured with adhesive tape or plastic string. Repair any rips or defects prior to backfilling.
- G. Pipe Deflection:
 - 1. Push-on and Mechanical Joints:
 - a. The maximum permissible deflection of alignment at joints, in inches for 18 foot lengths:

<u>Size of Pipe</u>	<u>Push-On</u>	<u>Mechanical</u>
6	19	27
8	19	20
10	19	20
12	11	20
14	11	13.5
16	11	13.5
18	11	11
20	11	11
24	11	9
 - b. The maximum permissible deflection for other lengths shall be in proportion of such lengths to 18 feet.
 - 2. Flexible Joints: The maximum deflection in any direction shall not exceed the manufacturer's instructions and recommendations.
- H. Testing to be performed in accordance with the appropriate section of Section 02610 – Pipe and Pipe Fittings – General.

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 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.

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

CORRUGATED POLYETHYLENE DRAINAGE TUBING (CPDT)
Drain Services and Underdrain

PART 1 - GENERAL

1.1 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 (PE) conforming to the following standard referenced specifications:
 - 1. AASHTO: M252, Corrugated Polyethylene Drainage tubing.
- B. Pipe and fittings shall be provided by a single manufacturer. The Contractor shall submit a certificate of compliance to the Engineer for approval.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Resin
 - 1. Resin used in the manufacturing of pipe and fittings shall meet the requirements of cell class 324420C as defined in ASTM 3350.
 - 2. Carbon black content shall not exceed 5%.
- B. Pipe

Pipe shall be heavy duty corrugated polyethylene (PE) tubing, soil tight with Class 2 perforations for underdrains. The water inlet area shall be a minimum of 2.0 square inch per linear foot. Drainage service pipe to have no perforations.
- C. Fittings

Only fittings and couplings supplied and recommended by the manufacturer of the pipe shall be used. The fitting and couplings shall not reduce or impair the overall integrity of the pipe.
- D. Acceptable Manufacturers:
 - 1. Hancor, Inc. Findlay, Ohio
 - 2. Advanced Drainage Systems, Inc. Columbus, Ohio

PART 3 - EXECUTION

3.1 TRANSPORTING, HANDLING AND STORING PIPE

- A. Transporting
 - 1. Care shall be taken during the transportation of the pipe in trucks and trailers so that it is not damaged from cuts and kinks.
- B. Handling
 - 1. The handling and lifting of pipe lengths and fittings shall be such as to avoid damage and shall be done by means of ropes, fabric or rubber protected slings and straps.
 - 2. The pipe shall not be lifted by means of metal slings, chains, cables or hooks inserted into the pipe ends. Slings shall be positioned to prevent excessive flexing of the pipe lengths to avoid kinking or damage to the pipe.

3. The pipe lengths shall not be dragged from the transportation media or allowed to fall onto unprepared or rocky ground.
 4. The handling of the joined pipe line shall be done in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects.
 5. Sections of the pipes where cuts and gouges of the pipe wall are apparent shall be removed and the ends of the pipeline rejoined.
- C. Storing
1. The stacking of the polyethylene pipe shall be limited to such a height as to not cause excessive deformation of the bottom layers of pipes under anticipated temperature conditions.
 2. The surface where the pipe shall be stored shall be level and free of foreign objects which could damage the pipe.
 3. Where necessary due to ground conditions, the pipe shall be stored on wooden sleepers of sufficient bearing and spacing.
 4. Pipe coils shall be laid flat on their flat side and not stacked.

3.2 INSTALLING PIPES AND FITTINGS

- A. Install in accordance with the manufacturer's written instructions and as shown on the Drawings.
- B. The polyethylene pipe shall be lifted and lowered into the trench with proper equipment and in such a manner to ensure that the pipe is not damaged or twisted.
- C. The pipe and fittings shall be laid with the perforations face down on the trench bottom or as directed.
- D. Pipe shall be laid true to line and grade.

END OF SECTION

CORRUGATED POLYETHYLENE (CPE) PIPE & FITTINGS

PART 1 - GENERAL

1.1 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 M294
 2. ASTM: D1248 Polyethylene Molding & Extrusion materials.
 3. 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 - PRODUCTS

2.1 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. Twelve - to 36 - inch diameters shall conform to AASHTO M294 Type S. Forty-two 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 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. 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.
- E. Pipe shall be laid true to line and grade.

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 02626

COPPER SERVICE PIPE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install copper service pipe of the type and size and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Seamless copper water tube, ASTM B88.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Type K, soft annealed, 3/4" (minimum) through 1".
- B. Type K, hard tempered, 1-1/4 inches and larger.

PART 3 - EXECUTION

- A. Jointing:
 - 1. Compression Joints
 - a. Ream or file the pipe to remove burrs.
 - b. Slip compression nut over pipe and slide pipe into corporation.
 - c. Tighten compression nut.
 - d. Inspect for cracks, splits or other damages and replace if necessary.
 - 2. Adapters: Use as required to connect to existing services.
- B. Bending Pipe:
 - 1. Bend pipe with suitable tools and provide smooth bend free of any cracks or buckles.

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) 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,
 - e. Acceptable Manufacturers:
 - (1) Dresser Manufacturing Co.
 - (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:
 - (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 for all sludge, sewage, and other lines with similar service.
 - 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 15 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 15 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.
- 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 02641

RESILIENT-SEATED GATE VALVES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install gate valves of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All gate valves of the same type and style shall be manufactured by one manufacturer.
- B. Meet or exceed AWWA 509 Resilient-Seated Gate Valves for Water and Sewerage Systems or AWWA C515 Reduced Wall Resilient Seated Gate Valves for Water Supply Service.
- C. Acceptable Manufacturers shall be specified by the local authority in their standards. If local standards do not exist, the following manufacturers shall be acceptable:
 - 1. Mueller
 - 2. Dresser
 - 3. Darling
 - 4. Clow
 - 5. Smith
 - 6. Or Equivalent

1.3 VALVE LOCATION AND USE

- A. As shown on the Drawings.
- B. Accessories: As shown and required for proper operation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Waterworks type NRS valves (AWWA C509 or AWWA C515), with mechanical joints and all accessories including retainer gland.
 - 1. Iron body bronze mounted (IBBM), coated inside and out with fusion bonded epoxy (AWWA C550).
 - 2. Non rising stem (NRS).
 - 3. Resilient seat gate.
 - 4. End Connections: As shown on the Drawings and as required for pipe.
 - 5. Working pressure:
 - a. All sizes: 200 psi water.
 - b. Unless otherwise shown on the Drawings.
 - 6. Stem Sealing:
 - a. Rust-proofed bolting.
 - b. "O" ring design.
 - c. Capable of replacing under pressure with valve open.
 - 7. Buried Valves:
 - a. Gate box required.
 - b. Sufficient quantity of tee-handle valve wrenches for operating valves of various depths.
 - c. 2 inch square operating nut, securely fastened to shaft.

8. Valve operation: Open by turning right-clockwise.
9. Arrow showing direction of opening plainly cast on valve bonnet.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Buried Valves:
 1. Stem vertical
 2. Box vertical and centered over operating nut.
 3. Thrust blocks installed as shown on the Drawings.
 4. Gate box supported during backfilling and maintained.
 5. Gate box shall not transmit shock load or stress to valve.

END OF SECTION

SECTION 02642

CORPORATION STOPS

PART 1 -- GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install corporation stops of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.
- B. Work Specified Elsewhere. This Section is not a stand-alone Section. Other requirements which relate to this Section are noted elsewhere in these documents. The Contractor and all Subcontractors are required to review this entire document along with the Drawings in an effort to identify all requirements.

1.2 Reference standards

- A. ANSI/AWWA C800.

1.3 Submittals

- A. Submit manufacturer's literature, test reports, and certificates in accordance with the General Conditions and Section 01340 - Submittals.

1.4 DELIVERY, STORAGE & HANDLING

- A. Store to prevent damage and in accordance with manufacturer's instructions.

PART 2 -- PRODUCTS

2.1 MATERIALS

- A. Ball valve-type corporation with 300 psi rating.
- B. Shall conform to ANSI/AWWA C800, latest revision.
- C. Constructed of brass. Brass alloys not listed in ANSI/AWWA C800 Paragraph 4.1.2 are not approved.
- D. Shall be "lead free" as defined in the Safe Drinking Water Act, amended January 4, 2011. Specifically, fittings shall contain not more than a weighted average of 0.25% lead when used with respect to their wetted surfaces.
- E. Outlet shall have a compression pack joint (CPPJ) for Copper Tubing Size (CTS) O.D.
- F. Stainless steel insert stiffeners shall be used where CTS plastic tubing is specified
- G. Inlet shall have AWWA (cc) Tapered Pipe Threads.
- H. Acceptable Manufacturers:
 - 1. **Mueller**
 - 2. **A. Y. McDonald**
 - 3. **Or equivalent**

2.2 Substitutions

- A. Products of equal or better quality, function and performance may be proposed for substitution by following the procedures in Section 01630 – Substitution and Product Options.

PART 3 -- EXECUTION

3.1 **INSTALLATION**

- A. Install at locations shown on the Drawings and as specified in accordance with manufacturer's instructions.
- B. Service saddles shall be required as noted on the drawings, on all PVC and AC mains, as required below, and as specified by the pipe and saddle manufacturers.

Pipe Size	Class 50 Ductile Iron Pipe	Class 51 Ductile Iron Pipe	Class 52 Ductile Iron Pipe
6"	All Taps	All Taps	Taps > 3/4"
8"	All Taps	Taps > 3/4"	Taps > 3/4"
10"	Taps > 3/4"	Taps > 3/4"	Taps > 1"
12"	Taps > 3/4"	Taps > 1"	Taps > 1-1/4"
16"	Taps > 1-1/4"	Taps > 1-1/2"	Taps > 2"

- C. Spiral-wrap completely the thread area with Teflon tape prior to insertion.
- D. Install corporation stops at the 2 and 10 o'clock positions on the pipe.
- E. A minimum of one and a maximum of three threads of the installed corporation stop must be showing outside the water main. Care shall be taken not to over-tighten the stops.
- F. Check and adjust all corporation stops for smooth operation.

3.2 **Testing**

- A. All corporation stops must be installed prior to leakage testing of the water main.

END OF SECTION

SECTION 02643

CURB STOPS ASSEMBLY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install curb stops of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All curb stops shall be manufactured by one manufacturer.
- B. All curb boxes shall be from one manufacturer.
- C. Qualifications of Manufacturer: Products shall have proven reliable in similar installations over a reasonable number of years.
- D. Meet or exceed ANSI/AWWA C800.
- E. Acceptable Curb Stop Manufacturers:
1. A.Y. McDonald Mfg. Co.
 1. Mueller Co.
 2. or equivalent.

PART 2 - PRODUCTS

- A. Curb Stop
1. Curb ball valve, quarter turn check.
 2. Construction shall be in accordance with AWWA C800 latest revision.
 3. Shall be "lead free" as defined in the Safe Drinking Water Act, amended January 4, 2011. Specifically, fittings shall contain not more than a weighted average of 0.25% lead when used with respect to their wetted surfaces.
 4. Inlet and outlet shall have compression type connections (CPPJ).
 5. Working pressure shall be 300 psi.
 6. Stainless steel insert stiffeners shall be used where plastic tubing (CTS) is specified.
 7. Inverted key and plug type curb stops are not acceptable.
- B. Service Boxes
1. Erie style
 2. 5½' - 6½' bury (unless shown otherwise)
 3. Plug cover with rope thread
 4. 36" x ½" stainless steel Box Rod
 5. For services over 1", provide heavy duty foot piece.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install at locations shown on the Drawings and in accordance with manufacturer's instructions.
- B. Install 2" x 8" x 8" concrete tile under curb stop.

3.2 ADJUSTMENTS

- A. Check and adjust all curb stops for smooth operation.
- B. The curb box shall be adjusted to final grade.
 - 1. In paved areas or in sidewalks, the adjustment shall be approximately 1/8" below finish grade.
 - 2. In lawn or grass area, the adjustment shall be approximately 1/2" below finish grade or at such a level as not to interfere with lawn maintenance.

END OF SECTION

SECTION 02644

HYDRANT ASSEMBLIES

PART 1 - GENERAL

1.1. DESCRIPTION

- A. Work Included: Furnish and install hydrant assemblies of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.
- B. Hydrant Assemblies consist of:
 - 1. Hydrant tee.
 - 2. 6 inch gate valve and valve box.
 - 3. 6 inch hydrant branch piping.
 - 4. Hydrant.
 - 5. Thrust blocking and retainer glands.

1.2. QUALITY ASSURANCE

- A. Hydrants shall conform to AWWA C502 and all hydrants shall be from one manufacturer.
- B. Hydrants shall comply with Factory Mutual Research Corporation and Underwriters' Laboratories UL246 Standard.
- C. Gate valves shall conform to AWWA C500.
- D. Acceptable Manufacturer:
 - 1. Kennedy Model K-81A or as approved by the City of Portsmouth Water Department.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fire Hydrants:
 - 1. Dry barrel type with a 5-1/4 inch minimum valve opening.
 - 2. Two (2) 2-1/2 inch hose connections and one (1) 4-1/2 inch pumper connection.
 - a. 2-1/2 inch outlets: 60 degree V threads, 7-1/2 threads to the inch, external threads 3-1/16 inches, O.D. National Standard threads.
 - b. 4-1/2 inch outlet: 4 threads to the inch, external threads 5-3/4 inches, O.D. National Standard threads.
 - 3. 200 pounds working pressure and 400 pounds hydrostatic test pressure.
 - 4. Working parts shall be bronze and open RIGHT (clockwise). Operating nut shall open by turning to the RIGHT and be five-sided, 1 1/2 inch point to flat.
 - 5. Designed with standpipe breaking ring or breakable sections.
 - 6. Supply one (1) collision repair kit for every twenty-five (25) hydrants installed.
 - 7. Caps shall be attached to hydrant body by chains.
- B. Gate Valves: Waterworks type non-rising stem AWWA valve as specified in Section 02646-Gate Valves.
- C. Valve Boxes:
 - 1. Cast or ductile iron, with the word "WATER" cast in covers.
 - 2. Be of such length as required without full extensions. Minimum lap 12 inches.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install hydrants as shown in the details and using manufacturer's written instructions.
- B. No hydrant assembly shall be backfilled until approved by the Engineer.
- C. Provide thrust blocks as shown.
- D. Provide barrel extensions as required for hydrant to be installed at proper grade at no additional cost to the Owner.
- E. Plug all drain openings with brass plugs.
- F. Provide finish paint on all exposed surfaces. Color must meet Owner's requirements.

3.2 CLEANING

- A. Clean all hydrants of concrete, etc. and repaint as necessary to the satisfaction of the Engineer and Owner.

END OF SECTION

SECTION 02646

VALVE BOXES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install valve boxes of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All valve boxes shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products to have been proven reliable in similar installations over a reasonable number of years.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. For valves 10 inches and smaller the valve box shall be cast iron, slip type two-piece integral base, with a top flange, 5-1/4 inch shaft.
- B. For valves 12 inches and larger the valve box shall be cast iron, slip type, three piece (separate base), with a top flange, 5-1/4 inch shaft.
- C. Cast or ductile iron, with the word "WATER" cast in covers.
- D. Acceptable Manufacturers:
 - 1. Mueller Co.
 - 2. Central Foundry Co.
 - 3. Clow.
 - 4. Or equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation as shown on the Drawings and/or as specified herein:
 - 1. When installation is complete, no pressure shall be exerted by valve box on the water main or on the valve.
 - 2. Be of such length as required without full extension. Minimum lap 12 inches.
 - 3. Install so cover is exactly level to 1/4 inch lower than pavement.

END OF SECTION

SECTION 02649

SERVICE SADDLES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install service saddles of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All service saddles shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products to have been proven reliable in similar installations over a reasonable number of years.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit shop drawings in accordance with the General Conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. For cast iron, ductile iron, and C900 PVC pipe
 - 1. Body - ductile iron.
 - a. Fusion bonded epoxy coated (10 mils min.)
 - 2. Gasket - NBR compound.
 - 3. Bolts, Washers and nuts - heavy hex constructed of type 304 (18-8) stainless steel.
 - 4. Threads-American Tapered Pipe Threads.
- B. Straps:
 - 1. 304 Stainless Steel single or double strap for 6" or smaller.
 - 2. 304 Stainless Steel double strap for 8" and larger.
- C. Acceptable Manufacturers:
 - 1. Smith-Blair
 - 2. Dresser
 - 3. Or equivalent

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation as shown on the Drawings and/or as specified herein:
 - 1. Install at locations with 1 1/2 inch or larger services on ductile iron pipe, or at any size service on A.C. pipe, or as specified by the pipe and saddle manufacturers.
 - 2. Check for leaks prior to backfilling as appropriate.
 - 3. Tap pipe with tools and methods specifically furnished by pipe manufacturer.

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 Superintendent 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 sub-grade 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. 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. Prior to commencing excavation and at locations designated by the Engineer, install temporary groundwater observation wells on the alignment of the pipe centerline.

- B. The required spacing of the wells will be determined by the Engineer based on the methods and sequence of excavation and dewatering and the soil and water conditions encountered. It is anticipated that temporary well spacing will generally vary within the range of 100 feet to 300 feet.
- C. Evaluate water level readings in the wells to confirm that the groundwater level has been lowered as specified such that excavation to final grade can be made in-the-dry.
- D. Make water level readings and submit to the Engineer, to confirm effectiveness of dewatering prior to final excavation. Permit the Engineer to make independent readings of water levels in wells.
- E. Temporary groundwater observation wells shall consist of a screened or slotted well point and riser pipe. The well point tip shall be placed at least two feet below the proposed bottom of excavation level.
- F. Leave temporary groundwater observation wells in place until immediately prior to final excavation at the well locations.

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.

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 or 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 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 the tested.
 - c. Pressurize the sealed pipe to 5 psig.
 - d. The pneumatic plugs are acceptable if they remain in place without bracing.
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 them.
 - 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

Pipe Diameter (inches) (min)	Minimum Time	Length for Min. Time	Time for Longer Lengths*
		(feet)	(sec)
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. 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.
- D. Deflection Tests:
 - 1. Deflection test all PVC pipe.
 - 2. Perform test by using a 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 average inside diameter. A test shall be conducted after a minimum of thirty days following installation.

TABLE 2 - PVC Materials

D 3034	Solid Wall	4" - 15"
F 679	Solid Wall	18" - 36"
F 794	Ribbed Wall	18" - 48"
F 949	Corrugated	4" - 8"

- b. The deflection gauge diameter (G) for this test shall be determined by the following formula:

$$G = 0.95 D \text{ inches (nominal)}$$

where D is the average inside diameter given in the applicable ASTM standard. In the cases where inside diameters are not given they shall be determined by the following formula:

$$D = D' - 2(1.06 t) \text{ inches}$$

Where: t = the minimum solid wall thickness
 D' = the average outside diameter

- 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.

E. Force Main Test:

1. Pressure Test:

- a. Perform testing in accordance with Section 5 of AWWA Standard C600, latest edition, at a pressure equal to 150 psi of the design operating total dynamic head.
- b. 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.
- c. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied. 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.
- d. While maintaining this pressure, the Contractor shall make a leakage test by metering the flow of water into the pipe. If the average leakage during a two-hour period on buried pipelines exceeds a rate of 10 gallons per inch of diameter per 24 hours per mile of pipeline the section shall be considered as having failed the test. All pipes within structures and chambers and all flanged joints shall be no visible leakage.
- e. If the section fails to pass the pressure and leakage 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.
- f. Tests shall be hydrostatic.

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 pipe line pressure 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 (HYDRAULIC)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

- a. Hydraulic seed application (hydroseed) – Furnish, place, and grade 4” (min.) of loam to prepared disturbed areas, uniformly place seed and mulch hydraulically.
- b. Dry seed application - 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 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 slopes 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 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 an appropriate quantity of pure culture 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 (4" minimum thickness).
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 place 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. 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 innoculum and remains in the hydroseeder longer than 30 minutes, fresh innoculum 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.
 3. 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..
 4. 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.
- 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 manufacture, 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 02950

TREES, PLANTS AND GROUNDCOVER

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
 - 1. Engage the services of a reputable nursery in the area to furnish and plant such trees and shrubs as recommended by the nursery and as approved by the Owner.
 - 2. Locations of new trees, plants and groundcover shown on Contract Drawings are conceptual only. Submit a plan to the Engineer showing the recommended locations of all trees and shrubs.
- B. Work Specified Elsewhere:
 - 1. Loaming and Seeding is specified in Section 02935.

1.2 QUALITY ASSURANCE

- A. Qualification of the Nursery shall be provided for approval a minimum of six weeks prior to Substantial Completion.
 - 1. The Nursery shall demonstrate five years business providing the type and size of plantings requested.
- B. All trees and shrubs shall conform to the requirements of the current edition of the "American Standard for Nursery Stock" sponsored by the American Associate of Nurserymen, Inc., unless otherwise shown on the Drawings.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Ball and burlap, or grow and deliver in approved containers. Secure root balls by strong, tight, heavy wrapping. Trees must come from a soil that will hold a firm root ball.
- B. Handle all plants so that the roots are adequately protected at all times. See that balls of balled or burlapped plants are well protected immediately upon delivery. Do not plant such plants if the ball is cracked or broken either before or during the process of planting.
- C. Keep all balled or burlapped plants constantly moist from the time of arrival until planting. If plants must be stored more than two days before planting, completely cover the root balls with at least a six inch thick layer of moist hay, leaves or loam, to protect against drying.

1.4 GUARANTEE

- A. The Contractor shall be responsible for all plants for a period of one full growing season following the final acceptance of the planting work, and during that period, shall promptly replace all plants that, in the opinion of the Owner, have died, or have made unsatisfactory growth. Replace with plants of the same variety and size, plant and maintain at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Trees and Plants:
 - 1. All Trees: First class representatives of their species or varieties.
 - 2. All Plants: Good, healthy, well-formed upper growth and a large, fibrous, compact root system.

3. Large Deciduous Trees: Straight trunks and a single leader, or as may be characteristic of the species. Tops shall be fully branched, densely foliated, well balanced, and in good proportion to the height of the tree. Trees with weak trunks, thinly or irregularly branched, or with unnatural shape or proportion due to undesirable pruning practices or for any other cause, will be rejected. Trees with leaders or branches too severely cut back or with bottom limbs trimmed too high will be rejected.
 4. Small Growing Deciduous Trees: Well branched, natural shape. Plants which are poorly furnished or have been grown or pruned into unnatural shapes will be rejected.
 5. Coniferous (Evergreen) Trees: Uniformly and thickly branched from the ground up, with a shape characteristic of the species.
- B. All trees shall have been grown under climatic conditions similar to those in the locality of the project site or have been acclimated to such conditions for at least two years.
- C. All trees must be healthy, vigorous, and free from disease, injurious insects, and their eggs or larvae, mechanical wounds, broken branches, decay or any other defects.
- D. Planting soil: Mixed in the following ratio: 4 cubic yards of loam, one cubic yard rotted cattle manure, 15 pounds 6-10-4 part organic commercial fertilizer.
- E. Stakes:
1. Material: Good quality spruce or fir.
 2. Size: 2 inches x 3 inches x 8 feet.
 3. Apply a heavy coat of oil painting before setting.
- F. Hose:
1. Material: 2-ply fabric bearing rubber.
 2. Size: Not less than 1/2 inch inside diameter.
- G. Wire:
1. Material: Zinc-coated iron.
 2. Type: 10 gauge double strand twisted.
- H. Wrapping Materials:
1. Material: Waterproof crinkly kraft paper or approved equal.
 2. Size: Not less than 6 inches nor more than 10 inches wide.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform all site work, including all excavation and disposal of surplus material, prior to the delivery of plants to the site.
- B. All excavations shall have as near to vertical sides as possible.
- C. Dispose of surplus soil.
- D. Construct planting pits one foot wider in diameter than the root mass with a depth of six inches deeper than the root mass.
- E. Have all planting soil, stakes, hose and other necessary materials on the site prior to delivery of the plants.

3.2 INSTALLATION

- A. Remove all boulders encountered in the excavations to the depths necessary to permit the proper excavation of pits for plants. Fill the resulting spaces with suitable compacted earth.
- B. Planting:
 - 1. Set all plants at a level that, after settlement, a natural relationship of the crown of the plant with the ground surface will be established.
 - 2. Set all trees and shrubs in the center of individual pits or pockets.
 - 3. Carefully and thoroughly tamp planting soil under and around the base of each ball to fill all voids. Do not use frozen or muddy soil.
 - 4. Pull all ropes, wires and other such material from under the root balls without pulling out the bur-lap.
 - 5. Form a shallow depression at each plant by placing a mound of topsoil around the edge of each pit or pocket.
- C. Prune all new plant materials at the site in accordance with standard, modern practices. Paint cuts over 1/2 inch in diameter with a suitable tree paint.
- D. Guy all plants or stake and wrap as required immediately after planting. Do not twist stakes or pull in any manner which might cause injury to root balls or roots. Set all stakes vertically. Draw taut all wires used to guy trees to the upper end of each stake and securely fasten. Encase all guy wires in hose to prevent contact with the bark of the plant. Drive stakes for guying 30 inches deep into the ground. Drive all stakes plumb and free from splitting.
- E. Wrap the trunks of all trees spirally to the height of the lowest branches. Hold the wrapping material in place by a suitable cord. All wrapping shall neat and snug.

3.3 MAINTENANCE

- A. Immediately upon completion of planting, begin to provide all operations of maintenance as required to keep the plants in a healthy growing condition including the repair or replacement of all staking and wrap-ping materials.

3.4 FIELD QUALITY CONTROL

- A. The Owner shall have the right to reject all trees and shrubs that are unsatisfactory as to growth or condi-tion, or do not meet the Specifications.

END OF SECTION

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
03010	Concrete Testing
03100	Concrete Formwork
03200	Concrete Reinforcement
03300	Cast in Place Concrete & Flowable Fill
03305	Concrete Cradles, Arches, Encasements, etc.
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 ACT 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.
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 03010

CONCRETE TESTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Perform all testing of concrete as specified herein and as directed by the Engineer.

1.2 QUALITY ASSURANCE

- A. Have all testing conducted by an independent testing laboratory approved in writing by the Engineer.
- B. ASTM Requirements:
1. Curing Test Cylinders: ASTM C31/C31M - 03.
 2. Slump Testing: ASTM C143/C143M - 03.
 3. Air Content Testing: ASTM C231 - 03.
 4. Core Testing: ASTM C42/C42M - 03.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete materials are specified in the appropriate Sections in these Specifications.

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Test Cylinders:
1. Have 4 standard test cylinders made and cured for each 50 cubic yards, or fraction thereof, of each type of concrete placed in any one day.
 2. Have 2 cylinders tested after 7 days, and 2 cylinders tested after 28 days.
 3. The necessity of breaking cylinders at intermediate periods will be determined by the testing laboratory.
- B. Slump Tests:
1. Have tests for slump made at the place of deposit.
 2. Have 1 slump test made for each 50 cubic yards of each type of concrete placed in any one day. Have at least 1 slump test made for each concrete pour.
 3. Have more frequent slump tests made if, in the opinion of the Engineer, the concrete delivered does not appear to be consistent.
- C. Air Content:
1. Have 1 air content test made for each 50 cubic yards of each type of concrete placed in any one day. Have at least 1 air content test made for each concrete pour.

- D. Changes of Materials:
 - 1. Have the above specified tests made for each change of materials and mix proportions.
 - 2. Make test occasioned by changes of materials and mix proportions at no additional cost to the Owner.
- E. Disputes:
 - 1. Have additional tests necessary to resolve disputes made only by the designated independent testing laboratory.
 - 2. If the work or materials are found to be deficient, testing shall be at no additional cost to the Owner.
 - 3. If the work or materials are found to be satisfactory, testing will be paid by the Owner.

3.2 EVALUATION OF STRUCTURES

- A. Concrete Strength: The strength of the concrete shall be considered satisfactory if the average of any 5 consecutive strength tests of the laboratory cured specimens representing each strength of concrete is equal to or greater than the specified strength, and if not more than 10 percent of the strength tests have values less than the specified strength, and no single test has a value more than 500 psi below the specified strength.
- B. Additional Tests:
 - 1. Impact hammers, sonoscopes, or other non-destructive testing devices may be used, if approved by the Engineer, to determine relative strengths of various areas of the structure, and as an aid in evaluating concrete strength in place or in determining locations of areas to be cored. Test results, so obtained, shall be used as a basis for acceptance or rejection only if these results are properly calibrated and correlated with other test data.
 - 2. When required by the Engineer, have core tests conducted.
 - 3. Have cores tested saturated-surface-dry if the concrete they represent will be wet at any time during the use of the completed structure. Have cores tested air-dry if the concrete they represent will be dry at all times during the use of the completed structure. The laboratory report shall state whether the cores were tested saturated-surface-dry or air-dry.
 - 4. Have at least 3 cores taken from each potentially deficient area. Locations will be determined by the Engineer. Damaged cores may be replaced.
 - 5. The strength of the cores from the concrete from each member or area shall be considered satisfactory if their average is equal to or greater than 90 percent of the specified strength, and no single core is less than 80% of the specified strength.
 - 6. Plug holes solid with 2:1 grout.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and erect formwork to provide concrete of the size(s) and in the location(s) shown on the Drawings and specified herein.

1.2 QUALITY ASSURANCE

- A. Formwork Design:
 - 1. A.C.I. 347
 - 2. Wind loads: As specified by local building codes.
- B. Earth Cut Forms: Do not use earth cuts as forms for vertical surfaces.
- C. Allowable Tolerances:
 - 1. Construct forms so that the concrete surfaces conform to the tolerances stated in A.C.I. 347.
 - 2. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Form Accessories:
 - 1. Provide commercially manufactured types of form accessories to be partially or completely embedded in the concrete, such as ties and hangers. Non-fabricated wire is not acceptable. Furnish and install form ties with a water seal in walls which will withstand a hydrostatic head.
 - 2. The portion of accessories remaining within the concrete shall leave no metal within 1 inch of the surface when concrete is exposed to view.
 - 3. Spreader cones on ties shall not exceed 1 inch in diameter.
 - 4. Furnish and install removable thru-wall ties with suitable plugs tested to withstand a hydrostatic head of at least two times the hydrostatic head in the structure.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Construct moldings or chamfer strips in the corners of column, beam, and wall forms where the concrete will be exposed to view.
- B. Construct temporary openings at the base of column forms, wall forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is placed.
- C. Construct forms sufficiently tight to prevent leakage of grout or cement paste. Swell board forms having joints opened by shrinkage of wood by wetting before concrete is placed.
- D. Seal plywood, and other wood surfaces not subject to shrinkage against absorption of moisture from the concrete by one of the following methods:
 - 1. A suitable field applied oil or sealer.
 - 2. A suitable factory applied non-absorptive liner.
- E. Coating Forms (shall be compatible with potable water):

1. Coat form prior to placing reinforcing steel.
 2. Do not allow coating material to stand in puddles in forms nor to come in.
 3. Where as-cast finishes are required, do not coat form surfaces with materials that will impart a stain to the concrete.
 4. Where painted finished surfaces are required, coat form surfaces with materials compatible with the type of paint to be used.
- F. Clean all form surfaces before reuse.

3.2 INSTALLATION

- A. Camber formwork to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and construction loads.
- B. Provide positive means of adjustment (wedges or jacks) of shores and struts to take up settlement during concrete placing operation. Brace shores and struts securely against lateral deflections.
- C. Edge Forms and Intermediate Screed Strips:
 1. Set accurately to produce the designed elevations and contours.
 2. Sufficiently strong to support vibrating bridge screeds or roller pipe screeds if finish requires the use of such equipment.
 3. Align concrete surface to the contours of screed strips by use of strike-off templates or approved compacting type screeds.
 4. When the formwork is cambered, set the screeds to a like camber to maintain the proper concrete thickness.

3.3 REMOVAL

- A. Formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations, but must remain a minimum of 3 days after the placement of the concrete, when ambient temperatures are below 50°F or 2 days after placement when ambient temperatures are above 50°F
- B. Leave formwork for beam soffits, slabs, and other parts that support the weight of the concrete in place until the concrete has reached 75 percent of the specified 28 day strength.
- C. Do not place live loads on slabs until the concrete has reached the specified 28 day strength, unless the slab is reshored.

3.4 RESHORING

- A. When required, plan reshoring in advance.
- B. Loads and Strength:
 1. Perform reshoring so that at no time will large areas of new construction be required to support their own weight.
 2. While reshoring is under way, do not permit live loads on the new construction.
 3. Leave reshores in place until concrete has reached its specified 28 day strength.
- C. Reshore Supports:
 1. Reshore floors supporting shores under wet conditions or leave their original shores in place.
 2. The reshores shall have at least one-half the load capacity of the shores above and shall be distributed in approximately the same pattern as those above.
 3. Leave these reshores in place until the freshly-placed concrete has reached 75 percent of its specified 28 day strength.

3.5 REMOVAL STRENGTH

- A. When formwork removal or reshoring removal is based on the concrete reaching its 28 day strength (or a specified percentage thereof), the concrete shall be presumed to have reached this strength when any of the following conditions has been met:
1. When test cylinders, field cured under the most unfavorable conditions prevailing for any portion of the concrete represented, have reached the required strength. Except for the field curing and age at test, the cylinders shall be molded and tested as specified in the Concrete Testing Section of these Specifications.
 2. When the concrete has been cured as specified for the same length of time as the age at test of laboratory-cured cylinders which reached the required strength. The length of time the concrete has been cured in the field shall be determined by the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50 degrees F. and the concrete has been damp or thoroughly sealed from evaporation and loss of moisture.
 3. When the concrete has reached a specified strength as determined by non-destructive tests.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install reinforcement for concrete of the type(s) and size(s) and in the location(s) shown on the Drawings and specified herein.

1.2 QUALITY ASSURANCE

- A. Reinforcing Steel:
 - 1. Yield strength of 60 ksi as shown on the Drawings.
 - 2. ASTM A 615
 - 3. Allowable fabrication tolerances:
 - a. Sheared length: +/- 1 inch.
 - b. Depth of truss bars: to, 1/2 inch.
 - c. Stirrups, ties, and spirals: +/- 1/2 inch.
 - d. All other bends: +/- 1/2 inch.
- B. Welded Wire Fabric: ASTM A185.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit shop drawings and schedules in accordance with the General Conditions of the Construction Contract.

1.4 DELIVERY AND STORAGE

- A. Protect reinforcement from the elements to prevent corrosion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All reinforcement shall be free of corrosion.

PART 3 - EXECUTION

3.1 PLACING

- A. Allowable Placement Tolerances:
 - 1. Concrete cover to formed surfaces: +/- 1/4 inch.
 - 2. Minimum spacing between bars: +/- 1/4 inch.
 - 3. Top bars in slabs and beams:
 - a. Members 8-inches deep or less: +/- 1/4 inch.
 - b. Members more than 8-inches but not over 1 foot deep: +/- 1/2 inch.
 - 4. Crosswise of Members: Spaced evenly within 2 inches.
 - 5. Lengthwise of members: +/- 2 inches.
- B. Interference:
 - 1. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items.

2. If bars are moved more than one bar diameter, or enough to exceed the above specified placement tolerances, the resulting arrangement of bars shall be subject to the written approval of the Engineer.
- C. Supports:
1. Support all reinforcing bars, wire together to prevent displacement by construction loads or the placing of concrete beyond the above specified placement tolerances.
 2. Use metal or plastic sand plate chairs on the ground at spacing called for on the drawings.
 3. Use concrete, metal, plastic, or other approved bar chairs and spacers over framework.
 4. Use galvanized or plastic accessories where concrete surface will be exposed to the weather in the finished structure, or where rust would impair architectural finishes.
- D. Load Carrying Welded Wire Fabric Reinforcement:
1. Lap splice so that the overlap measured between outermost cross wires of each fabric sheet is not less than the spacing of the cross wires plus 2 inches.
 2. Support welded wire fabric as required for reinforcing bars.
- E. Non-Load Carrying Welded Wire Fabric Reinforcement:
1. Lap splice so that the overlap measured between outermost cross wires of each fabric sheet is not less than 2 inches.
 2. Extend welded wire fabric across supporting beams and walls and to within 2 inches of concrete edges.
 3. Extend welded wire fabric through contraction joints and construction joints except keyed joints in slabs on ground.
 4. Position welded wire fabric during the placing of concrete to insure its proper position in the slab.
- F. Column Reinforcement:
1. Offset vertical bars in columns at least one bar diameter.
 2. To insure proper placement, provide templates for all column dowels.
- G. Obtain the Engineer's written approval of all splices not shown on the Drawings.
- H. Do not bend reinforcement partially embedded in hardened concrete.
- I. Do not tack weld reinforcement.
- J. Splicing:
1. Lapped splices will be used except where other methods are shown on the Drawings.
 2. Minimum splices: 50 bar diameters.
 3. Stagger splices by 50 bar diameters.
 4. Spliced bars shall be in contact and wired together to maintain the bar alignment.
 5. No splices will be permitted at points of high stress.
- K. Minimum concrete cover when not shown on the plans.
1. Footings - 3 inches.
 2. Walls, beams, columns, and slabs exposed to liquid immersion, earth or weather: 2 inches.
 3. Walls, beams, columns, and slabs not exposed to liquid immersion, earth or weather: 1-1/2 inches.

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.**

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 - PRODUCTS

2.1 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
 - 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

- 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):**

Type II Portland Cement	20 lb.
Ground Granulated Blas Furnace Slag	100 lb.
Sand	2,830 lb.
Water	40 – 50 gal.
Air Entrainment	10% to 15%

- 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 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. 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.
 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.
 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 03305

CONCRETE CRADLES, ARCHES, ENCASEMENTS & THRUST BLOCKS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and construct cradles, arches, encasements and thrust blocks for pipes in the location(s) and of the dimension(s) and shapes shown on the Drawings, and as required to rigidly support pipes.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Construct cradles, arches, encasements and thrust blocks of 2000 psi concrete, as specified in Cast-in-Place Section in these Specifications, unless otherwise shown on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Construct cradles, arches, encasements and thrust blocks the full width of the trench and/or as shown on the Drawings.
- B. Secure pipe to prevent movement and flotation during the placement of the concrete.

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

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

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 (Sewer Manholes)

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

SECTION 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 offsite 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).
- B. Work shall include documenting and tracking all excavation materials (regulated and non-regulated) in accordance with applicable local, state and federal regulations. Said documentations will be provided to the owner upon project completion or upon request.

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

MANAGEMENT & DISPOSAL OF SOILS AND GROUNDWATER

- 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.
- 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

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

HEALTH AND SAFETY PLAN REQUIREMENTS

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 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

NHDOT TECHNICAL SPECIFICATIONS AND AMENDMENTS

Work referenced using NHDOT item numbers shall be in accordance with current edition of the State of New Hampshire, Department of Transportation (NHDOT) Standard Specifications for Road and Bridge Construction, (Standard Specifications), and as amended herein. Although NHDOT specifications are not included within this Project Manual, the referenced specifications shall be considered part of the Contract Documents.

The following sections from the NHDOT Standard Specification (English Units) apply to this project by reference only:

<u>Section Number</u>	<u>Title</u>
604.39	Special Drainage Manholes and Stormwater unit
608	Concrete Sidewalk Construction & ADA Compliant Handicap Ramp Panels

This list is not all inclusive and does not relieve the Contractor from complying with any or all NHDOT specifications referred to by the Contract Documents or referred to by sections of the NHDOT specifications that apply. It is the Contractor's responsibility to obtain copies of these specifications.

NHDOT Standard Specifications for Road and Bridge Construction may be purchased from: NHDOT, Records Section, 1 Hazen Drive, P.O. Box 483, Concord, NH 03302-0483, Phone No.: 603-271-3514.

The NHDOT Standard Specifications for Road and Bridge Construction (latest edition) listed in this document shall be **amended** as follows:

Whenever a reference is made to the "Department", "Bureau", "State", and/or "District Engineer" it shall mean the City of Portsmouth, their Agents, or their Engineer.

Section 604.39 (Special Provision)

SQUARE CONCRETE DRAINAGE MANHOLE STRUCTURES AND WATER QUALITY UNIT STRUCTURES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnishing precast concrete structures, devices and appurtenant materials.
- B. Installation.
- C. Leakage testing.

1.02 REFERENCE STANDARDS

- A. AASHTO - Standard Specifications for Highway Bridges.
- B. NHDOT – Standard Specifications for Road and Bridge Construction.
- C. ACI 318 - Building Code Requirements for Reinforced Concrete.
- D. ACI 350R - Concrete Sanitary Engineering Structures.
- E. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- F. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- G. ASTM C109 - Compressive Strength of Hydraulic Cement Mortars (Using 2-in or 50 mm Cube Specimens).
- H. ASTM C827 - Early Volume Change of Cementitious Mixtures.
- I. ASTM C890 - Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
- J. ASTM C913 - Precast Concrete Water and Wastewater Structures.

1.03 SUBMITTALS

- A. Submit Shop Drawings in accordance with the Submittal Procedures.
 - 1. Shop Drawings shall include details of construction, reinforcing, lifting devices, joint details, access openings and doors, pipe penetrations and process equipment; design calculations; and, lifting and buoyancy analyses.
 - 2. Shop Drawings and design calculations shall be stamped by a professional structural engineer, registered in the same state as the Project.
- B. Submit manufacturer's product data for all components.

1.04 QUALITY ASSURANCE

- A. Design Criteria:

1. Design of precast concrete structures and components shall conform to ACI 350R and ASTM C890.
 2. Structures and components shall be capable of withstanding AASHTO H-20 loading with 30% impact factor, soil loading at 130 lb/ft³, and surcharge and groundwater elevations as shown on the Drawings, without failure or leakage.
 3. Concrete: Minimum compressive strength of 5,000 psi at 28 days.
- B. The structures shall be made of precast concrete and be made by a manufacturer of precast concrete units regularly producing units of similar type and size.
- C. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection by the ENGINEER. Such inspection may be made at the place of manufacture, and/or on the work site after delivery. Sections shall be subject to rejection due to failure to meet any of the Specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged after delivery will be rejected, or if already installed, shall be repaired or removed and replaced entirely at the CONTRACTOR'S expense as directed by the ENGINEER.
- D. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close-textured and free of blisters, cracks, roughness and exposed reinforcement.
- E. Imperfections may be repaired, subject to acceptance by the ENGINEER, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Concrete grout shall be used for repairs. Epoxy grout may be used for repairs, subject to acceptance by the ENGINEER.

1.05 SOURCE QUALITY CONTROL

- A. Test concrete in accordance with ACI 318.
- B. Retain plant records and quality control program used during production of precast tank and make such records and test results available to ENGINEER, if requested.
- C. All precast concrete sections shall have the date of manufacture indelibly marked on the inside of the wall.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Precast structure sections shall not be shipped until the concrete has attained a compressive strength of 3,000 psi or until 5 days after fabrication and/or repair, whichever time is longer.
- B. Conform to manufacturer's instructions for delivery and handling.
- C. Protect edges of structures to prevent chipping or spalling.
- D. Lift and support structure from lifting points using lifting or handling devices.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Specification includes references to designated manufacturers to illustrate minimum acceptable requirements for products. Precast concrete tank specification based on tanks manufactured by Rotundo & Sons, Inc.
- B. Vortechincs 11000 Unit shall be provided as manufactured by Contech Engineered Solutions.
- C. Substitutions: Products of equal or better quality, detail, function and performance may be proposed for substitution by following the procedures in the applicable section.

2.02 MATERIALS

- A. Concrete: ACI 318, Portland Cement Type II.
- B. Reinforcing steel: ASTM A615, Grade 60.
- C. Welded Wire Fabric: ASTM A185.
- D. Interior Surface Sealer: Consolideck Saltguard WB

2.03 PRECAST STRUCTURE SECTIONS

- A. All units shall have a monolithic floor and base wall section.
- B. Cast in all required items such as sleeves, floor doors, etc. Provide penetrations for process equipment.
- C. Floor doors shall be as specified in Section 07831 and as detailed on the Drawings.
- D. Wall sleeves shall be as specified in Section 15410.
- E. Fabrication shall be in compliance with ASTM C890 and ASTM C913.
- F. **All interior surfaces of the precast concrete structures shall have Consolideck Saltguard WB applied in accordance with the manufacturer's requirements.**

2.04 CONCRETE GROUT

- A. Concrete grout shall be premixed, prepackaged non-shrink cement based grout such as Five Star Grout manufactured by U.S. Grout Corporation.
- B. Nonshrink when tested in accordance with ASTM C827.
- C. Minimum compressive strength of 5000 psi at 28 days when tested in accordance with ASTM C109.

2.05 WATERPROOFING/CONCRETE SEALER

- A. All precast concrete structures shall be waterproofed with two seal coats applied to the exterior face of the walls in accordance with the seal coating manufacturer's recommendations. Waterproofing shall be masonry seal MSP-1 waterproofing material as made by the Masonry Seal Corporation, 7500 West Ridge Road, Elyria, Ohio or H.B. Tnemecol 46-465 as made by TNEMEC.
- B. Exterior of all joints shall be coated with waterproofing after setting.
- C. All interior surfaces of the precast concrete structures shall have Consolideck Saltguard WB applied in accordance with the manufacturer's requirements.

PART 3 EXECUTION

3.01 INSTALLATION OF PRECAST CONCRETE STRUCTURES

- A. Precast bases shall be placed on a layer of compacted bedding material. The excavation shall be properly dewatered to allow placing of bedding material and setting the precast tank on completely

drained subgrade. Tank sections shall be placed using manufacturer's recommended procedure for sealing the horizontal joints.

- B. Inlet and outlet pipes shall be connected and sealed in accordance with the manufacturer's recommended procedure and as shown on the Drawings.
- C. A leakage test shall be made as described below in this section.
- D. Upon successful completion of the leakage test all joints shall be pointed.
- E. The exterior waterproofing coat shall be touched up after installation and shall be applied to the exterior of all joints in accordance with manufacturer's recommendations.
- F. Interior concrete fill shall be placed on clean base slab and against clean walls after leakage test has been performed and accepted and water used for testing has been completely removed.
- G. The access door and frame shall be placed on the top of the tank/access structure or some other means shall be provided to prevent accidental/unauthorized entry until the CONTRACTOR is ready to make final adjustment to grade.

3.02 LEAKAGE TESTS FOR CONCRETE STRUCTURES

- A. Leakage tests shall be made by the CONTRACTOR and observed by the ENGINEER on each tank. The test shall be an exfiltration test made as described below.
- B. After the tank and access structures have been assembled in place, all lifting holes shall be filled with an approved nonshrink concrete grout. The test shall be made before backfilling and before filling and pointing the horizontal joints. If the groundwater table has been allowed to rise above the bottom of the tank, it shall be lowered for the duration of the test. All pipes and other openings into the tank and access structures shall be suitably plugged and the plugs braced to prevent blowout.
- C. The tank shall then be filled with potable water to the underside of top slab. If observation indicates no visible leakage, that is, no water observed moving down the surface of the tank after 24 hours, the structure may be considered to be satisfactorily watertight. If the test, as described above is unsatisfactory as determined by the ENGINEER, it shall be the CONTRACTOR'S responsibility to disassemble, reconstruct, repair or replace the tank as required to construct a watertight structure. The tank shall then be retested and, if satisfactory, interior joints shall be filled and pointed.
- D. If the CONTRACTOR elects to backfill prior to testing, for any reason, it shall be at the CONTRACTOR'S risk and it shall be incumbent upon the CONTRACTOR to determine the reason for any failure of any test. Allowable leakage rate shall be 0.1% of the volume of liquid per day in the tank filled to the underside of the top slab, over a testing period of 5 days. Review testing procedures with ENGINEER prior to starting test. No adjustments in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc., i.e., it will be assumed that all loss of water during the test is a result of leaks through the concrete. The CONTRACTOR shall take any steps necessary to assure the ENGINEER that the water table is below the bottom of the tank throughout the test.
- E. When groundwater is allowed to return to natural level outside the tank, there shall be no leakage into the tank or access structure. If leakage occurs, the CONTRACTOR shall repair, reconstruct or replace the tank or access structure, including retesting, at no additional cost to the OWNER.
- F. If, for whatever reason, the tank or access structures are disturbed during construction activities, the tank or access structure shall be retested by the above methods, at no additional cost to the OWNER.

END OF SECTION

Section 608 (Special Provision)

Items 608.24 & 608.26

Delete paragraph 1.03 (Method of Measurement) and 1.04 (Basis of Payment) and **refer** to Items 5.1.4 and 5.1.6 for measurement and payment of 4” thick and 6” thick concrete sidewalks.

Item 608.52

Add the following sentence to the end of paragraph 2.1.1: “The Owner reserves the right to specify the manufacturer during the shop drawing review.”

Replace paragraph 2.1.3 with the following: “Paver Dimensions: Minimum nominal paver dimensions shall be 2’ deep by 3’ wide.”

Delete paragraph 4.1 (Method of Measurement) and Basis of Payment for the installation of ADA Compliant Handicap Ramp Panels and **refer** to Item 5.5 for measurement and payment of ADA Compliant Warning Panels.

End of Section

APPENDICES