

PROJECT MANUAL

**PORTSMOUTH,
NEW HAMPSHIRE**

FOR CONSTRUCTION

**SHEAFE AND CHAPEL STREET
IMPROVEMENTS**

CITY BID No.: 68-15

March 25, 2015



Portsmouth, New Hampshire
FILE NO. 1902

**PORTSMOUTH
NEW HAMPSHIRE**

FOR CONSTRUCTION

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**SHEAFE AND CHAPEL STREET
IMPROVEMENTS**

March 25, 2015



Prepared and Copyrights by

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

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* **Indicates items to be submitted with Bid (all forms colored blue)**

A. BIDDING REQUIREMENTS

ADVERTISEMENT FOR BIDS

Sheafe and Chapel Street Improvements

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

Separate sealed BIDS for the construction of: **Sheafe and Chapel Street Improvements**
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 restoration. Sealed Bids will be received by the City of Portsmouth at the office of **Purchasing Department** until **2:00 PM**, (local time) on **May 4, 2015** and then publicly opened and read aloud.

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

2015 CONSTRUCTION SEASON – SHEAFE AND LOWER CHAPEL STREET:

90 calendar days for **Substantial Completion** (all Work except Final Pavement Wearing Course and Striping). Work shall begin between May 18, 2015 and May 29, 2015.

120 calendar days for **Final Completion**. Final Pavement Wearing Course shall be completed by **October 15, 2015**.

2016 CONSTRUCTION SEASON – UPPER CHAPEL STREET:

45 calendar days for **Substantial Completion** (all Work except Final Pavement Wearing Course and Striping). The work for the 2016 construction season shall begin by April 4, 2016.

75 calendar days for **Final Completion**.

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

- a. **\$1,000.00** for each day of delay from the date established for **Substantial Completion**.
 - b. **\$500.00** for each calendar day of delay from the date established for **Final Completion**.
2. Each General Bid shall be accompanied by a bid security in the amount of 5% of the Total Bid Price.
 3. The successful bidder must furnish 100% Performance and Payment Bonds and will be required to execute the Contract Agreement within 10 days following notification of the acceptance of his bid.
 4. No Bidder may withdraw a Bid within 60 days after the actual date of opening thereof.

5. The Owner reserves the right to reject any and all bids, to accept any bid, to waive any informality on bids received, and to omit any item or items as it may deem to be in the best interest of the Owner.
6. There will be a **MANDATORY** pre-bid meeting for all prospective Bidders held at the:

Portsmouth Public Works Department
680 Peverly Hill Road
Portsmouth, New Hampshire
on **April 22, 2015 at 9:00 AM.**

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

7. Inquiries as to availability of Contract Documents shall be directed to the City of Portsmouth Purchasing Department (603) 610-7227.
8. Technical questions regarding the plans and specifications shall be directed to Underwood Engineers (603) 436-6192.

The CONTRACT DOCUMENTS may be examined at the following locations: Office of Underwood Engineers, Inc., 25 Vaughan Mall, Unit 1 Portsmouth, NH 03801; City Hall, Purchasing Department, 1 Junkins Avenue, Portsmouth, New Hampshire.

Contract Documents will be available electronically from The City of Portsmouth Purchasing Department (www.cityofportsmouth.com/finance/purchasing.htm).

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 P.M., May 4, 2015 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 Sheafe and Chapel Street Improvements and the

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

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

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

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

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

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

A-2.2

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 BIDDERS QUALIFICATIONS set forth herein.

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.

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provisions of the equal opportunity clause set forth in the GENERAL CONDITIONS.

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

April 22, 2015, 9:00 AM
Portsmouth Public Works
680 Peverly Hill Road
Portsmouth, New Hampshire 03801

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.

SAFETY AND HEALTH REGULATIONS

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

COPIES OF THE CONTRACT

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

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

NON-RESIDENT CONTRACTORS

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

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

A Non-resident Contractor shall be deemed to be:

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

BIDDERS QUALIFICATIONS

No award will be made to any Bidder who, at the time bids are opened has not been prequalified by the NHDOT for road reconstruction projects. A list of NHDOT prequalified contractors is available at the NHDOT website: www.nh.gov/dot/org/administration/finance/prequalifiedcontractorslist.pdf

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 Sheafe and Chapel Street Improvements in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

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

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

2015 CONSTRUCTION SEASON – SHEAFE AND LOWER CHAPEL STREET:

- 90** calendar days for **Substantial Completion** (all Work except Final Pavement Wearing Course and Striping). Work shall begin between May 18, 2015 and May 29, 2015.
- 120** calendar days for **Final Completion**. Final Pavement Wearing Course shall be completed by October 15, 2015.

2016 CONSTRUCTION SEASON – UPPER CHAPEL STREET:

- 45** calendar days for **Substantial Completion** (all Work except Final Pavement Wearing Course and Striping). The work for the 2016 construction season shall begin by April 4, 2016.
- 75** calendar days for **Final Completion**.

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

- a. **\$1,000.00** for each day of delay from the date established for **Substantial Completion**.
- b. **\$500.00** for each calendar day of delay from the date established for **Final Completion**.

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). 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. Electrical _____
 - f. Curbing _____
 - g. Sidewalk _____

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 **The City Portsmouth, NH** as OWNER
in the penal sum of _____
for the payment of which, well and truly to be made, we hereby jointly and severally bind
ourselves, successors and assigns.

Signed, this _____ day of _____

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

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

NOW, THEREFORE,

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

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.

TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE	EXTENDED TOTAL
SCHEDULE 1: BASE BID				
1.0	1 LS	Maintenance of Combined Sanitary and Storm Sewer Flows during construction, including all temporary pumping and piping systems necessary to maintain live sewers around the work area during the work (Minimum Amount \$5,000): Dollars and _____ Cents per _____	LS	
1.1.06A	225 LF	Furnish and Install 6" PVC SDR 35 Sewer Pipe for service connection all depths within City Right of Way, including earth excavation, fittings, backfill, dewatering, curbing and property restoration: Dollars and _____ Cents per _____	LF	
1.1.06B	10 LF	Furnish and Install 6" PVC SDR 35 Sewer Pipe for service connection all depths on Private Property, including earth excavation, fittings, backfill, dewatering, curbing/retaining wall and property restoration (hardscaping, landscaping, flower beds etc.): Dollars and _____ Cents per _____	LF	
1.1.08	500 LF	Furnish and Install 8" PVC SDR 35 Sewer Pipe all depths, including removal or plugging of existing sewer line, earth excavation, fittings, backfill, and dewatering: Dollars and _____ Cents per _____	LF	
1.1.15	20 LF	Furnish and Install 15" PVC SDR 35 Sewer Pipe all depths, including removal or plugging of existing sewer line, earth excavation, fittings, backfill, and dewatering: Dollars and _____ Cents per _____	LF	
1.4	15 EA (*)	Cast Iron Cover for Sewer Service Cleanouts: Dollars and _____ Cents per _____	EA (*)	

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
1.5.4	35	VF	Furnish and Install 4' Diameter Sewer Manholes with Pamrex Cover Assembly including excavation and backfill: Dollars and _____ Cents per _____	VF		
1.5A	5	EA (*)	Additional Adjustment of SMH Covers (where directed): Dollars and _____ Cents per _____	EA (*)		
1.6	5	VF	Furnish and Install Inside Drop Structure for Sewer Manholes: Dollars and _____ Cents per _____	VF		
1.8A	100	LF (*)	Trench Stabilization: Furnish and Install Non-Woven Construction Fabric around sewer pipe and bedding stone (in trench) as shown and/or where directed in accordance with the standard details: Dollars and _____ Cents per _____	LF (*)		
1.8B	50	LF (*)	Trench Stabilization: Furnish and Install Geogrid at bottom of trenches and structures where directed in accordance with the standard details: Dollars and _____ Cents per _____	LF (*)		
1.9A	4	EA (*)	Field Core Penetration for Sewer Pipe (including pipe connection system) - Concrete Structures 4" - 15" Diameter: Dollars and _____ Cents per _____	EA (*)		
1.9C	4	EA (*)	Field Core Penetrations for Sewer Pipe (including pipe connection system) - Stone or Granite Foundation (up to 6" diameter): Dollars and _____ Cents per _____	EA (*)		

TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
1.10	1	EA (*) Abandon Sewer Manholes including backfill, disposal of concrete, and disposal of frames and covers: _____ Dollars and _____ Cents per	EA (*)		
1.11	25	CY (*) Furnish and Install Flowable Fill in Abandoned Sewers: _____ Dollars and _____ Cents per	CY (*)		
1.16	1	Allow Rework Interior Plumbing: <u>TEN THOUSAND</u> <u>ZERO</u>	Allow	\$10,000.00	\$10,000.00
1.17	800	LF(*) Video of Sewerlines: _____ Dollars and _____ Cents per	LF(*)		
2.1.06A	450	LF Furnish and Install 6" CPDT Drain Pipe for service laterals (and connection system where necessary) within City Right Of Way , all depths, including earth excavation, fittings, backfill, dewatering, curbing and property restoration:(pavement repairs, striping, wiring, hardscaping, landscaping, flower beds, etc.) _____ Dollars and _____ Cents per	LF		
2.1.06B	100	LF Furnish and Install 6" CPDT Drain Pipe for service laterals (and connection system where necessary) on Private Property all depths, including earth excavation, fittings, backfill, dewatering, and property restoration: _____ Dollars and _____ Cents per	LF		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
2.1.08	10	LF	Furnish and Install 8" CPE Drain Pipe all depths, including earth excavation, fittings, backfill, dewatering, and property restoration: Dollars and _____ Cents per _____	LF		
2.1.12	450	LF	Furnish and Install 12" CPE Drain Pipe, all depths, including earth excavation, fittings, backfill, and dewatering: Dollars and _____ Cents per _____	LF		
2.1.15	75	LF	Furnish and Install 15" CPE Drain Pipe, all depths, including earth excavation, fittings, backfill, and dewatering: Dollars and _____ Cents per _____	LF		
2.4A	10	EA	Cast Iron Cleanout Assembly: Dollars and _____ Cents per _____	EA		
2.4B	25	EA	Cast Iron Roof Leader Assembly: Dollars and _____ Cents per _____	EA		
2.5A	5	EA (*)	Additional Adjustment of Drain Manhole Covers or Catch Basin Frame and Grate Assemblies: Dollars and _____ Cents per _____	EA (*)		
2.6.2	20	VF	Furnish and Install 2' Diameter Drop Inlet including frame and grate/cover assemblies (all types) excavation and backfill: Dollars and _____ Cents per _____	VF		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
2.6.4	35	VF	Furnish and Install 4' Diameter Catch Basin including excavation and backfill: _____ Dollars and _____ Cents per	VF		
2.6A	3	EA	Furnish and Install Catch Basin Hood (up to 18" diameter outlet pipes or as directed): _____ Dollars and _____ Cents per	EA		
2.8A	100	LF (*)	Trench Stabilization: Furnish and Install Non-woven Construction Fabric around drain pipe and bedding stone (in trench) as shown and/or where directed in accordance with the standard details: _____ Dollars and _____ Cents per	LF (*)		
2.8B	50	LF (*)	Trench Stabilization: Furnish and Install Geogrid at bottom of trenches and structures where directed in accordance with the standard details: _____ Dollars and _____ Cents per	LF (*)		
2.9A	2	EA	Field Core Penetration for Drain Pipe (including pipe connection system) - Concrete Structures 4" - 15" Diameter: _____ Dollars and _____ Cents per	EA		
2.10	2	EA	Abandon Drain Manholes or Catch Basins: _____ Dollars and _____ Cents per	EA		
3.1.04	25	LF (*)	Furnish and Install 4" Diameter Ductile Iron Water Pipe including earth excavation, fittings, backfill and testing: _____ Dollars and _____ Cents per	LF (*)		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
3.1.06	15	LF (*)	Furnish and Install 6" Diameter Ductile Iron Water Pipe including earth excavation, fittings, backfill and testing: Dollars and _____ Cents per _____	LF (*)		
3.1.08	650	LF	Furnish and Install 8" Diameter Ductile Iron Water Pipe including earth excavation, fittings, backfill and testing: Dollars and _____ Cents per _____	LF		
3.2A	200	LF	Furnish and Install 3/4" Copper Water Service Pipe including earth excavation, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	LF		
3.2B	25	LF (*)	Furnish and Install 1" Copper Water Service Pipe including earth excavation, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	LF (*)		
3.2C	25	LF (*)	Furnish and Install 1 1/4" Copper Water Service Pipe including earth excavation, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	LF (*)		
3.2D	25	LF (*)	Furnish and Install 1 1/2" Copper Water Service Pipe including earth excavation, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	LF (*)		
3.2E	20	LF (*)	Furnish and Install 2" Copper Water Service Pipe including earth excavation, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	LF (*)		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE	EXTENDED TOTAL
3.3A	20	EA	Furnish and Install 3/4" Water Service Connections, including earth excavation, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	EA	
3.3B	1	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 1 1/4" Water Service Connections, including earth excavation, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	EA(*)	
3.3D	1	EA	Furnish and Install 1 1/2" Water Service Connections, including earth excavation, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	EA	
3.3E	2	EA	Furnish and Install 2" Water Service Connections, 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, backfill and testing: Dollars and _____ Cents per _____	EA	
3.4.06	1	EA (*)	Furnish and Install 6" Gate Valve Assembly including earth excavation, fittings, backfill and testing: Dollars and _____ Cents per _____	EA (*)	

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
3.4.08	4	EA	Furnish and Install 8" Gate Valve Assembly including earth excavation, fittings, backfill and testing: Dollars and _____ Cents per _____	EA		
3.4.08B	1	LS	Furnish and Install 8" Gate Valve and Fittings to Complete Water Tie In at Night (Penhallow Street): Dollars and _____ Cents per _____	LS		
3.4A	10	EA (*)	Adjustment of Existing Water Gate Valve Boxes and Water Shutoffs (to final pavement elevation): Dollars and _____ Cents per _____	EA (*)		
3.7	650	LF	Temporary Water System (potable): Dollars and _____ Cents per _____	LF		
4.1A	250	TON	Furnish and Install Hot Bituminous Pavement - Machine Method (3/4" Binder Course, 50 Gyration): Dollars and _____ Cents per _____	TON		
4.1B	150	TON	Furnish and Install Hot Bituminous Pavement - Machine Method (3/8" Wearing Course, 50 Gyration): Dollars and _____ Cents per _____	TON		
4.2A	200	TON	Hot Bituminous Pavement, Hand Worked including sidewalk, base course, flush paver base course, curbing, driveways and trench pavement repairs: Dollars and _____ Cents per _____	TON		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
4.2B	100	TON (*)	Temporary Pavement (where directed): Dollars and _____ Cents per _____	TON (*)		
4.3	1,350	SY	Full Width Pavement Reclamation-8" depth (in place): Dollars and _____ Cents per _____	SY		
4.4A	1,000	CY	Common Excavation - Roadway: Dollars and _____ Cents per _____	CY		
4.4C	25	CY (*)	Common Excavation - Concrete (reinforced and not reinforced): Dollars and _____ Cents per _____	CY (*)		
4.5.1A	300	CY	Furnish and Install Crushed Gravel (Roadway Reconstruction): Dollars and _____ Cents per _____	CY		
4.5.1B	25	CY(*)	Furnish and Install Crushed Gravel (Driveway Reconstruction): Dollars and _____ Cents per _____	CY(*)		
4.5.2	500	CY	Furnish and Install Bank-Run Gravel (where shown or as directed): Dollars and _____ Cents per _____	CY		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
4.6	100	SY(*)	Furnish and Install Construction Geotextile Fabric (where directed): Dollars and _____ Cents per _____	SY(*)		
4.7	75	SY	Cold Planing Existing Pavement: Dollars and _____ Cents per _____	SY		
4.8	1	Allow	Fuel Adjustment and Asphalt Escalation: FIVE THOUSAND ZERO	Allow	\$5,000.00	\$5,000.00
5.2.A	150	SY	Replace or Modify Existing Brick Sidewalk (maintain gravel base in place): Dollars and _____ Cents per _____	SY		
5.2.B	300	SY	Brick Sidewalk: Dollars and _____ Cents per _____	SY		
5.2.C	325	SY	Furnish & Install Flush Pavers: Dollars and _____ Cents per _____	SY		
5.3.2	500	LF	Furnish and Install Vertical Straight Granite Curb (6" x 18"): Dollars and _____ Cents per _____	LF		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
5.3.3	100	LF	Furnish and Install Vertical Curved Granite Curb (6" x 18"): Dollars and _____ Cents per _____	LF		
5.3.4	650	LF	Furnish and Install Vertical Flush Granite Curb (6" x 12" w. chamfer): Dollars and _____ Cents per _____	LF		
5.4	250	LF	Reset Vertical Granite Curb: Dollars and _____ Cents per _____	LF		
5.5A	75	SF	Furnish and Install Fiber Reinforced Concrete at Curb Ramps: Dollars and _____ Cents per _____	SF		
5.5B	7	EA	Detectable Warning Panels: Dollars and _____ Cents per _____	EA		
5.8B	1	LS	Reset Field Stone Sidewalk at 93 State Street: Dollars and _____ Cents per _____	LS		
5.9.1A	2	EA	Furnish and Install Architectural Lighting Assemblies (Type "A" Pole - 10'2") including excavation, concrete pole base, steel conduit, anchor assemblies, backfill and restoration: Dollars and _____ Cents per _____	EA		

TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
5.9.1B 4	EA	Furnish and Install Architectural Lighting Assemblies (Type "B" Pole - 9'2") including excavation, concrete pole base, steel conduit, anchor assemblies, backfill and restoration: Dollars and _____ Cents per _____	EA		
5.9.2A 1	LS	Electrical Installation, Wiring and Connections for Architectural Area Lighting System (State Street Circuit for Sheafe and Lower Chapel Street): Dollars and _____ Cents per _____	LS		
5.9.3A 450	LF	Furnish and Install 2" SCH 40 PVC Electrical Conduit all depths, including earth excavation, fittings, backfill, and restoration: Dollars and _____ Cents per _____	LF		
5.9.3B 100	LF	Furnish and Install 2" SCH 80 PVC Electrical Conduit all depths, including earth excavation, fittings, backfill, and restoration: Dollars and _____ Cents per _____	LF		
5.9.5 6	EA	Light Pole Base Assembly: Dollars and _____ Cents per _____	EA		
5.9.6 1	EA	Reconstruct Light Pole Base and Reset Light Pole Assembly including electrical connection to existing lighting circuit: Dollars and _____ Cents per _____	EA		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
5.9.7	2	EA	Electrical Hand Hole (Pull Box): ____ Dollars and ____ Cents per	EA		
6A	1	LS	Mobilization (not to exceed 10% of total bid): ____ Dollars and ____ Cents per	LS		
6B	1	Allow	Construction Vibration Monitoring: TEN THOUSAND ZERO	Allow	\$10,000.00	\$10,000.00
6D	10	EA (*)	Unknown Utility Crossing: ____ Dollars and ____ Cents per	EA (*)		
6E	10	EA (*)	Repair of Unknown Utility or Mismarked Utility: ____ Dollars and ____ Cents per	EA (*)		
6.1	100	CY (*)	Ledge Removal and Disposal (MIN \$80/CY, MAX \$140/CY): ____ Dollars and ____ Cents per	CY (*)		
6.2	50	CY (*)	Additional Trench Excavation (where ordered by Engineer): ____ Dollars and ____ Cents per	CY (*)		

TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
6.3	25 CY (*)	Furnish and Install Additional Crushed Stone (where ordered by Engineer): Dollars and _____ Cents per _____	CY (*)		
6.4	10 EA (*)	Exploratory Test Pit Excavation (as shown and where ordered by Engineer): Dollars and _____ Cents per _____	EA (*)		
6.5	1 UNIT	Maintenance of Traffic: Dollars and _____ Cents per _____	UNIT		
6.6A	1 Allow	Uniformed Officer with Cruiser for Traffic Control: ONE THOUSAND Dollars and _____ Cents per _____	Allow	\$1,000.00	\$1,000.00
6.6B	1,000 HRS	Uniformed Flagger for Traffic Control: Dollars and _____ Cents per _____	HRS		
6.6C	4 UNIT/WK (*)	Portable Message Board for Traffic Control: Dollars and _____ Cents per _____	UNIT/WK (*)		
6.8A	1 UNIT	Develop a Stormwater Pollution Prevention Plan (SWPPP) for Approval and Obtain NPDES Construction Permit: Dollars and _____ Cents per _____	UNIT		
6.8B	1 UNIT	Implement and Maintain Approved Stormwater Pollution Prevention Plan (SWPPP): Dollars and _____ Cents per _____	UNIT		

TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
6.9	LF (*)	Remove and Dispose of Asbestos Cement Pipe (all diameters) when encountered including earth excavation, backfill, disposal, and dewatering: Dollars and _____ Cents per _____	LF (*)		
6.14.0224	LF (*)	Furnish and Install 2" Thick x 24" Wide Rigid Polystyrene Insulation: Dollars and _____ Cents per _____	LF (*)		
6.15A	lbs (*)	Calcium chloride for Dust Control: Dollars and _____ Cents per _____	lbs (*)		
6.15B	Allow	Mechanically Enclosed Street Sweeping for Dust Control: FIVE THOUSAND Dollars and _____ ZERO Cents per _____	Allow	\$5,000.00	\$5,000.00
632.0104	LF	Retroreflective Paint Pavement Marking, Single Solid Line, 4 in.: Dollars and _____ Cents per _____	LF		
632.3112	LF	Retroreflective Thermoplastic Pavement Marking, Single Solid Line, 12 in.: Dollars and _____ Cents per _____	LF		
632.32	SF	Retroreflective Thermoplastic Pavement Marking, Words or Symbol: Dollars and _____ Cents per _____	SF		
TOTAL for SCHEDULE 1: BASE BID					

TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE	EXTENDED TOTAL
<u>BID ALTERNATE</u>				
SCHEDULE 2: ADDITIVE BID ALTERNATE NO. 1 - Upper Chapel Street Improvements (STA 4+05 to STA 8+70)				
1.1.06A	200	LF Furnish and Install 6" PVC SDR 35 Sewer Pipe for service connection all depths within City Right of Way , including earth excavation, fittings, backfill, dewatering, curbing and property restoration: Dollars and _____ Cents per _____	LF	
1.1.06B	25	LF Furnish and Install 6" PVC SDR 35 Sewer Pipe for service connection all depths on Private Property , including earth excavation, fittings, backfill, dewatering, curbing/retaining wall and property restoration (hardscaping, landscaping, flower beds etc.): Dollars and _____ Cents per _____	LF	
1.1.08	250	LF Furnish and Install 8" PVC SDR 35 Sewer Pipe all depths, including removal or plugging of existing sewer line, earth excavation, fittings, backfill, and dewatering: Dollars and _____ Cents per _____	LF	
1.4	10	EA (*) Cast Iron Cover for Sewer Service Cleanouts: Dollars and _____ Cents per _____	EA (*)	
1.5.4	20	VF Furnish and Install 4' Diameter Sewer Manholes with Pamrex Cover Assembly including excavation and backfill: Dollars and _____ Cents per _____	VF	
1.9A	1	EA (*) Field Core Penetration for Sewer Pipe (including pipe connection system) - Concrete Structures 4" - 15" Diameter : Dollars and _____ Cents per _____	EA (*)	

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
1.9C	1	EA (*)	Field Core Penetrations for Sewer Pipe (including pipe connection system) - Stone or Granite Foundation (up to 6" diameter): Dollars and _____ Cents per _____	EA (*)		
2.1.06A	200	LF	Furnish and Install 6" CPDT Drain Pipe for service laterals (and connection system where necessary) within City Right Of Way, all depths, including earth excavation, fittings, backfill, dewatering, curbing and property restoration:(pavement repairs, striping, wiring, hardscaping, landscaping, flower beds, etc.) Dollars and _____ Cents per _____	LF		
2.1.06B	235	LF	Furnish and Install 6" CPDT Drain Pipe for service laterals (and connection system where necessary) on Private Property all depths, including earth excavation, fittings, backfill, dewatering, and property restoration: Dollars and _____ Cents per _____	LF		
2.1.08	10	LF	Furnish and Install 8" CPE Drain Pipe all depths, including earth excavation, fittings, backfill, dewatering, and property restoration: Dollars and _____ Cents per _____	LF		
2.1.12	275	LF	Furnish and Install 12" CPE Drain Pipe, all depths, including earth excavation, fittings, backfill, and dewatering: Dollars and _____ Cents per _____	LF		
2.4A	5	EA	Cast Iron Cleanout Assembly: Dollars and _____ Cents per _____	EA		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
2.4B	10	EA	Cast Iron Roof Leader Assembly: ____ Dollars and ____ Cents per	EA		
2.5.4	5	VF	Furnish and Install 4' Diameter Drain Manhole with Pamrex Cover Assembly including excavation and backfill: ____ Dollars and ____ Cents per	VF		
2.6.4	10	VF	Furnish and Install 4' Diameter Catch Basin including excavation and backfill: ____ Dollars and ____ Cents per	VF		
2.6A	2	EA	Furnish and Install Catch Basin Hood (up to 18" diameter outlet pipes or as directed): ____ Dollars and ____ Cents per	EA		
2.9A	1	EA (*)	Field Core Penetration for Drain Pipe (including pipe connection system) - Concrete Structures 4" - 15" Diameter: ____ Dollars and ____ Cents per	EA (*)		
3.1.04	75	LF (*)	Furnish and Install 4" Diameter Ductile Iron Water Pipe including earth excavation, fittings, backfill and testing: ____ Dollars and ____ Cents per	LF (*)		
3.1.08	450	LF	Furnish and Install 8" Diameter Ductile Iron Water Pipe including earth excavation, fittings, backfill and testing: ____ Dollars and ____ Cents per	LF		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
3.2A	85	LF	Furnish and Install ¾" Copper Water Service Pipe including earth excavation, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	LF		
3.3A	10	EA	Furnish and Install ¾" Water Service Connections, including earth excavation, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	EA		
3.4.04	4	EA	Furnish and Install 4" Gate Valve Assembly including earth excavation, fittings, backfill and testing: Dollars and _____ Cents per _____	EA		
3.4.08	1	EA	Furnish and Install 8" Gate Valve Assembly including earth excavation, fittings, backfill and testing: Dollars and _____ Cents per _____	EA		
3.4.08A	1	LS	Furnish and Install 8" Gate Valve and Fittings to Complete Water Tie In at Night (Bow Street): Dollars and _____ Cents per _____	LS		
3.5	1	EA	Furnish and Install Hydrant Assembly including anchoring tee, gate valve, pipe extension, backfill, insulation, dewatering and testing: Dollars and _____ Cents per _____	EA		
3.7	450	LF	Temporary Water System (potable): Dollars and _____ Cents per _____	LF		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
4.1A	250	TON	Furnish and Install Hot Bituminous Pavement - Machine Method (3/4" Binder Course, 50 Gyration): Dollars and _____ Cents per _____	TON		
4.1B	125	TON	Furnish and Install Hot Bituminous Pavement - Machine Method (3/8" Wearing Course, 50 Gyration): Dollars and _____ Cents per _____	TON		
4.2A	200	TON	Hot Bituminous Pavement, Hand Worked including sidewalk, base course, flush paver base course, curbing, driveways and trench pavement repairs: Dollars and _____ Cents per _____	TON		
4.3	1,000	SY	Full Width Pavement Reclamation-8" depth (in place): Dollars and _____ Cents per _____	SY		
4.4A	550	CY	Common Excavation - Roadway: Dollars and _____ Cents per _____	CY		
4.5.1A	275	CY	Furnish and Install Crushed Gravel (Roadway Reconstruction): Dollars and _____ Cents per _____	CY		
4.5.1B	50	CY(*)	Furnish and Install Crushed Gravel (Driveway Reconstruction): Dollars and _____ Cents per _____	CY(*)		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
4.5.2	150	CY	Furnish and Install Bank-Run Gravel (where shown or as directed): Dollars and _____ Cents per _____	CY		
4.7	100	SY	Cold Planing Existing Pavement: Dollars and _____ Cents per _____	SY		
5.2.A	275	SY	Replace or Modify Existing Brick Sidewalk (maintain gravel base in place): Dollars and _____ Cents per _____	SY		
5.2.B	125	SY	Brick Sidewalk: Dollars and _____ Cents per _____	SY		
5.2.C	100	SY	Furnish & Install Flush Pavers: Dollars and _____ Cents per _____	SY		
5.3.2	300	LF	Furnish and Install Vertical Straight Granite Curb (6" x 18"): Dollars and _____ Cents per _____	LF		
5.3.3	50	LF	Furnish and Install Vertical Curved Granite Curb (6" x 18"): Dollars and _____ Cents per _____	LF		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
5.3.4	550	LF	Furnish and Install Vertical Flush Granite Curb (6" x 12" w. chamfer): Dollars and _____ Cents per _____	LF		
5.4	450	LF	Reset Vertical Granite Curb: Dollars and _____ Cents per _____	LF		
5.5A	75	SF	Furnish and Install Fiber Reinforced Concrete at Curb Ramps: Dollars and _____ Cents per _____	SF		
5.5B	7	EA	Detectable Warning Panels: Dollars and _____ Cents per _____	EA		
5.6	1	LS	Furnish and Install Landscaped Island at Bow Street: Dollars and _____ Cents per _____	LS		
5.7	1	Allow	Arborist Allowance for Tree and Root Pruning: FIVE THOUSAND ZERO	Allow	\$5,000.00	\$5,000.00
5.8A	1	LS	Reset Granite Retaining Blocks (11 LF), Replace Granite Retaining Blocks (3 LF Straight and 9 LF at 11' R) at 126 Daniel Street: Dollars and _____ Cents per _____	LS		

	TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS		UNIT PRICE	EXTENDED TOTAL
5.9.1A	5	EA	Furnish and Install Architectural Lighting Assemblies (Type "A" Pole - 10'2") including excavation, concrete pole base, steel conduit, anchor assemblies, backfill and restoration: Dollars and _____ Cents per _____	EA		
5.9.2B	1	LS	Electrical Installation, Wiring and Connections for Architectural Area Lighting System (Bridge Area Circuit for Upper Chapel Street): Dollars and _____ Cents per _____	LS		
5.9.3A	450	LF	Furnish and Install 2" SCH 40 PVC Electrical Conduit all depths, including earth excavation, fittings, backfill, and restoration: Dollars and _____ Cents per _____	LF		
5.9.3B	25	LF	Furnish and Install 2" SCH 80 PVC Electrical Conduit all depths, including earth excavation, fittings, backfill, and restoration: Dollars and _____ Cents per _____	LF		
5.9.5	5	EA	Light Pole Base Assembly: Dollars and _____ Cents per _____	EA		
5.9.6	1	EA	Reconstruct Light Pole Base and Reset Light Pole Assembly including electrical connection to existing lighting circuit: Dollars and _____ Cents per _____	EA		
6C	1	Allow	Archeological Monitoring Delay: FIVE THOUSAND _____ Dollars and ZERO _____ Cents per _____	Allow	\$5,000.00	\$5,000.00

TOTAL ESTIMATED QTY	UNITS	BID ITEM DESCRIPTION AND UNIT PRICE IN WORDS	UNIT PRICE	EXTENDED TOTAL
6.6B	HRS	Uniformed Flagger for Traffic Control: Dollars and _____ Cents per _____	HRS	
632.0104	LF	Retroreflective Paint Pavement Marking, Single Solid Line, 4 in.: Dollars and _____ Cents per _____	LF	
632.3112	LF	Retroreflective Thermoplastic Pavement Marking, Single Solid Line, 12 in.: Dollars and _____ Cents per _____	LF	
632.32	SF	Retroreflective Thermoplastic Pavement Marking, Words or Symbol: Dollars and _____ Cents per _____	SF	
TOTAL for SCHEDULE 2: BID ALT. No.1				
LINE 1 - BASE BID TOTAL				
<i>(Schedule 1 Only)</i>				
Line 2 - Base Bid and Bid Alt No.1 Total				
<i>(Schedule 1 + Schedule 2)</i>				
Notes to Bidders:				
1. The Lowest Apparent Bidder will be based on Engineer's Estimate of Quantities and Contractor's Bid for the Total Base Bid (Line 1).				
2. The Owner reserves the right to award the Contract on only the Base Bid (Line 1) or the Base Bid with Bid Alt. No.1 (Line 2).				
3. The Owner reserves the right to waive any informalities or minor bid discrepancies, to reject any or all bids, and to take any action in the best interest of the Owner.				
4. * Means Indeterminate Quantity.				

BID BOND

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

Signed, this _____ day of _____

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

a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing,
for the **Sheafe and Chapel Street Improvements**

NOW, THEREFORE,

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

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

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

Principal

By: _____

Surety

By: _____

IMPORTANT-Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state of New Hampshire.

B. CONTRACT

NOTICE OF AWARD

Dated _____, 20 15

TO: _____
(BIDDER)

ADDRESS: _____

OWNER'S PROJECT NO: _____

PROJECT: Sheafe and Chapel Street Improvements

OWNER'S CONTRACT NO: _____

CONTRACT FOR: Sheafe and Chapel Street Improvements

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

You are notified that your Bid dated _____ for the above Contract has been considered. You are the apparent successful bidder and have been awarded a contract for:

the construction of new sanitary sewer, storm sewer, and water main including modifications to existing sewers and utilities, and complete roadway reconstruction, sidewalks, curb and property restoration of impacted areas.

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

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

6 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 and proof of insurance.

B-1.2

3. (List other conditions precedent).

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, proof of insurance and agreement signed by the party to whom the Agreement was awarded, the **OWNER** will return to you one fully signed counterpart of the Agreement with the Contract Documents attached.

City of Portsmouth
(OWNER)

By _____
(AUTHORIZED SIGNATURE)

Peter H. Rice, P.E.
Public Works Director
(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 **15** by and between City of Portsmouth, New Hampshire, 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

Sheafe and Chapel Street Improvements

(Project)

2. The **CONTRACTOR** will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the **PROJECT** described herein.

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

130 calendar days for **Substantial Completion** (all Work except Final Pavement Wearing Course and Striping). Work shall begin between May 4, 2015 and May 18, 2015.

160 calendar days for **Final Completion**. Final Pavement Wearing Course shall be completed by **October 15, 2015**.

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

- a. **\$1,000.00** for each day of delay from the date established for **Substantial Completion**.
- b. **\$500.00** for each calendar day of delay from the date established for **Final Completion**.

(S) ADDENDA:

- No. _____ , dated _____ , 20 _____
- 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 6 copies, each of which shall be deemed an original on the date first above written.

OWNER: City of Portsmouth, New Hampshire

By: _____
John P. Bohenko
City Manager
Name: _____
(Please type)

(SEAL)
ATTEST: _____
Name: _____
Title: _____

CONTRACTOR: _____

By: _____
Name: _____

B-2.4

Address:

(SEAL)

ATTEST: _____

Name: _____

Title: _____

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____ (Name of Contractor)

_____ (Address of Contractor)

a _____ (Name of Contractor) hereinafter called Principal,
(Corporation, Partnership, or Individual)

and _____ (Name of Surety)

_____ (Address of Surety)

hereinafter called Surety, are held and firmly bound unto

City of Portsmouth, New Hampshire

_____ (Name of Owner)

1 Junkins Avenue, Portsmouth, NH 03801

_____ (Address of Owner)

hereinafter called **OWNER**, and all persons, firms, and corporations who or which may furnish labor, or who furnish materials, or who furnish services, or who furnish any other work under the contract and to their successors and assigns, in the total amount of _____ Dollars,

(\$ _____ in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the **OWNER**, dated the _____ day of _____

20 _____, a copy of which is hereto attached and made a part hereof for the construction of:

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

B-3.2 (SRF)

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

PROVIDED FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the **WORK** to be performed thereunder or the **SPECIFICATIONS** accompanying the same shall in any way affect its obligation on this **BOND**, and it does hereby waive no change, extension of time, alteration or addition to the terms of the contract or to the **WORK** or to the **SPECIFICATIONS**.

PROVIDED, FURTHER that any claimant shall be notified hereunder by any claimant: (a) Unless claimant, the claimant, or the subcontractor with the **PRINCIPAL** shall have given written notice to the **PRINCIPAL**, the **OWNER**, or the **SURETY** above named within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed, 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 registered mail or certified mail, postage prepaid, in an envelope addressed to the **PRINCIPAL**, **OWNER**, or **SURETY**, at any place where an agent regularly maintains a business, or served in any manner in which legal process may be served on a public officer. (b) After the expiration of one (1) year following the date the **PRINCIPAL** ceased work on said **CONTRACT**, it being understood that no limitation embodied in the **BOND** is prohibited by any law of the State of California, such limitation shall be deemed to be amended so as to be equal to the maximum period of limitation permitted by such law.

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

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

B-3.3 (SRF)

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall be deemed an original, this _____ day of _____, 20 ____ .

ATTEST:

By: _____
(Principal) Secretary
(SEAL)

By: _____
Witness as to _____
(Address)

ATTEST:

By _____
Witness as to Surety

(Address)

(Address)

Attorney - in - Fact
(Address)

NOTE: Date of **BOND** must not be prior to date of Contract.
If **CONTRACTOR** is partnership, all partners should execute **BOND**.

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

Superceded
See SC-28

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal,

(Corporation, Partnership, or Individual)

and

(Name)

(Address of Surety)

hereinafter called Surety, are held and firmly bound to

City of Portsmouth, New Hampshire

(Name of Owner)

1 Junkins Avenue, Portsmouth, New Hampshire 03801

(Address of Owner)

hereinafter called **OWNER** for total aggregate penal sum of _____

Dollars, \$ (_____)

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

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

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extension thereof which may be granted by the **OWNER**, with or without notice to the Surety and during the one year guaranty period, and if the **PRINCIPAL** shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the **OWNER** from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the **OWNER** all outlay and expense which the **OWNER** may incur in making good any default, then this obligation shall be void: otherwise to remain in full force and effect.

B-4.2 (SRF)

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

PROVIDED, FURTHER, that it is hereby agreed that this BOND shall be deemed amended automatically inasmuch as the Principal is authorized to execute separate amendments hereto, upon amendment to the Contract not changing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the faithful performance of the Contract as so amended. The term "Amendment", hereinafter used in this BOND and whether referring to this BOND, the contract or the loan Document shall include any alteration, addition, extension or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the WORKER and the CONTRACTOR shall abridge the right of any beneficiary hereof, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall be deemed an original and all of which together shall be deemed the full instrument.

ATTEST:

By: _____
(Principal) Secretary

(SEAL)

BY

Principal

(Address)

By: _____
Witness as to Principal

(Address)

(Surety)

ATTEST:

BY

Attorney - in - Fact

By _____
Witness as to Surety

(Address)

(Address)

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is partnership, all partners should execute BOND.

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

NOTICE TO PROCEED

Dated _____, 20 **15**

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

ADDRESS: _____

OWNER'S PROJECT NO. _____

PROJECT: **Sheafe and Chapel Street Improvements**

OWNER'S CONTRACT NO. _____

CONTRACT FOR: **Sheafe and Chapel Street Improvements**

You are notified that the Contract Time under the above contract will commence to run on _____, 2015. 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 _____, 2015 and _____, 2015 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 provide the following project submittals:

- SWPPP; NOI
- Traffic Control Plan
- Project Schedule
- Temporary Water Plan of Work

(add other requirements)

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

City of Portsmouth, New Hampshire
(owner)

By

(Authorized Representative)

Peter H. Rice, P.E.

Public Works Director

(Title)

ACCEPTANCE OF NOTICE

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

(Contractor)

this the _____, 20 _____

Employer Identification

Number: _____

By: _____

(Title)

CONTRACTOR'S RELEASE

KNOW ALL MEN BY THESE PRESENTS that _____

(Contractor)

of _____, County of _____

and State of New Hampshire do _____ hereby acknowledge that

(Contractor)

has _____ this day had, and received of and from the _____

City of Portsmouth, New Hampshire

(Owner)

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

(Contractor)

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

City of Portsmouth, New Hampshire

(Owner)

and _____

(Contractor)

dated _____ for **Sheafe and Chapel Street Improvements**

(Project)

NOW, THEREFORE, the said _____

(Contractor)

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

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

(Owner)

New Hampshire, of and from all claims and demands, arising from or in connection with the said contract dated _____, 2015, and of and from all, and all manner of

action and actions, cause and causes of action and actions, suits, debts, dues, duties, sum and sums of money, accounts, reckonings, bonds, bills, specialties, covenants, contracts, agreements, promises, variances, damages, judgments, extents, executions, claims and demand, whatsoever in

law or equity, or otherwise, against City of Portsmouth

(owner)

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

B-7.2

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

IN WITNESS WHEREOF, _____

(Contractor)

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

Signed, Sealed and Delivered in the presence of:

(Individual - Contractor) (seal)

(Partnership - Contractor) (seal)

(seal) By _____
(Partner)

Attested:

(Corporation)

(Secretary) By _____
(President or Vice President)

(Corp. Seal)

CERTIFICATE OF SUBSTANTIAL COMPLETION

OWNER's Project No.: _____ ENGINEER's Project No.: 1902

Project: **Sheafe and Chapel Street Improvements**

CONTRACTOR: _____

Contract For: **Sheafe and Chapel Street Improvements** Contract Date: _____

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

To: **City of Portsmouth**
(Owner)

And To: _____
(Contractor)

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

(Date of Substantial Completion)

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR within _____ 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: _____

CHANGE ORDER

No. _____

PROJECT: Sheafe and Chapel Street Improvements

DATE OF ISSUANCE:

OWNER: City of Portsmouth
(Name & Address)
 1 Junkins Avenue
 Portsmouth, New Hampshire

OWNER's Project No.

CONTRACTOR:

ENGINEER: Underwood Engineers, Inc.
 25 Vaughan Mall
 Portsmouth, New Hampshire

CONTRACT FOR: Sheafe and Chapel Street Improvements

ENGINEER's Project No. 1902

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

Description:

Purpose of Change Order:

Attachments:

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

This document will become a supplement to the CONTRACT and all provisions will apply hereto. The attached Contractor's Revised Project Schedule reflects increases or decreases in Contract Time as authorized by this Change Order.

Stipulated price and time adjustment includes all costs and time associated with the above described change. Contractor waives all rights for additional time extension for said change. Contractor and Owner agree that the price(s) and time adjustment(s) stated above are equitable and acceptable to both parties.

Recommended:

By: _____
 Engineer
 , P.E.

Accepted:

By: _____
 Contractor

Approved:

By: _____
 NHDES
 ,P.E.

Approved:

By: _____
 Public Works Dir.
 Peter H.Rice, P.E.

Approved:

By: _____
 Finance Dept. Director

Approved:

By: _____
 City Manager
 John P. Bohenko

C. GENERAL CONDITIONS

GENERAL CONDITIONS

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GENERAL CONDITIONS

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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.

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

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

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:

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- 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.

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

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

8.3 If a specified or equal item is not available to meet the construction schedule, the Contractor may propose a substitute item of less than equal performance and quality. If this substitute is acceptable to the Engineer, any difference in purchase cost or costs incidental to the installation of such item will be negotiated between the parties to the contract.

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

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

9. 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, the Engineer will establish and stake out one or more base lines as needed and will establish bench marks in and around the project site for the use of the Contractor and for the Engineer's own reference in checking the work in progress. For structures such as pipelines, the Engineer will establish the location of the pipe, manholes and other appurtenances, and will establish bench marks along the route of the pipeline at intervals for the using of the Contractor and for his own reference in checking the pipe and manhole inverts and other elevations throughout the project. The Contractor shall utilize the lines and bench marks established by the Engineer to set up whatever specific detail controls he may need for establishing location, elevation lines and grades of all structures. All this work is subject to checking, approval, and continuous surveillance by the Engineer to avoid error. The Contractor shall provide the Engineer with a qualified man or men to assist in this checking as needed and on request of the Engineer.

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

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

11. Contractor's 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.

27.4 The Contractor shall either:

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

b. Insure the activities of his Subcontractors in his policy.

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

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

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

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

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

28. 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 can not 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. Furnish and erect a sign at the project site to identify the project and to indicate that the State Government is participating in the development of the project. Place the sign in a prominent location as directed by the Engineer. Do not place or allow the placement of other advertising signboards at the project site or along rights-of-way furnished for the project work. See Exhibit 1 for details of construction.

53. [Reserved]

54. Public Convenience and Traffic Control requirements:

54.1 The Contractor shall at all times so conduct his work as to assure minimal obstruction to traffic. The safety and convenience of the general public and the residents along the work site route and the protection of property shall be provided for by the Contractor. The Contractor shall be responsible for timely notification to local residents before causing any interruptions of their access.

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

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

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

59. 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 other wise 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

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-24.2a	Payments to Contractor; Retainage by Owner	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	C-2.4
	Performance Bond (Portsmouth)	C-2.5
	Labor and Material Payment Bond (Portsmouth)	C-2.7

SPECIAL CONDITIONS

SC-17.1 Extra Work and Change Orders

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

SC-20.2 Claims for Differing Site Conditions

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

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

SC-24.2a Retainage by Owner

Delete paragraph 24.2a in its entirety. **Replace** with the following:

“The Owner will separately account for the retainage such that interest on the retainage will be paid to the Contractor.

SC-27 Insurance (Special Condition to GC27)

Change the following in paragraph two, Article 27.1:

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

Change the following in paragraph two, Article 27.2:

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

SPECIAL CONDITIONS

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.”

Add the following to Article 27.3:

“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.”

Change the following in Article 27.6:

The second sentence shall read: “Such insurance shall not be cancelled or materially altered, except after 30 days written notice has been received by the Owner.”

Delete Article 27.7 in its entirety.

Add the following to Article 27.8:

“The Engineer and Engineer’s Subcontractors shall be named as Additional Insured on the Owners policy provided by the Contractor”.

SPECIAL CONDITIONS

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.

SPECIAL CONDITIONS

LABOR AND MATERIAL PAYMENT BOND

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

Bond Number _____

KNOW ALL MEN BY THESE PRESENTS:

that _____

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

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

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

WHEREAS, Principal has by written agreement dated _____ entered into a contract with Owner for Sheafe and Chapel Street Improvements in accordance with drawings and specifications prepared by the Public Works Department, 680 Peverly Hill Road, Portsmouth, N.H. 03801, which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

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

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

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

SPECIAL CONDITIONS

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

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

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

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

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

Signed and sealed this _____ day of _____, 20____. In the presence of:

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

(Surety Company)

(Witness) BY: _____
(Title) (Seal)

Note:

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

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

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

SPECIAL CONDITIONS

PERFORMANCE BOND

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

Bond Number _____

KNOW ALL MEN BY THESE PRESENTS

that _____ as Principal, hereinafter called Contractor, and _____ (Surety Company) a corporation organized and existing under the laws of the State of _____ and authorized to do business in the State of New Hampshire as surety, hereinafter called Surety, are held and firmly bound unto the City of Portsmouth, N.H. Oblige, hereinafter called Owner, in the amount of _____ Dollars (\$ _____), for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents. WHEREAS, Contractor has by written agreement dated _____ entered into a contract with Owner for Sheafe and Chapel Street Improvements in accordance with drawings and specifications prepared by the Public Works Department, 680 Peverly Hill Road, Portsmouth, N.H. 03801, which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

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

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

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

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

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

SPECIAL CONDITIONS

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

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

In the presence of:

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

(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.

D. TECHNICAL SPECIFICATIONS

DIVISION 1
GENERAL REQUIREMENTS

Scope of Work

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

Contents of Division

<u>Section No.</u>	<u>Section Title</u>
01000	Prosecution of Work
01010	Summary of Work
01020	Coordination
01025	Measurement and Payment
01045	Cutting and Patching
01070	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
01515	Temporary Water (Potable)
01520	Maintenance of Sewer Flows
01546	Use of Explosives
01548	Vibration Monitoring
01562	Dust Control
01570	Traffic Regulation
01572	Night Work
01611	Owner's Right to Material
01630	Substitutions and Product Options
01701	Project Closeout Procedures
01710	Project Cleaning
01720	Project Record Documents

SECTION 01000

PROSECUTION OF WORK

The Prosecution of Work is intended to provide the Contractor with a summary of project requirements for reference. It is not intended to provide all the project requirements. The Contractor shall refer to Technical Specifications and Drawings for additional project requirements.

1. LOCATION OF WORK

Work will be conducted in the areas below during the following periods:

2015 Construction Season

- A. Sheafe Street, from Chapel Street to Penhallow Street (350')
- B. Lower Chapel Street, from State Street to Daniel Street (250')
- C. Daniel Street at Lower Chapel: Work is limited to matching existing pavement and sidewalk surfaces from Chapel Street at Daniel Street

2016 Construction Season

- D. Upper Chapel Street, from Daniel Street to Bow Street (450')
- E. Daniel Street at Upper Chapel: Work is limited to matching existing pavement and sidewalk surfaces from Chapel Street at Daniel Street.
- F. Bow Street: Work on Bow Street is limited water main tie-in (night work) and matching existing pavement and sidewalk surfaces from Chapel Street.

2. WORK SEQUENCING

The work will be completed in phases in the following order (no exceptions):

- 1. Lower Chapel Street
- 2. Sheafe Street
- 3. Upper Chapel Street (if Bid Alt. No.1 is awarded)

Prior to the start of any work, the Contractor shall submit a proposed work schedule for approval. The Contractor will need to consider the following items pertaining to general sequencing of the work:

2.1 Sanitary Sewer Service Laterals

The Contractor will be responsible for maintaining the existing sewer services and for providing new service pipe and water tight connections to existing service pipes within the project area. Sewer service connection piping may need to extend to the building interior where existing piping beneath roadways and/or sidewalks is impaired or obsolete. The Contractor shall review connection materials and connection locations for all buildings with the Engineer and Owner representatives in advance. Item 1.17 is provided to assist with confirming unknown service locations and/or materials. Die testing may also be employed at certain locations to verify sewer service location.

2.2 Drain Service Laterals

Drain service laterals shall be provided to all properties for current/future sump pump connections by homeowners. Terminate laterals with a cleanout directly behind the sidewalk (or at ROW). Connection piping may need to extend to the building where no side yard beyond the sidewalk exists. The Contractor shall review termination location and details with the Engineer and Owner's representatives in advance of the work.

2.3 Maintenance of Existing Sewer, Water and Gas/Temporary Water Systems

It will be necessary to maintain existing sewage systems (sanitary/storm sewer combined), water services and gas lines throughout the duration of the Project. The Contractor shall review utility installation sequencing with the Owner and Engineer in advance of the work. A temporary water system can be anticipated to maintain continuous water service. The Contractor will need to prepare and submit a temporary water system plan for review.

2.4 Road Reconstruction

The Contractor will be responsible for maintaining roadway surfaces in a stable condition (free of rutting and/or pumping) for the duration of the project. Full width road reclamation is included to facilitate maintenance of the temporary travel surface during utility construction. The stabilized base material will be removed during excavation for road reconstruction. Road reconstruction shall proceed through binder pavement installation immediately following installation and testing of utilities. Wearing course pavement shall be installed by October 15, 2015.

2.5 Flush Paver Road and Walking Surfaces

The Contractor will need to consider the timing of work sequences for installation of the flush pavers so that traffic flow and access are not restricted. If road closure is necessary overnight (i.e. flush paver crossing on Chapel Street at Chapel Court) to permit minimum time for concrete and/polymeric joint material to cure, 48 hour advance written permission from the City is required. Alternatively the work may be completed in segments or temporarily covered to facilitate vehicle passage.

2.6 Coordination and Protection of Utilities

Gas line relocation by Unitil is planned on Sheafe Street to resolve an alignment conflict with the proposed water main. Unitil has requested that the sewer line installation work be completed first to facilitate required clearances for gas line relocation. Therefore, the gas line work will be concurrent with the Contractor's work. The following coordination work is anticipated:

- Coordinate access and scheduling on gas line relocation work by Unitil
- Coordinate protection and/or relocation of existing gas mains with Unitil. Contact for Unitil is Phil Johnson (603-294-5157)
- Coordinate utility relocation work (by others) with utility companies
- Coordinate temporary water shutdowns, one week in advance, with Portsmouth Water Department (427-1552)

2.7 Private Property Work and Restoration

Work on private property is necessary for construction of certain sewer, water and/or drain service connections. The Owner will secure Memorandum of Understanding (MOU) agreements to provide Right of Entry where required to permit the work. Right of Entry agreements provided by the Owner does not relieve the Contractor from the responsibility to coordinate work with property owners in advance. A minimum of 48 hours advance notice will be required for work on private property. Complete property restorations as work progresses.

3. MAINTENANCE OF TRAFFIC

The Contractor shall prepare, submit for approval and implement a Traffic Control Plan (TCP) for each phase of the work incorporating detours, road closures and signs where applicable. The Contractor can anticipate the following conditions in preparation of the TCP:

- Upper Chapel Street may be closed to through traffic during daytime operations
- Lower Chapel Street may be closed to through traffic during daytime operations
- Sheafe Street may be closed to through traffic during daytime operations
- Traffic circulation on Bow Street, from Chapel Street to Daniel Street, may be reversed when Upper Chapel Street is closed.
- The City may limit road closures to a single work zone at a time depending on the Contractor's operations and public events that may be scheduled in the downtown area.
- The City may permit concurrent construction in up to two work zones provided that at least one travel lane is open (11' minimum width).
- Contractor will need to maintain access to driveways to the extent that is possible
- Police details (when required by the City) will be limited to work at major intersections (Daniel Street, State Street and Bow Street).
- Portable Message Boards, if necessary, will be provided by City of Portsmouth.
- Construction warning signs shall conform to MUTCD standards.
- Trenches must be backfilled at the end of each day.

4. CONSTRUCTION LAYOUT

Work is to be constructed as shown on the drawings. The Contractor will be responsible for construction layout. A list of control points (coordinates and TBM's) will be provided by the Engineer, along with electronic copies of plans, to assist the Contractor with their layout. The baseline layout and offsets shall be set by the Contractor and confirmed by the Engineer on the ground before work proceeds. The Engineer and 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.

5. REUSE OF MATERIALS

Stabilized base material from reclaimed pavement may be used for crushed gravel road base, sidewalk base or driveway restoration, when test results demonstrate the gradation meets the crushed gravel requirements and the material has not been contaminated from

construction operations. Material subjected to construction traffic in advance of paving operations will not be accepted.

6. WATER SYSTEM

A temporary water system is anticipated in order to prevent damage to the existing water systems and to maintain un-interrupted water service to users. Temporary service connections shall be made at the existing curb stop. Bypassing water meters and back flow preventers will not be allowed. The Contractor shall prepare and submit a temporary water plan for review and approval two (2) weeks in advance of the work. Plans for water installations and/or temporary systems are subject to review by the Engineer and approval by the Portsmouth Public Works Department. Temporary interruptions in water service to residents and businesses will need to be scheduled 72 hours in advance and be conducted in a manner that will not inconvenience property owners, to the extent which is possible. Twenty four (24) hour verbal and written courtesy reminders shall be provided to tenants, businesses and property owners prior to interruptions in their water service.

7. UTILITY CROSSINGS AND CONFLICTS

7.1 Coordination

The Contractor is responsible 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. Requirements for exposing utilities at crossings, including hand excavation are specified in Sections 02223 and 02224. Additionally, specific expectations for gas line crossings is outlined by Unitil's informational manual provided in the Appendix.

7.2 Utility Crossings and Repairs

Existing service pipes for gas, sewer and water (domestic and fire) utilities may not be shown on the drawings but can be anticipated for each building and/or unit. Where buildings have multiple units, multiple services can be expected.

- When additional or unknown utility crossings are encountered, payment will be measured 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 shown on the Plans 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.

8. MEETINGS

8.1 Public Information Meetings:

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 following any interruptions of the work (i.e. following temporary shutdown periods).

8.2 Bi-Weekly Progress Meetings:

It is anticipated that regular scheduled meetings will be held with Owner's Representatives, Contractor, and sub-contractors every other week, unless weekly meetings are considered necessary by the Contractor, Owner or Engineer.

9.3 Project Coordination Meetings:

Informal meetings can also be anticipated between the Contractor's Superintendent, Owner's Representatives, and Engineers Representative to review progress/schedule, work sequences and other day to day issues.

9. 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. Sediment and erosion controls shall be operational prior to commencing trench de-watering operations.

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

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

10. SIDEWALKS

The project includes the construction of new sidewalks along the project corridor. The roadway cross sections are provided to show the intent of sidewalk grading. 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 pavement, curb, bricks and/or concrete is placed.

11. GRANITE CURBING

All granite curbing shall be removed. Curb shall be reset along Chapel Street as shown, unless directed otherwise. All curbing not incorporated into the work will remain property of the Owner and be delivered to a location specified by the Owner.

12. RAISING STRUCTURE COVERS AND GRATES

The Contractor shall include one initial structure and casting for assembly adjustment for new sewer and drain structures in each of the respective bid items. Water gate boxes include two adjustments in the respective bid items. The City may request additional adjustment of structures following placement of the pavement binder course. This second adjustment, if requested, will be paid under the respective bid items for utility cover adjustment included in the bid schedule.

13. DUST CONTROL

The Contractor will be required to use a mechanically enclosed street sweeper on paved surfaces daily, to control dust. A combination of water and/or Calcium Chloride and regular sweeping are required on unpaved surfaces to control dust. Additional requirements are provided in Section 01562. An allowance for dust control using a mechanically enclosed sweeper is provided in the Bid Schedule (Item 6.15B). Continuous dust control is required for this project.

14. PEDESTRIAN TRAFFIC

Pedestrian traffic through the work area needs to be either maintained in a safe condition or barricaded. When required by the City, the Contractor will need to separate work zones from pedestrian corridors.

15. WORK HOURS

Regular work hours will be Monday through Thursday 7 AM to 5 PM and 7 AM to 2 PM on Friday unless specifically noted otherwise. Water tie-ins can be anticipated at night, where necessary to minimize inconvenience to the public. Nighttime, holiday or weekend operations must be approved by the City at least 2 days in advance. Additional costs associated with work operations beyond regular hours will be at the Contractor's expense. City observed holidays are listed in Section 01010.

16. STAGING AREA

The Contractor will be responsible to locate and secure all staging and material storage areas. The St. Johns church located between Chapel and Bow Streets may permit staging subject to their own conditions. Contacts for St. Johns Church are provided as follows:

	<u>Gerald Simkins</u>	<u>Andy Ritzo</u>
Address:	100 Chapel Street	100 Chapel Street
Phone:	(603) 436-8283	(603) 436-8283
Cell:	(207) 752-7267	(603) 498-0343
Email:		sexton@stjohnsnh.org

The City of Portsmouth requests that the Contractor provide a Hold Harmless Release to the City prior to occupying any private property staging area(s). At the completion of

work, the Contractor shall receive a release from the property owner(s) of the staging area(s) and a copy of each release shall be provided to the City prior to final acceptance of the project. The Contractor may not use the side of the roadway for staging materials.

17. SALVAGE OF MATERIALS

Hydrant assemblies and granite curb inlets will be salvaged to the City of Portsmouth. All items selected by the City for salvage shall be delivered to a location specified by the City. The City has the right to salvage additional materials as requested. Contractor is to coordinate delivery of materials to the City.

18. 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. Structures and/or pipe within normal excavation limits shall be removed and disposed of by the Contractor. Abandoned pipe, larger than 12-inches, and structures, outside normal excavation limits, will be filled with flow-able fill.

19. VIBRATION MONITORING

Vibration Monitoring for construction activities is required in addition to the vibration monitoring required for blasting. The Contractor will retain the services of a professional vibration consultant to determine vibration limits and to prepare a Vibration Monitoring Plan. The Contractor shall conduct a Pre-Construction survey to examine and document existing conditions of both the exterior and interior of structures within the project area. Vibration Monitoring shall be completed in accordance with the approved vibration monitoring plan and where directed by the vibration consultant throughout construction, Refer to Section 01548.

20. WORK ON PRIVATE PROPERTY & INTERNAL PLUMBING MODIFICATIONS

There are several properties where plumbing modifications and/or private property sewer service construction will be necessary at both interior and exterior of a building. The City of Portsmouth will obtain property owner 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, one week notification is desirable where interior work is needed.

Internal plumbing modifications may also be required, to minimize excavations at the exterior yard areas, or to prevent unnecessary bends in buried piping (see Section 01020 for contact information). The Contractor will be responsible for coordinating internal plumbing modifications with the City's plumber.

21. ARCHITECTURAL LIGHTING AND ELECTRICAL SYSTEM

A schematic line drawing for the electrical conduit layout and wiring is provided on drawing sheet E-1. The Contractor will be responsible for verifying final wiring and electrical system requirements with the City as part of the electrical permit to be issued by the City Inspection Department.

22. ARCHAEOLOGICAL MONITORING

All excavation work within 25 feet of St. John's Cemetery on Chapel Street must be monitored by the City's Archaeological Consultant. Provisions are included for potential delays that may result from review of subsurface archeological conditions.

23. PROTECTION OF THE PUBLIC DURING THE WORK

The project is located in the urban downtown area and is a popular destination for tourists, locals and other visitors; many travel the project corridor on foot. As the work progresses the Contractor will need to pay careful attention to unfinished portions of the work that could present a hazard to the walking and traveling public. Specific examples that have surfaced out of previous projects include mounting hardware on light pole bases and parking meter poles (w/o meter). The Contractor's attention is directed to GC 13.2 for further details of his responsibility to protect the Public during the work.

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 but is not limited to:
1. Construction of new sanitary sewer mains and new manhole structures and new sewer services.
 2. Construction of new storm sewers, manholes, catch basins and new drain services.
 3. Construction of new water distribution mains and service connections.
 4. Temporary water system and continuous maintenance of water service to users.
 5. Maintenance of combined sewer flows (both sanitary and storm sewer flows)
 6. Traffic control and maintenance of traffic.
 7. Piping and structure modifications necessary to tie into existing systems.
 8. Roadway and sidewalk reconstruction.
 9. Restoration of impacted properties both public and private.
 10. Preparation of a Storm Water Pollution Prevention Plan, erosion control and maintenance of systems.
 11. Vibration Monitoring (Section 01548).
 12. Other work as described in the Prosecution of Work preceding this section of the Project Manual

1.2 CONTRACTORS RESPONSIBILITIES

- A. The General Contractor shall have the following responsibilities:
1. The Contractor shall coordinate the work in accordance with the Prosecution of Work (Section 01000) and meet the performance requirements of the related 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. Erosion and Sediment Control – The Contractor shall submit a Storm Water Pollution Prevention Program (SWPPP) in accordance with Section 02540 and 02650. The Contractor shall also submit a Notice of Intent form to the USEPA (section 02540) in accordance with the regulations governing construction sites. (See Prosecution of Work and Sections 02402 and 02540 of these specifications).
 4. 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.
 5. Protect against vandalism. All losses incurred through vandalism are to be reimbursed by the Contractor or Contractor's insurance company.
 6. Coordinate with the City of Portsmouth Department of Public Works, including securing any required permits (excavation, electrical, blasting and flagging), on all work accomplished within City roadway rights-of-way.

7. 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.
8. Coordinate activities involving other utilities with the respective utility companies.
9. The work also includes but is not limited to furnishing all materials, labor and equipment to perform the following activities:
 - a. Preparation and submittal of contract specified submittals.
 - b. Testing of materials as specified herein.
10. Contractor shall provide Temporary water in accordance with Section 01515, where necessary to maintain uninterrupted service.
11. Contractor shall maintain sanitary and storm flow during construction.
12. The work zone is located in residential neighborhoods and businesses with high volumes of pedestrian traffic. The Contractor shall conduct work in a professional manner. Any unprofessional conduct (i.e., foul language, use of excessive speed, etc.) will not be tolerated.
13. 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 25, sheets entitled Sheafe and Chapel Street Improvements.

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

Appendices:

Appendix A – Gas Line Information

Appendix B – Boring/Probe Logs and Geotechnical Report

Appendix C – City Tie Sheets and Record Information

Appendix D – City of Portsmouth Blasting Ordinance

Appendix E – Sample Documents for Private Property Work

Appendix F – City of Portsmouth Electrical Permit Application

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. No earthwork may commence until an Erosion Control and Stormwater Pollution Prevention Plan has been submitted and approved. Also, no earthwork may commence until the Contractor has submitted a “Notice of Intent” letter to the USEPA under the NPDES permit system.
- C. 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 that property owners may be tied 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.
- D. 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.
- E. The work will be constructed from the lowest elevations to the highest elevations for each street, work area (when streets are phased) 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 interruption shall not exceed 4 hours.
- B. Where possible the Contractor shall maintain access to all properties during construction. Advance notification shall be provided otherwise.
- C. See Prosecution of Work, Section 01000.
- 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 pipe (if encountered) may require special handling when the existing pipe cannot be abandoned in place and intact. 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 sewer and water service connections in the field.
- I. 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. Monday through Thursday and 7:00 a.m. to 2:00 p.m. on Fridays, excluding weekends and holidays, unless otherwise approved by the City of Portsmouth.
- B. Standard Holidays – Holidays observed by the City include:
- New Year’s Day
 - Memorial Day
 - Fourth of July
 - Labor Day
 - Veteran’s Day
 - Thanksgiving
 - Day After Thanksgiving
 - Christmas

END OF SECTION

SECTION 01020

COORDINATION

PART 1 – GENERAL

1.1 DESCRIPTION

- A. All damage to existing structures, as a result of digging test pits, shall be paid by the Contractor. All materials shall be the responsibility of the Contractor.
- B. The Contractor will be responsible for replacing pavement around test pits for this Contract.
- C. The Contractor, by nature of this project, will be working in close proximity to residences, businesses and traveled ways. Portions of the service work 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.
- D. Any damage to existing structures, equipment and property as a result of the Contractor's or their subcontractor's operations shall repaired/restored by the Contractor at no additional cost to the Owner.
- E. The Contractor will be responsible for developing a Traffic Control Plan and for coordinating its implementation with the City, local businesses and residents. The Contractor shall coordinate the relocation of Traffic Control measures and devices as needed to move traffic through and/or around the Work Zone or as directed by the Public Works Departments.
- F. The Contractor will be responsible for developing Storm Water Pollution Prevention Plan (SWPPP), for obtaining all necessary permits and for implementing the SWPPP.
- G. The Contractor shall be responsible for Temporary Potable Water service as necessary and for all coordination with the City Water Department and with the local residents.
- H. The Contractor shall be responsible for the maintenance of sanitary and storm flows during construction
- I. The Owner will be responsible for the operation of all existing facilities and any new facilities accepted during the construction period.
- J. The Contractor shall notify the Engineer in writing when, in his opinion, a portion of the construction is ready to be accepted by the Owner. After reviewing the work the Engineer will either recommend that the Owner accept the portion of construction or shall identify remedial work needed to be performed by the Contractor.
- K. All damage to existing or accepted equipment or structures, as a result of the Contractor's or his Subcontractor's operations shall be paid by the Contractor at no additional cost to the Owner.

1.2 COORDINATION WITH OTHERS:

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

Electrical Inspector

John Plourde
(603) 610-7265

- 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 Engineering Division
David J. DesFosses – Project Manager
680 Peverly Hill Road
Portsmouth, NH 03801
(603) 498-4747

Portsmouth Water/Sewer Division
DPW Dispatch (Primary Contact)
680 Peverly Hill Road
Portsmouth, NH 03801
(603) 427-1552

Jim Tow (Water) (603) 766-1439
John Adams (Sewer) (603) 766-1430
Dispatch (City Emergency Services) (603) 427-1530

D. City of Portsmouth: **Sub-contractors**

1. The Contractor shall be responsible for coordinating interior plumbing work with the City's sub-contractor (see Section 01000, Prosecution of Work). It should be noted that the City sub-contractors have yearly contracts with the City and their contract may change during the course of the project.

Tree Removal

Urban Tree Service
119A Walnut Street
PO Box 1631
Rochester, NH 03866
(602) 332-1246

Interior Plumbing

Hart Plumbing
Bob Hart
PO Box 687
Portsmouth, NH 03801
(603) 431-8688

E. Power, Cable, and Phone

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

Public Service of New Hampshire (PSNH)

Richard St. Cyr – Field Technician Specialist
(603) 436-7708 X 5641

FairPoint

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

Comcast (Cable)

Mike Collins
334B Calef Highway

Epping, NH 03042
(603) 679-5695 X 1037

- F. New Hampshire Department of Environmental Services (NHDES) and EPA
The Owner shall be responsible for compliance with conditions of permits obtained, for execution of the work, and for securing other permits that pertain to the Contractor's own operations.
- G. 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 48 hours in advance of any street closings and detours.
- H. Gas
1. Gas mains within the project area have been upgraded to plastic pipe prior to the commencement of this work. The Contractor shall be responsible to coordinate protection of all existing gas mains in close proximity to the proposed work.
- Unitil (Gas Division)
Phil Johnson
325 West Road
Portsmouth, NH 03801
(603) 294-5157
- I. The Contractor shall coordinate and sequence daily operations with all businesses in the project area.
- J. The Contractor shall sequence daily operations to accommodate the weekly trash and recycling pickup. The day and time of pick-up may vary based on location of work.

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 (sample attached).
- 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. 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.
- I. 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, non-perishable 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 is subsidiary to utility installation items.
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 or piping exceeding the quantity provided for in the Bid** installed by the Contractor to perform the work without disruption to the existing facilities, will not be measured for payment.
13. Maintenance of roadway travel surfaces during construction.
14. Prosecution of Work in accordance with the specifications.
15. Dust control is included in Items 6.15X and is required on a daily basis.
16. **Mechanical Saw Cutting** bituminous surfaces (roadway pavement tie-in locations, temporary trench pavement repairs, curb/paver areas, driveways, etc.)
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 FLOWS

- A. Method of Measurement
 1. Maintenance of flows shall be a lump sum item
 2. Measurement shall be based on the percentage of sewer work completed as determined by the Engineer.
- B. Basis of Payment
 1. Maintenance of flows shall be paid at the contract unit price for the lump sum item.
 2. This item shall be considered full compensation for furnishing and installing bypass piping and/or pumping systems required to maintain flows until completion of the sewer and/or drain work including all pumps, piping, electrical systems, fuel, alarms, and control systems. It should be noted that the drawings do not state all instances where by-pass pumping may be required. The Contractor's schedule and sequence of work will dictate when and where by-pass piping and/or pumping systems are necessary for maintenance of existing sewer flows.

3. This item shall also be considered 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.
4. This item shall be considered full compensation to furnish all materials, tools, equipment and labor required to complete the work described above.

ITEM NO. 1.1.XXY: FURNISH AND INSTALL PVC SDR 35 SEWER PIPE (ALL SIZES)

A. Method of Measurement:

1. Sewer pipe **for sewer mains** will 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. Sewer pipe **for service laterals** will 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 complete within the City Right of way will be paid under Item 1.1.06A** (typically from the sewer main to the back of the sidewalk).
 - b. **Lateral work complete on private property will be paid under Item 1.1.06B** (typically from the back of proposed sidewalk to the limits shown on the drawings or as directed).
3. Note 1.1.XXY: 1 = Sewer Pipe
 XX = Pipe diameter in inches
 Y = Type (A – service lateral in ROW, B – service lateral on private property)

B. Basis of Payment:

1. Sewer pipe will be paid for at the Contract price per foot.
2. Said unit price shall constitute full compensation for furnishing and installing all materials, fittings, sewer service (or other) tees/wyes 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 will 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

MEASUREMENT AND PAYMENT

- 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, bypass piping or 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).
 - d. Compliance with homeowner conditions (e.g. advance notice, special work hours, access, restoration, etc.) stated on the Memorandum of Understanding or other documents granting permission for access to be provided by DPW for work on private property.
 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 reseeded 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 and Engineer.
 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. 1.4: CAST IRON COVER 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 installed.
- B. Basis of Payment:
 - 1. Cast iron covers for sewer service cleanouts in paved areas will 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 setting, handling and installing covers complete and in place.
 - 3. Said unit price shall constitute full compensation for all necessary excavation, backfill, compaction, 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)

W. PAMREX COVER ASSEMBLY

- 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 frame.
 - 2. Note: X=inside diameter in feet
- B. Basis of Payment:
 - 1. Manholes will 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 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 any field core penetrations not paid for under a separate item, 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 - 80%.
 - b. Manhole successfully tested - 10%.
 - c. Manhole cleaned and invert built – 10%

ITEM NO. 1.5A: ADDITIONAL ADJUSTMENT OF SEWER MANHOLE COVERS (WHERE DIRECTED)

- A. Method of Measurement
 1. Additional adjustment of new and/or adjustment of existing sewer manhole frame and cover assemblies shall be measured per each.
 2. The initial adjustment of new sewer manhole frames and covers will be incidental to the sewer manhole unit item, and will not be measured for payment.
 3. Existing sewer manhole frames and covers adjusted for 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 sewer manhole frames and cover assemblies.

ITEM NO. 1.6: FURNISH AND INSTALL INSIDE DROP STRUCTURE FOR SEWER MANHOLES

- A. Method of Measurement:
 1. Drop structures 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.
3. All pipe sizes will be paid for at the same unit cost.

ITEM NO. 1.8X: TRENCH STABILIZATION: FURNISH AND INSTALL NON-WOVEN CONSTRUCTION FABRIC AND GEOGRID

- A. Method of Measurement
 1. Trench stabilization measures using fabric and/or 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 manhole structures) will be measured for each layer (2 times the linear foot measurement)
 3. Note: X shall be the following:
 - A = Non-woven construction fabric around sewer bedding
 - B = Geogrid trench stabilization under pipe or structures
- B. Basis for Payment:
 1. Payment of non-woven construction 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 PENETRATION FOR SEWER PIPE (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 = Field core concrete structure - 4" through 15" diameter
 - B = Field core concrete structure - 18" through 30" diameter
 - C = Field core stone or granite foundation (all sizes up to 6" diameter)
 3. Foundation cores shall only be measured for payment after successful inspection and acceptance 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: ABANDON SEWER MANHOLES

- A. Method of Measurement:
 1. Abandoned sewer manholes, outside normal excavation limits (for any new utility), will 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. 1.11: FURNISH AND INSTALL FLOWABLE FILL IN ABANDONED SEWERS

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

ITEM NO. 1.16: REWORK INTERIOR PLUMBING

- A. Method of Measurement:
 - 1. Work authorized under this item will be measured in the same manner as extra work.
 - 2. An allowance has been included in the bid schedule.
- B. Basis of Payment:
 - 1. Payment for work authorized will be made on a dollar basis as invoiced by the Plumbing Subcontractor plus an additional percentage to the Contractor according to Section 17.3 of the Contract General Conditions. Payment shall be considered full compensation for additional administrative, coordinating, and supervising costs incurred while directing the sub-contractor. The dollar limit (allowance) prescribed in the bid schedule shall not limit the Engineer, or Owner, in determination of the value of the work.
 - 2. Payment of the allowance in the bid schedule will not be on lump sum basis, only the amount determined for the value of the work will be paid.
 - 3. Payment for interior plumbing work shall be based on actual invoices for time spent on the job by the plumbing subcontractor and submitted to the Engineer.
 - 4. Payment for this work is limited to work inside the respective building walls. All other work shall be paid by separate items.

ITEM NO. 1.17: VIDEO OF SEWER LINES

- A. Method of Measurement:
 - 1. Video of sewer lines shall be measured per the linear foot.
 - 2. When used for post construction CCTV inspection, actual payment shall be for the length of pipe from inside edge to inside edge of up and downstream manholes. This length shall be determined by measuring from the center of the upstream manhole to the center of the downstream manhole and subtracting the average diameter of the two manholes.
 - 3. When used for assisting with service lateral location/verification, actual payment will be for the full length of the existing service alignment measured on the ground from the sewer main connection to the building face.
- B. Basis of Payment:
 - 1. Post-construction video inspection shall be at the Contract unit price per linear foot.
 - 2. Payment for work shall include providing all materials, labor and equipment necessary for completing video inspection of the completed sewers, or at locations as directed, and in accordance with Section 01382.
 - 3. Payment will not be considered for video deemed to be poor quality by the Owner or the Engineer. The Contractor will be required to re-record and re-submit video records at no additional cost to the Owner before payment is authorized.

ITEM NO. 2.X.XXY: FURNISH & INSTALL DRAIN PIPE (ALL SIZES AND TYPES)

A. Method of Measurement:

1. Pipe for drain lines will 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. Drain pipe **for service laterals** will 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(s) and fittings will be considered subsidiary to the service lateral items and will not be measured for additional payment.
 - a. **Lateral work complete within the City Right of way shall be paid under Item 2.1.06A** (typically from the sewer main to the back of the sidewalk).
 - b. **Lateral work complete on private property shall be paid under Item 2.1.06B** (typically from the back of proposed sidewalk to the limits shown on the drawings or as directed).
3. Note 2.X.XXY: 2 = Drainage Pipe
 X = Material (1-CPE, 2-RC, 3-Vylon PVC, 4-PVC)
 XX = Pipe diameter in inches
 Y = Type (A – service lateral in ROW, B – service lateral on private property)

B. Basis of Payment:

1. Drain pipe will 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.
 - c. Compliance with homeowner conditions (e.g. advance notice, special work hours, access, restoration, etc.) stated on the Memorandum of

- Understanding or other documents granting permission for access to be provided by DPW for work on private property.
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. 2.4X: CAST IRON CLEANOUT ASSEMBLIES FOR DRAIN LATERALS AND ROOF LEADERS

- A. Method of Measurement:
 1. Cast iron cleanout assemblies for drain service laterals will be measured by each assembly installed.
 2. Note: X = Cleanout Type
A = Cast iron cleanout cover
B = Cast iron roof leader connection
- B. Basis of Payment:
 1. Cast iron cleanout assemblies will 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, piping, fittings, caps, plugs and tools necessary for setting, handling and installing covers complete and in place.
 3. Said unit price shall constitute full compensation for all necessary excavation, backfill, compaction, cleaning, connections to existing piping (sump pumps, downspouts, etc.) 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. 2.5A: ADDITIONAL ADJUSTMENT OF DRAIN MANHOLE COVERS

- A. Method of Measurement
 - 1. Additional adjustment of new and adjustment of existing drain manhole frame and cover assemblies shall be measured per each.
 - 2. The initial adjustment of frames and covers to binder grade on new manholes shall be incidental to the respective unit items.
 - 3. Existing drain manholes shall be adjusted to binder grade and to final grade and will only be measured for payment once.
 - 4. Existing sewer manhole frames and covers adjusted for 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 drain manhole frames and cover assemblies.

**ITEM NO. 2.5.X: FURNISH AND INSTALL DRAIN MANHOLES (ALL DIAMETERS)
W. PAMREX COVER**

- 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 will 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.
 - 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. 2.6.X: FURNISH AND INSTALL CATCH BASINS AND DROP INLETS
(ALL DIAMETERS AND ALL GRATE/COVER TYPES)**

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

ITEM NO. 2.6A: FURNISH AND INSTALL CATCH BASIN HOOD (UP TO 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 will 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. 2.8X: TRENCH STABILIZATION: FURNISH AND INSTALL NON-WOVEN CONSTRUCTION WRAP OR GEOGRID (WHERE DIRECTED)

- A. Method of Measurement
 1. Trench stabilization measures using fabric and/or 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 manhole or catch basin structures) will be measured for each layer (2 times the linear foot measurement)
 3. Note: X shall be the following:
 - A = Non-woven construction fabric around drain bedding
 - B = Geogrid trench stabilization under pipe or structures
- B. Basis for Payment:
 1. Payment of non-woven construction 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. 2.9X: FIELD CORE PENETRATION FOR DRAIN PIPE (INCLUDING PIPE CONNECTION SYSTEM)

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 = Field core concrete structure - 4" through 15" diameter

B = Field core concrete structure - 18" through 30" diameter

C = Field core stone or granite foundation (all sizes up to 6" diameter)

3. Foundation cores shall only be measured for payment after successful inspection and acceptance 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. 2.10: ABANDON DRAIN MANHOLES OR CATCH BASINS

- A. Method of Measurement:
1. Abandoned drain manholes 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 abandoned 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 abandoned 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 to the limits shown. 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. 3.1.XX: FURNISH AND INSTALL DUCTILE IRON WATER PIPE (ALL SIZES)

- A. Method of Measurement:
1. Ductile iron water pipe will 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. Ductile iron water pipe will 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, 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 WATER SERVICE PIPE (ALL SIZES)

- A. Method of Measurement:
1. Copper service pipe will 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" copper service
B = 1" copper service
C = 1 1/4" copper service
D = 1 1/2" copper service
E = 2" copper service
- B. Basis of Payment:
1. Pipe will 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 reseeded 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 will be for each service connection completed.
 2. Note: X=size in inches
A = 3/4" service connection
B = 1" service connection
C = 1 1/4" service connection
D = 1 1/2" service connection
E = 2" service connection
- B. Basis of Payment:
1. Water service connections complete in place will 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, wyes, 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 will be measured per each valve and valve box assembly installed.
 2. Note: XX=diameter in inches
- B. Basis of Payment:
 1. Gate valves will 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 full payment to **raise castings twice** to pavement elevation (binder and wearing course).

ITEM NO. 3.4.08X: FURNISH AND INSTALL GATE VALVE AND FITTINGS TO COMPLETE WATER TIE IN AT NIGHT

- A. Method of Measurement
 1. Work under this item will be measured by lump sum.
 2. Note: X = Location
A = Chapel Street and Bow Street
B = Sheafe Street and Penhallow
- B. Basis of Payment:
 1. Work will be paid under the contract lump sum price.
 2. Said unit price shall include furnishing and installing the tee connection, gate valve assembly, all 8" DI water pipe and fittings required to tie in the new ductile iron water main to the existing water main.

3. 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.
4. 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.
5. 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.
6. Said price shall include any fittings, tees, wyes, adapters, couplings, thrust blocks, etc. not covered under separate bid items which are required to connect existing pipe to the proposed water main.
7. Said unit price shall include 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.
8. Said unit price shall include temporary piping, temporary facilities, and temporary services to maintain water service during construction.
9. 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.
10. 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.
11. Said unit price shall include sheeting and bracing (if necessary).
12. Said unit price shall include disinfection, dechlorination and bacteriological testing.
13. Said unit price shall include any added costs and/or lost production time associated with completing the work at night (i.e. 12:00 PM to 6:00 AM).

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

- A. Method of Measurement:
 1. Additional adjustment of valve boxes will 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 will 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 ASSEMBLY

- A. Method of Measurement:
1. Hydrant assemblies will 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 will 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. 3.7: 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, and as shown on the Contractor's (approved) temporary water system work plan.
 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 plan (including required submittals or re-submittals) for temporary connections/tie-ins, services, hydrants, driveway/street crossings, etc; 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. Payment for temporary water system will be made in accordance with the following percentages:
 - a. Temporary water system plan submitted and approved – 10%
 - b. Temporary water system in place and operational – 70%
 - c. Temporary water system removed and restoration – 20%

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

- A. Method of Measurement:
1. Hot bituminous pavement machine method will be measured per ton of pavement installed within the limits shown on the drawings or as ordered by the Engineer.
 2. Two methods of measurement will be considered at the discretion of the Engineer:
 - a. Batch weights (tare slips) may be used. This method will not be acceptable if multiple paving methods (machine and hand methods) 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 4.1X: 1 = Machine Method
 - A – ¾” Binder Course – 50 Gyration
 - B – 3/8” Wearing Course – 50 Gyration
- B. Basis of Payment:
1. Hot bituminous pavement machine method will be paid for at the Contract unit price per ton.
 2. Said unit price shall constitute full compensation for furnishing all materials, labor, equipment and tools necessary for installing machine method hot bituminous pavement.
 3. Payment shall include fine grading.
 4. Said unit price shall include full compensation for adjustment or restoration to original condition of catch basins, manholes, valve covers, curb stops, signs, fences, shrubs, and/or landscaping, etc. not paid for under separate items.
 5. Asphalt escalation, if applicable, will 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.
 7. Payment shall be considered full compensation for mobilizing the paving operation multiple times.

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

- A. Method of Measurement:
1. Hot bituminous pavement hand worked will 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 for trench pavement repairs:
 - 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.

3. Note 4.2X: 2 = Hand Worked
A – Permanent hand method pavement placed for driveway, sidewalk base course, flush paver base course, curbing, trench pavement repairs or as directed by the Owner or the Engineer.
B – Temporary Pavement (where directed)
- B. Basis of Payment:
1. Hot bituminous pavement hand worked will 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 applicable, will 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 - 8" DEPTH IN PLACE

- A. Method of Measurement:
1. Full width pavement reclamation will be measured per square yard of roadway pavement reclaimed (to the specified depth).
 2. Measurement shall be by multiplying the ordered length by the ordered width of the trench for the depth specified on the Drawings.
- B. Basis of Payment:
1. Full width pavement reclamation will be paid for at the Contract unit price per square yard.
 2. Payment shall be based on pulverizing the existing road surface to the depth(s) specified.
 3. Said unit price shall constitute full compensation for protection of existing structures and utilities.
 4. 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.
 5. Said unit price shall also include full compensation for uniformly grading the reclaimed asphalt to match existing pavement grades.
 6. The reclaimed material is primarily intended for the Contractor's use in maintaining an acceptable travel surface during utility installation work. Said unit price shall include full compensation for maintenance of the temporary travel surface until binder course pavement is installed. Payment for

removing the stabilized base material will be under Item 4.4A, Common Excavation – Roadway.

ITEM NO. 4.4X: COMMON EXCAVATION

- A. Method of Measurement:
1. Common excavation will 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.
 3. Note 4.4X: 4 = Common Excavation
X = Application/Material
A – Roadway Excavation
B – Excavation of heavily reinforced concrete road bed (**Not Used**)
C – Excavation of concrete (reinforced or unreinforced)
 4. Additional excavation for roadway work ordered by the Engineer will be measured for payment under Item 4.4A.
 5. Common excavation depth for driveways is subsidiary and will not be measured for payment.
 6. Excavation and disposal of brick pavers or other masonry beneath the road surface will be measured under Item 4.4A.
 7. Excavation of existing concrete curb, miscellaneous concrete panels, curbing and miscellaneous brick/paver masonry structures (not being restored in place) shall be measured for payment under this item (Item 4.4C).
 8. Common excavation of concrete (Item 4.4C) includes disposal of all related concrete, panels, curbing, masonry, pavers, etc.
- B. Basis of Payment:
1. Common excavation will 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.
 4. Removal of existing concrete sidewalk curb ramps or other above grade concrete/masonry materials in plain view will be subsidiary to the excavation for the respective item being installed and will not be paid under this item.

ITEM NO. 4.5.1X: 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
- 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 will 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 borrow use to replace excavated material in trench, or rock excavation shall not be included for payment under this item.
 4. Additional bank run gravel borrow 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 will be paid at the Contract unit price per cubic yard.
 2. Said unit price shall be considered full compensation for the furnishing or all materials, labor, equipment and tools necessary for furnishing, placing, and compacting bank run gravel borrow.
 3. Said unit price shall include all labor, tools, materials, and equipment necessary to properly grade and compact gravel borrow to accommodate proper installation, grading, and compaction of crushed gravel.
 4. Additional bank run gravel borrow 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 GEOTEXTILE FABRIC (WHERE DIRECTED)

- A. Method of Measurement
 1. Construction geotextile fabric will 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 will 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 will 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 will 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: FUEL ADJUSTMENT AND ASPHALT ESCALATION

- A. Method of Measurement
 1. The amount of fuel measured for adjustment will be based on the fuel usage factor of 9 gallons per \$1,000 of work completed.
 2. The amount of asphalt measured for any eligible escalation will be based on the tonnage of asphalt placed during that pay period.
- B. Basis of Payment
 1. **Fuel adjustment** will be paid as described in the paragraphs below.
 - a. Fuel adjustment will be based on the NHDOT's monthly published price for fuel and applied to fuel usage as determined by Paragraph A.1 above. Fuel adjustment will be eligible for payment only when monthly published price varies by more than 10% (+/-) from the fixed based price (see paragraph B.1.b).
 - b. The fixed base price of fuel for this Contract will be the price per gallon as published by NHDOT at the time of the bid opening.
 - c. When the monthly price determined in paragraph (a) is more than 110% of the fixed base price set forth in paragraph (b), the adjustment will be calculated as follows: [monthly price less 110% of the fixed base price] x [fuel usage, as described paragraph A.1].
 - d. When the monthly price determined per paragraph (a) is less than 90% of the fixed base price set forth in paragraph (b), the adjustment will be calculated as follows: [monthly price less 90% of the fixed base price] x [fuel usage, as described paragraph A.1].
 2. **Asphalt escalation** will 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. Asphalt escalation will be eligible for payment when the monthly published price varies by more than 10% (+/-) from the fixed base price (see Paragraph B.2.b).
- b. The fixed base price of Asphalt Cement for this Contract will be the price per ton as published by NHDOT at the time of the bid opening.
 - c. The increase/decrease will be calculated as follows (back-up calculation shall be included with payment applications): [AC monthly price minus the AC base bid price] x [% AC in mix] x [tons of pavement placed]
 - d. No Adjustment will be made when the price of Asphalt Cement index varies less than 10%.

ITEM NO. 5.2A: REPLACE OR MODIFY EXISTING BRICK SIDEWALK (MAINTAIN GRAVEL BASE IN PLACE)

- A. Method of Measurement:
 1. Replacement or modified brick sidewalks will be measured per square yard.
 2. Measurement will 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. Replacement or modified brick sidewalk shall be paid for at the Contract unit price per square yard.
 2. Said unit price shall constitute full compensation for all materials, labor, equipment, and tools necessary for furnishing, cutting and installing brick, brick edging, excavation & backfilling, grading existing bedding material in place (including any supplemental crushed gravel material needed to meet finished grades), setting bed, edge restraints, polymeric joint sand, pre-molded joint filler, loam & seed or gravel backing, and any other work required for or incidental to the completion of this item.

ITEM NO. 5.2B: BRICK SIDEWALK

- A. Method of Measurement:
 1. Brick sidewalks will be measured per square yard.
 2. Measurement will 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, cutting and installing brick, brick edging, excavation & backfilling, bedding material (crushed gravel), setting bed, edge restraints, polymeric joint sand, pre-molded joint filler, loam & seed or gravel backing, and any other work required for or incidental to the completion of this item.

ITEM NO. 5.2.C: FURNISH AND INSTALL FLUSH PAVERS

- A. Method of Measurement:
1. Flush pavers will be measured per square yard.
 2. Measurement will 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. Flush pavers shall be paid for at the Contract unit price per square yard.
 2. Said unit price shall constitute full compensation for all materials, labor, equipment, and tools necessary for furnishing, cutting and installing brick pavers, concrete backfill, excavation & backfilling, bedding materials (gravel and crushed gravel), setting bed, polymeric joint sand, pre-molded joint filler, loam & seed or gravel backing, and any other work required for or incidental to the completion of this item.

ITEM NO. 5.3.X: FURNISH AND INSTALL VERTICAL CURB

- A. Method of Measurement:
1. Vertical curb will 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 - Straight Vertical Granite Curb (5" X 18")
 - 2 - Straight Vertical Granite Curb (6" X 18")
 - 3 - Curved Vertical Granite Curb (radius as shown or directed).
 - 4 - Flush Vertical Granite Curb (6" X 12" with chamfer)
 - 5 - Bituminous Curb
- B. Basis of Payment:
1. Vertical curb will be paid for at the Contract unit price per linear foot.
 2. Said unit price will include straight 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 furnishing all materials, labor, equipment, and tools necessary to install the vertical curb including, excavation, removal/disposal/salvage of any existing curbs, bedding (gravel and 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 vertical 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 will 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 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. 5.5A: FURNISH AND INSTALL FIBER REINFORCED CONCRETE AT CURB RAMPS

- A. Method of Measurement:
1. Concrete at curb ramps will be measured per square yard as shown on the drawings or as ordered by the Engineer.
 2. Measurement will be by multiplying the ordered width by the ordered length.
- B. Basis of Payment:
1. Concrete will 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 including excavation (including existing sidewalk regardless of materials), base gravels, fine grading, forming, concrete (fiber reinforced), backfill and all property restoration not paid for under a separate item.
 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 panel (Item 5.5.B).
 - c. Removal and re-placement of defective curb ramps not constructed in compliance with the Construction Drawings

ITEM NO. 5.5B: DETECTABLE WARNING PANELS AT CURB RAMPS

- A. Method of Measurement
1. Detectable warning panels will be measured per each installed in accordance to the drawings
- B. Basis of Payment
1. Detectable warning panels will be paid at the Contract unit price per each.
 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 #5.5A and will not be paid under this item.

ITEM NO. 5.6: FURNISH AND INSTALL LANDSCAPE PLANTING ISLAND AT BOW STREET

- A. Method of Measurement:
 1. The landscape planting island will be measured as a single unit complete and in place.
- B. Basis of Payment:
 1. The landscape planting island will be paid for at the contract lump sum unit price complete and in place as shown on the drawings and as described in the project specifications including excavation, soil preparation & fine grading, plant materials, approved mulch, soil amendments, additives and fertilizer.
Work for these items shall be performed by a qualified landscape contractor in accordance with the American Association of Nurserymen (ANN) Standards.
 2. Said unit price will be considered full compensation for all necessary labor and equipment to furnish and install plantings as specified including excavation, backfill soil material, mulch and soil amendments as specified.
 3. Payment shall include the maintenance/acceptance period including watering twice each week minimum, weeding, replacing dead plants, spraying for pests and disease, any required re-mulching and Contractor's one year guarantee for plantings.
 4. Actual payment shall be broken down into the following percentages:
 - a. Island plantings complete and installed – 80%.
 - b. All plants in poor condition or not accepted by Owner's Representative have been satisfactorily replaced and 1 year warranty period (starting at date of acceptance by Owner's Representative) has expired – 20%.

ITEM NO. 5.7: ARBORIST ALLOWANCE FOR TREE AND ROOT PRUNNING

- A. Method of Measurement:
 1. Tree and Root Pruning will be measured in the same manner as extra work.
 2. An allowance has been included in the bid schedule.
- B. Basis of Payment:
 1. Payment of work authorized will be made on a dollar basis as invoiced by the Arborist plus an additional percentage to the Contractor according to Section 17.3 of the Contract General Conditions. Payment shall be considered full compensation for additional administrative, coordinating, and supervising costs incurred while directing the sub-contractor. The dollar limit

(allowance) prescribed in the bid schedule shall not limit the Engineer, or Owner, in determination of the value of the work.

2. Payment of the allowance in the bid schedule will not be on lump sum basis, only the amount determined for the value the work will be paid.
3. Payment for arborist work shall be based on actual invoices for time spent on the job by the arborist and submitted to the Engineer.
4. Payment for this work is limited to tree care work completed at 126 Daniel Street. All other work shall be paid by separate items.

ITEM NO. 5.8A: RESET AND REPLACE GRANITE RETAINING BLOCKS AT 126 DANIEL STREET

- A. Method of Measurement:
 1. Resetting and replacing granite retaining blocks will be measured as a single unit complete and in place.
- B. Basis of Payment:
 1. Said unit price shall constitute full compensation for all materials, labor, equipment, and tools necessary for furnishing new granite curb blocks (straight and/or radial), removing preserving and resetting existing granite blocks, cutting granite blocks, excavation & backfilling, bedding material (granular backfill), and any other work required for or incidental to the completion of this item so that the work matches existing conditions.
 2. Said unit price shall constitute full compensation for all materials, labor, equipment, and tools necessary for exposing roots, air spade, pruning, replacing soil, and any other work required for or incidental to the completion of this item.

ITEM NO. 5.8B: RE-SET FIELD STONE SIDEWALK AT 93 STATE STREET

- A. Method of Measurement:
 1. Resetting field stone sidewalk will be measured as a single unit complete and in place.
- B. Basis of Payment:
 1. Said unit price shall constitute full compensation for all materials, labor, equipment, and tools necessary for removing and resetting field stones, excavation & backfilling, grading existing bedding material in place (including any supplemental crushed gravel material needed to meet finished grades), setting bed, edge restraints, polymeric stonedust joint material or gravel backing, and any other work required for or incidental to the completion of this item.

ITEM NO. 5.9.1X: ARCHITECTURAL LIGHTING ASSEMBLY

- A. Method of Measurement:
 1. The quantity to be measured for payment shall be on a per each basis for furnishing and installing each architectural lighting assembly complete and in place.

2. Note X = Type
A – 10' 2" Height
B – 9' 2" Height
- B. Basis of Payment:
1. Payment for architectural lighting assemblies shall be based on the contract unit price.
 2. Said price shall constitute full compensation for furnishing all labor, equipment and materials associated with installing the lights in accordance with the Contract Drawings and Specifications.
 3. Said unit price shall include, but not be limited to all labor and equipment necessary to furnish and install architectural lighting assemblies including excavation, concrete bases with conduit, setting poles level and plumb, back filling, installing fixtures and appurtenances and all other work required for or incidental to the satisfactory completion of this item.

ITEM NO. 5.9.2X: ELECTRICAL INSTALLATION, WIRING AND CONNECTIONS FOR ARCHITECTURAL AREA LIGHTING SYSTEM

- A. Method of Measurement:
1. The electrical installation for the architectural area lighting system will be measured as a single, lump sum unit, complete, in place and operational.
 2. Note: X = Location
A - Lower Chapel – State Street Circuit
B - Upper Chapel – Bridge Area Circuit
- B. Basis of Payment:
1. The Contractor shall submit a detailed cost breakdown for this lump sum price.
 2. Said lump sum price shall constitute full compensation for furnishing and installing the necessary labor, material and equipment for the electrical distribution and control system complete and operational, and as shown on the Drawings, and as specified in section 16402 of these Specifications including: connection to existing electrical system and extension of proposed lighting system including pull strings, appurtenant equipment, wiring and testing.
 3. Said unit price shall also constitute full compensation for coordination/review/approval of the proposed system with DPW in advance of the work.

ITEM NO. 5.9.3X: FURNISH AND INSTALL 2" ELECTRICAL CONDUIT

- A. Method of Measurement:
1. Conduit will be measured by the linear foot of the specified type and size required, to the nearest foot.
 2. When a conduit is connected to a light pole or other structure, measurement will be made only to 5 ft from the center of the base, measured horizontally. The limit of measurement where conduit is joined to previously existing conduit will be at the junction of the two conduits.

3. Note X = Conduit Material
A = Schedule 40 PVC
B = Schedule 80 PVC
- B. Basis of Payment:
 1. The accepted quantities of conduit will be paid for at the Contract unit price per linear foot of the type and size specified complete in place, including brackets/spacers, common structure excavation to the depth specified, bedding if required, and backfill.

ITEM NO. 5.9.5: LIGHT POLE BASE ASSEMBLY

- A. Method of Measurement:
 1. Light pole base assemblies will be measured by the number of units installed.
- B. Basis of Payment:
 1. The accepted quantities of light pole base assemblies of the type required will be paid for at the Contract unit price for each complete in place.
 2. The Contract unit price shall constitute full compensation for all tools, labor, equipment and materials necessary to construct pre-cast light pole base assemblies, including all excavation, pre-cast concrete bases, mounting hardware, steel conduit, penetrations, bedding, setting pole bases to proper grade level and true, backfill, compaction and any other work incidental to a complete light pole base assembly installation.

ITEM NO. 5.9.6: RECONSTRUCT LIGHT POLE BASE AND RESET LIGHT POLE ASSEMBLY

- C. Method of Measurement:
 1. Reconstructed light pole bases will be measured by the number of units reconstructed.
- D. Basis of Payment:
 1. The accepted quantities of reconstructed light pole bases of the type required will be paid for at the Contract unit price for each complete in place.
 2. The Contract unit price shall constitute full compensation for disassembling the existing light pole, protecting existing light equipment, modifications to the existing light pole base and related conduit/wiring necessary for the new electrical circuit connection/extension, restoring the light pole base and surrounding ground surface to meet existing condition and any other work, tools and equipment necessary for resetting/connecting the existing light pole complete, in place and operational.

ITEM NO. 5.9.7: ELECTRICAL HAND HOLE (PULL BOX)

- A. Method of Measurement:
 1. Electric hand holes will be measured by each, but will not be deducted from the length of the conduit.

- B. Basis of Payment:
1. The accepted quantities of electric hand holes of the type specified will be paid for at the Contract unit price per each.
 2. The contract unit price shall constitute full compensation for furnishing and installing all equipment, tools, materials and labor necessary for installing pre-cast concrete hand holes with cast iron covers including excavation, bedding, conduit penetration and connection, backfill, compaction, and surface restoration.

ITEM NO. 6A: MOBILIZATION

- A. Method of measurement:
1. Measurement for this item will 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(s) and for the utilities associated therewith.
 2. Said lump sum shall include full compensation for mobilization and demobilization costs including fees associated with transportation, rental fees necessary to secure a staging area and any other work necessary for the project not paid for under a separate item.
 3. In the event that a penalty is incurred by the Contractor (e.g. due to tree damage, private property commitments, etc.) the value of the penalty will be deducted from the Contract under this Item.
 4. 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.
 5. 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.
 6. The mobilization item shall not exceed ten (10%) percent of the Contract value.
 7. 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 that is beyond what is required by state and local ordinances, for blasting.
 - 3. Vibration monitoring for blasting will not be measured for payment under this item.
 - 4. 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 will 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 DELAY

- 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.
- 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 will be present during any excavation work within the designated area. This person has the authority to instruct the Contractor to discontinue the work operation for the investigation and assessment of potential archaeological resources.
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 for the Archaeological Consultant 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.

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. Additional (more than one of each) crossings of active utility pipes will be measured for payment under this item.
 2. Unmarked or mismarked utility crossings will not be measured for payment under this item unless they exceed what normally can be anticipated as defined in line 1.a above

3. Utility crossings, indicated on the drawings, delineated in the field or otherwise 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 Section 01000, 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. Crossing of an unknown or mismarked utility will only be considered once for payment (i.e. once exposed for crossing, the utility is no longer unknown for other crossings by other proposed piping installations).

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

ITEM NO. 6.2: ADDITIONAL TRENCH EXCAVATION (WHERE ORDERED BY THE ENGINEER)

- A. Method of Measurement:
 1. Additional trench excavation below normal depth of unsuitable material will 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 will 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 will be based on the net increase or decrease for these items.
 4. Additional excavation 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. Depths exceeding 1 foot will be measured for payment under this item.
 5. Excavation above normal depth shown on the Drawings will not be measured under this item.
 6. Additional excavation for roadway work will be measured under Item 4.4A
- B. Basis of Payment:
1. Additional trench excavation of unsuitable materials will be paid for at the Contract unit price per cubic yard.
 2. Said unit price shall constitute full compensation for the furnishing of all labor, equipment and tools necessary for excavation of all unsuitable materials where directed.
 3. Said unit price shall be considered full compensation for proper disposal of unsuitable materials.

ITEM NO. 6.3: FURNISH AND INSTALL ADDITIONAL CRUSHED STONE (WHERE ORDERED BY THE ENGINEER)

- A. Method of Measurement:
1. Additional crushed stone will 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 crushed stone replaces.
 4. Crushed stone 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 crushed stone will 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 stone as specified.

ITEM NO. 6.4: EXPLORATORY TEST PIT EXCAVATION

- A. Method of Measurement:
1. Test pits will 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 will be paid at the Contract unit price per each.
 2. Payment under this item shall be full compensation for furnishing all equipment, labor, and materials for excavation, location of existing utilities, backfill, property restoration and all else incidental for which separate payment is not provided for under other items.
 3. Payment for individual test pits exceeding 10 CY will constitute additional payment based on the proportional increase of the test pit excavation.
 4. Said unit price shall constitute full compensation for any repairs to existing utilities that result from exploratory test pit excavation.

ITEM NO. 6.5: MAINTENANCE OF TRAFFIC

- A. Method of Measurement:
1. Maintenance of Traffic will be measured for payment, based on the following percentages:
 - a. Traffic Control Plan(s) will be measured incrementally based on the TCP for each of the three phases of the work up to 10% of the unit item.
 - b. Maintenance of traffic will be measured incrementally based on the number of days traffic is maintained in accordance with Contract Documents and the approved Traffic Control Plan divided by the Contract time for substantial completion.
 - c. Days that traffic or Dust Control is not maintained in accordance with 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 will be paid for at the Contract unit price and shall be considered full compensation for maintenance of traffic in accordance with Section 01570 and Dust Control Section 01512.
 2. Said lump sum price shall be considered full compensation for development of a detailed traffic control plan that shows the location of all traffic control devices, detours, road closures etc., necessary to complete the work. The Plan shall include appropriate phases that are keyed to specific project milestones.

3. Said lump sum price shall be considered full compensation for revisions, modifications or resubmissions necessary to demonstrate safe passage through the work zone consistent with NHDOT and MUTCD standards.
4. Said unit price shall be considered full compensation for all materials, labor and equipment necessary for the installation of traffic control devices, the maintenance of the same in good working order, replacement of any devices damage or stolen and the relocation of devices made necessary by a new phase of the work in accordance with the Traffic Control Plan.
5. Failure to maintain the traffic control devices or failure to fully implement the Traffic Control Plan shall result in a reduction in the compensation for that period.
6. The City of Portsmouth Public Works Departments may require modification of the Traffic Control Plan based on actual field conditions. Modification of the approved Traffic Control Plan shall not constitute a claim for additional compensation under this item. Said lump sum shall include full compensation for making the necessary modifications to the Traffic Control Plan.
7. The Contractor shall maintain Safe Passage through the construction area at the end of each construction day. This shall include work necessary to assure that the full width of the roadway is made useable outside the immediate work zone.
8. Payment under this item shall be considered full compensation for deploying, protecting and maintaining portable message boards to be provided by the City. When portable message boards are not available from the City, payment will be made under Item 6.6C.

ITEM NO. 6.6A: UNIFORMED OFFICER WITH CRUISER 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 will 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 will 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. 6.6B: UNIFORMED FLAGGER FOR TRAFFIC CONTROL

- A. Method of Measurement
 1. Uniformed flagger for traffic control will be measured per actual man-hour 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 will 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. 6.6C: PORTABLE MESSAGE BOARD FOR TRAFFIC CONTROL

- A. Method of Measurement
1. Portable message board will be measured as a unit week.
 - a. A unit shall consist of the sign as described, the trailer, fuel and all necessary moves as approved.
 - b. A week shall consist of seven consecutive days beginning when the item is first mobilized to the project. The number of units required each week will be as specified in the approved Traffic Control Plan or as directed.
- B. Basis of Payment:
1. The accepted quantity of portable message boards (unit/week) will be paid for at the Contract unit price complete. Payment will be made based on the use for each unit, whether used once or multiple times during the week.

ITEM NO. 6.8A: DEVELOP A STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

- A. Method of Measurement:
1. The StormWater Pollution Prevention Plan will be measured as a single unit.
 2. Measurement will be made upon approval of the Plan by the Engineer, the Public Works Department and upon receipt of a NPDES permit for construction.
- B. Basis of Payment:
1. The StormWater Pollution Prevention Plan will be paid for at the Contract unit price.
 2. Said price shall be considered full compensation for development of a detailed plan that shows the location of all erosion and storm water control devices including sedimentation basins, sediment collections bags, etc., for construction

dewatering discharges, etc., necessary to complete the work. The Plan shall include appropriate phases that are keyed to specific project milestones.

ITEM NO. 6.8B: IMPLEMENT AND MAINTAIN APPROVED STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

- A. Method of Measurement:
 - 1. Implementation and maintenance of the Stormwater Pollution Prevention Plan will be measured as a unit.
 - 2. Measurement will be made based on the percentage of work completed at each payment requisition.
- B. Basis of Payment:
 - 1. Implementation and maintenance of the Stormwater Pollution Prevention Plan will be paid for at the Contract unit price.
 - 2. Said price shall be considered full compensation for all materials, labor and equipment necessary for the installation of erosion, sediment control and storm water management devices, the maintenance of the same in good working order, replacement of any devices damaged or filled with sediment and the relocation of devices made necessary by a new phase of the work in accordance with the Erosion and Storm Water Pollution Prevention Plan.
 - 3. Failure to maintain erosion and sediment control and storm water management devices, or failure to fully implement the plan, shall result in a reduction in the compensation for that period.
 - 4. Said price shall include daily dust control using a water truck and sweeping in accordance with Section 01562

ITEM NO. 6.9: REMOVE AND DISPOSE OF ASBESTOS CEMENT (AC) PIPE (ALL DIAMETERS) WHERE ENCOUNTERED

- A. Method of Measurement:
 - 1. AC pipe removed and disposed under this item will 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 will 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. 6.14.0224: FURNISH AND INSTALL 2” INCH THICK x 24” WIDE RIGID POLYSTYRENE INSULATION

- A. Method of Measurement:
 1. Rigid insulation installed as directed by the Engineer will be measured by the linear foot along the centerline of the pipe to the nearest foot.
 2. Rigid insulation installed in areas other than that shown on the drawings or not previously approved by the Engineer will not be measured for payment.
- B. Basis of Payment:
 1. Rigid polystyrene insulation will be paid at the contract price per linear foot.
 2. Said unit price shall constitute full compensation for furnishing and installing all materials, labor, equipment, and tools necessary for installation of insulation.

ITEM NO. 6.15A: 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 (not mechanically enclosed) 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. 6.15B: MECHANICALLY ENCLOSED STREET SWEEPING FOR DUST CONTROL

- A. Method of Measurement:
 1. Work authorized under this item will be measured in the same manner as extra work.
 2. An allowance has been included in the bid schedule.
- B. Basis of Payment:
 1. Payment for work authorized will be made on a dollar basis as invoiced according to section 17 of the Contract General Conditions. The dollar limit (allowance) prescribed in the bid schedule shall not limit the Engineer, or Owner, in determination of the value of the work.
 2. Payment of the allowance in the bid schedule will not be on lump sum basis, only the amount determined for the value of the work will be paid.
 3. Payment for mechanically enclosed street sweeping work shall be based on actual invoices for time spent on the job by the street sweeping subcontractor and submitted to the Engineer.
 4. Payment for this work is limited to street sweeping of paved surfaces (including disposal of collected material) as directed by the Engineer.
 5. Payment shall be considered full compensation for additional administrative, coordinating, and supervising costs incurred while directing the sub-contractor.

Refer to NHDOT Standard Specification for Road and Bridge Construction (Latest Edition) and necessary special provisions for the following unit items not described in this section:

ITEM NO. 632.0104: RETROREFLECTIVE PAINT PAVEMENT MARKING, 4" IN.

ITEM NO. 632.3112: RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKING, 12 IN.

ITEM NO. 632.32: RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKING, WORDS AND SYMBOLS

PART 2 – PRODUCTS (NOT PART OF THIS SECTION)

PART 3 – EXECUTION (NOT PART OF THIS SECTION)

END OF SECTION

Contractor's Application for Payment No. 10

Application Period: June 27, 2009 to August 1, 2009
 From Contractor: August 6, 2009
 Via Engineer: Underwood Engineers, Inc.

Owner's Project No. 01-08-08
 Funding Agency Project No.

Contract: Contractor's Project No.

Engineer's Project No.:

Application for Payment

Change Order Summary		Payment Summary
1. Original Contract Price		\$4,463,686.70
2. Net Change by Change Order		\$109,107.37
3. Current Contract Price (Line 1±2)		\$4,572,794.07
4a. Total Completed		\$3,668,435.80
4b. Total Stored		\$0.00
4. Total completed and Stored		\$3,668,435.80
5a. 5 % x Current Contract Price (Line 3)		\$228,639.70
5b. 10 % x Stored Materials		\$0.00
5. Total Retainage (Line 5a. + 5b.)		\$228,639.70
6. Amount Eligible for Payment (Line 4-5)		\$3,439,796.10
7. Less Previous Payments		\$3,000,135.87
8. Amount Due this Application (Line 6-7)		\$439,660.23
9. Balance to Finish plus Retainage (Line 3-6)		\$1,132,997.97
Totals:		
Net Change by Change Order	\$109,107.37	

Contractor's Certifications

The undersigned Contractor certifies that: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Payment of: \$439,660.23
 (Line 8 or other - attach explanation of other amount)

is recommended by: Underwood Engineers, Inc. (Date)

Payment of \$439,660.23

is approved by: _____ Owner (Date)

Approved by: N/A (Funding Agency) (Date)

By: _____ Contractor (Date)

Approved by: N/A (Funding Agency) (Date)

PAY APPLICATION

Prepared by: Underwood Engineers, Inc.
 Address:
 Alt#: Contractor:
 Address:
 Alt#:

Printed on: 3/4/2015 9:20

Item No.	Item Description	Estimated Quantity	Units	Unit Cost	Total Cost	Quantity Installed this Period	Value Earned this Period	Quantity Installed Previous	Value Earned Previous	Quantity Installed to Date	Value Earned to Date	Materials Stored	Percent Earned
PART 1 - SEWER													
202.41A	Removal of existing pipe:	2030	LF	\$10.00	\$20,300.00			980.0	\$9,800.00	980.0	\$9,800.00		48.28%
202.43	Removal of existing asbestos cement (AC) sewer pipe:	50	LF	\$50.00	\$2,500.00			9.0	\$3,150.00	9.0	\$3,150.00		180.00%
202.5A	Removal of existing sewer manholes:	5	EA	\$350.00	\$1,750.00			2155.5	\$60,354.00	2155.5	\$60,354.00		74.46%
1A	6" SDR 35 sewer pipe (services), 80% (TESTED):	2895	LF	\$28.00	\$81,060.00			1867.0	\$13,069.00	2046.0	\$14,322.00		70.67%
1A	20%	2895	LF	\$7.00	\$20,265.00	179.0	\$1,253.00	3849.0	\$197,068.80	3849.0	\$197,068.80		98.31%
1B	6" SDR 35 sewer pipe, 80%	3915	LF	\$51.20	\$200,448.00			3770.0	\$48,256.00	3770.0	\$48,256.00		96.30%
1B	20%	3915	LF	\$12.80	\$50,112.00			1227.0	\$63,804.00	1227.0	\$63,804.00		101.40%
1C	6" DR 25 sewer pipe, 80%	1210	LF	\$52.00	\$62,920.00			17.0	\$221.00	17.0	\$221.00		1.40%
1C	20%	1210	LF	\$13.00	\$15,730.00			667.0	\$2,668.00	667.0	\$2,668.00		16.78%
1D	6" DR 25 sewer pipe (TESTED): 20%	3975	LF	\$4.00	\$15,900.00			531.0	\$1,062.00	531.0	\$1,062.00		44.25%
1E	Geotextile wrap around sewer bedding materials:	1200	LF	\$2.00	\$2,400.00			29.0	\$44,660.00	29.0	\$44,660.00		100.00%
2	Sewer manhole, 4' dia (including frame and cover), 70%:	29	EA	\$1,540.00	\$44,660.00			30.0	\$6,600.00	30.0	\$6,600.00		103.45%
2	Sewer manhole, 4' dia (TESTED): 10%:	29	EA	\$220.00	\$6,380.00			12.0	\$2,640.00	12.0	\$2,640.00		41.38%
2	Sewer manhole, 4' dia (FRAME AT FINAL GRADE), 10%:	29	EA	\$220.00	\$6,380.00			4.0	\$4,000.00	4.0	\$4,000.00		400.00%
3	Field core existing structures:	1	U	\$1,000.00	\$1,000.00								
4	Adjust existing sewer manhole covers and frames:	5	U	\$300.00	\$1,250.00								
5	Sewer main Insulation:	500	SF*	\$3.00	\$1,500.00			167.0	\$501.00	167.0	\$501.00		33.40%
6	Predrained soil dewatering system:	2000	LF	\$0.01	\$20.00								
7	Trench Dam:	4	EA	\$250.00	\$1,000.00								
					\$541,955.00		\$1,253.00		\$457,853.80	84.71%	\$459,106.80		
PART 2 - WATER													
202.41B	Remove existing water main:	965	LF	\$10.00	\$9,650.00			587.0	\$5,870.00	587.0	\$5,870.00		60.83%
11	Additional cost for removal of existing water in proposed gas trench:	4050	LF	\$8.00	\$32,400.00	1338.0	\$10,704.00	3116.0	\$24,928.00	4454.0	\$35,632.00		109.98%
12	Temporary water system (including services): 75%:	400	LF	\$7.50	\$3,000.00			1230.0	\$9,225.00	1230.0	\$9,225.00		307.50%
12	Temporary water system (REMOVED): 25%:	400	LF	\$2.50	\$1,000.00			1230.0	\$3,075.00	1230.0	\$3,075.00		307.50%
13A	4" and 6" ductile iron water main, 80%:	430	LF	\$43.20	\$18,576.00			353.5	\$15,271.20	353.5	\$15,271.20		82.21%
13A	20%	430	LF	\$10.80	\$4,644.00	16.5	\$178.20	205.0	\$2,214.00	221.5	\$2,392.20		51.51%
13B	6" ductile iron water main, 80%:	965	LF	\$44.00	\$42,460.00			728.5	\$32,054.00	728.5	\$32,054.00		75.49%
13B	20%	965	LF	\$11.00	\$10,615.00			728.5	\$8,013.50	728.5	\$8,013.50		75.49%
13C	10" and 12" ductile iron water main, 80%:	5265	LF	\$52.80	\$277,992.00	50.0	\$2,640.00	5096.0	\$269,068.80	5146.0	\$271,708.80		97.74%
13C	20%	5265	LF	\$13.20	\$69,498.00			4080.0	\$53,856.00	4080.0	\$53,856.00		77.49%
14A	4" and 6" fillings:	14	EA	\$300.00	\$4,200.00	6.0	\$1,800.00	26.0	\$7,800.00	32.0	\$9,600.00		228.57%
14B	8" fillings:	28	EA	\$450.00	\$12,600.00			29.0	\$13,050.00	29.0	\$13,050.00		103.57%
14C	10" and 12" fillings:	44	EA	\$550.00	\$24,200.00	3.0	\$1,650.00	41.0	\$22,550.00	44.0	\$24,200.00		100.00%

Item No.	Item Description	Estimated Quantity	Units	Unit Cost	Total Cost	Quantity Installed this Period	Value Earned this Period	Quantity Installed Previous	Value Earned Previous	Quantity Installed to Date	Value Earned to Date	Materials Stored	Percent Earned
15A	4" and 6" valve and box:	18	EA	\$750.00	\$13,500.00			17.0	\$12,750.00	17.0	\$12,750.00		94.44%
15B	8" Valve and box:	15	EA	\$950.00	\$14,250.00			14.0	\$13,300.00	14.0	\$13,300.00		93.33%
15C	10" and 12" Valve and box:	10	EA	\$1,600.00	\$16,000.00			9.0	\$14,400.00	9.0	\$14,400.00		90.00%
16A	4" and 6" insert valve and box:	7	EA	\$4,400.00	\$30,800.00			6.0	\$39,600.00	6.0	\$39,600.00		128.57%
16B	8" insert valve and box:	6	EA	\$5,100.00	\$30,600.00			6.0	\$39,600.00	6.0	\$39,600.00		100.00%
16C	10" and 12" insert valve and box:	7	EA	\$11,500.00	\$80,500.00			6.0	\$69,000.00	6.0	\$69,000.00		85.71%
17A	1" corporation:	91	EA	\$250.00	\$22,750.00	26.0	\$6,500.00	64.0	\$16,000.00	90.0	\$22,500.00		98.90%
17B	2" corporation:	6	EA	\$350.00	\$2,100.00			7.0	\$2,450.00	7.0	\$2,450.00		116.67%
18A	1" Curb stop:	91	EA	\$250.00	\$22,750.00	26.0	\$6,500.00	64.0	\$16,000.00	90.0	\$22,500.00		98.90%
18B	2" Curb stop:	6	EA	\$400.00	\$2,400.00			7.0	\$2,800.00	7.0	\$2,800.00		116.67%
19A	1" plastic service water pipe:	2080	LF	\$20.00	\$41,600.00	640.0	\$12,800.00	1417.0	\$28,340.00	2057.0	\$41,140.00		98.89%
19B	2" plastic service water pipe:	145	LF	\$22.00	\$3,190.00	32.0	\$1,144.00	150.0	\$3,300.00	202.0	\$4,444.00		139.31%
20	Fire hydrants:	13	EA	\$1,900.00	\$24,700.00	3.0	\$5,700.00	11.0	\$20,900.00	14.0	\$26,600.00		107.69%
21	Removal of fire hydrants:	2	EA	\$350.00	\$700.00			2.0	\$700.00	2.0	\$700.00		100.00%
22	Water Main Insulation:	500	SF	\$3.00	\$1,500.00								
23	Adjust existing valve boxes:	4	EA	\$100.00	\$400.00								
24	Gate valve box riser section:	4	EA	\$100.00	\$400.00								
PART 3 - DRAINAGE							\$49,616.20	\$737,115.50	\$786,731.70	96.06%			
202.41C	Removal of existing drain pipes:	2000	LF	\$10.00	\$20,000.00	35.0	\$350.00	43.0	\$430.00	78.0	\$780.00		3.90%
202.5C	Removal of existing drain manholes and catch basins:	10	EA	\$350.00	\$3,500.00	3.0	\$1,050.00	3.0	\$1,050.00	6.0	\$2,100.00		60.00%
603.82204	4" & 6" plastic pipe (smooth interior):	800	LF	\$35.00	\$28,000.00	7.0	\$245.00	231.0	\$8,085.00	238.0	\$8,330.00		29.75%
603.82212	12" plastic pipe (smooth interior):	2875	LF	\$50.00	\$133,750.00	701.0	\$35,050.00	2022.0	\$101,100.00	2723.0	\$136,150.00		101.79%
603.82215	15" plastic pipe (smooth interior):	2450	LF	\$52.00	\$127,400.00	144.0	\$7,488.00	2215.0	\$115,180.00	2359.0	\$122,668.00		96.29%
603.82216	18" plastic pipe (smooth interior):	425	LF	\$56.00	\$23,800.00	3.0	\$168.00	388.5	\$21,756.00	391.5	\$21,924.00		92.12%
603.82221	21" plastic pipe (smooth interior):	980	LF	\$73.00	\$71,540.00								
603.82224	24" plastic pipe (smooth interior):	100	LF	\$73.00	\$7,300.00	1037.0	\$75,701.00			1037.0	\$75,701.00		1037.00%
603.82224	6" underdrain with fabric around stone:	620	LF	\$18.00	\$11,160.00	679.0	\$12,222.00	50.0	\$80,000.00	679.0	\$12,222.00		109.52%
604.124	Catch basin type B - 4' Dia:	66	U	\$1,600.00	\$105,600.00	22.0	\$35,200.00	50.0	\$80,000.00	72.0	\$115,200.00		109.09%
604.125	Catch basin type B - 6' Dia:	1	U	\$2,000.00	\$2,000.00	1.0	\$2,000.00	1.0	\$2,000.00	2.0	\$4,000.00		200.00%
604.222	Drop inlet type B - 2' Dia:	1	U	\$1,200.00	\$1,200.00								
31	Catch basin protection:	155	EA	\$150.00	\$23,250.00	17.0	\$2,550.00	26.0	\$3,900.00	43.0	\$6,450.00		27.74%
604.324	4' Dia drain manhole:	14	EA	\$2,000.00	\$28,000.00	2.0	\$4,400.00	9.0	\$19,800.00	11.0	\$24,200.00		78.57%
604.4A	Adjust existing catch basin frame and grates:	20	EA	\$250.00	\$5,000.00			1.0	\$250.00	1.0	\$250.00		5.00%
604.4B	Modifying existing DNR's and CB's structures:	1	EA	\$1,500.00	\$1,500.00								
PART 4 - ROADWAY							\$176,424.00	\$343,551.00	\$529,975.00	88.95%			
203.31	Unclassified excavation - asphalt road, drives, and sidewalks:	15560	SY	\$3.00	\$46,680.00	1120.0	\$3,360.00	14815.0	\$44,445.00	15935.0	\$47,805.00		102.41%
203.32	Unclassified excavation - concrete walks and driveway aprons:	13500	SY	\$5.00	\$66,500.00			11386.0	\$56,930.00	11386.0	\$56,930.00		85.61%
203.33	Unclassified excavation - concrete walks and driveway aprons:	7530	SY	\$5.00	\$37,650.00			4640.0	\$23,200.00	4640.0	\$23,200.00		61.62%
41	Temporary roadway gravels for construction phasing:	1	LS	\$10,000.00	\$10,000.00			75%	\$7,500.00	75%	\$7,500.00		75.00%
304.2	Bankrun gravel:	11100	CY	\$12.00	\$133,200.00			8828.0	\$105,936.00	8828.0	\$105,936.00		79.53%
304.3	Crushed gravel - roads:	5550	CY	\$16.00	\$88,800.00			4652.0	\$74,432.00	4652.0	\$74,432.00		83.82%
304.35	Crushed gravel - driveways:	380	CY	\$20.00	\$7,600.00	32.0	\$640.00	128.5	\$2,570.00	160.5	\$3,210.00		44.58%
403.11	Bituminous pavement (wearing course) machine method:	2445	TON	\$81.00	\$197,235.00								
403.11A**	Bituminous pavement (binder course) machine method:	5175	TON	\$71.00	\$367,425.00	118.0	\$8,378.00	1222.0	\$86,762.00	1340.0	\$95,140.00		61.77%
403.11A (escalation)*	Hand Method Pavement adjusted for November placement (November 17, 2008 Liquid asphalt index)	-	TON	\$85.75	-			1856.4	\$159,186.30	1856.4	\$159,186.30		-

Item No.	Item Description	Estimated Quantity	Units	Unit Cost	Total Cost	Quantity Installed this Period	Value Earned this Period	Quantity Installed Previous	Value Earned Previous	Quantity Installed to Date	Value Earned to Date	Materials Stored	Percent Earned
403.12**	Bituminous pavement - drives, sidewalks, and hand method (including compensation for sidewalk concrete).	290	TON	\$145.00	\$42,050.00	180.0	\$26,100.00	451.0	\$65,395.00	631.0	\$91,495.00		297.41%
403.12 (escalation)*	Hand Method Pavement adjusted for November placement (November 17, 2008 Liquid asphalt index)	-	TON	\$159.75	-			149.5	\$23,882.63	149.5	\$23,882.63		-
403.12 (escalation)*	Hand Method Pavement adjusted for April placement (April 15, 2009 Liquid asphalt adjustment index)	-	TON	\$149.77	-			60.0	\$8,986.20	60.0	\$8,986.20		-
403.12 (escalation)*	Hand Method Pavement adjusted for May placement (May 19, 2009 Liquid asphalt adjustment index)	-	TON	\$145.27	-			22.0	\$3,195.94	22.0	\$3,195.94		-
608.28A	Concrete drives 8" thick:	80	SY	\$55.00	\$4,400.00								
632.0104	RPPM - 4" line:	50000	LF	\$0.15	\$7,500.00			8021.0	\$1,203.15	8021.0	\$1,203.15		16.04%
632.0108	RPPM - 6" line:	3300	LF	\$1.00	\$3,300.00			556.0	\$556.00	556.0	\$556.00		16.85%
632.0116	RPPM - 16" line:	525	LF	\$3.00	\$1,575.00								
632.02	RPPM - crosswalk symbols:	16	EA	\$250.00	\$4,000.00								
42	Impainted crosswalks:	860	SY	\$63.00	\$54,180.00								
43	Brick crosswalks:	55	SY	\$125.00	\$6,875.00								
44	Parking meter posts:	30	LS	\$150.00	\$4,500.00			15.0	\$2,250.00	15.0	\$2,250.00		50.00%
					\$1,083,070.00		\$38,478.00		\$666,430.22		\$704,908.22		
PART 5 - CURB AND SIDEWALK													
202.6	Granite curb removal for storage:	975	LF	\$8.00	\$7,800.00								
202.61	Removal of concrete and bituminous curb:	2260	LF	\$4.00	\$9,000.00			224.0	\$1,792.00	224.0	\$1,792.00		22.97%
304.35A	Crushed gravel - sidewalks:	1235	CY	\$20.00	\$24,700.00	430.6	\$8,612.00	1882.0	\$5,528.00	1382.0	\$5,528.00		61.42%
608.24	Concrete sidewalk 4" thick:	6640	SY	\$252.3200	\$1,675,200.00	1822.0	\$69,236.00	11117.0	\$22,340.00	1547.6	\$30,952.00		125.31%
608.26	Concrete sidewalk 6" thick:	230	SY	\$42.00	\$9,660.00	23.8	\$999.60	94.0	\$3,948.00	117.8	\$4,947.60		73.91%
608.28	Concrete sidewalk 8" thick:	700	SY	\$48.00	\$33,600.00	730.9	\$35,371.20	208.6	\$10,012.80	945.5	\$45,384.00		135.07%
608.4	Brick sidewalks:	25	SY	\$125.00	\$3,125.00	13.0	\$1,625.00	6.5	\$812.50	19.5	\$2,437.50		78.00%
608.52	ADA compliant ramp panels (cast iron treated domes):	52	EA	\$350.00	\$18,200.00	14.0	\$4,900.00	25.0	\$8,750.00	39.0	\$13,650.00		75.00%
609.01	Straight granite curb (5"x18"):	9400	LF	\$19.00	\$178,600.00			6789.0	\$128,991.00	6789.0	\$128,991.00		72.22%
609.01A	Straight granite curb (6"x24"):	100	LF	\$55.00	\$5,500.00	112.0	\$6,160.00	692.5	\$38,087.50	804.5	\$44,247.50		804.50%
609.02	Curved granite curb (5"x18"):	740	LF	\$30.00	\$22,200.00	31.0	\$930.00	651.5	\$19,545.00	682.5	\$20,475.00		92.23%
609.812	Bluminous curb (Type A):	85	LF	\$20.00	\$1,700.00								
					\$566,405.00		\$127,833.80		\$357,052.00		\$484,885.80		
PART 6 - COMMON IMPROVEMENTS													
50	Allowance for hiring an Arborist:	1	ALL	\$5,000.00	\$5,000.00								
201.22	Removal of large trees:	6	EA	\$550.00	\$3,300.00	240.00	\$240.00	\$2,430.00	\$2,430.00	\$2,670.00	\$2,670.00		53.40%
201.32	Tree firming:	40	HR	\$125.00	\$5,000.00	4.0	\$2,200.00	7.0	\$3,850.00	11.0	\$6,050.00		183.33%
202.31	Fill abandoned pipe:	20	CY	\$150.00	\$3,000.00			52.5	\$6,562.50	52.5	\$6,562.50		131.25%
203.1	Common excavation:	19850	CY	\$8.00	\$157,200.00	384.0	\$3,072.00	15928.5	\$126,628.00	16212.5	\$129,700.00		15.00%
203.2	Rock excavation:	40	CY	\$25.00	\$1,000.00			45.9	\$1,147.50	45.9	\$1,147.50		114.75%
206.19	Common structure excavation - exploratory (least job):	12	EA	\$350.00	\$4,200.00	3.0	\$1,050.00	25.0	\$8,750.00	28.0	\$9,800.00		233.33%
304.1	3/4" crushed stone:	435	CY	\$12.00	\$5,220.00	484.6	\$5,815.20	787.0	\$9,444.00	1271.6	\$15,259.20		292.30%
304.4A	Uniformed officer with vehicle:	375	CY	\$25.00	\$9,375.00			183.6	\$4,590.00	183.6	\$4,590.00		48.96%
616.61	Establish and maintain traffic control plan:	1	ALL	\$230,000.00	\$230,000.00	\$192.50	\$192.50	\$72,670.00	\$72,670.00	\$72,862.50	\$72,862.50		31.68%
616.7	Flagger:	6300	HR	\$25.00	\$157,500.00	394.0	\$9,850.00	3775.5	\$94,337.50	4167.5	\$104,187.50		66.15%
619.1	Establish and maintain traffic control plan:	1	U	\$50,000.00	\$50,000.00			75.0%	\$37,500.00	75.0%	\$37,500.00		75.00%
619.255	Purchase PCM board (DELIVERED ON SITE):	2	U	\$10,000.00	\$20,000.00			2.0	\$20,000.00	2.0	\$20,000.00		100.00%
619.255	Purchase PCM board (DELIVERED TO CITY):	2	U	\$10,000.00	\$20,000.00								
51A	Dust control - calcium chloride:	31030	LB	\$0.50	\$15,515.00	7050.0	\$3,525.00	49695.0	\$24,849.50	56749.0	\$28,374.50		182.88%
51B	Dust control - water:	515	HR	\$0.01	\$5.15	3.0	\$0.03	33.0	\$0.33	36.0	\$0.36		6.99%
51C	Dust control - street sweeper:	155	HR	\$0.01	\$1.55			16.0	\$0.16	16.0	\$0.16		10.32%
52	Allowance for geotechnical testing:	1	ALL	\$5,000.00	\$5,000.00	\$2,023.50	\$2,023.50	\$10,160.20	\$10,160.20	\$12,183.70	\$12,183.70		243.67%

Item No.	Item Description	Estimated Quantity	Units	Unit Cost	Total Cost	Quantity Installed this Period	Value Earned this Period	Quantity Installed Previous	Value Earned Previous	Quantity Installed to Date	Value Earned to Date	Materials Stored	Percent Earned
53	Adjust existing telephone and/or electric manhole covers and frames:	12	EA	\$350.00	\$4,200.00								
641	Loam & seed:	11575	SY	\$3.00	\$34,725.00	4074.0	\$12,222.00	3007.0	\$9,021.00	7081.0	\$21,243.00		61.17%
652.10	Deciduous tree (non-invasive):	5	EA	\$550.00	\$2,750.00								
652	Misc. work & cleanup:	1	LS	\$110,000.00	\$110,000.00								
					\$842,991.70		\$40,190.23		\$514,890.69		\$555,080.92		75.00%
PART 7 - GAS INSTALLATION													
54	Excavation and backfill - gas main:	126	HR	\$115.00	\$14,490.00	51.0	\$5,865.00	285.0	\$32,775.00	336.0	\$38,640.00		266.67%
					\$14,490.00		\$5,865.00		\$32,775.00		\$38,640.00		
							\$439,660.23		\$3,119,668.21		\$3,559,328.44		79.74%

CHANGE ORDERS

Change Order #1	Change Order #2	Original Contract Total:	Current Contract Value:	Change Orders Total:	Retainage (5% of Current Contract Value):	Previous Disbursements:	Amount Due:
23	Adjusting valve boxes	\$400.00	\$400.00	\$400.00	\$20.00	\$0.00	\$380.00
201/22	Removal of large trees	\$1,100.00	\$1,100.00	\$1,100.00	\$55.00	\$0.00	\$1,045.00
403/11	Bituminous wearing course	\$34,911.00	\$34,911.00	\$34,911.00	\$1,745.55	\$0.00	\$33,165.45
403.11 (Oct 08)	Bituminous wearing course (escalation)	\$8,068.32	\$8,068.32	\$8,068.32	\$403.42	\$0.00	\$7,664.90
403.12	Bituminous drives (hand method)	\$145,000.00	\$145,000.00	\$145,000.00	\$7,250.00	\$0.00	\$137,750.00
403.12 (Aug 08)	Bituminous drives (hand method) (escalation)	\$1,855.05	\$1,855.05	\$1,855.05	\$92.75	\$0.00	\$1,762.30
603.82/12	12" plastic pipe (smooth interior)	\$1,700.00	\$1,700.00	\$1,700.00	\$85.00	\$0.00	\$1,615.00
604/4A	Adjust existing CB grate and frame	\$2,000.00	\$2,000.00	\$2,000.00	\$100.00	\$0.00	\$1,900.00
608.2	Sawed bituminous pavement	\$2.00	\$744.00	\$744.00	\$37.20	\$0.00	\$706.80
608.24	Concrete sidewalk (4')	\$9,006.00	\$9,006.00	\$9,006.00	\$450.30	\$0.00	\$8,555.70
608.28	Concrete sidewalk (8')	\$48.00	\$2,400.00	\$2,400.00	\$120.00	\$0.00	\$2,280.00
611.A	Intersection connections	\$1,500.00	\$1,500.00	\$1,500.00	\$75.00	\$0.00	\$1,425.00
641	Loam and seed	\$3.00	\$4,023.00	\$4,023.00	\$201.15	\$0.00	\$3,821.85
			\$82,207.37	\$82,207.37	\$4,110.37	\$0.00	\$78,096.99
203.32A	Crushing Concrete	\$26,900.00	\$26,900.00	\$26,900.00	\$1,345.00	\$0.00	\$25,555.00
			\$26,900.00	\$26,900.00	\$1,345.00	\$0.00	\$25,555.00
			\$109,107.37	\$109,107.37	\$5,455.37	\$0.00	\$103,651.99
					\$109,107.37		\$3,228,775.57
					\$439,660.23		\$3,668,435.80
							\$228,639.70
							\$3,000,135.87
							\$439,660.23

Notes:

- * Escalation based on NHDOT monthly asphalt index (see attached calculations)
- **No escalation required for the following pay applications:
 #9 - Liquid Asphalt Index is \$481.25 per TON (6/16/09), Index was \$455.00 per Ton at bid, 5.8% difference
 #10 - Liquid Asphalt Index is \$480.00 per TON (7/16/09), Index was \$455.00 per Ton at bid, 5.5% difference

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 observation of ill timed work.
 - 3. Remove and replace defective work not conforming to requirements of the Contract Documents.
 - 4. Upon the Engineer's request, uncover the Work to provide for observation by the Engineer and remove samples of installed materials for testing.
- B. Quality Assurance:
 - 1. Perform all cutting and patching in strict accordance with pertinent requirements of these Specifications, and in the event no such requirements are determined, in conformance with the Engineer's written direction.
 - 2. Do not cut or alter the Work performed under a separate Contract without the Engineer's written permission.
- C. Submittals:
 - 1. Request for the Engineer's written consent:
 - a. Prior to cutting which affects structural safety. Submit written request to the Engineer for permission to proceed with cutting.
 - b. Prior to proceeding with Work requiring a change of materials or methods for cutting and patching due to conditions or scheduling.
 - 2. Notices to the Engineer
 - a. Prior to cutting and patching performed pursuant to the Engineer's instructions, submit a cost estimate to the Engineer. Secure the Engineer's approval of cost estimates and type of cost reimbursement before proceeding with cutting and patching.
 - b. Submit written notice to the Engineer designating the time and date the Work will be uncovered, to provide for the Engineer's observation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. For replacement of Work removed, use materials which comply with the pertinent sections of these Specifications and/or Drawings.

2.2 PAYMENT FOR COSTS

- A. The Owner will reimburse the Contractor for cutting and patching performed pursuant to the Engineer's written request after a claim for such reimbursement is submitted by the Contractor. Perform all other cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.

PART 3 - EXECUTION

3.1 CONDITIONS

- A. Inspection:
 - 1. Inspect and document the existing conditions, including elements subject to movement or damage prior to cutting and patching Work.
 - 2. After uncovering the work, inspect conditions affecting installation of new Work.
- B. Discrepancies:
 - 1. If uncovered conditions are not as anticipated, immediately notify the Engineer and obtain the needed directions.
 - 2. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION PRIOR TO CUTTING

- A. Provide all required protection including but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.

3.3 PERFORMANCE

- A. Prior to cutting which may affect structural safety of the Work, submit written request to the Engineer for permission to proceed with cutting.
- B. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, notify the Engineer and obtain written permission prior to proceeding.

END OF SECTION

SECTION 01070

ABBREVIATIONS & SYMBOLS

PART 1 - GENERAL

1.1 DESCRIPTION

- a. Where any of the following abbreviations are used in these Specifications, they shall have the meaning set forth opposite each.

AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating Current
ACI	American Concrete Institute
ACP	Asbestos Cement Pipe
AGA	American Gas Association
AIC	Ampere Interrupting Capacity
AGMA	American Gear Manufacturers Association
AIEE (IEEE)	American Institute of Electrical Engineers (Institute of Electrical and Electronics Engineers, Inc.)
AISC	American Institute of Steel Construction
amp	Ampere
125-16	
Amer. Std.	American Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class 125 (ASA B16 11960)
ANSI	American National Standards Institute
API	American Petroleum Institute
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASH & AE	American Society of Heating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWG	American or Brown and Sharpe Wire Gage
AWWA	American Water Works Association
BOD	Biochemical Oxygen Demand
c.f.	Cubic Foot
c.f.m	Cubic Foot Per Minute
c.f.s	Cubic Foot Per Second
CI	Cast Iron
CIPRA	Cast Iron Pipe Research Association
CSI	Construction Specifications Institute
c.y.	Cubic Yards
DC	Direct Current

DEP	Department of Environmental Protection
DES	Department of Environmental Services
DI	Ductile Iron
DOT	Department of Transportation
EDR	Equivalent Directional Radiation
EPA	U.S. Environmental Protection Agency
FmHA	Farmers Home Administration (RD)
fps	Feet Per Second
ft.	Feet
gal.	Gallons
gpd	Gallons Per Day
gpm	Gallons Per Minute
HDPE	High Density Polyethylene
HP	Horsepower
IBR	Institute of Boiler and Radiator Manufacturers
in.	Inches
inter.	Interlock
ISA	Instrument Society of America
kva	Kilovolt-ampere
kw	Kilowatt
lb.	Pound
max.	Maximum
MCB	Master Circuit Board
MGD	Million Gallons Per Day
Min.	Minimum
NBS	National Bureau of Standards
NEC	National Electrical Code, Latest Edition
NEMA	National Electrical Manufacturers Association
NEWWA	New England Water Works Association
NPT	National Pipe Thread
OS&Y	Outside Screw and Yoke
PCA	Portland Cement Association
PE	Polyethylene
ppm	Parts Per Million
%	Percent
psi	Pounds Per Square Inch
psig	Pounds Per Square Inch Gage
PVC	Polyvinyl Chloride
R.D.	Rural Development (Formerly FmHA)
rpm	Revolutions Per Minute
s.f.	Square Foot
STL.W.G.	U.S. Steel Wire, Washburn and Moen, American Steel and Wire Cos., or Roebling Gage
s.y.	Square Yard

TDH	Total Dynamic Head
USAS	Standards of the United States of America Standards Institute (formerly American Standards Association)
USS GAGE	United States Standard Gage
VC	Vitrified Clay
WSP	Working Steam Pressure
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Service Administration, Washington, D.C.

PART 2 - PRODUCTS

(Not part of this Section)

PART 3 - EXECUTION

(Not part of this Section)

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on the date of Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.2 SCHEDULE OF REFERENCES

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
NEMANational	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NSWMA	National Solid Wastes Management Association
NTMANational	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. Project meetings shall be held once every two weeks.
- 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. Record Drawings
 - 8. Other Items

1.3 WEEKLY COORDINATION MEETINGS (INFORMAL)

- A. The contractor's superintendent, the owner, and the resident engineer shall meet weekly to informally discuss the project 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 on a weekly basis. On Thursday of each week, the Contractor will provide a summary update on the work planned for the following week including:
 - 1. Work zones
 - 2. Work tasks and disciplines
 - 3. Traffic conditions, planned interruptions to water service or any other impacts to the public.
- B. On the date of each scheduled formal project meeting, the Contractor shall complete the following (minimum) requirements:
 - 1. Prepare and post a map representing the work locations for the next two week period of each work crew.
 - 2. Prepare a brief written narrative of upcoming work and deliver to the Owner for public information and for posting on the local Website.
 - 3. Provide a system for tracking complaints (sample form attached).
- C. The Contractor shall provide a twenty-four (24) hour contact person for emergencies.

1.3 PUBLIC INFORMATION MEETINGS

- A. The Contractor shall schedule and conduct public information meetings to relay project schedules and other pertinent information to the Community.
 - 1. The meeting shall be held each construction season prior to beginning construction.
- B. The meetings shall be scheduled during the evening hours.
- C. There shall be at least a two week advance notice regarding the meetings.
- D. The Owner shall post and advertise for the meetings.
- E. The Owner will provide the site for the meeting.

1.4 RESIDENT COMPLAINTS

- A. The Contractor is responsible for resolution of resident complains that may arise as a result of his work operations.
- B. Verbal complaints should be addressed promptly as they occur. If immediate resolution is not possible, the complaint should be recorded in writing for further follow up and action by the Contractor (sample form attached)

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

Underwood Engineers , Inc.
25 Vaughan Mall, Unit 1
Portsmouth, New Hampshire 03801

Complaint No. _____
(Assigned by Engineer)

COMPLAINT FORM

Name _____ Date: _____

Address: _____

Tel: _____

Location of Problem: _____

Nature of Complaint: _____

(Signature)

*Attach additional pages if required. Attach copies of receipts or estimates if applicable.
Retain copies of all correspondence.*

Remit form to Contractor:
*(Insert Contractor's Name
Address, Telephone & Fax Number)*

Carbon Copy Engineer:
Underwood Engineers, Inc.
25 Vaughan Mall
Portsmouth, New Hampshire 03801

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Within ten days after the effective date of the Agreement between Owner and Contractor, submit to the Engineer an estimated progress schedule.
- B. Form of Schedules:
 - 1. Narrative: Completely describe the construction methods to be employed.
 - 2. Horizontal Bar Chart (i.e., Gantt chart):
 - a. Provide a separate horizontal bar column for each trade or operation.
 - b. Order: Chronological, for each trade and/or operation.
 - c. Horizontal scale: Identify first work day of each week, allow space for updating and revision.
- C. Content of Schedules:
 - 1. Provide complete sequence of construction by activity:
 - a. Shop Drawings, Project Data and Samples:
 - (1) Submittal Dates
 - (2) Dates reviewed copies will be required.
 - b. Decision dates for:
 - (1) Products specified by allowances.
 - (2) Selection of finishes (when applicable).
 - c. Product procurement and delivery dates.
 - d. Dates for beginning and completion of each element of construction.
 - 2. Identify work of separate phases and logically grouped activities.
 - 3. Show the projected percentage of completion for each item of work as of the first day of each month.
 - 4. Provide separate sub-schedules, if requested by the Engineer, showing submittals, review times, procurement schedules, and delivery dates.
- D. Updating:
 - 1. The schedules shall be updated at least every month and for each project meeting.
 - 2. Show all changes occurring since previous submission.
 - 3. Indicate progress of each activity, show completion dates.
 - 3. Include:
 - a. Major changes in scope.
 - b. Activities modified since previous updating.
 - c. Revised projections due to changes.
 - d. Other identifiable changes.
 - 4. Provide narrative report, including:
 - a. Discussion of problem areas, including current and anticipated delay factors.

- b. Corrective action taken, or proposed.
 - c. Description of revisions that may affect schedules.
- E. Standard Holidays – Holidays observed by the City include:
- New Year's Day
 - Memorial Day
 - Fourth of July
 - Labor Day
 - Thanksgiving
 - Day after Thanksgiving
 - Christmas

Project work will not be permitted on these dates unless approved by advance (72 hours) written request to the Owner.

1.2 SUBMITTALS

- A. Submit periodically updated schedules when requested by the Engineer.
- B. Submit 4 copies of initial and updated schedules to the Engineer.

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01340

SUBMITTALS

PART 1 -- GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Submit to the Engineer, Shop Drawings, Operation and Maintenance Manuals, Manufacturers' Certificates, Project Data, and Samples required by the Specification Sections.

B. Alternates

1. If the Contractor elects to submit an Alternate that is considered an alternate, the Contractor will be responsible to make all modifications to the Work resulting from the use of the Alternate at no additional cost to the Owner.
2. If the Contractor elects to submit an Alternate, the Contractor must follow the procedures listed in Section 01630 - Substitutions & Product Options.

1.2 SHOP DRAWINGS

- A. Shop Drawings are required for each and every element of the work. Each shop drawing shall be assigned a sequential number for purposes of easy identification, and shall retain its assigned number, with appropriate subscript, on required resubmission.
- B. Shop Drawings are generally defined as all fabrication and erection drawings, diagrams, brochures, schedules, bills of material, manufacturers data, spare parts lists, and other data prepared by the Contractor, his subcontractors, suppliers, or manufacturers which illustrate the manufacturer, fabrication, construction, and installation of the work, or a portion thereof.
- C. The Contractor shall submit to the Engineer a minimum of six (6) copies of Shop Drawings and approved data. The Engineer will retain three (3) copies (for Owner's, Engineer's and Field Representative's files) and return three (3) copies to the Contractor for distribution to subcontractors, suppliers and manufacturers. If the Contractor requires more than three (3), then the number of copies submitted shall be adjusted accordingly
- D. The Contractor shall provide a copy of a completed submittal certification form which shall be attached to every copy of each shop drawing. Shop Drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for the work.
- E. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings so that there shall be no delay to the work due to the absence of such drawings.

- F. No material or equipment shall be purchased or fabricated especially for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.
- G. Until the necessary review has been made, the Contractor shall not proceed with any portion of the work (such as the construction of foundations), the design or details of which are dependent upon the design or details of work, materials, equipment or other features for which review is required.
- H. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. Shop drawings shall be of standardized sizes to enable the Owner to maintain a permanent record of the submissions. Approved standard sizes shall be: (a) 24 inches by 36 inches; (b) 11 inches by 17 inches, and (c) 8-1/2 inches by 11 inches. Provision shall be made in preparing the shop drawings to provide a binding margin on the left hand side of the sheet. Shop drawings submitted other than as specified herein may be returned for re-submittal without being reviewed.
- I. Only drawings, which have been checked and corrected by the fabricator, should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer.
- J. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.
- K. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires and appurtenances, layout, etc., detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do all work necessary to make such modifications.
- L. A maximum of two submissions of each Shop Drawing will be reviewed, checked, and commented upon without charge to the Contractor. Any additional submissions which are ordered by the Engineer to fulfill the stipulations of the Drawings and Specifications, and which are required by virtue of the Contractor's neglect or failure to comply with the requirements of the Drawings and Specifications, or to make those modifications and/or corrections ordered by the Engineer in the review of the first two submissions of each Shop Drawing, will be reviewed and checked as deemed necessary by the Engineer, and the cost of such review and checking, as determined by the Owner, and based upon Engineer's documentation of time and rates established for additional services in the Owner-Engineer Agreement for this Project, may be deducted from the Contractor to make all modifications and/or corrections as may be required by the Engineer in an accurate, complete, and timely fashion.

1.3 SAMPLES

- A. The Contractor shall submit samples when requested by the Engineer to establish conformance with the specifications, and as necessary to define color selections available.

1.4 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall furnish the Engineer six (6) copies of a complete instruction manual for installation, operation, maintenance, and lubrication of each item specified. At least 3 months prior to the expected substantial completion date, the Contractor shall submit to the Engineer all manuals in accordance with the requirements specified herein.
- B. Manuals shall include operating and maintenance information on all systems and items of equipment. The data shall consist of catalogs, brochures, bulletins, charts, schedules, equipment numbers, shop drawings corrected to as-built conditions, wiring diagrams, and assembly drawings which shall describe location, operation, maintenance, lubrication, operating weight, lubrication charts showing manufacturer recommended lubricants for each rotating or reciprocating unit, and other necessary information for the Engineer to establish a complete maintenance program.
- C. The submittal shall also include details of all replacement parts; "Nameplate" data for all equipment; detailed instructions for start-up, normal operation, shutdown procedures, and control techniques; and a guide to troubleshooting the system.

1.5 MANUFACTURER'S CERTIFICATES

- A. Prior to accepting the installation, the Contractor shall submit manufacturer's certificates for each item specified.
- B. Such manufacturer's certificates shall state that the equipment has been installed under either the continuous or periodic supervision of the manufacturer's authorized representative, that it has been adjusted and initially operated in the presence of the manufacturer's authorized representative, and that it is operating in accordance with the specified requirements, to the manufacturer's satisfaction. All costs for meeting this requirement shall be included in the Contractor's bid price.
- C. Certified performance test data will also be submitted to the Engineer as required by the specifications.

1.6 SUBMISSION REQUIREMENTS

- A. Accompany submittals with transmittal letter, containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Contractor's name and address.
 - 4. The number of each Shop Drawing, Project Data and Sample submitted.
 - 5. Notification of deviations from Contract Documents.
 - 6. Other pertinent data.
- B. Submittals shall include:
 - 1. Date and revision dates.
 - 2. Project title and number.
 - 3. The names of:

- a. Engineer.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.
 - e. Manufacturer.
 - f. Separate detailer when pertinent.
4. Identification of product or material.
 5. Relation to adjacent structure or materials.
 6. Field dimensions, clearly identified as such.
 7. Specification section number.
 8. Applicable standards, such as ASTM number or Federal Specification.
 9. A blank space, 4" x 4", for the Engineer's stamp.
 10. Identification of deviations from Contract Documents.
 11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.
 12. Where specified or when requested by the Engineer, manufacturer's certification that equipment, accessories and shop painting meet or exceed the Specification requirements.
 13. Where specified, manufacturer's guarantee.

1.7 RESUBMISSION REQUIREMENTS

- A. Revise initial drawings as required and resubmit as specified for initial submittal.
- B. Indicate on drawings any changes which have been made other than those required by Engineer.

1.8 ENGINEER'S REVIEW

- A. The review of shop and working drawings hereunder will be general only, and nothing contained in this specification shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance specified thereunder.

PART 2 -- PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 -- EXECUTION

(NOT PART OF THIS SECTION)

SUBMITTAL CERTIFICATION FORM

PROJECT: _____ CONTRACTOR'S PROJ. NO: _____

CONTRACTOR: _____ ENGINEER'S PROJ. NO: _____

ENGINEER: _____

TRANSMITTAL NUMBER: _____ SHOPDRAWING NUMBER: _____

SPECIFICATION SECTION OR DRAWING NO: _____

DESCRIPTION: _____

MANUFACTURER: _____

The above referenced submittal has been reviewed by the undersigned and I/we certify that the material and/or equipment meets or exceeds the project specification requirements with

NO DEVIATIONS

or

A COMPLETE LIST OF DEVIATIONS AS FOLLOWS^a:

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

Date: _____ Date: _____

^a Any deviations not brought to the attention of the Engineer for review and concurrence shall be the responsibility of the Contractor to correct, if so directed.

^b Required on all submittals

^c When required by specifications

END OF SECTION

SECTION 01381

PRE-CONSTRUCTION VIDEO RECORDS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
1. Supply a set of video records to the Engineer clearly indicating pre-construction status of roadway pavement condition, curbing, driveway entrances, lawns, sidewalks, and other pertinent features throughout the project area.
 2. Video may be provided in either DVD or other digital formats.
 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.
 5. See Vibration Monitoring (Section 01548) and Use of Explosives (Section 01546) for other preconstruction documentation requirements.

PART 2 - PRODUCTS

2.1 QUALITY

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

PART 3 - EXECUTION

3.1 SUBMITTAL OF VIDEO RECORDS

- A. Submit all video to the Engineer no later than two weeks prior to construction work.
- B. The quality of the video is subject to approval by the Engineer prior to the start of construction work in the areas shown by the video records.

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 it 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 01515

TEMPORARY WATER (POTABLE)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Summary

1. Water service must be maintained to the customers. Temporary service connections shall be made at the curb stops. Bypass of water meters or backflow preventers shall not occur. 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. Submit a detailed plan of the temporary water system for approval prior to the work.
2. 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.
3. Provide temporary service connections at curb stops (see A.1 above).
4. Make all necessary arrangements for power.
5. Furnish, install, maintain and remove bypass piping, appurtenances and temporary connections to water users, where necessary.
6. Excavate and backfill for connection to service pipes or branches at streets which are not otherwise served.
7. Provide advance notice one week (5 business days) prior to the work and forty-eight (48) hour follow up notices to all users regarding any disruption of service. Notices will be verbal and written.
8. Disinfect the temporary piping in accordance with Section 02610, Part 3.3.
9. 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.
10. 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.
 - 3. Temporary mains shall be 6" diameter unless existing hydrants are maintained or the fire department approves taking a particular hydrant offline.
- B. The temporary service tubing shall be:
 - 1. NSF-51/NSF-61 certified
 - 2. Kuri Tec Series K6155/K6158 tubing or approved equivalent
 - 3. Service sizes shall be ¾" (min) or as required to match existing service size.
- C. Coupling between pipes shall be solid PVC with rubber splines to restrain the pipe.
- D. Adequate piping, free of leaks, to bypass water around the work area.
- E. The Contractor shall take necessary steps to protect the temporary water main and services from freezing.
- F. Contractor shall submit certification that the pipe is either new or has been used exclusively for potable water only.
 - 1. New pipe shall be thoroughly flushed out prior to use
- G. Services shall consist of the following:
 - 1. Service saddle
 - 2. A shutoff at the main
 - 3. NSF approved service tubing
 - 4. Connection to the existing service below grade
 - 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 (work plan attached).
- B. The submission shall include the following:
 - 1. Identify the sections to be bypassed.
 - 2. Type of materials including manufacturer cut sheets.
 - 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 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 bypass mains are less than 6-inch diameter.

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. All new service tubing shall be thoroughly flushed prior to completion to connection.
- L. Service connections shall be made below grade at the existing curb stop. Exterior connections made at the sill cock or connections made internally will not be permitted. Modifications to existing water meters, backflow preventers, etc. in order to make a temporary connection will not be permitted.
- 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.




3.3 LAYOUT REQUIREMENTS

General Requirements:

1. A valve shall be installed at all source locations (i.e. hydrants).
2. In-line valves shall be installed at 500 foot intervals.
3. Manual air releases shall be installed at the end of all dead-end branches and at high points.
4. Temporary water mains shall be installed along the road edge or curb line and buried at driveways and street crossings.
5. The main shall be secured from movement with sand bags or other approved devices.

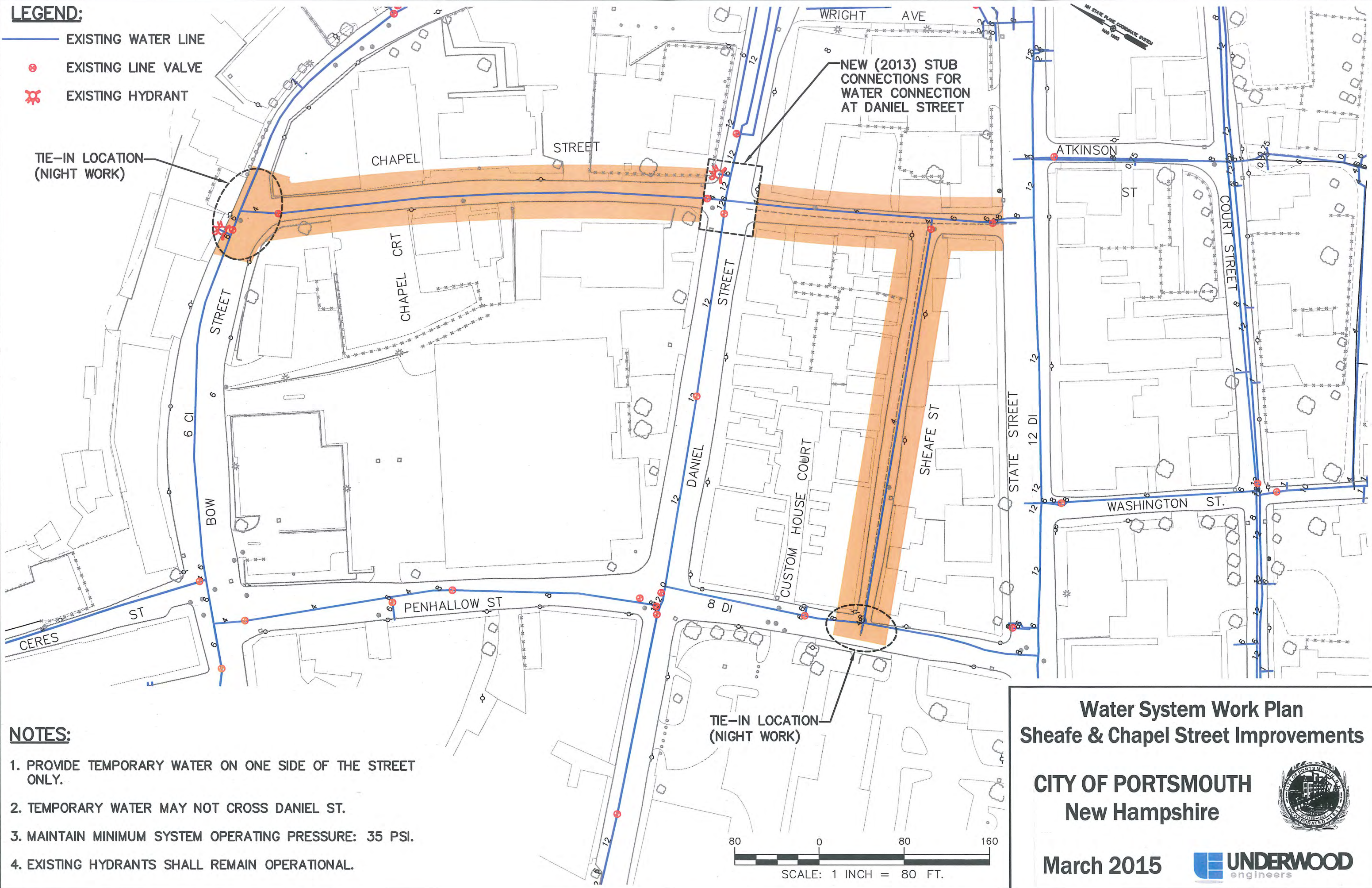
END OF SECTION

LEGEND:

-  EXISTING WATER LINE
-  EXISTING LINE VALVE
-  EXISTING HYDRANT

TIE-IN LOCATION
(NIGHT WORK)

NEW (2013) STUB
CONNECTIONS FOR
WATER CONNECTION
AT DANIEL STREET



NOTES:

1. PROVIDE TEMPORARY WATER ON ONE SIDE OF THE STREET ONLY.
2. TEMPORARY WATER MAY NOT CROSS DANIEL ST.
3. MAINTAIN MINIMUM SYSTEM OPERATING PRESSURE: 35 PSI.
4. EXISTING HYDRANTS SHALL REMAIN OPERATIONAL.

**Water System Work Plan
Sheafe & Chapel Street Improvements**

**CITY OF PORTSMOUTH
New Hampshire**



March 2015



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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, Drainage and/or combined flows 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 for sewer mains and services. 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 SUBMITTALS

- A. The Contractor shall submit a detailed description and plan showing the proposed methods and equipment for maintenance of sewer flows 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. Manufacturer's pump performance data and capacity for the proposed pumping station.
 - 3. The names and telephone number for three (3) contact persons that will be on 24-hour notice to maintain the system.

3.2 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. The existing sewers are collectors and sanitary flows are minimal during dry weather periods. However, combined sewer flows can be expected to significantly increase during storm events. Contractor should size piping and pump equipment for pipes flowing full during wet weather. 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)
8"	400
10"	750
12"	1,800
15"	3,200

END OF SECTION

SECTION 01546

USE OF EXPLOSIVES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Provide all materials and perform all work necessary to insure safe use and storage of explosives.
2. Contractor shall be responsible for any and all damage resulting from use of explosives.
3. Blasting, if performed, is subject to City of Portsmouth ordinances (see Appendix). Contractor shall review and consider requirements during preparation of bid for trench ledge removal.

1.2 QUALITY ASSURANCE

- A. Requirements of regulatory agencies: Conduct all blasting in accordance with all applicable local and state laws, ordinances and code requirements.
- B. See Special Conditions for additional requirements.
- C. Blasting reports are to be provided if Contractor elects to use blasting as a means of trench ledge removal.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Explosive charges and detonation devices shall be of a type suitable for the intended use.
- B. Store all explosives in a secure manner, in compliance with all State and local laws and ordinances, and legibly mark all such storage places. Storage shall be limited to such quantity as may be needed for the work underway.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Preparation:

1. Blasting, if required, shall be performed only after approval has been given by the Owner for such operation.
2. Do not bring explosives to the site or use any explosives without obtaining all necessary permits and the written consent of authorities having jurisdiction. Such written consent will not relieve the Contractor of total responsibility for any injury to persons or for any damage to property due to blasting operations.

3. Designate as a **BLASTING AREA** all sites where electric blasting caps are located and where explosive charges are being placed.
 4. Mark all blasting areas with signs as required by law.
 5. Place signs, as required by law, at each end of the blasting area and leave in place while the above conditions prevail. Immediately remove signs after blasting operations or the storage of caps is over.
 6. The Contractor shall conduct a Pre-blast Condition Survey of all existing structures on the site, or in the vicinity of the site. This survey shall also included such structures as may be affected by the Contractor's construction operations. At a minimum the Survey shall be performed on all structures to include parking deck and other such sturctures within 500 feet of the construction activity. Further observation may be required at the discretion of the Contractor. Further observation may be required as directed by the Engineer. The completed Survey shall be provided to the Engineer as a written report.
 7. Notify each property owner and public utility company having structures in proximity to the site of the work sufficiently in advance to enable them to take such steps as they may deem necessary to protect their property. Such notice shall not relieve the Contractor of any of his responsibility for damage resulting from his blasting operation.
 8. Warn all persons within the danger zone of blasting operations and do not perform blasting work until the area is cleared. Provide sufficient flagmen outside the danger zone to stop all approaching traffic and pedestrians.
- B. **Blasting:**
1. All blasting shall be performed in accordance with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc..
 2. Provide watchmen during the loading period and until charges have been exploded.
 3. Provide adequate protective covering over all charges before being exploded.
 4. **Blasting Log:**
 1. The Contractor shall provide the Engineer with a blasting log for the work. The blasting log shall contain the following information:
 - a. Location.
 - b. Time and date.
 - c. Location of explosives.
 - d. Amount of type of explosives used at each location.
 - e. The names of persons, companies, corporations or public utilities that own, lease or occupy property or structures in proximity to the site of the work and were contacted about the Contractor's intention to use explosives.
- C. **Vibration Limits:**
1. The maximum peak particle velocity (PPV) of ground vibration, in any of three mutually perpendicular compnents of particle velocity, for above ground, residential structures shall not exceed the following limits:

Type of Structure	Maximum PPV, inches/second	
	Frequencies Below 40Hz	Frequencies 40Hz or Greater
Modern Homes – Drywall Interiors	0.75	2.0
Older Homes – Plaster on Wood Lath for Interior Walls	0.50	2.0
Stone Masonry or Brick Masonry Structures		1.3
Buried Pipe Lines		1.5

2. Deteriorated structures or utilities, structures housing computers or other sensitive equipment, and manufacturing processes that are sensitive to vibrations may require lower PPV limits than stated in this specification.
3. Determine appropriate vibration limits for deteriorated, sensitive structures and/or critical work areas in accordance with Section 01548.

Ground Vibration Limits for New Concrete

Age of Concrete	Maximum PPV, inches/second
Less than 3 days	No blasting
After 3 days	1 in/sec
After 5 days	1.8 in/sec
After 7 days	2.0 in/sec

4. The Contractor shall not conduct blasting operations within 20 feet of newly placed concrete (less than 14 days). For blasting greater than 20 feet away from new concrete, the following PPV ground vibration limits apply:

END OF SECTION

SECTION 01548

VIBRATION MONITORING

PART 1 - GENERAL

1.1 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. Employ a professional vibration consultant to 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. Provide a preconstruction survey including photographic documentation of all existing structures. The preconstruction survey shall include both external and internal, foundations, plaster, masonry and other internal surfaces adjacent to work areas, similar to pre-blast survey requirements.
6. Contractor shall be responsible for any and all damage resulting from construction activity vibrations.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 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 adjacent to the work including interior and exterior building foundations, walls and surfaces, plaster, 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 in advance of the work.
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 01562

DUST CONTROL

PART 1 - GENERAL

1.1 DESCRIPTIONS

- A. This project is in an urban business district with private residences and daily dust control 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 for paved surfaces on a regular basis and as frequently as once daily.
- C. The Contractor shall have a water truck on site at all times.
- D. Calcium chloride may be used in conjunction with watering to control dust generated from unpaved surfaces.
- E. Dust control work shall be incidental to the appropriate items of the Contract unless a separate unit item is provided

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Water for Sprinkling: Clean, free of salt, oil, and other injurious matter.
- B. Calcium Chloride: Meet the requirements of AASHTO M144.
- C. Street Sweeper: Mechanically enclosed street sweeper with watering device able to pick up and haul away debris. Sweeper shall be self-loading, motorized and shall have spray nozzles. Vacuum apparatus may be necessary for certain site conditions where sediment/dust is not being removed by other methods employed by the Contractor.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Water: Use suitable equipment including a tank with gauge equipped pump or spray bar. Apply water 2-3 times a day and on weekends as needed.
- B. Calcium Chloride: Apply at a rate sufficient to maintain a damp surface but low enough to assure non-contamination of water courses.
- C. Street Sweeping:
 - Street sweeping shall be conducted where sediment is likely to be tracked from the work area(s) onto paved roadways and/or as directed by the Engineer.
 - Street sweeping shall start at the beginning of excavation and earth moving operations and continue through project completion (as necessary until disturbed areas are stable and dust/sediment generating activities have ceased), or as directed by the Engineer.
 - Sweep paved surfaces on a daily basis.

3.2 PROTECTION

- A. Perform all Dust Control Work in a manner that will prevent damage to public and private property from dust and the materials used.
- B. Repair, replace or make payment for all damage caused by Dust Control Work at no additional cost to the Owner.

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
 - 1. Contractor shall provide a Traffic Control Plan for approval by the Engineer and the Owner. The Plan shall include but not be limited to the following:
 - a. Map (s) of the proposed area including all anticipated signs, barricades, work zones, proposed detours and land and road closures for each phase of the work.
 - b. Provide a narrative that discusses special considerations for access for local residents, businesses and emergency vehicles.
 - 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 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.

2.2 PORTABLE MESSAGE BOARD

- A. Depending on availability, the City intends to supply Portable Message Boards (PMB's) for use by the Contractor during construction.
- B. For periods when City PMB's are not available for use on the project, provide the quantity of PMB's necessary to meet the requirements of the approved Traffic Control Plan. PMB's shall meet the following criteria:
 - The message board shall meet or exceed the requirement for portable message boards of MUTCD Section 6.
 - General purpose trailer mounted units - maximum size 32 SF to 50 SF
 - Alpha numeric and graphic display capability)

PART 3 - EXECUTION

3.1 DETOURS

- A. If approved, 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.
- C. Through traffic (at least one lane) must be maintained at all times unless approved otherwise.
- D. On all roads, 2-lane traffic must be in-place at the end of each workday.

3.2 INCONVENIENCE TO RESIDENTS AND BUSINESSES 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.
- C. Specific attention and coordination is required to ensure public awareness and accommodations for businesses in and adjacent to the project area. Up to four (4) custom signs (3 sq feet each) can be anticipated for area businesses. At a minimum, custom signs are required for the following:
 - Sheafe Street Books

- Three other locations TBD

3.3 UNIFORMED FLAGGERS AND POLICE OFFICERS

- A. The Contractor shall employ uniformed flaggers at either end of the work areas to maintain safe passage through or around the work area when one way alternating traffic is required.
- B. Uniformed police officers may only be used in locations approved by the City. If approved, arrange police detail with the local Police.

3.4 SAFE PASSAGE

- A. The Contractor is responsible for maintaining safe passage of vehicles and pedestrians around and through the work area. This shall include but not be limited to:
 1. Barricades and fences to prevent entry to equipment and immediate work area.
 2. Dust Control.
 3. Installation and grading of suitable material for vehicle passage on roadways.

3.5 TRAFFIC ROUTING

- A. Preliminary plans have been prepared to identify preliminary signing requirements, locations and traffic routing (see work plan at the end of this section). These are not intended to be the location final TCP but are provided to give the Contractor an idea of the magnitude of the signage required and define initial traffic routing scenarios that would be acceptable to the City.

END OF SECTION

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PHASE 1 NOTES – LOWER CHAPEL

① CONSTRUCTION SIGN PACKAGE

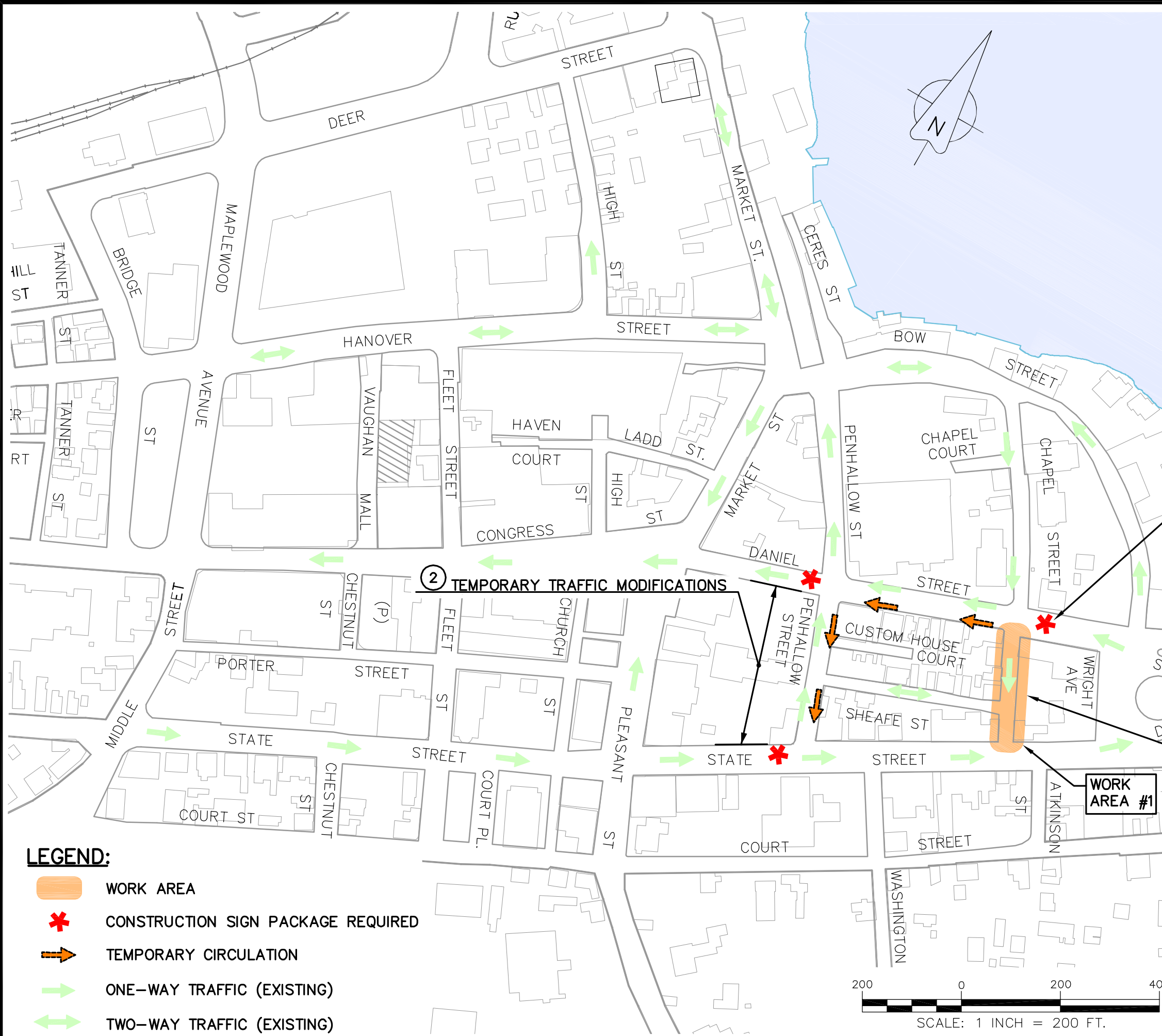
- BEGIN SIGNS AT CHAPEL AND STATE
- PROVIDE NOTIFICATION THAT PENHALLOW STREET IS CLOSED.
- IDENTIFY ACCESS FOR ROUTE 1 NORTH

② TEMPORARY TRAFFIC MODIFICATIONS

- REVERSE DIRECTION OF ONE-WAY TRAFFIC ON PENHALLOW STREET FROM DANIEL STREET TO STATE STREET.

③ DAILY ROAD CLOSURE

- PHASE 1: STATE TO DANIEL
- PHASE 2: SHEAFE STREET
- PHASE 3: DANIEL TO BOW



② TEMPORARY TRAFFIC MODIFICATIONS

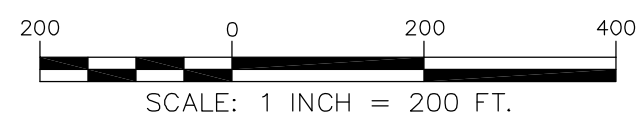
③ DAILY ROAD CLOSURE

② TEMPORARY TRAFFIC MODIFICATIONS

WORK AREA #1

LEGEND:

- WORK AREA
- CONSTRUCTION SIGN PACKAGE REQUIRED
- TEMPORARY CIRCULATION
- ONE-WAY TRAFFIC (EXISTING)
- TWO-WAY TRAFFIC (EXISTING)



Traffic Circulation Work Plan (1 of 3) Sheafe & Chapel Street Improvements

CITY OF PORTSMOUTH New Hampshire



March 2015



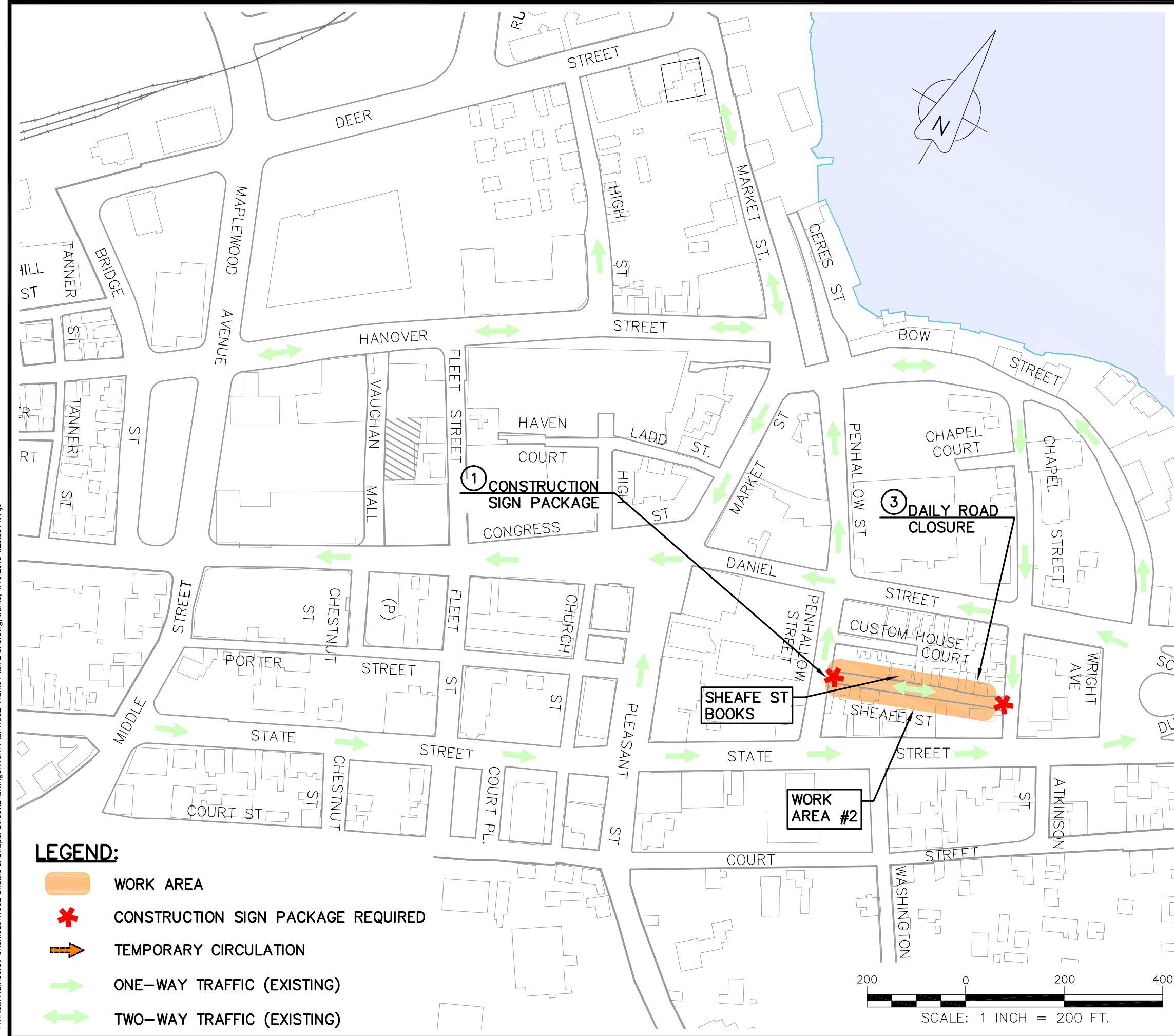
PHASE 2 NOTES – SHEAFE STREET

① CONSTRUCTION SIGN PACKAGE

- DAILY ROAD CLOSURE ONLY
- LOCAL TRAFFIC ONLY
- IDENTIFY ACCESS FOR ROUTE 1 NORTH
- BUSINESS OPEN SIGN – SHEAFE STREET BOOKS

③ DAILY ROAD CLOSURE

- PHASE 1: STATE TO DANIEL
- PHASE 2: SHEAFE STREET
- PHASE 3: DANIEL TO BOW



LEGEND:

- WORK AREA
- CONSTRUCTION SIGN PACKAGE REQUIRED
- TEMPORARY CIRCULATION
- ONE-WAY TRAFFIC (EXISTING)
- TWO-WAY TRAFFIC (EXISTING)

**Traffic Circulation Work Plan (2 of 3)
Sheafe & Chapel Street Improvements**

**CITY OF PORTSMOUTH
New Hampshire**



March 2015



H:\Real Numbers\Portsmouth\1902-Sheafe & Chapel Street\Drawings\Work Plan\1902-Traffic Plan 2 of 3.dwg, traffic, 4/10/2015 4:23:38 PM, .ipb

H:\Real Numbers\Portsmouth\1902 Sheafe & Chapel Street\Traffic Plan 3 of 3.dwg, traffic, 4/10/2015 4:25:23 PM, ipb

PHASE 3 NOTES – UPPER CHAPEL

① CONSTRUCTION SIGN PACKAGE

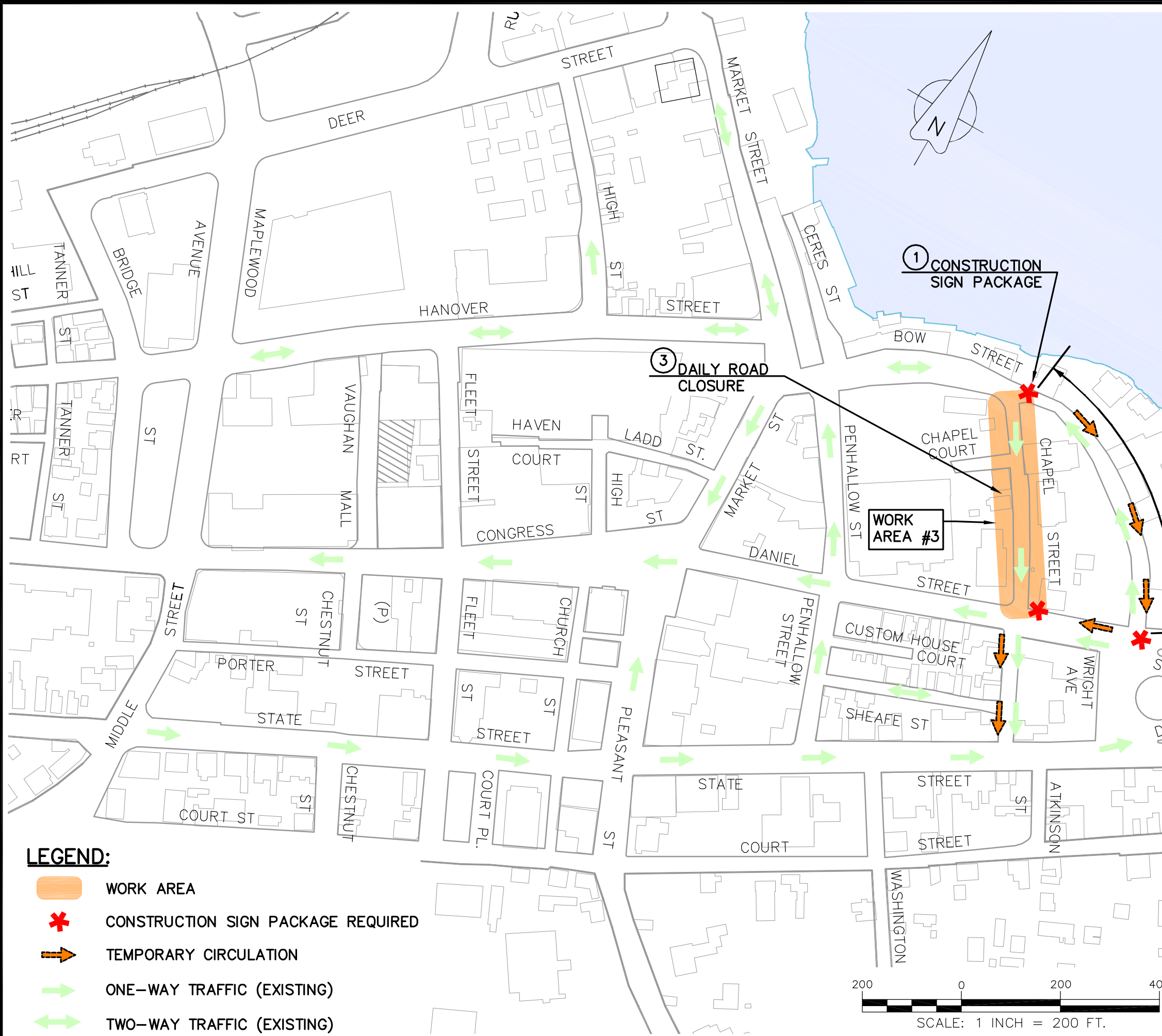
- BEGIN SIGNS AT CHAPEL AND BOW.
- PROVIDE NOTIFICATION THAT CHAPEL STREET IS CLOSED.
- IDENTIFY ACCESS FOR ROUTE 1 NORTH.
- PARKING ACCESS FOR CHAPEL COURT BUSINESS GROUP
- PARKING ACCESS FOR 126 DANIEL STREET BUSINESS GROUP

② TEMPORARY TRAFFIC MODIFICATIONS

- REVERSE DIRECTION OF ONE-WAY TRAFFIC ON BOW STREET FROM CHAPEL STREET TO DANIEL STREET.
- DAILY OPERATIONS: MAINTAIN LOCAL ACCESS TO EXTENT POSSIBLE.
- NIGHTLY – RESTORE ACCESS FOR LOCAL TRAFFIC ONLY.

③ DAILY ROAD CLOSURE

- PHASE 1: STATE TO DANIEL
- PHASE 2: SHEAFE STREET
- PHASE 3: DANIEL TO BOW





LEGEND:

- WORK AREA
- CONSTRUCTION SIGN PACKAGE REQUIRED
- TEMPORARY CIRCULATION
- ONE-WAY TRAFFIC (EXISTING)
- TWO-WAY TRAFFIC (EXISTING)

Traffic Circulation Work Plan (3 of 3)
Sheafe & Chapel Street Improvements

CITY OF PORTSMOUTH
New Hampshire



March 2015  **UNDERWOOD**
 engineers

SECTION 01572

NIGHT WORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
 - 1. Provide all equipment, labor and materials necessary to complete work at night.
 - 2. Work to be performed at night must be identified in the approved traffic control plan.
- B. Refer to Section 01570 for Traffic Control requirements.

1.2 SCHEDULING WORK

- A. Work to be completed at night shall be identified in advance. A 5-day written notice shall be provided.

1.3 PRECONSTRUCTION MEETING

- A. Prior to executing work at night, a preconstruction meeting shall be held. At a minimum, the following shall be included in the meeting:
 - 1. Department of Public Works
 - 2. Fire Department
 - 3. Police Department
 - 4. Engineer
 - 5. NHDES, when in jurisdiction
 - 6. NHDOT, when in jurisdiction

1.4 NIGHT WORK

- A. When night work is required or ordered, the Contractor will complete the work for the unit prices identified in the bid schedule, unless paid for otherwise.
- B. Night work is defined between the hours of 9:00 P.M. and 6:00 A.M. Specific time restrictions may apply for certain work areas and/or work operations.
- C. Night Work will be required in the following areas:
 - 1. Water Tie-In at Chapel Street and Bow Street
 - 2. Water Tie-In at Sheafe Street and Penhallow Street

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND BARRICADES

- A. Do not perform night work without providing adequate warning signs, barricades, signal lights, watchmen and other necessary precautions for the safety of the public.
- B. Provide and illuminate suitable warning signs to show where construction, barricades or detours exist.
- C. Provide barricades of substantial construction and painted with a finish that increases visibility at night.

- D. Keep signal lights illuminated at all barricades and obstructions from sunset to sunrise.
- E. Maintain all necessary signs, barricades, lights, watchmen and other safety precautions during authorized suspension of the Work, weekends, holidays or other times when the Work is not in progress.
- F. Traffic control signs for construction work shall be located and of the size and type as outlined in latest edition of the Manual on Uniform Traffic Control Devices for Streets and Highways as published by U.S. Department of Transportation.

PART 3 - EXECUTION

3.1 DETOURS

- A. If approved, 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.
- C. On all roads, 2-lane traffic must be in-place at the end of each workperiod

3.2 INCONVENIENCE TO RESIDENTS OF VICINITY

- A. Whenever possible, the Contractor shall employ strategies for completing night work to minimize noise and inconvenience to businesses and residences in the area. This shall include providing:
 - 1. Alternatives to back-up alarms at night.

END OF SECTION

SECTION 01611

OWNER'S RIGHT TO MATERIAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
 - 1. The Owner retains the right to claim materials considered suitable for reuse.
 - 2. 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. Granite curb removed and not reset.
 - 2. Other materials claimed by Owner based on project conditions observed in the field.

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.

SUBSTITUTIONS & PRODUCT OPTIONS

- 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 01710

PROJECT CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
1. Maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
 2. At completion of Work, remove waste materials, tools, equipment, machinery, and surplus materials, and clean all sight-exposed surfaces. Leave project clean and ready for use.

1.2 QUALITY ASSURANCE

- A. Conduct cleaning and disposal operations in accordance with all applicable local and state laws, ordinances, and code requirements.

PART 2 - PRODUCTS

- A. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Cleaning During Construction (where applicable):
1. Execute cleaning operations to ensure that buildings, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
 2. Entirely remove and dispose of material or debris during the progress of the Work that has washed into or has been placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations.
 3. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
 4. At reasonable intervals during the progress of work, clean the site and dispose of waste materials, debris, and rubbish.
 5. Clean interiors of buildings, when applicable, prior to finish painting, and continue on an as-needed basis until buildings are ready for occupancy.
 6. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.
 7. Where applicable, schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.

- B. 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 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

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>
02223	Trench Excavation - Earth
02224	Trench Excavation - Ledge
02229	Backfill and Compaction
02275	Construction Fabrics
02369	Sheeting
02402	Site Dewatering
02431	Catch Basins, Frames & Grates (NH)
02540	Temporary Erosion Control
02545	Sidewalk Pavers
02551	Bituminous Concrete Paving (NH)
02555	Removal & Replacement of Paving (NH)
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 Assembly
02644	Hydrant Assemblies
02646	Valve Boxes
02649	Service Saddles
02650	Excavation Dewatering
02651	Final Sewer Testing

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: 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. Do not leave any trenches open overnight.

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 and screened gravel or crushed 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 Division 1.
 2. Dispose of surplus and unsuitable material at the locations acceptable to or designated by the Owner.
- C. Embankment Material: Obtain prior approval and instructions from the Engineer prior to undertaking the excavation for pipe placement of any fill material that has been in an embankment for less than one year.

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. General:
1. Unless otherwise specifically directed or permitted by the Engineer, begin excavation at the low end sewer lines and proceed upgrade.
 2. Perform excavation for force mains and 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 necessary to prevent caving and sliding and to meet the requirements of the State and OSHA safety standards.

END OF SECTION

SECTION 02224

TRENCH EXCAVATION - LEDGE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Trench excavation work in ledge includes the removal of ledge and rock required for the installation of pipes and/or structures.
2. "Ledge" and "rock" includes any natural compound, natural mixture, and chemical element required to be excavated that, in the opinion of the Engineer, can be removed from its existing position and state only by blasting, drilling and blasting, wedging, drilling and wedging, wedging and breaking with power hand tools, or by extending the use of an approved excavating machine beyond normal and design wear and tear. No boulder, ledge, slab, or other single piece of excavated material less than two cubic yards in total volume shall be considered to be rock unless, in the opinion of the Engineer, it must be removed from its existing position by one of the methods mentioned above.
3. All trench excavation shall be classed as earth or ledge.

1.2 JOB CONDITIONS

A. Utilities:

1. The locations of known buried water lines, sewer lines, telephone cables, storm drains, culverts, gas mains, electric conduits and other utilities are shown on the Drawings. No guarantee is made as to the correctness of the locations shown and to the completeness of the information given.
2. Use manual excavation methods to locate existing utilities.

B. Existing Structures:

1. Perform excavation in such a manner that will prevent any possibility of undermining and disturbing the foundations of any existing structures and any work previously completed under this Contract.
2. Where existing buildings and other structures are in close proximity to the proposed construction, exercise extreme caution and utilize whatever precautionary measure that may be required.

C. Repairing Damage: Repair, or have repaired, all damage to existing utilities, structures, lawns, and other public and private property which results from construction operations, at no additional expense to the Owner, to the complete satisfaction of the Engineer, the utility company, property owner and the Owner.

D. Do not leave any trenches open overnight.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Disposal of Suitable Material:
 - 1. All material that is, in the opinion of the Engineer, suitable shall remain the property of the Owner.
 - 2. Stockpile all suitable material in locations approved or designated by the Owner.
- B. Disposal of Unsuitable Material:
 - 1. All unsuitable material shall become the property of the Contractor unless specified otherwise in Division 1.
 - 2. Dispose of unsuitable material at the locations acceptable to or designated by the Owner.

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. General:
 - 1. Unless otherwise specifically directed or permitted by the Engineer, begin excavation at the low end of sewer lines and proceed upgrade.
 - 2. Perform excavation for force mains and/or water mains in a logical sequence.
- B. Amount of Excavation:
 - 1. Trench width: As shown on the Drawings.
 - 2. Trench depth: As shown on the Drawings.
 - 3. Open Excavation:
 - a. The extent of open excavation shall be controlled by prevailing conditions.
 - b. Open excavation shall, at all times be confined to the limits acceptable to the Owner.
 - 4. Unauthorized Excavation:
 - a. Backfill to the specified grade, any excavation beyond the limits stated above and as shown on the Drawings (unless specifically ordered otherwise by the Engineer) with thoroughly compacted crushed stone or screened gravel.
 - b. Backfill unauthorized excavation at no additional cost to the Owner.
- C. Shoring and Bracing:
 - 1. As the excavation progresses, install such shoring and bracing necessary to prevent caving and sliding and to meet the requirements of the State and OSHA safety standards.

END OF SECTION

SECTION 02229

BACKFILL AND COMPACTION

PART 1 -- GENERAL

1.1 DESCRIPTION

- A. Work Included:
 - 1. Work includes backfilling trenches and/or excavation around structures with suitable material removed in the course of excavating and other suitable materials.
 - 2. Testing soils.
- 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. Sieve Analysis of Fine and Coarse Aggregates: ASTM C136
- B. Sampling Aggregates: ASTM D75
- C. Moisture Density Relations of Soils (Modified Proctor): ASTM D1557
- D. Density of Soil In-Place by Nuclear Methods: ASTM D6938
- E. State of New Hampshire Department of Transportation (NHDOT) Standard Specifications for Road and Bridge Construction (latest edition)

1.3 QC/QA AND MATERIALS TESTING

- A. Quality Control for the Contractor's Construction Processes:
 - 1. The Contractor is responsible for process controls to complete the work specified including any equipment inspections, material sampling and/or field tests necessary to control his construction operations.
 - 2. The Contractor shall obtain and pay for any services of a materials testing firm to perform soil and compaction tests needed to meet for his quality control plan.
- B. Quality Assurance for Work to be Accepted by the Owner:
 - 1. The Owner is responsible for acceptance (or rejection) of the Contractor's work.
 - 2. The Owner will employ an independent testing agency for quality assurance for the work installed by the Contractor to verify that his construction operations are producing an acceptable product (or that corrective measures are warranted).
 - 3. The Contractor shall make necessary arrangements to allow compaction testing to be performed at a time, place and elevation determined by the Engineer.
 - 4. Testing methods and frequencies for construction materials incorporated into the work are specified in sections 1.3.C and 1.3.D below. The Engineer and/or Owner may request additional tests/samples based on conditions observed in the field.

BACKFILL AND COMPACTION

5. In the event that material testing results reveal non-conforming material has been installed, the Contractor will be required to submit a plan outlining his approach to correcting the non-conforming work. After corrective actions are completed, the material will be retested for acceptance. The Contractor shall bear the cost of any subsequent sampling, testing and evaluation necessary to demonstrate conformance with the Project Specifications. Such costs will be deducted from the monies owed the Contractor under the respective Contract Unit Item for the work being installed. The Owner's Quality Assurance and Material Testing Program does not absolve the Contractor's responsibility to implement a Quality Control Plan (See Section 106 of the NHDOT Standard Specifications for expectations on the Contractor's QC Plan).
- C. Pre-placement testing.
1. The Contractor shall take one sample of each material proposed to be used on the project. The samples shall be taken in the presence of the Engineer and in accordance with ASTM D75.
 2. Subgrade Material: Proctor density tests shall be performed on the existing subgrade in accordance with the following schedule and in accordance with ASTM D1557:
 - a. At the bottom of excavations where structures or slabs will be placed.
 - b. One after every 5,000 cubic yards has been relocated on the site.
 - c. Whenever the material has changed in the opinion of the Engineer.
 3. Select and Borrow Materials: Sieve and modified proctor density tests shall be performed on all select and borrow material in accordance with the following schedule and in accordance with ASTM C136 and ASTM D1557:
 - a. Before any materials are brought to the site.
 - b. One after every 5,000 cubic yards has been brought to the site.
 - c. Whenever the source changes.
 4. The result shall be submitted to the Engineer for approval prior to placement.
 5. The Contractor shall obtain representative samples for ongoing trench backfill operations.
 - a. Samples may be obtained in-situ at time of testing provided they are, in the Engineers opinion, representative of ongoing operations.
 - b. Samples may be obtained from stockpiles provide the stockpiled material is thoroughly mixed to represent ongoing operations..
 - c. Samples shall also be obtained for select materials such as reclaimed asphalt or gravels previously excavated from the trench.
- D. Post-placement testing:
1. The trench and/or excavation shall be prepared using the normal backfill technique employed by the Contractor. No special or additional preparation will be allowed.
 2. Determine in-place density in accordance with ASTM D6938 or by other methods as approved by the Engineer.
 3. Compaction tests shall be made in accordance with the following table:

	Material	Testing Frequency	Percent Compaction
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% 24" lifts
	Gravels or loam	See requirements for Under paved Areas and Grassed Areas for requirements below	See below
Under Paved Areas:			
	Select Materials	One for every 10,000 s.f. of surface area for every 2 lifts of material placed.	95% 12" lifts
Under Grassed or Landscaped Areas			
	Native material or borrow material	One for every 20,000 s.f. of surface area for every 2 lifts of material placed.	90% 12" lifts

Notes:

1. *The Contractor shall submit his proposed method(s) for material placement and backfill operations two weeks prior to the first day of work. This proposed method will be tested in the field during the course of the work. The Contractor will be responsible for determining modifications required to meet the compaction requirements noted in the above table.*
2. *For trench, backfill operations, the first day of testing will include testing up to 4 lifts. Upon confirmation by satisfactory test results, this compaction method will be accepted until the soil characteristics have changed in the opinion of the Engineer. At that point new compaction tests may be required to determine if the compaction method is still acceptable. If failing test results are*

reported, the method shall be modified until the compaction requirements are met.

3. *Even if the soil characteristics have not changed, confirmatory compaction tests may be taken every 3 weeks. Confirmatory testing will include testing of a minimum of 2 lifts. The Engineer will determine the location of all tests.*
4. *Should compaction tests fail to meet the specified densities, the Contractor shall modify backfill methods as necessary to obtain passing results. The modified method shall be used from that point on.*

1.4 SUBMITTALS

- A. The Contractor shall submit at the preconstruction meeting his proposed compaction technique which shall include compaction around field structures (i.e manholes, catch basins, etc.) and valve boxes.
- B. The Contractor shall submit sieve and proctor curves to the Engineer for approval 7 days before any material is brought to the site.
- C. The Contractor shall submit compaction test result sheets to the Engineer no later than 7 days after the test were performed.
- D. NHDOT Control Strip Procedure for Road Construction
 1. When proposed by the Contractor, the Engineer may permit density testing using the control strip procedure (Section 304.3.8 NHDOT Standard Specifications).

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Excavated Material Suitable for Reuse:
 1. Material shall be friable natural material comprised of gravels, sand, silts, or clayey gravel and sands.
 2. Material shall be free from peat, muck, other organic matter, frozen material, ice, and/or snow.
 3. Material shall be free from stones, ledge/rock fragments, and asphalt over 8” in the largest dimension.
 4. The material shall not have a moisture content over 2% of its optimum moisture content.
 5. See Specification Section 13100 for re-using suitable material found to/or suspected of environmental contamination. In general, the accepted approach is to use the excavated material as backfill when the conditions of 1-4 above are met.
- B. Select Materials for Road Construction:
 1. Crushed Gravel:
 - a. Well graded granular crushed gravel material for use as a crushed gravel base.

BACKFILL AND COMPACTION

- b. Material shall be hard and durable, free from frost, organic material, loam, debris and other unsuitable material.
- c. At least 50% of material retained on the 1 inch sieve shall have a fractured face.
- d. Sieve Analysis:

<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)

- e. See 2.1.B.3 for alternative materials to crushed gravel

2. Bank Run Gravel:

- a. Well graded granular bank-run gravel material for use as gravel subbase.
- b. 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.
- c. 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)

3. Aggregate Base Course:

- a. When crushed gravel is specified for road reconstruction, the Engineer may approve use of alternative aggregate base course materials in lieu of crushed gravel provided the following requirements are met:
 - a. A minimum 1' of free draining material (sand or gravel) is provided below the crushed gravel course.
 - b. The approved material shall be supplied from a homogenous stockpile and be applied across the entire cross section at the depth specified. Short or discontinuous sections will not be permitted.
 - c. Transitions between materials (crushed gravel and alternate base course) shall be made at the 50:1 taper.
 - d. The reclaimed stabilized base material meets the project

BACKFILL AND COMPACTION

specifications (section 02557 or NHDOT section 306). Approval will be based on verification by sieve analysis tests when ordered by the Engineer/Owner. Reclaimed stabilized base material may also be approved in lieu of crushed gravel for sidewalks and driveways.

- e. Crushed stone meeting the requirements of NHDOT item 304.4 (fine gradation) may be substituted for crushed gravel.

C. Backfill and Bedding Materials for Trench Construction:

1. Crushed Stone:

- a. Crushed stone shall be well graded in size from 1/4 inch to 3/4 inch and conform to ASTM C33 stone size No. 67.
- b. Clean, hard, and durable particles or fragments.
- c. Sieve Analysis:

<u>Sieve Designation</u>	<u>% Passing by Weight Square Opening</u>
1"	100
3/4"	90 - 100
3/8"	20 - 55
No. 4	0 - 10
No. 8	0 - 5
No. 200	1% Max.

2. Sand:

- a. Clean, hard and durable particles or fragments.
- b. Sieve Analysis:

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

3. Common Borrow - Sand:

- a. Consist of earth suitable for embankment construction; free from frozen material, perishable rubbish, peat and other unsuitable material.
- b. The moisture content shall be sufficient to provide the required compaction and stable embankment. In no case shall the moisture content exceed 4 percent above optimum.

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- c. The optimum moisture content shall be determined in accordance with AASHTO T 180, Method C or D.
 - d. 100% shall pass the 3" sieve and 70-100% shall pass the No. 4 sieve.
4. Gravel Borrow:
- a. 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.
 - b. 95-100% shall pass the 3" sieve and 25-70% shall pass the No. 4 sieve.
- D. Structural Fill and Backfill for Structures and Foundations:
- 1. See Sections 02200 – Earth Work and 02230 Granular Fill Material (when applicable).

PART 3 -- EXECUTION

3.1 PERFORMANCE

A. General:

- 1. Provide and place all necessary backfill material.
- 2. Do not allow large masses of backfill to be dropped into the excavation, as from a grab bucket, in such a manner that may endanger pipes and structures.
- 3. Place material in a manner that will prevent stones and lumps from becoming nested.
- 4. Completely fill all voids between stones with fine material.
- 5. Do not place backfill on or against new concrete until it has attained sufficient strength to support loads without distortion, cracking, and other damage.
- 6. Deposit backfill material evenly on all sides of structures to avoid unequal soil pressures.
- 7. Place backfill material evenly in the trench in an effort to maximize compaction.
- 8. Do not backfill with, or on, frozen materials.
- 9. Remove, or otherwise treat as necessary, previously placed material that has frozen prior to placing backfill.
- 10. Do not mechanically or hand compact material that is, in the opinion of the Engineer, too wet. Fill material that is too wet to be properly placed back in the trench its current state shall be dried (disced, harrowed, etc.) to within 2% of optimum moisture content. This material shall not be classified as unsuitable material and ineligible for payment as such.
- 11. Material made unsuitable by the Contractor's construction methods shall be replace with Gravel Borrow at no additional cost to the Owner.
- 12. Fill that is too dry shall be uniformly watered. The water shall be placed over a loose lift to allow for the water to migrate through the entire lift before compaction.

BACKFILL AND COMPACTION

13. Do not continue backfilling until the previously placed and/or new materials have dried sufficiently to permit proper compaction.
 14. When original excavated material is, in the opinion of the Engineer, unsuitable, use only approved gravel borrow for backfilling.
 15. Backfill excavation/trench as early as possible to allow for the maximum time for natural settlement.
 16. Slope grade away from structures at a minimum slope of 1.5%.
 17. The Contractor shall remove excess fill material from the site.
- B. Sheeting:
1. Leave sheeting in place when damage is likely to result from its withdrawal. This shall only be allowed with written approval of the Engineer.
 2. Completely fill with suitable material and thoroughly compact all voids left by the removal of sheeting.
 3. 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.
 4. See Section 02369 – Sheeting.
- C. Backfilling Around Trench Obstacles
1. Material must be properly compacted around trench obstacles (i.e. manholes, catch basin, valve boxes, etc.). Uncompacted fill will not be allowed to be placed around these obstacles.
 2. The Contractor shall provide adequate excavation supports to allow for a safe work environment in which to properly compact the excavation/trench.
 3. The Contractor shall use methods that compensate for the space limitations in the immediate area around these obstacles.
- D. Backfilling in Paved Areas:
1. Backfill trenches in streets and other paved areas by maintaining a moisture content within 2% of optimum.
 2. In an effort to allow the road to heave uniformly, backfill material that was removed from the top portion of the trench shall be replaced back into the top of the trench. Similarly, the material removed from the middle of the trench shall be replaced back into the middle of the trench. Existing material removed from the bottom of the trench (i.e. where the pipe box is located) shall be stockpiled for later use.
 3. Backfill in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide the required bearing value for paving immediately after backfilling is completed.
 4. 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.
- E. Backfilling Trenches in Nonpaved Areas:

BACKFILL AND COMPACTION

1. Grade the ground to a reasonable uniformity.
 2. Leave the mounding over the trenches in a uniform and neat condition, satisfactory to the Engineer.
- F. Bedding & Backfilling of Pipelines:
1. 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.
 2. Deposit and thoroughly compact the remainder of the backfill as noted herein.
- G. Placing and Compacting Backfill:
1. Water Jetting: Shall not be allowed without the approval of the Engineer.
 - a.
 2. Puddling: Shall not be allowed without the approval of the Engineer.
 3. Tamping:
 - a. Deposit and spread the backfill material in uniform parallel layers not exceeding the lift thicknesses noted herein.
 - b. Tamp each layer as required to obtain a thoroughly compacted mass.
 - c. If necessary, furnish and use an adequate number of power driven tampers, each weighing at least 150 lbs.
 4. Rolling:
 - a. Compact material by rolling only when the width and depth of the excavation are sufficient to accommodate the rollers, dozers, mechanical tampers, or other similar powered equipment, as may prove to be acceptable, and when it can be performed without causing damage to pipes and structures installed in the excavation.
 - b. Deposit and spread the backfill material in uniform parallel layers not exceeding the lift thicknesses noted herein.
 - c. Roll each layer as required to obtain a thoroughly compacted mass.
 5. Other placing and compacting methods may be employed only when approved by the Engineer.
- H. Improper Backfill
1. When, in the opinion of the Engineer, excavation and trenches have been improperly backfilled, and when settlement occurs, reopen the excavation to the depth required, as directed by the Engineer.
 2. Refill and compact the excavation or trench with suitable material and restore the surface to the required grade and condition.
 3. Excavation, backfilling, compacting work and testing performed to correct improper backfilling shall be performed at no additional cost to the Owner.

END OF SECTION

SECTION 02275

CONSTRUCTION FABRICS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install the appropriate construction fabric at locations shown on the Drawings.
- B. Related Work Specified Elsewhere:
 - 1. Temporary Erosion Control - Section 02540.
 - 2. Pipe and Pipe Fittings - General - Section 02610
 - 3. Earthwork - Section 02200

1.2 SUBMITTALS

- A. Shop drawings for each type of fabric to be used on the project shall be submitted to the Engineer for approval prior to installation. The Contractor will demonstrate that the strength of the chosen fabrics, while meeting the physical characteristics given below, shall withstand without failure the stresses which will be applied by his equipment and activity using his proposed construction techniques.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Construction fabrics shall be divided into four categories:
 - 1. Soil Stabilization
 - 2. Erosion Control
 - 3. Sediment Control
 - 4. Drainage

2.2 STABILIZATION

2.2.1

- A. The fabric specified herein is suitable for light to medium duty applications.
- 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.	200	ASTM D 4632
2. Apparent Opening Size	US Standard Sieve	40	ASTM D 4751
3. Water Flow Rate	gal/min/SF	50	ASTM D 4491
4. Grab Elongation	%	15	ASTM D 4632
5. Trap Tear Strength	lbs.	75	ASTM D 4533
6. Mullen Burst Strength	psi	450	ASTM D 3786
7. Permittivity	sec. ⁻¹	.5	ASTM D 4491

- | | | | |
|----|---------------------------|--------|-----|
| | 8. Weight | oz./sy | 4.5 |
| E. | Acceptable manufacturers: | | |
| | 1. Amoco | | |
| | 2. Mirafi | | |
| | 3. 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

- 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 02369

SHEETING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, install and maintain sheeting and bracing in the location(s) shown on the Drawings and as required to comply with all applicable State and Federal Regulations including the Occupational Safety and Health Act.
- B. Design: Insure that the sheeting is properly designed and installed to sustain all existing and expected loads to prevent all movement of earth which could in any way cause injury to workmen, delay the work or endanger adjacent structures.

1.2 JOB CONDITIONS

- A. Utilize dewatering devices to facilitate excavation within the sheeted area.
- B. Dewatering shall be considered incidental to excavation and no separate payment for dewatering will be made, unless specified elsewhere.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials shall conform to all applicable State and Federal regulations including the Occupational Safety and Health Act.
- B. Sheeting shall consist of driving timber or steel uprights ahead of open excavation to be held rigidly opposite each other forming the walls of the trench and to be held rigidly by horizontal cross members (braces) and longitudinal members (walers).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install sheeting in accordance with all applicable State and Federal regulations including the Occupational Safety and Health Act.
- B. Backfill as specified in these Specifications. When the level of compacted backfill reaches the location of bracing and wales, remove these items from the trench or other excavation.
- C. Cut the sheeting as shown on the Drawings.
- D. Complete backfilling as specified in these Specifications.

END OF SECTION

SECTION 02402

SITE DEWATERING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. The Contractor shall provide all materials, equipment, and labor necessary for the removal of surface water and as required to provide silt and erosion control devices, in accordance with the approved Storm Water Pollution Prevention Plan (SWPPP)
2. The Contractor shall build all drains and do all ditching, pumping, bailing, and all other work necessary to keep the excavation clear of ground water, sewage, or storm water during the progress of the work and until the finished work is safe from damage.

1.2 RECOMMENDED GUIDES

- A. AASHTO Highway Drainage Guidelines, Volume III, Guidelines for Erosion and Sediment Control in Highway Construction, American Association of State Highway and Transportation Officials, Inc., 444 North Capital St. N.W., Suite 249, Washington, D.C. 20001.
- B. Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire, New Hampshire Department of Environmental Services, Public Information Office, P.O. Box 95, 6 Hazen Drive, Concord, New Hampshire.
- C. Storm Water Phase II Compliance Assistance Guide, Section 5 Small Construction Activity, United State Environmental Protection Agency, Publication No. 833-R-00-003.
- D. USEPA Publication 430/9-73-007 Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity.
- E. New Hampshire Stormwater Manual Volume 3: Erosion and Sediment Controls During Construction, New Hampshire Department of Environmental Services, Public Information Office, P.O. Box 95, 29 Hazen Drive, Concord, New Hampshire.

1.3 SUBMITTALS

- A. The Contractor shall meet submittal requirements for the SWPPP. See Section 02540 Temporary Erosion Control. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.
- B. Prior to the start of construction submit a NOI for Storm Water Discharges Associated with CONSTRUCTION ACTIVITY under a NPDES General Permit. The Contractor shall provide the appropriate National Pollutant Discharge Elimination System (NPDES) permit number prior to the start of construction.

PART 2- PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 – EXECUTION

3.1 REMOVAL OF WATER

- A. Water pumped from excavations shall be piped to points discharging into approved treatment facilities prior to discharging into water courses

3.2 DIVERTING SURFACE WATER

- A. The Contractor shall build, maintain, and operate all cofferdams, channels, flumes, sumps, and other temporary diversion and protection works needed to divert streamflow and other surface water through or around the construction site and away from the construction work while construction is in progress. Unless otherwise specified, stream diversion must discharge into the same natural drainageway in which its headworks are located. Storm runoff from disturbed areas must discharge into a sedimentation pond prior to discharge into a natural drainageway.

3.4 EROSION CONTROL PROVISIONS

- A. The discharge from pumping operations during dewatering operations shall be contained by a device so constructed as to prevent silt from spreading off-site.
- B. Prior to removal of all sediment control devices all retained silt or other materials shall be removed at no additional cost to the Owner.

3.5 REMOVAL OF TEMPORARY WORKS

- A. After the temporary works have served their purpose, the Contractor shall remove them or level and grade them to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

3.6 ENVIRONMENTAL PERMITS (IF APPLICABLE)

- A. All work under this section shall be done in accordance with all federal, state, and local regulations, laws, and rules which may apply and any individual permits that have been obtained for the project.

END OF SECTION

SECTION 02431

CATCH BASINS, FRAMES & GRATES, (NH)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
1. Construct catch basins in conformance with the dimensions, elevations, and locations shown on the Drawings, as specified herein, and/or as directed by the Engineer.
 2. Construct all catch basins throughout the entire project from the same materials.
 3. Furnish and install cast iron catch basin frames and grates on all catch basins unless otherwise shown on the Drawings.

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
1. New Hampshire Department of Transportation Standard Specifications, latest edition.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit Shop Drawings and manufacturer's literature in conformance with the standard General Conditions of the construction contract.

PART 2 - PRODUCTS

2.1 RISERS, TOPS, FRAMES, GRATES AND MASONRY

- A. Sides of catch basins shall be made of precast concrete barrel sections or cast-in-place concrete.
- B. Catch basin bases shall be precast or cast-in-place concrete.
- C. Precast concrete sections shall conform to the N.H.D.O.T. Standard details.
- D. Concrete masonry units shall conform to the requirements of ASTM C139 with a minimum compressive strength of 3000 pounds per square inch when tested by the method in ASTM C116
- E. Cement mortar shall conform to Section 569 of the N.H.D.O.T. Standard Specifications.
- F. Castings shall be gray iron, Class 30, conforming to AASHTO M105, unless otherwise specified.
- G. Catch basin grates shall be N.H.D.O.T. Standard detail type B in pavement areas and Type C in non-pavement areas unless otherwise shown on the Drawings.
- H. All castings shall be "Made in USA".

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Precast Risers and Tops:
 - 1. Install risers and tops level and plumb.
 - 2. Construct full mortar joints not more than 1/2" wide, with all exposed joints neatly finished.
 - 3. Construct masonry to fit neatly and tightly around the pipe.
 - 4. Set metal frames in a full mortar bed.
 - 5. Do not permit water to rise over newly made joints until after inspection by the Engineer.
 - 6. Solidly fill annular spaces around pipes entering the catch basin with non-shrink grout.
 - 7. When necessary, cut openings carefully to prevent damage to risers and tops. Replace all damaged risers and tops at no additional expense to the Owner.
- B. Adjustment to Grade:
 - 1. If necessary, adjust the tops of catch basins to grade with brick masonry.
 - 2. Concrete rings are not acceptable for adjusting to grade.
 - 3. Temporarily set structures within the limits of pavement at the elevation of the bottom of the binder course or as directed. After the binder course has been compacted, set the structures at their final grade.
- C. Frames and Grates:
 - 1. Set all frames in a full bed of mortar, true to grade and concentric with the catch basin openings.
 - 2. Completely fill all voids beneath the bottom flange to make a watertight fit.
 - 3. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the catch basin all around its circumference.
 - 4. Clean the frame seats before setting the grates in place.
- D. 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. Prepare and submit a Stormwater Pollution Prevention Plan (SWPPP) for review and approval by the Engineer prior to the start of any construction activities.
3. Submit NOTICE OF INTENT letter to the USEPA for approval. Post the appropriate permit number on site.
4. Provide all labor, equipment, materials and maintain temporary erosion control devices as described in the Plan.
5. Provide such erosion control measures as may be necessary to correct conditions that develop prior to the completion of permanent erosion control devices and/or as required to control erosion that occurs during normal construction operations.
6. Provide such sediment control measures as may be necessary to address conditions created by construction dewatering methods and/or stormwater runoff.
7. After award of the Contract, prior to commencement of construction activities, meet with the Engineer to discuss the Plan and develop a mutual understanding relative to.
8. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.
9. Stabilize disturbed earth surfaces in the shortest practical time and employ such temporary erosion control devices as may be necessary until such time as adequate soil stabilization has been achieved.

B. Recommended Guides:

1. AASHTO Highway Drainage Guidelines, Volume III, Guidelines for Erosion and Sediment Control in Highway Construction, American Association of State Highway and Transportation Officials, Inc., 444 North Capital St. N.W., Suite 249, Washington, D.C. 20001.
2. Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire, New Hampshire Department of Environmental Services, Public Information Office, P.O. Box 95, 6 Hazen Drive, Concord, New Hampshire.
3. Storm Water Phase II Compliance Assistance Guide, Section 5 Small Construction Activity, United State Environmental Protection Agency, Publication No. 833-R-00-003.

4. New Hampshire Stormwater Manual Volume 3: Erosion and Sediment Controls During Construction, New Hampshire Department of Environmental Services, Public Information Office, P.O. Box 95, 29 Hazen Drive, Concord, New Hampshire.

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 ¾ 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 02545

SIDEWALK PAVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following:
1. Brick Pavers
 2. Concrete Pavers
 3. Joint Sand
 4. Cement Setting Bed
 5. Asphalt Base Course

1.2 REFERENCES

- A. ASTM International, latest edition:
1. C 33, Standard Specification for Concrete Aggregates.
 2. C 67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile, Section 8, Freezing and Thawing.
 3. C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 4. C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
 5. C 144 Standard Specifications for Aggregate for Masonry Mortar.
 6. D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
 7. C 936, Standard Specification for Solid Concrete Interlocking Paving Units.

1.3 SUBMITTALS

- A. Product Data: For all materials other than water and aggregates.
- B. Concrete Pavers:
1. Samples for verification: Three representative full-size samples of each paver type, thickness, color and finish that indicate the range of color variation and texture expected upon project completion.
 2. Accepted samples become the standard of acceptance for the product produced.
 3. Test results from an independent testing laboratory for compliance of concrete pavers with ASTM C 936.
 4. Manufacturer's catalog product data, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.
- C. Brick Pavers:
1. Samples for verification: Three representative full-size samples of each paver type, thickness, color and finish that indicate the range of color variation and texture expected upon project completion.

2. Accepted samples become the standard of acceptance for the product produced.
 3. Test results from an independent testing laboratory for compliance of concrete pavers with ASTM C 902.
 4. Manufacturer's catalog product data, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.
- D. Polymeric Joint Sand and Polymeric Stonedust:
1. Test results from an independent testing laboratory for sieve analysis per ASTM C 136 conforming to the grading requirements of ASTM C 144.
 2. Samples for Initial Selection: Provide three representative samples in containers of Polymeric Joint Sand material and Polymeric Stonedust cured and dried, for color selection.
- E. Paving Installation Contractor:
1. Job references from a minimum of three projects similar in size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.

1.4 QUALITY ASSURANCE

- A. Source Limitations:
1. Obtain Brick Pavers from one source location with the resources to provide products of consistent quality in appearance and physical properties.
 2. Obtain Concrete Pavers from one source location with the resources to provide products of consistent quality in appearance and physical properties.
 3. Obtain Polymeric Joint Sand and Polymeric Stonedust from one source with the resources to provide materials and products of consistent quality in appearance and physical properties.
- B. Paving Contractor Qualifications:
1. Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated.
- C. Mockups:
1. Install a 5 ft x 5 ft paver area per each paving pattern.
 2. Use this area to determine surcharge of the Setting Bed Sand layer, joint sizes, lines, laying pattern(s) and levelness. This area will serve as the standard by which the workmanship will be judged.
 3. Subject to acceptance by owner, mock-up may be retained as part of finished work.
 4. If mock-up is not retained, remove and dispose legally.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver Pavers in manufacturer's original, unopened and undamaged container packaging with identification labels intact.
1. Coordinate delivery and paving schedule to minimize interference with normal use of streets and sidewalks adjacent to paver installation.

2. Deliver Pavers to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by forklift or clamp lift.
3. Unload Pavers at job site in such a manner that no damage occurs to the product or adjacent surfaces.
- B. Store and protect materials free from mud, dirt and other foreign materials.
- C. Prevent Joint from exposure to rainfall or removal by wind with secure, waterproof covering.
- D. Store Polymeric Joint Sand on elevated platforms, under a cover and/or in a dry location.

1.6 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
 1. Install Pavers only on unfrozen Setting Bed.
 2. Install Setting Bed materials only when the temperature is above freezing.
 3. Install Setting Bed materials only when there is no heaving rain or snowfall.
 4. Install Setting Bed Sand/Cement Mix or Pavers only when there is no heavy rain or snowfall.
- B. Weather Limitations for Polymeric Jointing Sand:
 1. Install Polymeric Joint Sand and Polymeric Stonedust only when ambient temperature is above 40°F (5°C), under dry conditions with no rain forecast for 24 hours and when surface of pavement is completely dry.

1.7 CONCRETE PAVER OVERAGE AND ATTIC STOCK

- A. Provide a minimum of 5% additional material for overage to be used during construction.
- B. Contractor to provide 100 square feet of each product and size used to owner for maintenance and repair. Furnish Pavers from the same production run as installed materials.

PART 2 - PRODUCTS

2.1 BRICK PAVERS

- A. Product: Moring Paving Brick: Light-traffic brick complying with ASTM C902, Class SX, Type I, Application PS. .The bricks shall not be cored nor have frogs.
 1. Physical characteristics:
 - Grade SW
 - Compressive strength: 6,000 psi minimum
 - Size: modular
 - Thickness: 2-1/4 inches (57mm).
 - Face Size: 3-5/8 by 7-5/8 inches (92 by 194 mm).
 - Color: Artisan Flashed.
 2. Manufacturer: Subject to compliance with requirements, provide products by the following:
 - Morin Brick
 - 130 Morin Brick Road Pvt

Auburn, ME 04210
(207) 784-9375

2.2 CONCRETE PAVERS

- A. Basis-of-Design Product: The Concrete Paver shapes are based on:
 - 1. Unilock:
 - a. Courstone
 - b. Town Hall Pavers
 - 2. As manufactured by: Unilock
Contact
Joel Skaaland
Unilock New England
35 Commerce Drive
Uxbridge, MA 01569
Mobile (978) 375-2849
Office (508) 278-4536
 - 3. The specified products establish minimum requirements that substitutions must meet to be considered acceptable.
 - a. To obtain acceptance of unspecified products, submit written requests at least 7 days before Bid Date.
- B. Product requirements:
 - 1. See Drawings.
- C. Provide pavers meeting the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units. Efflorescence is not a cause for rejection.
 - 1. Average compressive strength 8,000 psi (55MPa) with no individual unit under 7,200 psi (50 MPa).
 - 2. Average absorption of 5% with no unit greater than 7% when tested according to ASTM C 140.
 - 3. Resistance to 50 freeze-thaw cycles, when tested according to ASTM C1645, with no breakage greater than 1.0% loss in dry weight of any individual unit. Conduct this test method not more than 12 months prior to delivery of units.
- D. Accept only pigments in concrete pavers conforming to ASTM C979. Note: ACI Report No. 212.3R provides guidance on the use of pigments.
- E. Maximum allowable breakage of product is 5%.

2.3 SAND FOR USE IN SAND/CEMENT SETTING BED

- A. Provide natural Joint Sand as follows:
 - 1. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
 - 2. Reject limestone screenings, stone dust, or sand for the Joint Sand material that does not conform to the grading requirements of ASTM C33.
 - 3. Utilize sands that are as hard as practically available where concrete pavers are subject to vehicular traffic.
 - 4. Gradation as shown in Table 1 below:

**TABLE 1 – JOINT SAND
GRADATION REQUIREMENTS FOR JOINT SAND**

ASTM C 144		
Sieve Size	Natural Sand Percent Passing	Manufactured Sand Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 75
No. 50 (0.300 mm)	10 to 30	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No. 200 (0.075 mm)	0 to 1	0 to 10

2.4 POLYMERIC JOINT SAND

- A. Provide “Polybind Sand” Polymeric Joint Sand as manufactured by Polybind: 225 Blvd. Bellerose West Laval, Quebec CANADA; (450) 624-1611
1. Color to be selected by the Owner

2.5 EDGE RESTRAINTS

- A. Metal Edge Restraints: Manufacturer’s standard painted steel edging ¼ inch thick by 5 inches high with loops pressed from or welded to face to receive stakes at 36 inches o.c., and steel stakes 15 inches long for each loop.

Manufacturers:

1. Border Concepts, Inc.
2. Model: Border King
3. Color: black.

2.6 CEMENT

- A. Provide Dragon Type I cement for use in sand mortar setting bed meeting requirements of ASTM C-150.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas indicated to receive paving for compliance with requirements for installation tolerances and other conditions affecting performance for the following items before placing the Concrete Pavers.
1. Verify that the Asphalt Base Course materials, thickness, compacted density, surface tolerances and elevations conform to specified requirements.
 2. Verify location, type, and elevations of edge restraints, curbing, concrete collars around utility structures, and drainage inlets.
 3. Verify that surfaces to receive the cement bedding materials are free of dust, oil, grease, paint, wax, curing compounds, primer, sealers, form release agents, from cracks over 3/16 in. (5 mm) in width, or any deleterious substances and debris which may prevent or reduce bonding.

4. Verify location, type, and elevations of edge restraints, concrete collars around utility structures, and drainage inlets.
 5. Do not proceed with installation of Setting Bed or Concrete Pavers until base condition are corrected by the General Contractor or designated subcontractor.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stockpile Joint Sand materials such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.
- B. Keep area where pavement is to be constructed free from sediment during entire job. Remove and replace all Joint Sand contaminated with sediment with clean materials.
- C. Compact subgrade uniformly to at least 95 percent of Standard Proctor Density per ASTM D 698 for pedestrian areas. Compact subgrade uniformly to at least 98 percent Modified Proctor per ASTM D 1557 for vehicular areas.
- D. Backfill all service trenches within the pavement area to the subgrade level with approved material placed in uniform lifts not exceeding 4 in. (100 mm) loose thickness. Compact each lift to at least 100 percent Standard Proctor Density as specified in ASTM D 698.
- E. Trim the subgrade to within 0 to 1/2 inch (0 to 13mm) of the specified grades. Do not deviate the surface of the prepared subgrade by more than 3/8 inch (10mm) from the bottom edge of a 39 inches (1m) straight edge laid in any direction.
- F. Do not proceed with further pavement construction, under any circumstances, until the subgrade has been inspected by the Architect/Engineer.

3.3 INSTALLATION

- A. Aggregate Base Preparation:
 1. Prepare and install aggregate base as depicted in detail drawings.
- B. Asphalt Base Course:
 1. Place in panels between screed rails spaced approximately 12 ft (4 m). Set the depth screed rails carefully to bring the Asphalt Base Course material to proper grade, to insure proper Concrete Paver finished height. Place Asphalt Base Course between the parallel screed rails. Rake and screed smooth with strike board. Fill any depressions with fresh bituminous material to produce a smooth, firm and even setting bed after each pass.
 2. Use screed rails to achieve a level setting bed conforming to elevations and slope shown on the drawings. After one panel is completed, advance screed rails to the next position in readiness for screeding adjacent panels with strike board. Fill depressions left from removed screed rails and smooth to height consistent with panel.
 3. Place an area in size that will remain at least 270° F (130° C) during compaction.
 4. Compact the Asphalt Base Course with a powered roller compactor to the nominal thickness specified on the typical drains after compaction while

still hot. Set Asphalt Base Course to accommodate the required finished grade of the Concrete Pavers.

5. Re-heat, fill, and compact low areas to conform to slope and elevation shown on the drawings.
6. Re-heat, remove, level, and compact high areas to conform to slope and elevation shown on the drawings.
7. Correct irregularities or evenness in the grade of the concrete base surface with matching materials only.

C. Edge Restraints:

1. Provide concrete edge restraints as indicated on drawings.

D. Pavers:

1. Replace Pavers with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.
2. Mix Pavers from a minimum of three (3) bundles simultaneously drawing the paver vertically rather than horizontally, as they are placed, to produce uniform blend of colors and textures.
4. Place Pavers using laying pattern as indicated. Adjust laying pattern at pavement edges such that cutting of edge pavers is minimized. Cut all pavers exposed to vehicular tires no smaller than one-third of a whole paver.
5. Use string lines or chalk lines on cement Setting Bed to hold all pattern lines true.
6. Set surface elevation of pavers 1/8 in. (3 mm) above adjacent drainage inlets, concrete collars or channels.
7. Place concrete paver units hand tight against spacer bars. Adjust horizontal placement of laid pavers to align straight.
 - a. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
8. Brick Pavers to be butt jointed.
9. Fill gaps between units or at edges of the paved area that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size unit pavers.
10. Cut Pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
11. Prevent all traffic on installed Pavers until Polymeric Joint Sand has been swept and vibrated into joints. Keep skid steer and forklift equipment off newly laid Pavers that have not received initial compaction and Joint Sand material.
12. Vibrate Pavers into leveling course with a low-amplitude plate vibrator capable of a to 5000-lbf (22-kN) compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:
 - a. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.
 - b. Compact installed Pavers to within 6 feet (2 meters) of the laying face before ending each day's work. Cover Pavers that have not been compacted and leveling course on which pavers have not been placed,

with nonstaining plastic sheets to prevent Setting Bed Sand/Cement mix from becoming disturbed.

13. Protect Paver surface from scuffing during compaction by utilizing a urethane pad.
 14. Remove any cracked or structurally damaged Concrete Pavers and replace with new units prior to installing Polymeric Joint Sand material.
- E. Joint Sand
1. Polymeric Joint Sand and Polymeric Stonedust
 - a. Install Polymeric Joint Sand per manufacturers recommended instructions.

3.4 FIELD QUALITY CONTROL

- A. Verify final elevations for conformance to the drawings after sweeping the surface clean.
1. Prevent final Concrete Paver finished grade elevations from deviating more than $\pm 3/8$ in. (± 10 mm) under a 10 ft (3 m) straightedge or indicated slope, for finished surface of paving.
- B. Lippage: No greater than $1/32$ in. (0.8 mm) difference in height between Concrete Pavers and adjacent paved surfaces.

3.5 REPAIRING, CLEANING AND SEALING

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
- B. Cleaning: Remove excess dirt, debris, stains, grit, etc. from exposed paver surfaces; wash and scrub clean.
1. Clean Concrete Pavers in accordance with the manufacturer's written recommendations.

3.6 PROTECTION

- A. Protect completed work from damage due to subsequent construction activity on the site.

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 0.5% and the mix shall meet all volumetric mix design criteria.
 - 2. Asphalt Cement shall not contain any form of used, recycled or refined oil. Suppliers of PG Binder shall certify that the PG Binder does not contain any used, recycled or refined oil.
 - 3. All 3/8 inch (9mm), 1/2 inch (12.5mm), 3/4 inch (19mm) and 1 inch (25mm) pavement mixes shall be designed using the 50 gyration N design, unless specified otherwise.
 - 4. Liquid asphalt cement binder shall have a Performance Grade (PG) of PG 64-28 for all standard bituminous and PG 64-E for all high strength bituminous pavements. NHDOT QC/QA Specifications shall be followed for high strength mixes.
 - 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 Binder Content		
Mix Type	50 Gyration	75 Gyration*
3/8-in (9.5 mm)	6.3	*
1/2-inch (12.5 mm)	5.9	*
3/4-inch (19 mm)	5.3%	*

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 Gyrations 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 - EXECUTION

3.1 INSTALLATION

- A. Construction requirements shall be in accordance with Sections 401 of the NHDOT Standard Specifications for Road and Bridge Construction (latest edition) **and** as specified in this section.
1. Prior to placing any mix, a pre-paving conference shall be held with the Owner, Contractor, and Engineer to discuss the proposed paving schedule, source of mix, type and amount of equipment to be used, sequence of paving pattern, rate of mix supply, traffic control, and general continuity of the operation. Special attention shall be made to the paving pattern sequence to minimize cold joints.
 2. The Contractor shall notify the Engineer one week in advance of paving operations to allow sufficient time for scheduling personnel.
 3. Any pavement course four inches (compacted depth) or greater shall be placed and compacted in two lifts.
 4. Sweeping. Existing pavement or previously laid courses shall be thoroughly dry and free from all dust, dirt, and loose material. Sweeping with a power broom, supplemented by hand 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 0.02 and 0.05 gal/yd².
 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 be corrected.

END OF SECTION

SECTION 02557

PAVEMENT RECLAMATION (NH)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
 - 1. Lower existing utility structures to a depth below the material to be scarified.
 - 2. Prepare road surface in accordance with reclaimer manufacturer recommendations.
 - 3. Reclaim roadway to specifications listed below.
 - 4. Regrade stabilized base according to typical section.
 - 5. Provide additional material or remove excess material to achieve the required profile and cross-section.
 - 6. Raise existing utility structures as specified.
- 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:

<u>Sieve Designation</u>	<u>Percentage by Passing Weight</u>
2"	100
1-1/2"	70 - 100
3/4"	55 - 90
#4	40 - 75
#40	10 - 30
#200	3 - 10

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. Reclamation:
1. Apply water to insure optimum water content.
 2. The reclaimer shall process the material to the specified gradation.
 3. The process shall be repeated until the "Stabilized Base" meets the required specification.

- C. Placement of the Stabilized Base:
1. Where specified remove the stabilized base and perform the necessary regrading of the underlying roadbed in accordance with the plans and profiles, typical specifications or as directed by the Engineer.
 2. The stabilized base shall be compacted in accordance with NHDOT Section 304, "Aggregate Base Course", current edition.
 3. The finish grade shall not vary more than plus or minus a quarter inch (+/- 1/4") from a ten foot (10') straight line applied parallel to or perpendicular to the centerline.
 4. Excess material becomes the property of the contractor unless otherwise specified on the contract drawings or in Section 01611 - Owner's Right to Materials, of this document.
- D. Contractor shall sawcut existing drives in accordance with the standard details on the plans.

END OF SECTION

SECTION 02560

GRANITE CURBING (NHDOT)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included:
 - 1. Work shall consist of constructing new or resetting existing curbing as shown on the Drawings or as ordered.

1.2 DELIVERY, STORAGE AND HANDLINGS

- A. The Contractor shall inspect curbing upon delivery. Any damaged, chipped or defective curbing shall not be accepted.
- B. The Contractor shall exercise care during storage and handling of curbing. Broken curb not meeting the dimensions shown on the Drawings shall not be considered for payment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Curb shall be new granite, hard, durable, reasonably uniform in appearance and free of seams. Solid quartz or feldspar veins will not be cause for rejection.
- B. Surfaces of granite shall meet the following requirements:

<u>Type</u>	<u>Surface</u>	<u>Minimum Requirements</u>
Straight or Curved	Top	4" wide or as otherwise shown, sawn true plane. Front and back arris lines pitched straight and parallel.
	Front Face (Exposed)	Right angle to top, approximately true plane. No drill holes showing in top 10" .
	Back Face (Not Exposed)	Plane parallel with front face. Straight split to 1 1/2" below exposed surface. No larger than 1/4" segment of drill holes showing in arris lines.
	Bottom	Approximately parallel to top. Minimum width: 3".
	Ends (Exposed portion)	Square with planes of top and face.
	Joints (Exposed)	Optimum width: 1".
	Joints (Concealed)	To break back no more than 4". Lengths of stones 3' to 10' with 50% of sections to be 5' or greater, or as indicated.
	Length of Stones	3' to 10' with 50% of sections to be 5' or greater, or as indicated

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Construction requirements shall be in accordance with Division 600, Section 609 (Curbs) of N.H.D.O.T. Standard Specifications for Road and Bridge Construction, latest edition.
- B. Excavation for curbing shall be made to the required depth and the base upon which the curb will be set shall be compacted to a firm even surface.
- C. The front top arris line shall conform to the line and grade specified.
- D. Joints shall be pointed with mortar and finished with a jointer.
- E. Curbing to be salvaged and reset shall be carefully removed and stored. The Contractor shall replace any curbing damaged or lost as a result of his failure to remove or store curbing correctly.
- F. The Contractor shall backfill curbing immediately after the curb is set.

END OF SECTION

SECTION 02601

MANHOLES, COVERS AND FRAMES (NH)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install manholes, cast iron frames and covers in conformance with the dimensions, elevations, and locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Construct all manholes in conformance with the New Hampshire Department of Environmental Services - Water Division- Standards of Design and Construction for Sewerage and Wastewater Treatment Facilities.
- B. Construct all manholes of a quality to withstand loads of 8 tons (H-20 loading) without failure for a period of time in excess of 25 years.
- C. Construct all manholes of a quality to prevent leakage in excess of 1 gallon per day per vertical foot of manhole.
- D. Construct all manholes throughout the entire project from the same materials unless otherwise shown on the Drawings.
- E. All castings shall be at least Class 30 conforming to ASTM Standard Specifications for Gray Iron Casting, Designation A40.
- F. All essential details of design shall be as shown on the Drawings.
- G. Frames and covers shall be New Hampshire Standard.
- H. Masonry: See specification Section 04201.
- I. Waterproofing: Shall be with a product with demonstrated five (5) years successful use in similar applications.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit shop drawings in accordance with the General Conditions of the Construction Contract.
- B. A description of all methods of jointing.
- C. All Certificates of Compliance.
- D. Provide Fabrication Schedule that shows:
 - a. Orientation and elevation of opening.
 - b. Section dimensions and assembly order.

1.4 SUPPLEMENTAL INFORMATION

- A. The Contractor shall provide certification that all frames and covers were manufactured in the United States.

PART 2 - PRODUCTS

2.1 PRECAST MANHOLE SECTIONS

A General

1. Risers and tops shall be precast reinforced or non-reinforced concrete, or cast-in-place reinforced or non-reinforced concrete.
2. Manhole bases shall be monolithic to a point 6 inches above the crown of the incoming pipe and shall be constructed of reinforced or non-reinforced concrete.
3. Use concrete that conforms to the requirements of Class A concrete in Section 520 of the N.H.D.O.T. Standard Specifications for manhole bases and cast-in-place manholes.
4. Use reinforcing steel for cast-in-place concrete that conforms to the requirements of the N.H.D.O.T. Standard Specifications for Billet-Steel Bars or Welded Steel Wire Fabric.
5. Construct pipe to manhole joints that are approved by the New Hampshire Department of Environmental Services – Water Division. In general, use approved non-shrinking mortar or elastomeric or mastic like sealants to ensure these joints are watertight.
6. Do not install manhole steps unless shown on the Drawings.
7. Minimum size for sewer manhole covers shall be 30 inches in diameter unless shown otherwise on the Drawings and have the letter "S" or the word "SEWER" in 3-inch letters cast into the top surface.
8. Minimum size for drain manhole covers shall be 30 inches in diameter unless shown otherwise on the Drawings and have the letter "D" or the word "DRAIN" in 3-inch letters cast into the top surface.
9. All castings shall be of good quality, strong, tough, even-grained ductile iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended.
10. Contact surfaces of covers and frame seats shall be machined at the foundry before shipment to prevent rocking of covers in any orientation.
11. All castings shall be thoroughly cleaned and subject to a careful hammer inspection.
12. Prior to being shipped from the foundry, castings shall be sandblasted.
13. Repair all coatings that have been damaged in transit or handling to the satisfaction of the Engineer.

B. Openings:

1. Provide openings in the risers to receive pipes entering the manhole.
2. Make openings at the manufacturing plant.
3. Size: To provide a uniform annular space between the outside wall of pipe and riser.
4. Location: To permit setting of the entering pipes at the correct elevations.
5. Openings shall have a flexible watertight union between pipe and the manhole base.
 - a. Cast into the manhole base and sized to the type of pipe being used.

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- b. Type of flexible joint being used shall be approved by the Engineer. Install materials according to the Manufacturer's instructions.
 - 1. Lock Joint Flexible Manhole Sleeve made by Interpace Corporation.
 - 2. Kor N Seal made by National Pollution Control System, Inc.
 - 3. Link Seal by Thunderline Corporation (Wayne, MI).
 - 4. Approved Equal.
- C. Joints:
 - 1. Joint gaskets to be flexible self-seating butyl rubber joint sealant installed according to manufacturer's recommendations. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.
Acceptable Materials:
 - a. Kent-Seal No. 2
 - b. Ram-Nek
 - c. Or equivalent.
 - 2. Joints between precast sections shall conform to related standards and manufacturer's instructions.
 - 3. All manholes greater than 6 ft. diameter and all manholes used as wet wells, valve pits and other dry-pit type structures shall be installed with exterior joint collars. The joint collar shall be installed according to the manufacturer's instructions. Acceptable materials:
 - a. MacWrap exterior joint sealer as manufactured by Mar-Mac Manufacturing Company.
 - b. Or equivalent.
- D. Waterproofing:
 - 1. The exterior surface of all manholes shall be given two coats of bituminous waterproofing material.
 - 2. The coating shall be applied after the manholes have cured adequately and can be applied by brush or spray in accordance with the manufacturer's written instruction.
 - 3. Sufficient time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.
 - 4. Drain manholes do not require exterior bituminous waterproofing.

2.2 FRAMES AND COVERS

- A. Standard Units:
 - 1. Dimensions and Style shall conform to the Drawings; Standard castings differing in non-essential details are subject to approval by the Engineer:
 - a. Covers - solid 3-inch letters diamond pattern.
 - b. Frame - 32-inch diameter clear opening, with flange bracing ribs.
 - c. Pamrex as manufactured by Certainteed
 - 2. Minimum weight of frame and cover shall be 269 lbs.
 - 3. Provide certification that Frames and Cover are "Made in USA".

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.

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2. Obtain the Engineer's approval of the type of waterstop and the installation.
 3. Cast all pipes entering the manholes in accordance with pipe manufacture recommendations.
- F. Drop Manholes:
1. No free drop shall be permitted at the pipe inlet.
 2. Where the vertical distance between inlet and outlet pipe inverts exceeds 24 inches, construct a drop manhole as shown on the Drawings.
- G. Adjustment to Grade: If necessary, adjust tops of manholes to grade, a maximum of 12 inches, with brick masonry.
- H. Set manhole frames with the tops conforming accurately to the grade of the pavement or finished ground surface or as shown on the drawings.
- I. Set frames concentric with the top of the masonry and in a full bed of mortar so that the space between the top of the manhole masonry and the bottom flange at the frame shall be completely filled and made watertight.
- J. Place a thick ring of mortar extending to the outer edge of the masonry all around and on the top of the bottom flange.
- K. Finish the mortar so that it will be smooth and have a slight slope to shed water away from the frame.
- L. When the work on each manhole is complete, clean the frame seat and set the cover in place.

3.2 LEAKAGE TESTS

- A. General:
1. Perform vacuum tests on all manholes.
 2. Exfiltration tests on manholes shall be performed in case of vacuum test failure or may be submitted as a substitution with approval by the Engineer.
 4. The Engineer shall observe tests.
 5. Repairs to manholes found to leak by any test method shall be performed both inside and outside the structure by a method approved by the Engineer.
- B. Preparation:
1. After manholes have been assembled in place, fill and point all lifting holes.
 2. If the manhole is to be backfilled before testing, fill those exterior joints within 6 feet of the ground surface with an approved non-shrink mortar.
 3. Test all manholes with pipes and or stubs installed. Testing with through pipes to be removed and replaces is not acceptable.
 4. Manholes in which the pipe to manhole connection is disassembled after testing shall be retested at the Contractors expense.
 5. Make the tests prior to placing the shelves and inverts and before filling and pointing the horizontal joints below the 6-foot depth line.
 6. Suitably plug all pipes and other openings into the manholes.
- C. Test Procedure: Vacuum
1. Use only an approved testing machine.
 - a. National Pollution Control, Inc.
 - b. Or equal.
 2. Securely brace all plugs.
 3. Check cone section to insure good seal with Test Machine Bladder.

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4. Bring test vacuum to 10 in. Hg gauge.
 - a. Time:
 - Manholes 0'-10' - 2 minutes
 - Manholes 10'-15' - 2.5 minutes
 - Manholes 15'-25' - 3 minutes
 - b. Allowable leakage is 1" Hg or less per times given.
 - c. If pressure drop exceeds 1" Hg in the required time, the manhole shall be repaired and retested.
 - d. If the manhole fails after being repaired, the manhole shall be "Water Exfiltration Tested" according to the criteria of the specification.
 5. When a leak is identified, repair the area from both inside and out by a method approved by the Engineer. Methods to be considered include parging with hydraulic cement and pressure application of polyurethane grout.
- D. Test Procedure: Water Exfiltration Test
1. Lower groundwater below the bottom of the manhole for the duration of the tests.
 2. Fill the manhole with water to the top of the cone section.
 3. If the excavation has not been backfilled and observation indicates no visible leakage (no water visibly moving down the surface of the manhole); the manhole may be considered to be satisfactorily watertight.
 4. If the test is unsatisfactory, in the opinion of the Engineer, or if the manhole has been backfilled, the test shall be continued.
 5. A period of time may be permitted, if the Contractor so wishes, to allow for absorption.
 6. At the end of the absorption time period, refill the manhole to the top of the cone, if necessary, and begin measuring an 8-hour test period.
 7. At the end of the test period, refill the manhole to the top of the cone and measure the volume of water added. This amount shall be extrapolated to a 24-hour rate and the leakage shall be determined on the basis of depth. The leakage for each manhole shall not exceed 1 gallon per vertical foot for a 24-hour period.
 8. If the test fails this requirement, but the leakage does not exceed 3 gallons per vertical foot per day, repairs by approved methods may be made, as directed or approved by the Engineer, to bring the leakage within the allowable rate of 1 gallon per vertical foot per day.
 9. Leakage due to a defective section or joint exceeding the 3-gallon per vertical foot per day shall be cause for the rejection of the manhole.
 10. Uncover all rejected manholes as necessary and disassemble, reconstruct or replace them as directed by the Engineer at no additional cost to the Owner.
 11. All manhole repairs shall be made inside and out.
 12. Retest repaired or replaced manhole and, if satisfactory, fill and finish interior joints.
- E. Backfilling:
1. Manhole testing may be conducted either before or after backfilling around the manhole. However, if the Contractor elects to backfill prior to testing, for any reason, it shall be at Contractor's own risk and it shall be incumbent upon the Contractor to determine the reason for any failure of the test.

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2. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc. It shall be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete.
 3. If the manhole test fails, lower the water table and carry out the exfiltration test specified above at no additional cost to the Owner.
- F. Accident Prevention: Following the satisfactory completion of the leakage test, place the frame and cover on the top, or provide other means of preventing accidental entry by unauthorized persons, children, animals, etc., until ready to make final adjustment to grade.

END OF SECTION

SECTION 02610

PIPE & PIPE FITTINGS - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. 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 EXAMINATION

- A. Provide all labor and equipment necessary to assist the Engineer to observe 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 provided by the City of Portsmouth Water Department, at no cost to the Contractor. However, the Contractor will 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 OBSERVATION

- A. Provide all labor necessary for the Engineer to observe pipe, fittings, gaskets, and other materials.
- B. Carefully observe all materials at the time of delivery and just prior to installation.
- C. Carefully observe all pipe and fittings for:
 - 1. Defects and damage.
 - 2. Deviations beyond allowable tolerances for joint dimensions.

3. Removal of debris and foreign matter.
- D. Examine areas and structures to receive piping for:
 1. Defects, such as weak structural components that adversely affect the execution and quality of work.
 2. Deviations beyond allowable tolerances for pipe clearances.
- E. All materials and methods not meeting the requirements of the Contract Documents will be rejected.
- F. Immediately remove all rejected materials from the project site.
- G. Start work only when conditions are corrected to the satisfaction of the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pipe:
 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. 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, studs 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 Bracing:
 - a. Provide joint bracing to prevent the piping from pulling apart under pressure as required.
 - b. Types of bracing:
 - (1) Field Lok 350™ Gasket by US Pipe for Ductile Iron Pipe.
 - (2) Thrust blocks of sufficient size in accordance with DIPRA and AWWA standards for thrust restraint.
 - (3) Mechanical joint ductile iron pipe shall have “Mega-lug Type” restrained ductile iron glands.
 - (4) 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.
 - (5) 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 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. 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 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 OBSERVATION

- A. Provide all labor necessary to assist the Engineer to observe pipe, fittings, gaskets, and other materials.
- B. Carefully observe all materials at the time of delivery and just prior to installation.
- C. Carefully observe all pipe and fittings for:
 - 1. Defects and damage.
 - 2. Deviations beyond allowable tolerances for joint dimensions.
 - 3. Removal of debris and foreign matter.
- D. Examine areas and structures to receive piping for:
 - 1. Defects, such as weak structural components, that adversely affect the execution and quality of work.
 - 2. Deviations beyond allowable tolerances for pipe clearances.
- E. All materials and methods not meeting the requirements of the Contract Documents will be rejected.
- F. Immediately remove all rejected materials from the project site.
- G. Start work only when conditions are corrected to the satisfaction of the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe & Fittings:

1. Type - Polyvinylchloride (PVC) plastic pipe with integral bell and spigot joints. Polymer compounding and classification shall be in accordance with ASTM D-1784 (Class 12454-B).
2. Gravity Sewers:
 - a. 4" - 15" nominal diameter sizes shall conform to ASTM D-3034 and SDR=35.
 - b. 18" - 36" nominal diameter sizes shall conform to ASTM F-679 (wall thickness T-1).
 - c. 42" - 48" nominal diameters shall conform to ASTM 794.
3. Pressure Sewers shall conform to ASTM D-2241 and D-1784, 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 D-3212 with push-on bell and spigot.
2. Gaskets shall conform to ASTM F-477.
3. Rubber rings for pressure sewer shall conform to ASTM D-1869 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

CORRUGATED POLYETHYLENE DRAINAGE TUBING (CPDT)

SECTION 02624CORRUGATED POLYETHYLENE DRAINAGE TUBING (CPDT)PART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install, anchor, support and test pipe and pipe fittings of the types and sizes in the locations shown on the Drawings and/or as directed by the Engineer.

1.2 QUALITY ASSURANCE

- A. Pipe shall be high density polyethylene (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 - PRODUCTS2.1 MATERIAL

- A. Resin
 - 1. Resin used in the manufacturing of pipe and fittings shall meet the requirements of cell class 424420C as defined in ASTM 3350.
 - 2. Carbon black content shall not exceed 5%.
- B. Pipe
 - Pipe shall be heavy duty corrugated polyethylene PE tubing, Type SP with Class 2 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 - EXECUTION3.1 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.

CORRUGATED POLYETHYLENE DRAINAGE TUBING (CPDT)

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.

END OF SECTION

CORRUGATED POLYETHYLENE (CPE) PIPE & FITTINGS

CORRUGATED POLYETHYLENE (CPE) PIPE & FITTINGSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install, anchor, support and test pipe and pipe fittings of the types and sizes in the locations shown on the Drawings and/or as directed by the Engineer.

1.2 QUALITY ASSURANCE

- A. Pipe shall be high density polyethylene (HDPE) conforming to the following standard referenced specifications:
1. AASHTO M252 (4" diameter through 10" diameter).
 2. AASHTO M294 (12" diameter through 60" diameter).
 3. ASTM: D1248 Polyethylene Moulding & Extrusion materials.
 4. ASTM D3350 Polyethylene Plastic Pipes and Fittings.
- B. Pipe and fittings shall be provided by a single manufacturer, and a certificate of compliance will be submitted to the Engineer for approval.

PART 2 - PRODUCTS2.1 MATERIALS

- A. General
1. The prescribed sizes of pipes are nominal inside diameters. Pipes shall be of the size and length shown on the plans.
- B. Smooth Interior Corrugated Polyethylene Pipe
1. The product supplied under this specification shall be high density polyethylene corrugated exterior/smooth interior pipe. Four (4)-inch to 10-inch shall conform to AASHTO #1252 Type 5. Twelve (12) - to 36 - inch diameters shall conform to AASHTO M294 Type S. Forty-two (42) and 48 - inch diameters shall have minimum pipe stiffness of 20 and 17 psi, respectively, at 5% deflection; and shall meet all other requirements of AASHTO M294.
 2. Material shall meet ASTM D1248 Type III, Category 4, Grade P33, Class C; or ASTM D3350 Cell Classification 324420C.
- C. Coupling Bands and Fittings
1. Coupling bands shall cover at least one full corrugation on each section of pipe. When gasketed coupling bands are required, the gasket shall be made of closed-cell synthetic expanded rubber meeting the requirements of ASTM D1056, Type 2. Gaskets shall be installed on the coupling band by the pipe manufacturer. All coupling bands shall meet or exceed the soil-tightness requirement of the AASHTO Standard Specification for Highway Bridges, section 23, paragraph 23.3.1.5.4(e).

CORRUGATED POLYETHYLENE (CPE) PIPE & FITTINGS

2. Furnish fittings of approved equal to the pipe and having connection configurations identical to that of the pipe.
 3. Pipe fittings shall conform to AASHTO M294.
- D. Drain Services
1. All drain services shall be 6-inch diameter, single walled, non-perforated, CPE tubing.
- E. Acceptable Manufacturers:
1. Hancor, Inc., Findlay Ohio
 2. Advanced Drainage Systems, Columbus Ohio
 3. Or equal.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Installation shall be in accordance with manufacturer's recommendations and as shown on the drawings.
- B. Prior to backfilling, exercise extra care to maintain water level in open excavation below the pipe invert to avoid flotation of pipe already set to line and grade.
- C. Flared end sections shall be fully supported.
- D. Stones larger than 3 inches in diameter shall not contact the pipe, fittings or appurtenances.

3.2 INSPECTION AND CLEANING

- A. Inspect all drain pipes in the presence of the Owner and the Engineer. All pipes not demonstrating uniform slope and alignment shall be replaced at no additional cost to the Owner.

END OF SECTION

SECTION 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:

COUPLINGS, CONNECTORS, CAPS & PLUGS

- (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,

COUPLINGS, CONNECTORS, CAPS & PLUGS

- (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 - EXECUTION3.1 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.

COUPLINGS, CONNECTORS, CAPS & PLUGS

- 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

RESILIENT-SEATED GATE VALVES & TAPPING SLEEVE AND VALVES

SECTION 02641RESILIENT-SEATED GATE VALVES & TAPPING SLEEVE AND VALVESPART 1 - GENERAL1.1 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.
- 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 - PRODUCTS2.1 RESILIENT-SEATED GATE VALVES

- A. Waterworks type NRS valves (AWWA C509, 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.

RESILIENT-SEATED GATE VALVES & TAPPING SLEEVE AND VALVES

- 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.

2.2 TAPPING SLEEVE AND VALVE ASSEMBLY

- A. Tapping Sleeve
 - 1. Body and Outlet: Type 304 or better stainless steel fully passivated welds to restore stainless characteristics.
 - 2. Flange: Type 304 or better stainless steel with recess to accept standard tapping valves. Flange shall conform to AWWA C207 Class D ANSI 150 lb. drilling.
 - 3. Bolts and Nuts: Type 304 stainless steel or better, coated to prevent galling.
 - 4. Lifter Bar: Type 304 or better stainless steel to provide a heavy bearing surface for nuts.
 - 5. Gaskets: Gridded virgin SBR or Buna-N compounded for water service ASTM D2000. Full gasket to give 360° pipe coverage.
 - 6. Rating: Tapping sleeve shall be rated for pressures equal to or greater than the pipe to which it is connected.
- B. Tapping Valve
 - 1. Tapping valves shall be resilient seated gate valves meeting the requirements of Paragraph 2.1 above and shall have the following additional features.
 - 2. The valve shall be furnished with a flange-end connection on one end and a mechanical joint end on the opposite end. The flange shall be furnished with an alignment ring to help ensure true alignment of the valve and tapping sleeve. The mechanical joint end shall be furnished in accordance with ANSI/AWWA C153/A21.53.
 - 3. All tapping valves shall include a minimum 3/8" NPT pipe plug on the bonnet of the valve body to aid in the field testing of the valve.

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.
- B. Tapping Sleeves and Valves:
 - 1. Tapping sleeves and valves shall be installed by an experienced crew trained to safely and properly install a tapping sleeve and valve on a live main.

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.

<u>Pipe Size</u>	<u>Class 50 Ductile Iron Pipe</u>	<u>Class 51 Ductile Iron Pipe</u>	<u>Class 52 Ductile Iron Pipe</u>
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 Superintendant in advance of the work based on the following:
 - 1. Observed water table >2' above the proposed invert of the pipe.
 - 2. Sufficient hydrostatic groundwater pressure to cause blowup of the trench bottom or sufficient to cause disturbance of the soil in the trench.
 - 3. Perched water table above the invert of the pipe that can be addressed by conventional trench dewatering methods, such as by sump or trench pumps will not require a well point system.

1.2 DESIGN AND PERFORMANCE RESPONSIBILITY

- A. The Contractor shall be solely responsible for the proper design and execution of methods for controlling surface water and pre-draining groundwater.
- B. Damage to properties, buildings or structures, sewers and other utility installations, pavements, sidewalks, and work resulting from the Contractor's dewatering operations will be the responsibility of the Contractor.
- C. Design review and field monitoring activities by the Engineer shall not relieve the Contractor from their responsibility for the Work.

1.3 SUBMITTALS TO THE ENGINEER

- A. Plan of proposed dewatering method including, the number, type, size, power supply and location of proposed dewatering units; schedule of operation; and method of disposal of water.
- B. Water level readings in observation wells, the well locations, well point tip elevation and elevation of water in the wells.
- C. Include provisions for the dewatering system in the Erosion and Sediment Control and Storm water Management Plan described in Section 02540 – Temporary Erosion Control.

1.4 SUBSURFACE CONDITIONS

- A. When available, locations of test borings and pits are shown on the Drawings. The boring logs are included in the Appendix of these Specifications.
- B. Variations in subsurface conditions should be anticipated by the Contractor when planning and estimating the work. Water levels can be expected to vary with season, precipitation and stages of nearby brooks and, therefore, water levels encountered at the time of construction may differ from any that are shown on the boring and test pit logs.

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

3.1 GENERAL

- A. Control surface water and pre-drain groundwater such that excavation to final grade is made in-the-dry, maintain undisturbed bearing soils and insure that softening and/or disturbance due to the presence of seepage of water does not occur.
- B. Perform all construction and backfilling in-the-dry. Flotation of completed portions of the Work is prohibited.

3.2 SURFACE WATER CONTROL

- A. Construct surface water control measures, including dikes, ditches, sumps and other methods to prevent, as necessary, flow of surface water into excavations.

3.3 EXCAVATION DEWATERING

- A. Construct all pipelines, concrete work, pipe bedding, and backfill in-the-dry. Excavate in-the-dry and not until the water level, as indicated by groundwater observation wells, is a minimum of six inches below the proposed bottom of final excavation within the trench limits.
- B. Provide and maintain, at all times during construction, proper equipment and facilities to promptly and adequately remove and dispose of all water entering excavations. Keep undisturbed subgrade foundation conditions until the fill, structure or pipes to be built thereon have been completed to such an extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.
- C. Conduct dewatering, at all times, in such a manner to preserve the natural undisturbed capacity of the subgrade soils at the bottom of excavations.
- D. Evaluate the impact of the anticipated subsurface soil/water conditions on the proposed method of excavation and removal of water.
- E. Where groundwater level is above the bottom of the proposed excavation level, install and operate a pumped dewatering system, including well points or closely spaced wells. Pre-drain the soils prior to final excavation, and maintain the lowered groundwater level until construction has been completed to such an extent that the structure, pipeline or fill will not be floated or otherwise damaged. The type of system, spacing of dewatering units and other details of the work will vary depending on soil/water conditions at particular locations.
- F. At least two weeks prior to the start of construction in any areas of anticipated dewatering, submit a proposed initial plan for removal of water, method of excavation and support of the excavation to the Engineer for review. Do not proceed with construction in any of these areas until the initial plan has been reviewed and commented upon by the Engineer. Concurrence by the Engineer with the Contractor's initial plan shall be the Engineer's agreement that the plan is satisfactory for initial trial. It is expected that the initial plan may need modifications to suit the variable soil/water conditions to be encountered along the route.

EXCAVATION DEWATERING

- G. Dewater and excavate in a manner which does not cause loss of ground or disturbance to the pipe bearing soil or soil supporting overlying or adjacent structures.
- H. Surround well points and other dewatering units with suitable filter sand to prevent fines from being removed by pumping.
- I. Pump the dewatering system continuously until pipe or structure is adequately backfilled, and provide stand-by pumps.
- J. Collect water entering the excavation from precipitation or surface runoff in shallow ditches around the perimeter of the excavation, drain to sump and pump from the excavation to maintain a bottom free from standing water.
- K. Dispose of drainage in an approved area so that backflow, pollution, or public nuisance will not occur.

3.4 TEMPORARY GROUNDWATER OBSERVATION WELLS

- A. The Contractor may install temporary observation wells to monitor groundwater during pipe installation
- B. The wells can be used to determine the effective dewatering techniques as required to achieve the objectives described in Paragraph 3.3 of this section.
- C. Temporary observation wells shall consist of a screened or slotted well point or riser pipe. The well point tip shall be placed at least two feet below the proposed bottom of excavation level.
- D. Contractor is responsible for dewatering as required whether monitoring wells are used or not.

END OF SECTION

SECTION 02651

FINAL SEWER TESTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. All sewers, manholes, and appurtenant work, in order to be eligible for approval by the Engineer, shall be subjected to tests that will determine the degree of watertightness and horizontal and vertical alignment.
2. Final sewer testing work includes the performance of testing and inspecting each and every length of sewer pipe, pipe joints and each item of appurtenant construction.
3. Perform testing at a time approved by the Engineer, which may be during the construction operations, after completion of a substantial and convenient section of the work, or after the completion of all pipe laying operations.
4. Provide all labor, pumps, pipes, connections, gages, measuring devices and all other necessary apparatus to conduct tests.

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

3.1 PERFORMANCE

A. General:

1. Thoroughly clean all sewer lines to be tested, in a manner and to the extent acceptable to the Engineer, prior to initiating test procedures.
2. Perform all tests and inspections only under the direct observation of the Engineer and the plumbing or building inspector and in accordance with the requirements of the local and State plumbing codes.
3. Prior to construction, inform the Engineer of the planned sewer testing pattern.
4. Remedial Work:
 - a. Perform all work necessary to correct deficiencies discovered as a result of testing and/or inspections.
 - b. Completely retest all portions of the original construction on which remedial work has been performed.
 - c. Perform all remedial work and retesting in a manner and at a time approved by the Engineer at no additional cost to the Owner.

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 be 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 (<u>inches</u>)	Minimum Time (<u>min</u>)	Length for Min. Time (<u>feet</u>)	Time for Longer Lengths* (<u>sec</u>)
4	1:53	597	.190L
6	2:50	398	.427L
8	3:47	298	.760L
10	4:43	239	1.187L
12	5:50	199	1.709L
15	7:05	156	2.671L
18	8:30	133	3.846L
21	9:55	114	5.235L
24	11:20	99	6.837L
27	12:45	88	8.653L
30	14:10	80	10.683L
33	15:35	72	12.926L
36	17:00	66	15.384L

*Applies to pipe runs greater than those listed in column 3.
L = Actual length of pipe being tested.

- 6. Test Results:
 - a. If the installation fails the low pressure air test, determine the source of leakage.
 - b. Replace all defective materials and/or workmanship and repeat low pressure test at no additional cost to the Owner.
 - c. Repairs shall only be made with prior approval of the Engineer in accordance with a method acceptable to the Engineer.
- C. Alignment Tests (Gravity Sewers):
 - 1. Perform tests for the correctness of horizontal and vertical alignment on each and every length of gravity sewer pipeline between manholes.
 - 2. 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 not less than thirty (30) days and not more than ninety (90) 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 in accordance with Uni-B-9 Table 4. The following values are based on the table:

Pipe Size	Base ID from Table 4 Uni-B-9-94 (in)	5% Deflection from Base ID (in)
4	3.864	3.680
6	5.725	5.452
8	7.637	7.273
10	9.525	9.071
12	11.312	10.773
15	13.828	13.170
18	16.923	16.117
21	19.956	19.006
24	22.6	21.524
27	25.446	24.234
30	28.35	27.000
33	31.249	29.761
36	34.106	32.482
39	37.003	35.241
42	39.88	37.981
45	42.762	40.726
48	45.639	43.466

- c. All PVC pipe is to be gauged and the results are to be recorded and the owner is to be provided written results.

- d. Limits of installed deflection for other flexible pipe materials shall not exceed the above for PVC.
- 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 1.5 times of the design operating total dynamic head or at a minimum of 100 psi.
 - 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 hydrostatic test being applied.
 - d. If the section fails to pass the hydrostatic test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test.
 - f. Tests shall be hydrostatic. Air tests shall not be allowed.
 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

DIVISION 3
CONCRETE

Scope of Work

Furnish, install and test all concrete work and appurtenant work in complete accordance with the Drawings and Specifications.

Contractor's Duties

Except as specifically noted, provide and pay for all labor, materials, equipment, tools, machinery, water, heat, other facilities and services necessary for proper execution and completion of the work.

Contents of Division

<u>Section No.</u>	<u>Section Title</u>
03000	Concrete – General
03300	Cast in Place Concrete and Flowable Fill
03305	Concrete Cradles, Arches, Encasements, Thrust Blocks.
03604	Non-Shrink Grout

SECTION 03000

CONCRETE - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install all concrete work of the type(s) and size(s) and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Testing:
 - 1. Have tests conducted as specified in the Concrete Testing Section of these specifications.
 - 2. Perform all concrete work in accordance with the latest ACI Code and Manual.

1.3 SUBMITTALS TO THE ENGINEER

- A. Shop Drawings:
 - 1. Submit shop drawings in accordance with the General Conditions of the Construction Contract.
 - 2. Submit schedules and detailed setting diagrams for all reinforcing steel.
 - 3. Submit copies of test results on all aggregates and on all mix design proportions for concrete strengths specified in this Division.
- B. Informational Data:
 - 1. Have informational data available on the site at all times as a standard of reference when applicable.
 - 2. Informational data shall consist of the latest edition of the P.C.A. Manual of Concrete Mix Design.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials to prevent damage of any nature.
- B. Store cement in undamaged condition with seals and labels intact as packaged by the manufacturer.
- C. Store cement in weathertight bins or buildings and keep cement dry at all times.
- D. Store aggregate in separate piles or bins and handle in a manner that will minimize segregation and prevent contamination.
- E. Protect anchors, ties, reinforcement and other hardware from the elements.

1.5 JOB CONDITIONS

- A. Wet Weather Protection:
 - 1. Do not place concrete during rain, sleet, or snow unless adequate protection is provided.
 - 2. Do not allow rain water or other weather conditions to damage the surface finish.
- B. Cold Weather Protection:

1. Do not place concrete in an ambient air temperature below 40 degrees F.
 2. When Work must be performed in temperatures below 40 degrees F, make approved provisions for heating materials and the completed work in accordance with A.C.I. 306.
 3. The minimum temperature of concrete as placed shall be 50 degrees F.
- C. Hot Weather Protection:
1. During hot weather conditions, place concrete in accordance with A.C.I. 305.
 2. Place concrete at a temperature which will not cause difficulty from loss of slump, flash set, or cold joints, usually somewhat less than 90 degrees F.
- D. Metal Protection: Paint metal to be in contact with mortar, concrete or other masonry materials with alkali-resistant coatings, such as heavy bodied bituminous paint.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials are specified in the appropriate sections of these Specifications.

PART 3 - EXECUTION

3.1 ACCEPTANCE OF STRUCTURE

- A. Work which meets all applicable requirements will be accepted without qualification.
- B. Work which fails to meet one or more requirements, but which has been repaired to bring it into compliance, will be accepted without qualification.
- C. Work which fails to meet one or more requirements and which cannot be brought into compliance may be accepted or rejected, as determined by the Engineer.
- D. Concrete failing to meet the strength requirements as stated in these Specifications may require additional curing as directed by the Engineer. Modifications may be required in the concrete mix design for the remaining concrete work, at no additional cost to the Owner.
- E. Formed surfaces larger or smaller than dimensional tolerances specified may be rejected. If the Engineer permits the Contractor to correct errors, such corrections shall be as directed and in such a manner as to maintain the strength, function and appearance of the structure.
- F. Concrete members cast in the wrong location may be rejected and shall be removed at no additional cost to the Owner.
- G. Inaccurately formed surfaces exposed to view may be rejected and shall be repaired or removed at no additional cost to the Owner.
- H. Finished flatwork exceeding specified tolerances may be repaired by grinding high spots or patching low spots with an approved epoxy grout.
- I. Concrete exposed to view with defects which adversely affect the appearance of the specified finish may be repaired, if possible. If, in the opinion of the Engineer, the defects cannot be repaired, the concrete shall be removed and replaced at no additional cost the Owner.
- J. The strength of the structures in place will be considered potentially defective if it fails to comply with any of the following requirements:
1. Low concrete strength as evaluated by the requirements of these Specifications.

2. Reinforcing steel size, quantity, strength, position or arrangement at variance with the Drawings.
3. Concrete which differs from the required dimensions or locations in such a manner as to reduce the strength.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE & FLOWABLE FILL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish and install the following, when applicable and as shown on the Drawings and as specified herein.
 - 1. Cast-in-place concrete, including building foundations, walls, slabs, beams, columns, equipment bases, conduit envelopes, concrete stair fill, and other concrete Work shown on the Drawings.
 - 2. Do all cutting, patching and repairing of concrete which may be required for proper completion of the work.
 - 3. **Place flowable fill into abandoned pipes/structures (minimum 85% of total void for pipes) where directed by the Owner or the Owner's Representative including narrative summarizing execution and verification of the work.**

1.2 REFERENCE SPECIFICATIONS

- A. "Specifications for Structural Concrete for Buildings" by the American Concrete Institute (ACI-301), latest edition.
- B. "Building Code Requirements for Structural Concrete and Commentary" (ACI-318), latest edition.
- C. NHDOT Standard Specifications for Road and Bridge Construction (Latest Edition)

1.3 SHOP DRAWINGS

- A. Submit complete shop drawings as stated in the General Conditions of the Construction Contract.
- B. Provide shop drawings for fabricating and placing reinforcing steel. Show all required information for cutting, bending and placing reinforcing bars and show all accessories and support bars on placing drawings. Indicate suitable marks for placing bars.
- C. Fabrication of any material or performing of any Work prior to the final approval of the shop drawings will be entirely at the risk of the Contractor.
- D. **For Flowable Fill: Provide narrative to Engineer prior to placement of flowable fill including the following:**
 - 1. **Sequence of placement including fill/pump points and vent locations.**
 - 2. **Method of verification that all voids (85% minimum for pipes) have been filled.**

CAST-IN-PLACE CONCRETE & FLOWABLE FILL

1.4 RELATED TRADES

- A. Notify all trades responsible for installing chases, inserts, sleeves, anchors, louvers, etc., when ready for such installation, and for final checking immediately before concrete is placed.
- B. Leave openings in walls for pipes, ducts and other items for mechanical and electrical work, as shown on the Drawings, or required by layout of mechanical and electrical systems.

PART 2 - PRODUCTS2.1 MATERIALS FOR CONCRETE

- A. Cement: Portland cement - ASTM Specification C-150, Type II.
- B. Aggregates:
 - 1. Coarse aggregate: Hard, durable, uncoated crushed stone or gravel conforming to ASTM, Specification C-33 and shall pass through sieves 1-1/2 inch.
 - 2. Fine aggregate: Sand, clean, hard, durable, uncoated grains, free from silt, loam, and clay, to meet ASTM Specification C-33.
- C. Water: Potable from the local municipal supply.
- D. Admixtures:
 - 1. High range water Reducing Agent, ASTM 494 Type F or G, (superplasticizer) by same manufacturer as air-entraining agent.
 - a. Daracem 100 by Grace Construction Products
 - b. Sikament by Sika Corporation
 - c. Or approved equal.
 - 2. Water Reducing Agent, ASTM 494 Type A, by same manufacturer as air-entraining agent.
 - a. WRDA with HYCOL by Grace Construction Products
 - b. Plastocrete 161 by Sika Corporation
 - c. Or approved equal.
 - 3. Air-Entraining Agent, ASTM C-260, to be used to obtain percent air-entrainment specified unless obtained by cement used.
 - a. "Daravair 1000" by Grace Construction Products
 - b. Sika AER by Sika Corporation
 - c. Or approved equal.
 - 4. Water Reducing, Retarding Admixture, ASTM 494 Type D.
 - a. Daratard 17 by Grace Construction Products
 - b. Plastiment 161 by Sika Corporation
 - c. Or approved equal.
 - 5. Non-Corrosive, Non-Chloride Set Accelerating Admixture, ASTM 494 Type C, by same manufacturer as air-entraining agent.
 - a. Polarset by Grace Construction Products
 - b. Sikaset NC by Sika Corporation
 - c. Or approved equal.

CAST-IN-PLACE CONCRETE & FLOWABLE FILL

6. No other admixtures may be used without written approval by the Engineer.
 7. Calcium chloride will not be permitted.
- E. Joint Sealer: Furnish and install as specified in these Specifications.
- F. Floor Hardener: Apply to concrete floors to remain exposed and not receiving floor cover.
1. "Lapidolith" by Sonneborn Building Products,
 2. "Hornlith" by A.C. Horn Company,
 3. "Saniseal 5" by Master Builders Company,
 4. Or approved equal.
- G. Moisture Barrier:
1. Black polyethylene film extruded onto both sides of high quality kraft paper and laminated with asphalt to rot and fungus resistant kraft paper. Kraft paper shall have crossed reinforcing fibers which are embedded in asphalt laminent for high resistance to puncturing and tearing during the application.
 2. Moistop, Grade 395.
 3. Or approved equal.
- H. Perimeter and Under Slab Insulation as specified in Division 7.
- I. **Flowable Fill materials shall be in accordance with Section 520.2 of the NHDOT Standard Specifications for Road and Bridge Construction (latest edition).**

2.2 STORAGE OF MATERIALS

- A. Store all materials to prevent damage from the elements and other causes.
- B. Store cement and aggregates in such a manner as to prevent deterioration or intrusion of foreign matter. Do not use any materials which have deteriorated, or which have been damaged, for concrete.
- C. Store reinforcing steel on wood skids to protect it from weather, oil, earth and damage from trucking or other construction operations. Reinforcement shall be free from loose mill scale, rust, from oil, concrete spatter and other extraneous coatings at the time it is embedded in the concrete.
- D. Store all forms in a neat manner and orderly fashion, protected from the weather and abuse.
- E. Do not store materials which, in the opinion of the Engineer, are not acceptable for the Work and immediately remove them from the site.

2.3 CONCRETE MIXTURES

- A. Strength, cement, and water requirements:

Use	Min.Strength @28 day-psi	Max.Size Coarse Agg.	% Air (+/-1%)	Min.-Max Slump	Min Cem.Fac.	Max W/C
Concrete	4,000	3/4"	5	2"- 4"	---	0.40
Concrete	3,000	3/4"	5	2"- 4"	---	0.45
Concrete	2,000	3/4"	5	1"- 3"	---	0.55

CAST-IN-PLACE CONCRETE & FLOWABLE FILL

- B. If a pumping process is utilized to convey concrete, established concrete mixtures may require increased proportion of cement and fine aggregate and a decreased proportion of coarse aggregate, but these mixtures may not be altered more than:
1. Cement plus 20 lbs./cu.yd.
 2. Fine Aggregate plus 50 lbs./cu.yd.
 3. Coarse Aggregate minus 50 lbs./cu.yd.
- C. Concrete shall contain specified admixtures.
- D. Flowable fill shall be mixed using the approximate proportions described below (per cubic yard):**

Type II Portland Cement	20 lb.
Ground Granulated Blast 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

CAST-IN-PLACE CONCRETE & FLOWABLE FILL

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

CAST-IN-PLACE CONCRETE & FLOWABLE FILL

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.

CAST-IN-PLACE CONCRETE & FLOWABLE FILL

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.

CAST-IN-PLACE CONCRETE & FLOWABLE FILL

- 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

DIVISION 4
MASONRY

Scope of Work

Furnish, install and test all masonry work and appurtenant work in complete accordance with the Drawings and Specifications.

Contractor's Duties

Except as specifically noted, provide and pay for all labor, materials, equipment, tools, machinery, water, heat, other facilities and services necessary for proper execution and completion of the work.

Contents of Division

<u>Section No.</u>	<u>Section Title</u>
04000	Masonry - General
04201	Manhole Brick Masonry (NH)

SECTION 04000

MASONRY - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
 - 1. Furnish and install concrete masonry units, block reinforcing, ties, anchors, inserts, nailing blocks and appurtenant Work as shown on the Drawings and as specified herein.
 - 2. Clean and remove surplus material and waste.
- B. Other Work Included (When Applicable):
 - 1. Furnish and install:
 - a. Receivers or reglets for flashings.
 - b. Door frames, window frames and lintels with anchors.
 - c. Electrical panel boxes, conduit, grounds and electric fixtures to be set in masonry.
 - d. Miscellaneous hardware including sleeves, anchors, vents, grills, access panels, etc. to be set in masonry.
 - e. Leveling plates, anchor bolts and similar items requiring building into the masonry work.

1.2 REFERENCE STANDARDS

- A. Comply with the following codes for all materials, methods, and workmanship, not otherwise specified.
 - 1. The National Concrete Masonry Association Standard "Specifications for the Design and Construction of Load Bearing Concrete Masonry".
 - 2. "Recommended Practices for Cold Weather Masonry Construction" by the International Masonry Industry All-Weather Council.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Mortar and Joint Materials:
 - 1. Cement - An approved brand of domestic Portland cement, conforming to ASTM C150-02a, Type 1.
 - 2. Sand - Clean, washed, uniformly well-graded, conforming to ASTM C144-03, 100 percent passing a No. 8 sieve with not more than 35 percent passing a No. 50 sieve and with a fineness modulus maintained at 2.25 plus or minus 0.10. Sand shall be light in color and obtained from a single source.
- B. Mortar Mixes:
 - 1. General - In proportioning volumetric mixes, one (1) 94 pound sack of Portland cement and one (1) 50 pound sack of hydrated lime each shall be assumed to

constitute a nominal one (1) cubic foot. For mortar below the exterior grade, reduce lime proportion of (1/4) 50 pound sack.

2. Lime - Approved brand of plastic hydrated, such as New England 4X, conforming to ASTM Specification C207-91(1997), Type "S".
 3. Mortar Colorant (for joints of face brick) - SGS pigments, or approved equal, in color as approved by the Engineer.
 4. Integral Waterproofing for All Exterior Mortar - Rheomix Rheopel, as manufactured by Master Builders Inc., "Drycrete" as manufactured by C.G. Pardee Co., Inc., or approved equal.
 5. Weepholes - Clear plastic tubing, 3/8 inch o.d., by 4 inches long.
 6. Compressible Filler - Rigid glass fiber board, 6 pounds p.c.f. density, 25 percent thicker than joint width.
 7. Waterstops for Control Joints - Extruded rubber, Hohmann and Barnard standard type, or approved equal.
- C. Reinforcement Anchors, Ties and Dowels:
1. Continuous Horizontal Reinforcement for All Exterior Cavity Type Masonry - Truss design, 9 gauge galvanized wire, with all cross members having a V drip over cavity locations of walls where same occurs, in overall width 1-5/8 inches less than the overall wall thickness. Provide preformed reinforcing section at intersections of masonry walls and partitions and whenever walls and partitions change direction. Reinforcement shall be Dur-O-Wal, Hohmann Tru-Mesh, or approved equal. Vertical reinforcement shall be deformed bars with size and spacing as shown on the Drawings.

2.2 DELIVERY, STORAGE & HANDLING

- A. Deliver, store and handle materials to prevent damage of any nature.
- B. Store material off the ground to prevent contamination by mud, dust or materials likely to cause staining or other defects.
- C. Cover and protect all materials from the elements.

2.3 EXECUTION

- A. Masonry work in general.
 1. Do not deliver cement, lime and similar perishable materials to the site until suitable storage is available. Store such materials in weatherproof structures, and ensure that materials are in perfectly fresh condition when ready for use.
 2. Perform all masonry work with skilled workmen under adequate supervision, and erect all masonry true to lines and levels with joints of uniform thicknesses, all surfaces true, and corners straight and plumb. Lay exposed-to-view masonry block units with an individual unit-to-unit level tolerance not exceeding 1/8 inch and an overall tolerance from true level not exceeding 1/4 inch in 10 feet in any direction. Lay no unit having chipped edges or face in exposed-to-view locations. Remove any such unit, if installed and replace with a new undamaged unit.

3. Examine all Drawings for locations of masonry requiring patching and as required for the accommodation of work of other trades. Provide all required recesses, chases, slots, cutouts, and built-in items, for the accommodation of heating and plumbing pipes, bearing plates, and set loose lintels. Place anchors, bolts, sleeves and other items occurring in the masonry work. Take precautions to minimize future cutting and patching.
- B. Cold Weather Protection:
1. Do not construct masonry in an ambient air temperature below 40 degrees F.
 2. When work is permitted by the Engineer in temperatures below 40 degrees F., make approved provisions for heating and drying materials and protecting the completed work. Heat the materials and maintain a temperature above 50 degrees F. Maintain a minimum temperature of 50 degrees F. on both sides of masonry work for a period of 48 hours or more for type M or type S mortar and 72 hours or more for Type N or Type O mortar. Reduce time periods to 24 and 48 hours respectively, when using high-early-strength cement.
 3. Do not use any material which is frozen or covered with frost or snow.
- C. Hot Weather Protection: Protect masonry work from direct exposure to wind and sun when in an ambient air temperature of more than 90 Degrees F. with a relative humidity less than 50 percent.
- D. Wet Weather Protection:
1. During construction, keep all walls, including partially completed walls not being worked on, dry by covering with a strong waterproof membrane at the end of each day or shutdown period. The membrane shall have a 2 foot minimum overhang on each side of each wall and shall be securely anchored.
 2. Do not allow rain water to increase the amount of the mixing water.
- E. Metal Protection: Metal in contact with mortar or other masonry materials should be painted with alkali-resistant coatings such as heavy bodied bituminous paint.
- F. Batching and Mixing:
1. Proportions:
 - a. For bricks: Mix one part masonry cement 2-1/2 parts sand by volume.
 - b. For concrete masonry units: Mix one part portland cement with 0.25 (25%) part hydrated lime and three parts sand.
 2. Measurement:
 - a. Measure accurately by volume in boxes construction for this purpose. Do not measure by shovel.
 - b. Accurately and uniformly control the quantity of water.
 3. Method:
 - a. Machine mix mortar in a suitable mixer.
 - b. Mix five minutes or more; two minutes for mixing dry materials and three minutes after adding water.
 4. Consistency:
 - a. Add enough water to produce a consistency for satisfactory workability for the material being set in the mortar.
 - b. Mix batches that can be used within two hours after the initial mixing.

- c. Do not retemper mortar in the mortar box.
 - d. Do not use mortar that has greatly stiffened or has started to set.
- G. Reinforcement and Anchorage:
- 1. Install specified continuous reinforcement in all masonry walls, partitions, and in chimney walls, spacing the reinforcing not more than 16 inches on centers, vertical dimension, commencing one course above supporting concrete. Install additional reinforcement over all exterior and interior openings in first joint above opening and extending 36 inches beyond each side of opening. Lap all reinforcement 6 inches minimum. Install preformed units at intersections of all masonry walls and partitions and wherever walls and partitions change directions.
- H. Construction:
- 1. Assist the waterproofing subcontractor and the roofing and flashing subcontractor to install their flashings. Provide soft mortar bed above and below flashings which penetrate the masonry.
 - 2. Clean all receiving surfaces of masonry units free from any loose dry mortar, cement dust, oil and any other matter which might otherwise interfere with the bond of the insulation adhesive.
 - 3. Use same mortar mixture used for laying masonry units wherever cavity in exterior walls is indicated to be filled with mortar.

END OF SECTION

SECTION 04201

MANHOLE BRICK MASONRY (NH)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish all materials and perform manhole masonry Work to construct manhole shelves, inverts and grade adjustments as shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Perform brick masonry work in conformance with the New Hampshire Water Supply and Pollution Control Division 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. 4.5 parts sand.
 2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1"3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.
- C. Cement:
1. Type II Portland Cement.
 2. ASTM C-150, Standard Specifications for Portland Cement.
- D. Hydrated Lime:
1. Type S.
 2. ASTM Standard Specifications for Hydrated Lime for Masonry Purposes, Designation C207.
- E. Sand:
1. Inert and natural.
 2. ASTM Standard Specifications for Concrete (Fine) aggregates, Designation C33 as follow:

Grading:

<u>Sieve</u>	<u>Percent Passing</u>
#3/8	100
4	95-100
8	80-100
16	50-85
50	10-30
100	2-10

Fineness Modulus 2.3 - 3.1

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Laying Brick:

1. Use only clean bricks.
2. Moisten all bricks by suitable means until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
3. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond.

B. Curing:

1. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
2. Protect brick masonry from the weather and frost as required.

END OF SECTION

DIVISION 16
ELECTRICAL

Scope of Work

Furnish, install and test all electrical 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>
16402	Electrical Work

SECTION 16402

ELECTRICAL WORK

PART I – GENERAL

1.01 RELATED DOCUMENTS

- A. Electrical design components and details shown on the Drawings also apply to work of this section.
- B. The Contractor must be familiar with all other Sections of the specifications and the associated Drawings, which affect the scope of work. Where paragraphs of this Section conflict with similar paragraphs elsewhere, the more stringent requirements shall prevail.

1.02 DESCRIPTION OF WORK

- A. The Contractor shall furnish a complete finished product, which meets all applicable codes and standards, and the intent and specific requirements of the Drawings and specifications for this project. It is the intent of these specifications that the electrical system shall be suitable in every way for the service (and use) required. All materials and all work, which may be reasonably implied as being incidental to the work of this Section, shall be furnished at no extra cost to the Owner.
- B. As used in this Section, “*provide*” means “furnish and install”, “*furnish*” means “to purchase and deliver to the project site complete with every necessary appurtenance and support”, and “*install*” means “to unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project”.
- C. Perform work and provide (furnish and install) material and equipment as shown on Drawings and as specified, or indicated, in this Section of the specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation. Drawings and specifications form complimentary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both. When incidental work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation.
- D. Remove all debris caused by Contractors’ work.

- E. Provide demolition and relocation of existing electrical items as shown on the drawings.
- F. The work under this section shall require that the Contractor provide all labor, materials, equipment, tools, supplies and transportation involved in the installation of electrical equipment as specified.
- G. The work to be done under this contract generally includes, but is not limited to the following:

Electrical System

1. Provide new conduit and handhole system for outdoor electrical work, in locations as shown on Contract Drawings. Provide precast concrete electric handholes (14"x14"x24") in locations as shown and "Electric" logo on cover rated for H-20 loading.
2. Provide new 16" diameter x 42" high light pole pre-cast or cast in place concrete bases for new proposed decorative lighting poles in locations and quantities as shown on Contract Drawings. Precast foundations to be reinforced with wire and bolt patterns shall be as shown on Contract Drawings, to match City-standard light poles.
3. Install new decorative light poles and fixtures, along with necessary accessories in quantities and locations as shown on Contract Drawings.
4. Provide conduit and cabling for outdoor lighting between fixtures, hand holes, etc.
5. Conduits outside below grade to be PVC Schedule 40 under sidewalks, schedule 80 under roadways and rigid steel for 5' on either side of new light base. Conduit sizes as indicated on Contract Drawings. Provide all necessary grounding, including ground rods at each light pole foundation if required by NEC or local authorities.
6. Provide startup services for new lighting system.
7. Provide other associated electrical equipment necessary for a complete system, shown, or implied in these Specifications and on Contract Drawings.

1.03 SITE VISIT

- A. Each bidder shall visit the site of the proposed work and fully acquaint himself with the conditions there relating to construction and labor, and should fully inform himself as to the facilities involved, and the difficulties and restrictions attending the performance of the Contract. The Bidder should thoroughly examine and familiarize himself with Drawings, Technical Specifications and all other Bid and Contract Documents. The Contractor, by the execution of the Contract, shall in no way be relieved of any obligation under it due to his failure to receive or examine any form or legal document or to visit the site and acquaint himself with the conditions there existing and the Owner will be justified in rejecting any claim thereof.

1.04 GUARANTEE

- A. Guarantee work of this Section in writing for one year from date of Owner's acceptance. Repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to Owner's satisfaction and correct damage caused in making necessary repairs or replacements under guarantee with no extra cost to Owner. Contractor shall transfer all equipment warranties for all systems to Owner.

1.05 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Perform work strictly as required by rules, regulations, standards, codes, ordinances, and laws of local, state, and federal government, and other authorities that have lawful jurisdiction.
- B. All materials and installations shall be in accordance with the latest edition of the National Code, and all applicable local codes and ordinances. Materials and equipment shall be listed by Underwriters Laboratories (UL). Special Attention shall be paid to the latest edition of the following standards:

American National Standards Institute (ANSI)
American Society for Testing & Materials (ASTM)
Illuminating Engineering Society (IES)
Institute of Electrical & Electronics Engineers (IEEE)
Insulated Cable Engineers' Association (ICEA)
National Electrical Code (NEC)
National Electrical Manufacturer's Association (NEMA)
National Electrical Safety Code (NESC)
InterNational Electrical Testing Association (NETA)
National Fire Protection Association (NFPA)
Occupational Safety & Health Administration (OSHA)
Underwriter's Laboratories, Inc. (UL)

- C. The above listed codes and standards are referenced to establish minimum requirements and wherever this Section requires higher grades of materials and workmanship than required by the listed codes and standards, this Section shall apply. In the event a conflict occurs between the above listed codes and standards and this Section, the more stringent requirement shall govern.

1.06 SUBMITTALS

- A. Within 10 days after Award of General Contract, submit shop drawings and product data on below listed items for approval. Submit copies as requested.
- B. List of electrical equipment and materials requiring shop drawings:
1. Concrete Products and Light Bases
 2. Hand holes
 3. Lanterns
 4. Light Poles

1.07 CODE INSPECTIONS AND PERMIT FEES

- A. Obtain all necessary permits and licenses, file necessary plans and pay all fees for permits and inspections. Permit fees are the responsibility of the Contractor as part of his bid, as is all coordination as fees with the local utility. Contractor is also responsible for obtaining any site-specific utility requirements for this project prior to the start of construction and notifying local utility for all inspections prior to backfilling, etc.

1.08 INTERPRETATION OF DRAWINGS

- A. Drawings are diagrammatic and indicate general arrangement of systems and work included in Contract. Drawings are not intended to specify or show every offset, fitting or component; however, Contract Documents require components and materials whether or not indicated or specified as necessary to make installation complete and operational.
- B. Any work installed contrary to, or without review by, the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed for making these changes.
- C. Circuit layouts are not intended to show the number of fittings, or other installation details. Additional circuits shall be installed wherever needed to conform to the specific requirements of the equipment or local codes.

- D. As work progresses and for duration of Contract, maintain complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately, including work installed as a modification or addition to the original design

PART II – MATERIALS & PRODUCTS

2.01 GENERAL

- A. Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the National Electric Code (NEC), and all local codes.
- B. Materials shall be manufactured in accordance with the standards indicated in this Section, and typical industry standards and codes for the products specified. Materials and equipment shall be Underwriter's Laboratory (UL) listed.
- C. The materials used shall be new, unused, and of the best quality for the intended use. All equipment shall have the manufacturer's name, address, model or type designation, serial number and all applicable ratings clearly marked thereon in a location which can be readily observed after installation. The required information should be marked on durable nameplates that are permanently fastened to the equipment.
- D. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored outside exposed to the elements. If any equipment or apparatus is damaged, such damage shall be repaired at no additional cost, or replaced at no additional cost as directed by the Engineer.

2.02 RACEWAYS

- A. Rigid Metallic Conduit: UL6 and ANSI C80.1.
- B. Flexible Metallic Conduit: UL1. Liquidtight® flexible metal conduit shall be used in wet locations.
- C. Polyvinyl Chloride (PVC) Conduit, electrical, gray, Schedule 40 or 80 as specified, meeting the requirements of UL 651 and NEMA TC-2. If concrete encasement is required, a minimum of 3,000 psi concrete shall be used.
- D. Minimum size of conduit shall be 2". Unless indicated on Drawings, conduit sizes can be sized in accordance with National Electric Code (NEC). Conduit bends shall not have kinks or flats, and shall not be less than standard radii.

- E. Rigid Galvanized Steel (RGS) conduit shall be used for 5' to entrance and exit of each light pole, except where noted. Conduit shall be fully threaded at both ends and each length shall be furnished with one threaded coupling. All 90 degree conduit sweeps shall be RGS for all entry and exit into concrete pads and at riser poles, with ground bushings connected to new grounding with minimum #4Awg ground wire for conduit grounding bushings.
- F. Expansion fittings shall be provided on all conduits as required by the 2008 National Electrical Code, and as required by local and state codes. This includes, but is not limited to, vertical conduit risers coming from below-grade.

2.03 WIRE AND CABLE

- A. Unless otherwise noted, conductors for power, lighting, and grounding *above grade* shall be No. 12 through No. 2 AWG, NEC type THWN/THHN, meeting the requirements of UL 83. Conductors for power and lighting shall be no smaller than No. 12 AWG. **All underground pole to pole conductors shall be No. 8 (or larger if required based on voltage drop calculations).**
- B. Where required by code, conductors for power, lighting, grounding, and control *below grade* (and in wet locations) shall be No. 2 AWG and larger, NEC type XHHW (or XHHW-2), meeting the requirements of NEMA WC7 and ICEA S-66-524.
- C. All conductors shall be annealed copper, 98% conductivity, Class B stranded, except conductors used for power and lighting circuits No. 10 AWG and smaller which may be solid. All conductors should be rated for 600 volts or less, with a thermal rating of 90° C.
- D. The outside covering of all wiring for power, lighting, grounding, and control uses shall be color coded to identify polarity.

2.04 WIRE AND CABLE CONNECTORS AND DEVICES

- A. Wire and cable connectors and devices shall meet the requirements of UL 486. Connectors, including miscellaneous nuts, bolts, and washers shall be silicon bronze. Ferrous materials shall not be used. All connectors below grade shall be water-proof secondary type, gel-filled, bolted submersible connectors (gel-port style). No "wire-nuts" are allowed to be used below grade. **All electrical connections shall be coated in anti-corrosive grease.**

2.05 BOXES

- A. Pull Boxes, Junction Boxes, and Equipment Enclosures: NEMA ICS 6.
- B. Pull boxes, junction boxes, and equipment enclosures shall be of NEMA Type 1 construction for indoor use, and NEMA Type 3R construction for outdoor or wet location use, unless otherwise noted.
- C. Box sizes shall not be less than that required by the National Electrical Code.

2.06 WARNING TAPE

- A. Warning tape shall be six (6) inches wide, polyethylene not less than 3.5 mil thick with a minimum strength of 1,500 psi. Install 12 inches below final grade. Tape shall be red for electric conduit, and red or yellow for communication conduit. Tape shall have black lettering on two lines as indicated below:
- B. For Electric conduit:

<u>CAUTION</u>	<u>CAUTION</u>	<u>CAUTION</u>
BURIED	ELECTRIC LINE	BELOW

2.07 ELECTRIC HANDHOLES

- A. Electric Handholes are to be precast concrete and provided in the dimensions as shown on the Contract Drawings. Handhole size as indicated on Contract Drawings.
- B. Handholes shall be provided with skid-resistant cast iron surface covers, with an “Electric” logo. Handholes and Covers shall be design for street-rated, heavy duty applications, meeting the requirements of the either: AASHTO HS-20 loading, with a minimum design load of 15,000 lbs for both the handhole box and cover. . Handholes shall meet the requirements of the latest edition of the National Electric Code (2008 or later) with regards to structural integrity, installation methods, grounding of the cover and metallic parts, etc.
- C. A layer of 6-inches of crushed rock shall be installed below and in the bottom of each handhole to assist with drainage, and this compacted gravel base material shall extend out beyond the sidewalls of the handhole. Conduits shall sweep up and be at least 4-inches above top of crushed rock layer.
- D. Handhole size to be 14”W x 14”L x 24”D minimum for this project.

2.08 FOUNDATIONS FOR LIGHTING POLES

- A. Provide approved precast foundations, and other devices as necessary and as required.
- B. Foundations for 14-foot light poles shall be as shown on Contract Drawings, including number, type and location of anchor bolts. Foundations shall be made of minimum 5,000 psi concrete (at 28 days) and have steel reinforcement meeting ASTM A-615, grade 60 (cover to steel, 1" minimum). Foundations shall have 2-2" RGS conduits for lighting circuits, 180 degrees apart. Foundations to be installed with the top of the concrete approximately 1/2" inch above final grade. Foundation minimum size is 16" diameter x 3'-6" in length. Conduits to be flush with top of concrete to not interfere with anchor bolts or pole base.
- C. Pole to base connection threads shall be coated in 'blue' removable type Loctite or approved equal.

2.09 DECORATIVE LIGHTING

- A. Install light poles and fixtures in quantities and locations as shown. Pole to be Spring City "Hancock", Ductile Iron, in both the 10-foot 2 inch and 9 foot 2 inch sizes, with 12-inch bolt circles. All fasteners for the access panels of the poles shall be coated in never-seize grease.
- B. Fixture is Newstamp RUS-TUR-177 "PORTSMOUTH" in the 48" and 44" sizes. Fixture is 120V.

PART III – EXECUTION

3.01 GENERAL

- A. This Section covers the requirements for installation of materials, proper workmanship, testing, cleaning, grounding, and work methods to be followed by the Contractor. This Section also includes specific instructions and to be used in conjunction with the contract Drawings. Any discrepancies noted between the specification, Drawings, and actual installation shall be reported immediately to the Owner, Engineer, and Architect. Failure on the part of the Contractor to report discrepancies immediately will be considered negligent and Contractor will be responsible for correcting actions at no cost to Owner.
- B. Contractor is responsible for coordinating work with other trades, Owner, and Architect's schedule. Work will be coordinated such that systems can be properly located, and conflicts and delays are avoided. Contractor shall consider commencement of work acceptance of existing conditions.

3.02 MATERIALS AND WORKMANSHIP

- A. Work shall be executed in workmanlike manner and shall present neat, rectilinear and mechanical appearance when completed. Do not run raceway exposed unless shown exposed on Drawings. Material and equipment shall be new and installed according to manufacturer's recommended best practice so that complete installation shall operate safely and efficiently.

3.03 CONTINUITY OF SERVICES

- A. Do not interrupt existing services without Owner's, Utilities, Engineer's and Architect's approvals.

3.04 TESTING, INSPECTION AND CLEANING

- A. Test lighting fixtures with specified lamps in place for 100 hours. Replace lamps that fail within 90 days after acceptance by Owner at no extra cost to Owner (no exceptions).
- B. Provide necessary testing equipment and testing services.
- C. Failures or defects in workmanship or materials revealed by tests or inspection shall be corrected promptly and retested. Replace defective material.

3.05 WIRING METHODS

- A. Install wire and cables in approved raceways as specified and as approved by authorities that have jurisdiction.
- B. Run concealed conduit in as direct lines as possible with a minimum number of bends of longest possible radius. Run exposed conduit parallel to or at right angles to building/field lines. Bends shall be free from dents or flattening. The exact locations and routing of conduit shall be determined by the Contractor subject to the approval of the Owner and Engineer.
- C. Polarity of all electrical connections shall be observed in order to preserve phase relationship in all feeders and equipment.
- D. Splices shall be made in neat, workmanlike manner using approved mechanical connectors. After splicing, insulation equal to that on the spliced wires shall be applied at each splice. Splices are permitted only in junction boxes, outlet boxes, or other permanently accessible locations. Splices installed in electric handholes shall be weather and waterproof, pre-molded polymer splices. Hand taping of splices below-grade is not acceptable.

3.06 GROUNDING

- A. Bond and ground equipment and systems connected under this Section in accordance with standards of the NEC and other applicable regulations and codes.
- B. Copper fittings for ground connections shall conform to the requirements of ASTM B 30. All bolts, u-bolts, cap screws, nuts, and lock washers for copper fitting shall be of approved corrosion-resisting material. Compression connectors required for all below-grade grounding connections. Exothermic (cad-weld) connectors are also acceptable for use below grade. The use of bolted grounding and ground rod connectors below grade is not acceptable.
- C. Ground Rods shall be 5/8" diameter and 8' in length, as required by applicable codes (NEC, NESC). All wire used for grounding shall be no smaller than #4 Awg copper, stranded conductor.

3.07 INSTALLATION OF LIGHTING FIXTURES

- A. Verify construction of light pole foundations is suitable, and provide fixtures, poles, hardware, and other accessories suitable for construction encountered.
- B. Coordinate installation of fixtures with installation of surrounding materials and landscaping (if applicable). Investigate lighting fixture locations and foundation supports to ensure that no interference exists between lighting fixtures, supports, and other equipment including that provided by other trades. Report any possible interference's to the Engineer.

3.08 EXECUTION – INSTALLATION OF ELECTRICAL EQUIPMENT

- A. Contractor to Provide (furnish & install) all items as indicated as Contractor-furnished and install all items as indicated as City-furnished, and all necessary minor and expected accessories.
- B. Contractor to meet with local wiring inspector prior to the start of any work and obtain any local site requirements and restrictions, which must be followed. Contractor shall also meet with local utility, any other Town/City officials, as directed by Owner and wire inspector, prior to the start of work, or ordering of materials. Failure to meet with the local officials and utility prior to ordering materials and start of construction will be considered negligent and all necessary corrections resulting from this failure will be at no cost to Owner.
- C. Provide, furnish and install all products and work outlined in this Specification.
- D. Provide all grounding of electrical lighting. Grounding to be installed per installation details and National Electrical Code.

- E. Balance the lighting, or electrical load evenly on all circuits and on all phases of each circuit.
- F. Provide new hand holes and conduit system for lighting and electrical work, in locations as shown on Contract Drawings.
- G. Install all equipment in locations as shown on Contract Drawings. All deviations must be approved, in advance by Engineer.
- H. Install all equipment per manufacturer's instructions.
- I. Clean-up excavated areas, and restore with new loam & seed or pave to match existing surfaces, as directed by Engineer.

END OF SECTION

E. NHDOT STANDARD SPECIFICATIONS AND AMENDMENTS
NHDOT Standard Specifications for Road and Bridge Construction
(Current Edition by reference)

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>SectionNumber/Designation</u>	<u>Title</u>
Special Attention	Buy America
608A	Concrete Sidewalk Construction (Special Provision)
608B	Brick Sidewalk Construction (Special Provision)
632	Retroreflective Pavement Markings

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.

NOTE: Provisions of the Contract Document shall take precedence over any conflicts with the NHDOT Standard Specifications.

SPECIFICATION AMENDMENTS

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

General:

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.

End of Section

SPECIAL ATTENTION

ALL MANHOLES AND GRATES SHALL BE SUPPLIED IN ACCORDANCE WITH BUY AMERICA REQUIREMENTS

In accordance with the **BUY AMERICA** requirements of the Federal regulations, all manufacturing processes for steel and iron materials furnished for permanent incorporation into the work on this project shall occur in the United States. The only exception to this requirement is the production of pig iron and the processing, pelletizing and reduction of iron ore which may occur in another country. Other than these exceptions, all melting, rolling, extruding, machining, bending, grinding, drilling, coating, etc. must occur in the United States.

Products of steel include, but are not limited to, such products as structural steel, piles, reinforcing steel, structural plate, steel culverts, guardrail and steel supports for signs, signals and luminaires. Products of iron include, but are not limited to, such products as cast iron grates. Coatings include, but are not limited to, the applications of epoxy, galvanizing and paint. The coating material is not subject to this clause, only the application process.

A Certificate of Compliance, conforming to the requirements of Section 106.04, may be requested for steel and iron materials. The certificates, in addition to certifying that the materials comply with the specifications, shall also specifically certify that all manufacturing process of the materials, except as allowed by this Special Attention, occurred in the United States.

The requirements of said law and regulations do not prevent a minimal use of foreign steel and iron materials if the cost of such materials used does not exceed one-tenth of one percent (0.1%) of the total contract price or \$2,500.00, whichever is greater. The Contractor shall furnish the Engineer acceptable documentation of the quantity and value of any foreign steel and iron prior to incorporating such materials into the work.

SHEAFE AND CHAPEL STREET IMPROVEMENTS
1902
3/11/15

SPECIAL PROVISION
SECTION 608A – CONCRETE SIDEWALK CONSTRUCTION

Description

1.1 General Description of Work: The work shall consist of construction of new concrete sidewalks. The CONTRACTOR is responsible for furnishing, installing and removing existing sidewalks and furnishing and installing the new concrete sidewalks in accordance with the plans and as specified herein or as ordered by the ENGINEER.

1.1.1 Sidewalk and Curb Ramps: The purpose of this work is to install concrete sidewalks along roadway corridors and related curb ramps at cross walk locations within the project area.

1.1.2 Detectable Warning Devices: This work shall consist of furnishing and installing a detectable warning surface and accessories on sidewalk ramps at locations shown on the plans, as specified herein, or as ordered including any and all required surface preparation. Detectable warnings shall be installed at sidewalk ramps where a sidewalk crosses a vehicular way, excluding un-signalized driveway crossings.

1.2 The City of Portsmouth, hereinafter called OWNER, together with the ENGINEER, will review, accept and/or reject work related to sidewalk construction herein specified.

1.3 The CONTRACTOR shall furnish all materials, labor, tools and equipment, and perform all operations, testing, and incidentals necessary for a complete concrete sidewalk installation, as outlined herein and on the plans and maintaining safe pedestrian corridors at all times, except for authorized closures or detours approved by the Public Works Department.

Construction Materials and Methods of Construction

2.1 Sidewalk and Curb Ramps: All labor and materials shall conform to the State of New Hampshire Standard Specifications for Road and Bridge Construction, Section 608, 203 and 209 except as amended here.

2.1.1 All concrete shall be Class AA, 4000-PSI after 28 days with 5 to 7 percent air entrained. All concrete will have poly-fiber reinforcing. Any concrete found not meeting this specification will be removed and re-poured by the contractor with no additional expense to the owner. Expansion joints shall be 25' apart. Control joints shall be 5' apart and shall be ¼ of the depth of the sidewalk (up to 1 ½" deep).

2.1.2 Minimum thicknesses shall be 4" for sidewalks and 6" for curb ramps.

2.1.3 The ends of all sidewalks at driveways shall be ramped at a maximum slope of 1: 12.

2.1.4 All sidewalks shall have handicap curb ramps at street intersections or as located by the Engineer, built at a maximum slope of 1:12 and in accordance with the ADA Regulations (see plan details).

2.1.5 Excavation for new sidewalks shall be at a depth of 12 inches below finish grade. In areas not butting curbing or buildings the excavation shall be 6 inches wider on each side than the finished sidewalk width. At all

drive crossings, the depth of excavation shall be increased accordingly. All unsuitable material shall be approved by the Engineer and removed and disposed of offsite at the Contractor's own expense. At no time will unsuitable material be left under sidewalk areas.

2.1.6 Handicapped curb ramps (at street intersections) shall be 6" deep, 4000 psi fiber mix reinforced with 6" x 6" x 10ga welded wire mesh with truncated dome panels (paid for under Item 5.5).

2.1.7 All exposed edges of sidewalks will be sealed with an approved Silane-Siloxane coating as specified under 534.3.4. Any sidewalks not meeting the test referenced in 534.3.4 will be recoated at no expense to the owner. Contractor will provide cut sheets on product before installation for Engineer's approval.

2.1.8 All sidewalk areas shall be thoroughly wetted and compacted prior to the pouring of any concrete. All sidewalks will be kept damp using wet burlap tarps or any other approved method for 24 hours after set up. Tarps will be staked down to prevent being blown off by wind gusts. Curing compounds will be considered an approved equal.

2.1.9 All sidewalks will be finished with a soft broom with the finish being transverse to the typical pedestrian path. After brooming, all edges will be finish edged.

2.1.10 Any sidewalks poured that have excessive "popcorning" on top or on the sides as determined by the engineer will not be approved or paid for.

2.1.11 All joints shall be straight, even and perpendicular to the sidewalk.

2.2 Detectable Warning Devices: This section provides for the installation of handicap accessible ramp surfaces (Detectable Warning Devices) to be in compliance with the Americans with Disabilities Act (ADA). This section neither modifies nor amends any other provisions of this section unless specifically noted. All labor and materials shall conform to the State of New Hampshire Standard Specifications for Road and Bridge Construction, Section 608, 203 and 209 except as amended here.

2.2.1 Material: The detectable warning surface shall consist of Engineered Plastic units or approved equal. The units will be pressed into Portland cement concrete or other Owner approved material. The paver units shall be Armor Tile as manufactured and supplied by Engineered Plastic, Inc., 300 Interactional Dr. Suite 100, Williamsville, NY 14221, 1-800-769-4463, www.armor-tile.com

2.2.2 Color: The color of the tile used shall be light gray when installed in a curb ramp adjacent to brick sidewalk areas.

2.2.3 Paver Dimensions: Nominal paver dimensions shall be 2' x 3'.

2.2.4 Detectable Warning Truncated Dome Geometry:

2.2.4.1 Detectable warnings shall be in full compliance with ADA guidelines (Title 49 DFR Transportation, Part 37.9 Standard for Accessible Transportation Facilities, Appendix A, Section 4.29.2-Detectable Warning on Walking Surfaces).

2.2.4.2 Size and Spacing: Base diameter of nominal 0.9 inch, top diameter of nominal 0.4 inch, height of nominal 0.2 inch, with a center to center spacing of nominal 2.35 inches.

2.2.4.3 The truncated dome pattern shall be aligned from paver to paver if more than 1 paver is required.

2.3 Setting Bed Material

2.3.1 Material: Pavers shall be set into fresh concrete before it sets. See ramp specification above (paragraph 2.1.6). Also see manufacturer instructions.

2.3.2 The Contractor shall submit manufacturer's installation instructions and descriptive literature for materials specified herein.

2.3.3 Transport, storage, and handling of products shall be in accordance with manufacturer's instructions.

2.3.4 All sealants/adhesives shall be protected from freezing conditions.

2.3.5 The air and surface temperatures during construction shall be in accordance with manufacturer's recommendations.

2.3.6 Concrete foundation shall be installed in accordance with the specifications included within Section 608 to depths indicated in the section shown on the plans.

2.3.7 Install detectable warning pavers in accordance with manufacturer's instructions directly in the setting bed and the allowing the top surface of the paver units to be at or just below the required finish grade. The edge of the detectable warning paver nearest the curb line shall be located 6 to 8 inches from the face of curb line. The paver shall be centered on the ramp.

2.3.8 Care shall be taken to ensure the safety of pedestrians when sidewalks must remain in service during construction.

Method of Measurement

3.1 Measurement will be as stated in the Specification Section 010205 – Measurement and Payment.

Basis of Payment

4.1 Payment will be as stated in the Specification Section 010205 – Measurement and Payment.

SHEAFE AND CHAPEL STREET IMPROVEMENTS
1902
3/11/15

SPECIAL PROVISION
SECTION 608B – BRICK SIDEWALK CONSTRUCTION

Description

1.1 General Description of Work: The work shall consist of construction of new brick sidewalks. The CONTRACTOR is responsible for furnishing, installing and removing existing sidewalks and furnishing and installing the new brick sidewalks in accordance with the plans and as specified herein or as ordered by the ENGINEER.

1.1.1 Sidewalk and Curb Ramps: The purpose of this work is to install brick sidewalks along roadway corridors and related curb ramps at cross walk locations to match existing conditions at the limits of the project area.

Construction Materials and Methods of Construction

2.1 Sidewalk and Curb Ramps: All labor and materials shall conform to the State of New Hampshire Standard Specifications for Road and Bridge Construction, Section 608, 203 and 209 except as amended here.

2.1.1 New bricks shall conform to the requirements of ASTM Standard Specifications for Building Bricks Designation C902 SX for Grade SW. The bricks shall be No. 1, wire cut type for paving, with a compressive strength of not less than 6,000 pounds per square inch. The bricks shall not be cored or have frogs and shall be of a standard size (2.25" x 3.625" x 7.625"). The Engineer will have 5 working days to approve the brick submittals before they are installed. It is the responsibility of the Contractor to provide suitable brick samples for approval.

2.1.2 Excavation for sidewalks shall be at a depth of 13 inches below finish grade. In areas not butting curbing or buildings, the excavation shall be 6 inches wider than the finished sidewalk width. At all drive crossings, the depth of excavation shall be increased accordingly. The Contractor's price shall include neat and square cutting of existing asphalt road surface as needed. All unsuitable material shall be removed and disposed of off-site at the Contractor's own expense.

2.1.3 The ends of all sidewalks at driveways shall be ramped at a maximum slope of 1: 12.

2.1.4 All sidewalks shall have handicap curb ramps at street intersections or as located by the Engineer, built at a maximum slope of 1:12 and in accordance with the ADA Regulations (see plan details).

2.1.5 The base material for brick sidewalks shall consist of 8" of crushed gravel.

2.1.6 The Contractor shall lay the bricks so that approximately 5 bricks shall cover one square foot.

2.1.8 The sidewalk shall pitch 1/4 inch per foot towards the street or as directed.

2.1.8 In areas where the edge of the brick sidewalk is not adjacent to granite curbing, the Contractor shall install edging to hold the bricks in place. Such edging shall be installed per the manufacturer's recommendations.

2.1.9 In areas with a closed drainage system, the contractor shall provide “silt sacks” to prevent brick dust from entering the collection system. Also, the area will be swept daily to keep dust levels as low as possible.

2.1.10 All half bricks will be snapped if possible and all efforts will be made to keep brick dust to a minimum. All cuts not made by snapping will be wet cut.

2.1.11 Prior to placing the brick, the sidewalks will be paved parallel to grade with 3/8” 75 gyration bituminous asphalt hot mix paving 1 1/2” compacted thickness. Paving for this will be paid for under item 403.12. 1” of 1:3 Portland cement / course sand mix will then be placed on the asphalt base and the pavers will be dry laid on the mixture.

Method of Measurement

3.1 Measurement will be as stated in the Specification Section 010205 – Measurement and Payment.

Basis of Payment

4.1 Payment will be as stated in the Specification Section 010205 – Measurement and Payment.

F. APPENDIX

A. GAS LINE INFORMATION



NEW HAMPSHIRE

SAFETY MESSAGE / CONTRACTOR INFORMATION

EMERGENCY
Call 911

Emergency Number
1-866-900-4115

Considerations When Working Around Gas Mains and Services

New Hampshire Public Utilities Commission Dig Safe Rules & Regulations

- Pre-Mark area, On Site meeting
- Safety Zone, 18" around gas lines
- Hand Shovel only in Safety Zone
- Dig Safe Tickets only good for 30 Days
- Contractor Maintains All Dig Safe Markings
- Re-Marks, On-going tickets, new dig safe required when going outside of original scope of work or outside of original pre-marks

General Information:

- Types of pipe: Cast Iron, Plastic, Cast Iron Inserted with Plastic, Steel Inserted with Plastic
- Pressures range from ½ PSI to 492 PSI, or more.
- A Tracer wire is buried with plastic pipe for locating purposes.
- Warning tape isn't always present above pipes. It wasn't used on older mains and isn't used with trenchless methods of construction; such as directional drilling (HDD)
- **NO LEAK;** Notify the gas company if you damage a gas line, damage can be anything from scrapping the coating, undermining a cast iron main, breaking a tracer wire

Recognizing an Emergency: **EMERGENCY Call 911**

- Hissing
- Blowing Dirt
- Rotten Egg / Sulfur Smell
- Water Blowing or bubbling from a pond or creek
- Dry spot in a normally wet area
- Broken Pipe

In the Event of an Emergency:

- Clear the area and eliminate sources of ignition
- Call 911 or the appropriate emergency number for the area
- Call the emergency number for the appropriate utility

If You Hit a Gas Pipe and there is No Apparent Leak:

- Notify the appropriate utility, **Do not backfill or attempt to repair until inspected by the utility company representative**
- If a pipe is hit, and pulled, a leak could be created nearby
- A coating nick on a steel pipe could cause a corrosion leak in the future
- A minor gouge could create a stress concentration and result in future pipe failure
- A broken tracer wire please call routine business number

Emergency Number 1-866-900-4115



Underwood Engineers
Attn: Mr. Ben Dreyer
25 Vaughan Mall Unit 1
Portsmouth, NH 03801
603.436.6192

March 8, 2012

Ref: **Portsmouth, NH Gas Map Information Request**
Aldrich Road-Islington Street to Middle Road
1st VERIFICATION-GAS-SUE Level D

Dear Mr. Dreyer,

As a follow up to your e-mail dated Tuesday, February 21, 2012, Unitil Corporation, Inc/Northern Utilities, Inc (Unitil) has completed a review of the location of our gas mains in the subject project area. In an effort to provide your office with **preliminary** information regarding the location of our gas main in Portsmouth, NH on the street noted above, Unitil has completed a thorough review of our existing maps, work orders, available "as-built" plans and data from engineering firms that were used during the initial design & installation of this main and has included copies of this information in this package. Unitil does not provide GIS/GPS information for use in verification of either gas alignment or depth of cover.

Please be advised, that any information provided in this response relative to the location of Unitil gas mains in the subject project area is to be considered "**SUE LEVEL D-REFERENCE ONLY**" information, and should be used only to help facilitate graphic representation of Unitil's facilities on your revised plans. In addition, the provided information does not detail the location of the service lines that are supplied from any of the mains located on the noted street.

The following details a brief summary of the information included in this response:

Unitil "As-build" map drawings #0364, #0365, #0390 and #0391 which provide graphic representation of the location of the gas main-highlighted in orange-(services not included) for Aldrich Road, from Islington Street to Middle Street, in Portsmouth, NH. In addition, these maps also provide a general description of the size and type (plastic/steel) and year of installation of the existing gas main. Swing tie information provided denotes the location of either a service valve or main line valve.

It is understood between Unitil, Underwood Engineers and any other parties who may be provided this information, that this information is "**REFERENCE ONLY**" and that prior to any construction commencing in the area of this project, appropriate Dig-Safe locating must be executed, Unitil will review the project plans and Unitil will require participation in all pre-construction meetings to be sure that the integrity and safety of all gas facilities in this project area are maintained throughout the entire construction phase.

If you should have any further questions, please feel free to contact me via phone or e-mail.

Regards,

Mark D. Dupuis

Gas Engineer-New Hampshire
Unitil Service Corp
325 West Road
Portsmouth, NH 03801
603.294.5192-office
dupuis@unitil.com

UNIT REPORTS THIS
LINE ABANDONED
CONFIRMATION NEEDED.

UNIT
1/16/15



B. BORING/PROBE LOGS AND GEOTECHNICAL REPORT



R.W. Gillespie & Associates, Inc.

Geotechnical Engineering • Environmental Consulting • Materials Testing Services

09 March 2015

Benjamin Dreyer, P.E.
Underwood Engineers, Inc.
25 Vaughan Mall, Unit 1
Portsmouth, NH 03801

Subject: Geotechnical Evaluation
Chapel Street and Sheafe Street Infrastructure Improvements
Portsmouth, New Hampshire
RWG&A Project No. 0515-121

Dear Mr. Dreyer:

R. W. Gillespie & Associates, Inc., (RWG&A) is pleased to provide this geotechnical evaluation for the Chapel Street and Sheafe Street Infrastructure Improvements project to be built in Portsmouth, New Hampshire. This evaluation was undertaken at the request of Underwood Engineers, Inc., (UE), and performed in general accordance with RWG&A Proposal No. P-8910GI, dated 13 January 2015, and authorized by UE on 22 January 2015.

RWG&A has enjoyed working on this project with UE. If you have any questions or if we may be of further service, please contact us.

Sincerely,
R. W. GILLESPIE & ASSOCIATES, INC.

Marc R. Grenier, P.E.
Project Geotechnical Engineer

Charles R. Nickerson, P.E.
Principal Geotechnical Engineer

MRG/CRN:md
Submitted In Quadruplicate and via Email in Adobe

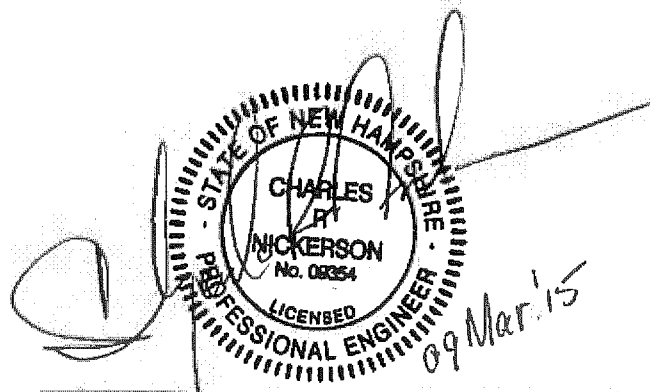
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R.W. Gillespie & Associates, Inc.

**Report
of
GEOTECHNICAL EVALUATION
for
CHAPEL STREET AND SHEAFE STREET INFRASTRUCTURE IMPROVEMENTS
PORTSMOUTH, NEW HAMPSHIRE**

**Prepared
for
UNDERWOOD ENGINEERS, INC.
PORTSMOUTH, NEW HAMPSHIRE**

**Prepared
by
R. W. GILLESPIE & ASSOCIATES, INC.
PORTSMOUTH, NEW HAMPSHIRE**



**Charles R. Nickerson
New Hampshire P.E. Serial No. 9354**

R.W. Gillespie & Associates, Inc.

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Attachments

- Table, Summary of Explorations and Construction Considerations
- Figure 1, Locus Map

APPENDIXES

- Appendix A, Exploration Logs
- Appendix B, Laboratory Test Results

R.W. Gillespie & Associates, Inc.

SUMMARY

The proposed underground utility alignments occur within fill and naturally deposited sand with varying amounts of silt and silty clay. Individual soil units are absent along parts of the alignment. Refusal surfaces were not encountered in the explorations; bedrock or boulders might be present intermediate of the exploration locations, in particular near the north end of Chapel Street where City of Portsmouth personnel have indicated that relatively shallow refusal surfaces are present.

The attached table titled *Summary of Explorations and Construction Considerations* provides the results of the subsurface explorations drilled for the project and anticipated earthwork issues associated with construction of the project. Changes in the design alignments and/or depths of the sewer main, storm drain, and/or water main might be cause for R.W. Gillespie & Associates, Inc., to re-evaluate the design recommendations and construction considerations presented in this report.

In general, it should be practical to make trench excavations for the sewer main, storm drain, and water main alignments as steep-sided, open cuts combined with a worker protection device (i.e., trench box) provided the soils are adequately dewatered. The proposed storm drain alignment near the west end of Sheafe Street is within about 4 feet of existing buildings, and extends to depths of about 4 to 8 feet below ground surface. Where the bottom of excavations are less than the lateral distances from the buildings and less than the building foundation depth, steep sided, open cut techniques should be practicable. Excavations deeper than the buildings' foundation or within a lateral distance of the building equal to the excavations depth might require temporary lateral support consisting of soldier piles and lagging, driven sheet piles and bracing, or similar techniques. The need for excavation support should be determined during construction after details of the existing buildings foundations are exposed by the Contractor. Special excavation equipment and/or methods might be needed to remove boulders or bedrock. If encountered, bedrock and boulders will likely need to be fragmented by controlled blasting and/or mechanical methods to be removed efficiently.

Free water was not observed in the explorations at the time of drilling. Free water might be encountered during construction due to snow melt, wet climatic conditions, or nearby construction activities. Water levels should be evaluated just prior to construction, either by observation wells or test pits, to assess dewatering requirements at that time. Based on the recent observed conditions, it is anticipated that open pumping would be suitable for dewatering during construction of the underground utilities. Permeability of the soils encountered in the subsurface explorations will vary from high to low.

Laboratory tests performed on recovered samples of the in-place base materials do not meet requirements for New Hampshire Department of Transportation aggregate base coarse, but should be suitable for trench backfill. The existing base materials should be evaluated during construction to determine how they can be used in the proposed construction.

R.W. Gillespie & Associates, Inc.

1.0 PROJECT DESCRIPTION

The proposed Chapel Street and Sheafe Street Infrastructure Improvements project includes new gravity sewer, storm drain, and water main and full depth roadway reconstruction. The project location is illustrated on Figure 1, *Locus Map*. The total length of the project is about 1,190 linear feet, with about 780 linear feet along Chapel Street and about 410 linear feet along Sheafe Street. Total length of the proposed sewer main is about 760 linear feet, with about 510 linear feet along Chapel Street and 250 linear feet along Sheafe Street. Total length of the proposed storm drain is about 700 linear feet, with about 440 linear feet along Chapel Street and about 260 linear feet along Sheafe Street. New water main would be installed along the entire length of both streets in the project area, and the roadway will be reconstructed along the entire alignment.

It is understood the new utilities would be installed by cut and cover methods. The gravity sewer main would consist of 8 and 15-inch diameter PVC pipe, and the depth to the bottom of the trench would be about 4 to 9.5 feet below current ground surface; depths to the bottoms of manhole structures would be about 6 to 11 feet below current ground surface. The storm drain would consist of 12 and 15-inch diameter CPE pipe, and the depth to the bottom of the trench would be about 3 to 5 feet below current ground surface; depths to the bottoms of catch basin structures would be about 8 feet below current ground surface. It is understood the water main would consist of 8-inch diameter ductile iron pipe, and the depth of cover would be a minimum of 5.5 feet.

R.W. Gillespie & Associates, Inc.'s (RWG&A's) understanding of the proposed project is based on communications with Underwood Engineers, Inc. (UE) and review of the following drawings: Sheets P-1, P-2, and P-3, dated 2/18/2015, from the drawing set titled *Sheafe and Chapel Street Improvements*, prepared by UE and the sketch titled *Work Plan, Alt. Alignment*, dated 2/23/2015, also prepared by UE.

2.0 PURPOSE

This geotechnical evaluation has been limited to consideration of the geotechnical aspects of the proposed Chapel Street and Sheafe Street Infrastructure Improvements Project in Portsmouth, New Hampshire. The primary purpose of RWG&A's services was to explore subsurface conditions along the planned alignment and evaluate how they might affect earthwork construction aspects of the sewer, storm drain, and water main. In particular, this report identifies geotechnical criteria and construction considerations intended to assist engineers that will design the project and monitor its construction.

This geotechnical evaluation might also aid Contractors responsible for installation of the proposed sewer, storm drain, and water main. However, the recommendations and comments provided hereinafter are not intended to be instructions or directives to the project Contractor. The project Contractor must evaluate construction issues encountered in the work on the basis of their experience with similar projects taking in to account their own methods and procedures.

RWG&A has not considered the construction from a worker safety perspective. Construction safety is the responsibility of the project Contractor, who is also solely responsible for the means, methods, and sequencing of construction operations. RWG&A is providing this information as a service to UE. Under no circumstances should this information be interpreted to mean that RWG&A and/or UE are assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

3.0 SUBSURFACE EXPLORATIONS

Explorations made for this geotechnical evaluation consisted of four test borings and five auger borings advanced to depths ranging from about 10 to 12 feet below local ground surface. The explorations were drilled on 03 March 2015 by Great Works Pump and Test Boring, Inc., of Rollinsford, New Hampshire, using a truck-mounted rotary drill rig. Two swing ties to identifiable site features were measured from each exploration by RWG&A and the information was provided to UE; it is understood the exploration locations will be shown on the UE design drawings.

The test borings and auger borings were advanced with continuous flight augers. Split-barrel sampling with standard penetration testing was performed semi-continuously in general accordance with *ASTM D1586, Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils* in the test borings. The soil descriptions indicated on the auger boring logs were inferred by observation of cutting and drilling progress; grab samples were obtained from auger cuttings from two of the auger borings.

Exploration activities were coordinated by RWG&A. Soils were visually described in accordance with *ASTM D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*. Logs of the explorations prepared by RWG&A are attached as Appendix A. Stratification lines shown on the exploration logs represent the approximate boundaries between the different soil types encountered; the actual transitions may be gradual and vary over short distances. Refusal is defined as 100 blows for less than one-foot of penetration of a split barrel sampler or rod probe or the inability to advance the auger with reasonable effort as determined by the driller and RWG&A representative.

4.0 LABORATORY TESTING

Laboratory testing consisted of two particle-size analyses and five natural moisture content determinations performed on representative soil samples recovered from the explorations. The results of the analyses are presented in Appendix B, *Laboratory Test Results*. The analyses were performed in general accordance with the methods and procedures provided in *American Society for Testing and Materials (ASTM) C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates*. Laboratory tests were performed at RWG&A's soils and materials testing laboratory which is accredited by the American Association of State Highway and Transportation Officials (AASHTO) for the ASTM test method.

5.0 SUBSURFACE CONDITIONS

5.01 Soil Conditions

The subsurface explorations encountered five primary soil units identified herein as: fill, sand, sand with silt, silty clay, and silty sand. These soil units are described below in order of increasing depth below ground surface. About 2 to 5 inches of asphalt pavement were encountered at ground surface at each exploration location. A summary of the subsurface soils encountered in the explorations is provided in the attached table; logs of the explorations prepared by RWG&A are provided in Appendix A and should be referenced for additional information at specific locations and depths.

Fill: Every exploration encountered Fill material below surficial asphalt, with the thickness of Fill ranging from about 2 to 10 feet. Encountered fill materials generally consisted of sand, but varied along the alignments from sand with gravel, silty sand, gravelly sand, and silt with sand. The Fill was underlain by Sand in B-101 and B-104, Sand with Silt in P-103, Silty Sand in P-105 and B-202, Silty Clay in B-107, and extended to boring termination depths in P-102, P-106, and P-201.

Sand: Sand was encountered beneath the Fill in B-101 and B-104 and extended to exploration termination depths. The sand encountered was about 10 feet thick at B-101 and 3.5 feet thick at B-104, and consisted of medium dense to dense, coarse to fine sand, with trace to no gravel, few silt.

Sand with Silt: Sand with Silt was encountered in P-103 below the Fill and in B-107 below the Silty Clay. Sand with Silt consisted of medium dense to dense, medium to fine sand with few silt. The encountered thickness of the Sand with Silt was about 3.5 feet to 4 feet and extended to exploration termination depths.

Silty Clay: Silty Clay was encountered in B-107 below the Fill and extended to Sand with Silt. Silty Clay consisted of very stiff, clay with silt, trace fine sand. The encountered thickness of the Silty Clay was about 3.5 feet.

Silty Sand: Silty Sand was encountered in P-105 and B-202 below the Fill. Silty Sand consisted of medium dense to dense, medium to fine sand with some silt, trace to no gravel. The encountered thickness of the Silty Sand was about 2.5 feet to 4 feet and extended to exploration termination depths.

The explorations were advanced to depths locally varying from 10 to 12 feet below ground surface. Refusal surfaces were not encountered to the depths explored.

5.02 Groundwater Conditions

Free water was not observed in the explorations at the time of drilling. The absence of free water data on the exploration logs implies no groundwater data is available, but does not necessarily mean that groundwater will not be encountered at these locations within the vertical reaches of the explorations in the future. Water levels in the project area are anticipated to vary with location,

season, elevation, precipitation, local runoff or surface ponding, nearby utility trenches, and the proposed and/or other nearby construction activity. Therefore, water levels during and following construction will vary from those observed in the subsurface explorations.

5.03 Local Depth of Freezing

Depth of freezing for snow free ground was calculated with the ModBerg Version 99.2.0 computer program. The design freezing index for the closest location to the project, Greenland, New Hampshire was used. The air design freezing index is about 922° Fahrenheit degree - days. It is understood the waterline would generally be installed within the paved roadway. Therefore, calculations were made based on the snow-free asphalt pavement underlain by gravelly sand to sand fill (pavement section base and subbase) over sandy fill. The calculated depth of freezing under these conditions is about 43 inches.

6.0 RECOMMENDATIONS AND CONSTRUCTION CONSIDERATIONS

The attached table titled *Summary of Explorations and Construction Considerations* presents results of the explorations drilled for the project, and anticipated earthwork issues associated with installation of the project. Changes in the design alignments might be cause for RWG&A to reconsider recommendations and construction considerations presented in this geotechnical evaluation report.

6.01 Temporary Excavation

1. Steep-sided, open cut excavation methods are considered technically feasible for trenches along most of the alignments. It is anticipated that worker protection devices (i.e., trench boxes/shields) will be necessary in conjunction with open cut methods. A disadvantage of using open cut methods is that the sides of the excavation are free to slough and deform, usually resulting in settlement of pavements, sidewalks, ground surface, and adjacent buildings.

As currently planned, the proposed storm drain line and catch basin CB10 near the west end of Sheafe Street are within about 4 feet of existing buildings; the bottom of trench and structure excavations might range from about 4 feet (storm drain) to 8 feet (catch basin) below ground surface. When this report was prepared the dimensions, depth, and construction of the building foundations were not known. Reportedly, one building has a full basement. The Contractor should perform a pre-construction survey, including test pit excavations, to observe and document building and foundation conditions. Vibration and settlement monitoring should also be required during installation of the storm drain.

Where excavation depths are less than the lateral distance from the buildings and/or less than the building foundation depth, steep sided, open cut techniques should be practicable. Excavations deeper than the buildings' foundation or within a lateral distance of the building equal to the excavations depth might require temporary lateral support consisting of soldier piles and lagging, driven sheet piles and bracing, or similar techniques. The need for excavation support should be determined during construction after details of the

existing buildings foundations are exposed by the Contractor. If needed, the design of the temporary excavation support system should be performed by a Professional Engineer licensed in the State of New Hampshire and engaged by the Contractor.

2. Trench excavations are anticipated to occur primarily in the fill and naturally deposited soils. The fill and naturally deposited soils should generally be suitable for use as trench backfill, but, if encountered, boulders and over-sized pieces of fragmented bedrock would need to be removed. It is anticipated that crushed stone bedding and sand cover will be placed beneath and above the sewer pipe and storm drain, respectively. Filter fabric should be wrapped around the crushed stone to separate it from the sand cover, backfill, and trench subgrade materials.
3. It should be practical to make trench excavations with earthwork equipment fitted with smooth-edged buckets. Excavator buckets with ripper teeth will disturb the trench subgrade soils which could increase post-installation settlement of the utility pipes, pavement, and ground surface. Disturbed subgrade soils should be removed and/or compacted prior to placing bedding and setting the pipe. Any boulders or fragmented bedrock dislodged should be removed prior to placement of bedding. Fill to replace or build up disturbed or undercut subgrades should consist of compacted pipe bedding.
4. The Contractor should be aware that slope height, slope inclination, and excavation depths should in no case exceed those specified in local, state, or federal safety regulations (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations). Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

6.02 Construction Dewatering

5. The above recommendations are meant to be used in conjunction with good construction practices including construction dewatering methods that are appropriate for the subsurface conditions encountered within the trench excavations. Construction dewatering should be provided as-needed to reduce disturbance of the subgrade soils and instability of the excavations, and to complete the work (i.e., excavation, bedding placement, pipe installation, backfilling and compaction) in-the-dry. The Contractor should be aware that ineffective or non-continuous dewatering can reduce the stability of excavation side slopes and bottoms, cause sloughing and disturb subgrade soils and bedding.
6. Free water levels were not observed in the explorations, but might be encountered in excavations depending on climate and time of year during construction. In RWG&A's opinion, construction dewatering with open pumping and sumps should be practicable if free water is less than about 1 to 2 feet above the bottom of the trench excavation at the time of construction. If excavations extend to greater depths below free water, then predrainage with wells might be necessary to maintain stability of the excavations, help ensure proper pipe bedding, and reduce post-construction settlement of trench backfill. Currently, based on free water levels observed in the subsurface explorations, dewatering with open pumping is anticipated for underground utility construction.

7. It is strongly recommended that water levels be observed along the alignment by the Contractor just prior to construction, either by observation wells or test pits, to assess dewatering requirements at that time. If water levels during construction are higher than those observed in the explorations, then it should be anticipated that dewatering by open-pumping methods might not be effective and construction dewatering by wells might be needed.
8. Based on RWG&A's evaluation of the particle-size distribution tests, the permeability of the soils encountered in the subsurface explorations will vary from high to low.
9. The Contractor should be advised that trapped water in pervious fill, naturally deposited soils, and the bedding and backfill of utility trenches might be encountered locally. In the event that significant zones of free-draining materials are encountered, it might be necessary to temporarily employ additional dewatering pumps or other measures.
10. It is anticipated that the Contractor will design, install, operate, and maintain the dewatering system. Details of the proposed dewatering system should be submitted to UE to allow review of its components prior to installation. The submittal should provide information on sources of power, locations of sumps and wells, pump types, methods of monitoring the performance of the system during construction, and other features including filtering methods to reduce pumping of soils, and locations of discharge points.

6.03 Bedrock Removal

11. Refusal surfaces were not encountered in the explorations. However, boulder and bedrock removal might be needed in between the explorations, in particular at the north end of Chapel Street where City personnel have indicated that relatively shallow bedrock is present. Where encountered at or above trench subgrade, undercutting of bedrock should be in accordance with the pipe manufacturer's recommendations and a minimum of 6 inches. If bedrock and/or boulder removal necessitates use of controlled blasting methods, then technical requirements in general accordance with the *Standard Specifications for Road and Bridge Construction, State of New Hampshire Department of Transportation* are considered appropriate for this project. Blasting operations should also be performed in accordance with the City of Portsmouth Blasting Ordinance.
12. It might not be possible to blast near existing utilities without damaging them. Suspending operation of vulnerable utilities during blasting should be considered; local repairs will likely be needed. Fragmentation of boulders and bedrock with hydraulic hammers (i.e., hoe rams) might also be used where blasting is impractical or where relatively small quantities of bedrock need to be removed.

6.04 Backfilling

13. When a trench box is used, it can be difficult to compact backfill materials. Sometimes there might be a tendency to remove the trench box after the pipe has been installed and then end-dump backfill material with little compaction. Relative compaction to less than

recommended herein could result in settlement over the pipe trench years after the utilities are installed and associated maintenance.

- 14. Compaction of trench backfill should be in accordance with local ordinance requirements and at the minimum of the following criteria. Fill placed within 2 feet of finished grade should be compacted to at least 95 percent of the maximum dry density as determined by *ASTM Standard D 1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))*. Trench backfill from the top of pipe cover and up to ground surface in unpaved areas, should be compacted to a minimum of 92 percent of ASTM D1557.
- 15. Contractors should anticipate that fill excavated from trenches might need to be moisture conditioned to be used efficiently as backfill. Trench backfill should be placed to generally match the local stratification sequence of the naturally deposited soils and be systematically compacted in uniform lifts to reduce post construction settlement and differential frost heaving of the ground surface.

6.05 Pavement Sections

- 16. Reconstructed roadways should be provided with the following minimum pavement sections. Proposed flexible pavements were evaluated using AASHTO design methods. Materials and placement methods should meet current New Hampshire Department of Transportation (NHDOT) requirements. The laboratory tests performed on recovered samples of in-place base materials indicate they do not meet NHDOT requirements for aggregate base coarse. The samples tested were obtained from discrete locations at widely spaced intervals. RWG&A recommends that the materials be evaluated during construction to determine how they can be used in the proposed construction.

Component	Thickness in inches	
	Sheafe Street	Chapel Street
Surface Course (NHDOT Type 12.5 mm)	2	2
Binder Course (NHDOT Type 19 mm)	2	3
Gravel Base (NHDOT 304.3)	6	8
Subbase (NHDOT 304.2)	12	12
Totals	22	25

Pavement sections were determined based on average daily traffic counts provided on the State of New Hampshire Department of Transportation website for similar roads in the Portsmouth area between 2006 and 2014. Traffic volume growth was estimated for a 20-year period based on increases observed in the average daily traffic counts.

- 17. Prior to the start of paving, it is recommended a thorough evaluation of the subgrade be undertaken. The evaluation should include proof-rolling with a loaded tandem axle dump truck. Any unstable areas encountered should be repaired. Repairs should consist of excavation of the soft material(s) and replacement with compacted fill.

18. The pavement sections are designed to support post-construction traffic loads. The sections are not designed to support construction traffic loading. Construction means and methods are the responsibility of the Contractor and the Contractor should anticipate the need to evaluate and employ methods to prevent subgrade softening, rutting, or impairment of overlaying fill materials as a result of construction traffic. Measures that should be considered by the Contractor include, but are not limited to, use of lower weight equipment, dispersion of construction traffic, constructing haul roads and construction traffic paths designed to support construction vehicles and equipment, and the use of geotextiles.

7.0 CLOSURE

This report has been prepared for specific application to the Chapel Street and Sheafe Street Infrastructure Improvements project in Portsmouth, New Hampshire, and for the exclusive use of UE. This work has been completed in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. In the event that any changes are made in the nature, alignment, or depths of the project, the conclusions and recommendations of this report should be reviewed by RWG&A.

The recommendations presented are based on the results of widely spaced explorations. The nature of variations between explorations may not become evident until construction. If variations are encountered, it will be necessary for RWG&A to re-evaluate the recommendations presented in this report. RWG&A requests an opportunity for a general review of the final design and specifications in order to determine that the design recommendation presented herein have been interpreted in the manner in which they were intended.

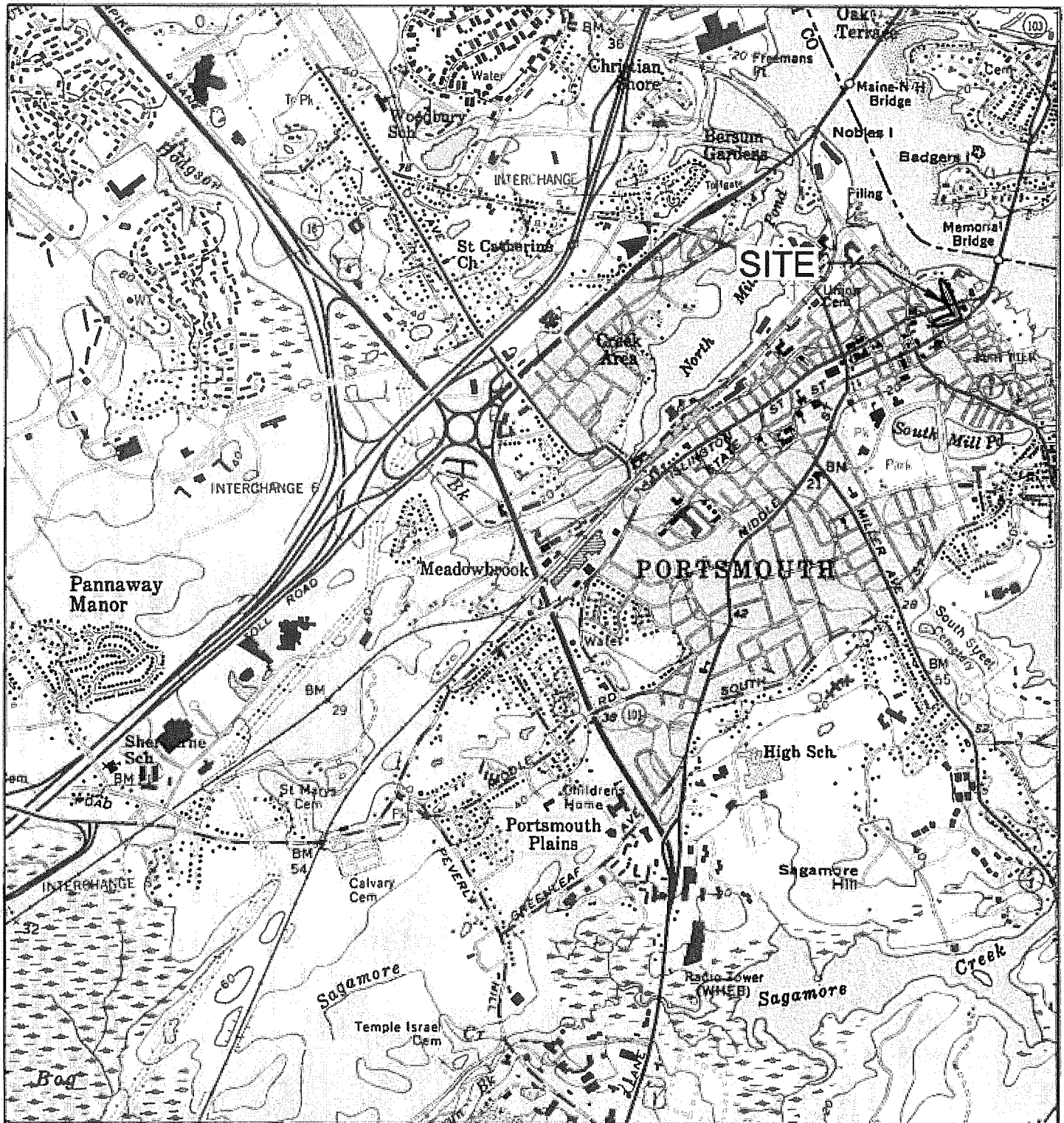
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TABLE

SUMMARY OF EXPLORATIONS AND CONSTRUCTION CONSIDERATIONS
 CHAPEL STREET AND SHEAFE STREET INFRASTRUCTURE IMPROVEMENTS
 PORTSMOUTH, NEW HAMPSHIRE

Station	Exploration Designation	Encountered Soil Unit Thickness (feet)				Refusal Depth (feet)	Observed Free Water Depth (feet) ⁽¹⁾	Construction Considerations ⁽²⁾			
		Fill	Sand	Sand with Silt	Silty Sand			Silty Clay	Subgrade	Dewatering	Bedrock or Boulder Removal
Chapel Street											
1+40	B-107	5.0	--	3.5+	--	3.5	Below 12	Not Observed	Sand with Silt	Open Pumping	Not Anticipated
2+10	P-106	10.0+	--	--	--	--	Below 10	Not Observed	Fill	Open Pumping	Not Anticipated
2+85	P-105	6.0	--	--	4.0+	--	Below 10	Not Observed	Silty Sand	Open Pumping	Not Anticipated
5+10	B-104	8.5	3.5+	--	--	--	Below 12	Not Observed	Fill	Open Pumping	Not Anticipated
5+60	P-103	6.0	--	4.0+	--	--	Below 10	Not Observed	Sand with Silt	Open Pumping	Not Anticipated
7+00	P-102	10+	--	--	--	--	Below 10	Not Observed	Fill	Open Pumping	Possible
7+50	B-101	2.0	10.0+	--	--	--	Below 12	Not Observed	Sand	Open Pumping	Possible
Sheafe Street											
32+50	P-201	10.0+	--	--	--	--	Below 10	Not Observed	Fill	Open Pumping	Not Anticipated
33+50	B-202	8.5	--	--	2.5+	--	Below 12	Not Observed	Fill	Open Pumping	Not Anticipated

Notes: ⁽¹⁾ Observed free water depth in explorations at the time of drilling; not considered representative of stabilized water levels.
⁽²⁾ Subgrade conditions and anticipated dewatering inferred from results of explorations performed for this geotechnical evaluation.



SCALE, FEET

FIGURE 1
LOCUS MAP
GEOTECHNICAL EVALUATION
CHAPEL STEET & SHEAFE STREET
INFRASTRUCTURE IMPROVEMENTS
PORTSMOUTH, NEW HAMPSHIRE

MARCH 2015

PROJECT NO. 0515-121

SOURCE:
 USGS 7.5-MINUTE TOPOGRAPHIC QUADRANGLE OF
 PORTSMOUTH, N.H. - MAINE, DATED 1956, REVISED 1993.



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APPENDIX A

EXPLORATION LOGS

Geotechnical Evaluation
Chapel Street and Sheafe Street Infrastructure Improvements Project
Portsmouth, New Hampshire

RWG&A, Inc. soil descriptions are based on the following criteria. Descriptive terminology is used to denote the grain size and percentage of each component. The soil descriptions are based on visual-manual classification procedures, Standard Penetration Test results, and the results of laboratory testing on selected soil samples, where available. The Unified Soil Classification Group Symbol will be indicated in capital letters.

COMPONENT DEFINITIONS BY GRADATION SIEVE LIMITS

Materials	Definitions	Fractions	Upper	Lower
Boulders	Material too large to pass through an opening 12 in. square.			
Cobbles	Material passing through a 12 in. opening and retained on the 3 in. sieve.			
Gravel	Material passing the 3 in. sieve and retained on 1/4" (No. 4 sieve).	Coarse Fine	3 in. 3/4 in.	3/4 in. 1/4 in.
Sand	Material passing the No. 4 sieve and retained on the No. 200 sieve.	Coarse Medium Fine	No. 4 (1/4") No. 10 (1/8") No. 40 (1/32")	No. 10 (1/8") No. 40 (1/32") No. 200
Silt	Material passing the No. 200 sieve which is usually non-plastic in character and exhibits little or no strength when air dried.		No. 200	
Clay	Material passing the No. 200 sieve which can also be made to exhibit plasticity within a certain range of moisture contents and which exhibits considerable strength when air dried.		No. 200	

SOIL DESCRIPTION

General

Soils are described as to the Unified Soil Classification Systems Group Symbol, density or consistency, color, grain size distribution and other pertinent properties such as plasticity and dry strength. The RWG&A order of descriptors is as follows:

1. USCS Group Name and Symbol, or Fill
2. Density or Consistency
3. Moisture
4. Grain Size & Constituent percentages
5. Other pertinent descriptors
6. Color

DESCRIPTIVE TERMINOLOGY DENOTING COMPONENT PROPORTIONS

Descriptive Terms	Range of Proportions
Noun (major component)	≥ 50%
Adjective (secondary component)	20 - 50%
Some (third component)	25 - 45%
Little (second or third component)	15 - 25%
Few (second or third component)	5 - 15%
Trace	0 - 5%
With	Amount of component not determined. Used as a conjunction only. Does not indicate component percentile

OTHER DESCRIPTIVE TERMS

Where appropriate, geological classifications are also used (Glacial Till, etc.)

TYPICAL DESCRIPTIONS

- SAND WITH SILT (SP-SM): Medium dense, moist, coarse to medium sand, few silt, brown.
- FILL; Loose, dry, fine sand, some gravel and silt, with brick and concrete fragments, dark brown.
- SILTY CLAY (CL); Very stiff, moist, silty clay, olive-brown.

DENSITY OR CONSISTENCY OF SOILS		
COHESIVE SOILS		
Consistency of Cohesive Soils	Standard Penetration Test (Blows Per Foot) (N)	Undrained Shear Strength (TSF)
Very Soft	0 - 2	Below 0.13 (250 psf)
Soft	2 - 4	0.13 to 0.25 (to 500 psf)
Medium	4 - 8	0.25 to 0.5 (to 1,000 psf)
Stiff	8 - 15	0.5 to 1.0 (to 2,000 psf)
Very Stiff	15 - 30	1.0 to 2.0 (to 4,000 psf)
Hard	Over 30	over 2.0 (over 4,000 psf)
Consistency of cohesive soils is based upon field vane shear, torvane, or pocket penetrometer, or laboratory vane shear or Unconsolidated-Undrained Triaxial Compression tests. Consistency of cohesive soils is based upon the Standard Penetration test when no other data is available.		
COHESIONLESS SOILS		
Density of Cohesionless Soils	Standard Penetration Test (Blows per Foot) (in)	
Very Loose	0 - 4	
Loose	4 - 10	
Medium Dense	10 - 30	
Dense	30 - 50	
Very Dense	over 50	
PENETRATION RESISTANCE		
STANDARD PENETRATION TEST (ASTM D1586) - a 2.0-inch diameter, 1-3/8 inch inside diameter split barrel sample is driven into soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The total number of blows required for penetration from 6 to 18 inches is the Standard Penetration Resistance (N).		
COBBLES AND BOULDERS		
The percentage of cobbles and boulders is estimated visually where possible.		
Descriptive Term	Estimated Percentage	
Very Few	0 - 10%	
Few	10 - 25%	
Common	25 - 40%	
Numerous	40 - 50%	
If the percentage cannot be determined, as in a typical test boring, then use "with" to indicate the presence of cobbles and/or boulders. (i.e., gravelly sand with cobbles and boulders).		
FILLS		
The following terminology is used to denote size range of man-made materials within fill deposits:		
Size Range	Comparative Soil Terms	
<No. 200 Sieve	Silt - size	
No. 200 to 1/4 in.	Sand - size	
1/4 in. to 3 in.	Gravel - size	
3 in. to 12 in.	Cobble - size	
>12 in.	Boulder - size	
SUPPLEMENTAL SOIL DESCRIPTION TERMINOLOGY		
Term	Example	
Seam	Typically 1/16 to 1/2 inch thick	1/4 inch sand seams
Layer	Greater than 1/2 inch thick	2-inch sand layers
Occasional	One or less per foot of thickness	
Frequent	More than one per foot of thickness	
Interbedded	Alternating soil layers of different composition	
Varved	Alternating thin seams of silt and clay	
Mottled	Variations in color	



Project Name: Chapel St & Sheafe St Infrastructure Improvements
 RWG&A Project No. 0515-121
 Location: Portsmouth, New Hampshire
 Client: Underwood Engineers, Inc.
 RWG&A Representative: C. Morrell
 Boring Location: Near Sta. 7+50
 Boring Abandonment Method: Backfilled with cuttings
 Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring
 Drill Rig: Acker B-53
 Driller Rep.: Jeff Lee
 Date Started: 03/03/2015
 Date Completed: 03/03/2015
 Surface Elevation: ()
 Drilling Method: SSA
 Casing Type: N/A

DEPTH, FT.	SYMBOL SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0		S-1	ASPHALTIC PAVEMENT (3 inches). FILL; Sand with gravel, moist, fine to medium sand, little gravel, few silt, brown. FILL; Sand, moist, fine sand, trace silt, light brown. SAND (SP); Dense, moist, fine sand, few silt, trace medium sand, brown.		Auger Sample		6.9	GS MC
3		S-2		10	16 18 18 20	36		
6		S-3		9	10 15 17 21	32	4.2	MC
9								
12		S-4		11	9 14 20 20	34	4.5	MC
12			Bottom of Exploration at 12'; Not Refusal.					
15								

Notes: Sampled 0.5' - 1.5' from auger cuttings. Unable to sample by standard penetration test due to frost.



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Boring Log: P102

Total Depth (ft): 10

Sheet 1 of 1

Project Name: Chapel St & Sheafe St Infrastructure Improvements
 RWG&A Project No. 0515-121
 Location: Portsmouth, New Hampshire
 Client: Underwood Engineers, Inc.
 RWG&A Representative: C. Morrell
 Boring Location: Near Sta. 7+00
 Boring Abandonment Method: Backfilled with cuttings
 Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring
 Drill Rig: Acker B-53
 Driller Rep.: Jeff Lee
 Date Started: 03/03/2015
 Date Completed: 03/03/2015
 Surface Elevation: ()
 Drilling Method: SSA
 Casing Type: N/A

DEPTH, FT.	SYMBOL SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0		S-1	ASPHALTIC PAVEMENT (5 inches).		Auger Sample			
			FILL; Gravelly sand, moist, fine to coarse sand, some fine gravel, brown.					
3								
6								
9								
			Bottom of Exploration at 10'; Not Refusal.					
12								
15								

Notes: Collected sample of auger cuttings from 4' - 7'.



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Boring Log: P103
 Total Depth (ft): 10
 Sheet 1 of 1

Project Name: Chapel St & Sheafe St Infrastructure Improvements
 RWG&A Project No. 0515-121
 Location: Portsmouth, New Hampshire
 Client: Underwood Engineers, Inc.
 RWG&A Representative: C. Morrell
 Boring Location: Near Sta 5+75
 Boring Abandonment Method: Backfilled with cuttings
 Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring
 Drill Rig: Acker B-53
 Driller Rep.: Jeff Lee
 Date Started: 03/03/2015
 Date Completed: 03/03/2015
 Surface Elevation: ()
 Drilling Method: SSA
 Casing Type: N/A

DEPTH, FT.	SYMBOL SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0			ASPHALTIC PAVEMENT (3 inches).					
			FILL; Sand with gravel, moist, fine to coarse sand, little gravel, few silt, dark brown.					
3			FILL; Silty sand, moist to wet, fine to coarse sand, some silt, few gravel, dark brown.					
6			SAND WITH SILT (SM); Moist, fine to medium sand, little to few silt, brown.					
9								
			Bottom of Exploration at 10'; Not Refusal.					
12								
15								

Notes:



Project Name: Chapel St & Sheafe St Infrastructure Improvements
 RWG&A Project No. 0515-121
 Location: Portsmouth, New Hampshire
 Client: Underwood Engineers, Inc.
 RWG&A Representative: C. Morrell
 Boring Location: Near Sta. 5+00
 Boring Abandonment Method: Backfilled with cuttings
 Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring
 Drill Rig: Acker B-53
 Driller Rep.: Jeff Lee
 Date Started: 03/03/2015
 Date Completed: 03/03/2015
 Surface Elevation: ()
 Drilling Method: SSA
 Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0		S-1	ASPHALTIC PAVEMENT (3 inches). FILL; Sand with gravel and silt, moist, fine to coarse sand, little gravel, little silt, dark brown.		Auger Sample		8.7	GS MC
3		S-2	FILL; Silty sand, medium dense, moist, fine to medium sand, some silt, brown.	14	21 14 7 7	21		
6		S-3	FILL; Sand with gravel, medium dense, moist, fine to coarse sand, little gravel, reddish brown.	12	8 11 11 30	22	4.1	MC
9		S-4	SAND (SP); Medium dense, moist, fine to coarse sand, few silt, trace gravel, light brown.	11	9 13 12 15	25		
12			Bottom of Exploration at 12'; Not Refusal.					
15								

Notes: Sampled 0.5' - 1.5' from auger cuttings. Unable to sample by standard penetration test due to frost.



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Boring Log: P105
 Total Depth (ft): 10
 Sheet 1 of 1

Project Name: Chapel St & Sheafe St Infrastructure Improvements
 RWG&A Project No. 0515-121
 Location: Portsmouth, New Hampshire
 Client: Underwood Engineers, Inc.
 RWG&A Representative: C. Morrell
 Boring Location: Near Sta. 3+00
 Boring Abandonment Method: Backfilled with cuttings
 Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring
 Drill Rig: Acker B-53
 Driller Rep.: Jeff Lee
 Date Started: 03/03/2015
 Date Completed: 03/03/2015
 Surface Elevation: ()
 Drilling Method: SSA
 Casing Type: N/A

DEPTH, FT.	SYMBOL SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0		S-1	ASPHALTIC PAVEMENT (3 inches).		Auger Sample			
			FILL; Sand with silt, moist, fine to medium sand, little silt, dark brown and black.					
3			FILL; Silty sand, moist, fine sand, some silt, brown.					
6			SILTY SAND (SM); Moist to wet, fine to medium sand, some silt, brown.					
9			Bottom of Exploration at 10'; Not Refusal.					
12								
15								

Notes: Collected sample of auger cuttings from 0.3' - 1.0'.



Project Name: Chapel St & Sheafe St Infrastructure Improvements
 RWG&A Project No. 0515-121
 Location: Portsmouth, New Hampshire
 Client: Underwood Engineers, Inc.
 RWG&A Representative: C. Morrell
 Boring Location: Near Sta. 2+00
 Boring Abandonment Method: Backfilled with cuttings
 Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring
 Drill Rig: Acker B-53
 Driller Rep.: Jeff Lee
 Date Started: 03/03/2015
 Date Completed: 03/03/2015
 Surface Elevation: ()
 Drilling Method: SSA
 Casing Type: N/A

DEPTH, FT.	SYMBOL SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0			ASPHALTIC PAVEMENT (2.5 inches).					
			FILL; Sand with silt, moist, fine to coarse sand, little silt, black then brown.					
3			FILL; Silty sand, moist, fine to medium sand, some silt, brown.					
6								
9								
			Bottom of Exploration at 10'; Not Refusal.					
12								
15								

Notes:



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Boring Log: B107

Total Depth (ft): 12

Sheet 1 of 1

Project Name: Chapel St & Sheafe St Infrastructure Improvements
 RWG&A Project No. 0515-121
 Location: Portsmouth, New Hampshire
 Client: Underwood Engineers, Inc.
 RWG&A Representative: C. Morrell
 Boring Location: Near Sta. 1+50
 Boring Abandonment Method: Backfilled with cuttings
 Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring
 Drill Rig: Acker B-53
 Driller Rep.: Jeff Lee
 Date Started: 03/03/2015
 Date Completed: 03/03/2015
 Surface Elevation: ()
 Drilling Method: SSA
 Casing Type: N/A

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0			ASPHALTIC PAVEMENT (3 inches).					
			FILL; Sand with gravel, moist, fine to coarse sand, little gravel, dark brown.					
			FILL; Silty sand, medium dense, moist, fine sand, some silt, few medium to coarse sand, gray.					
3		S-1		15	2 3 6 9	9		
6		S-2	SILTY CLAY (CL); Very stiff, moist, silty clay, trace fine sand, gray with brown mottling. Pocket Penetrometer: Undrained Shear Strength: Su=3.25 ksf.	20	5 8 9 11	17		
9			SAND WITH SILT (SP-SM); Dense, moist, fine sand, little silt, brown.					
12		S-3		20	12 16 20 24	36		
			Bottom of Exploration at 12'; Not Refusal.					
15								

Notes:



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Boring Log: P201
 Total Depth (ft): 10
 Sheet 1 of 1

Project Name: Chapel St & Sheafe St Infrastructure Improvements
 RWG&A Project No. 0515-121
 Location: Portsmouth, New Hampshire
 Client: Underwood Engineers, Inc.
 RWG&A Representative: C. Morrell
 Boring Location: Near Sta. 32+50
 Boring Abandonment Method: Backfilled with cuttings
 Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring
 Drill Rig: Acker B-53
 Driller Rep.: Jeff Lee
 Date Started: 03/03/2015
 Date Completed: 03/03/2015
 Surface Elevation: ()
 Drilling Method: SSA
 Casing Type: N/A

DEPTH, FT.	SYMBOL SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0	[Cross-hatched pattern]		ASPHALTIC PAVEMENT (4 inches).					
			FILL; Sand with gravel, moist, fine to coarse sand, little fine gravel, trace silt, dark brown.					
3			FILL; Silty sand, moist, fine sand, some silt, few medium sand, brown.					
6			Increased drilling resistance from 6' - 6.5', brick fragments observed in cuttings.					
9								
12			Bottom of Exploration at 10'; Not Refusal.					
15								

Notes:



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Boring Log: B202
 Total Depth (ft): 11
 Sheet 1 of 1

Project Name: Chapel St & Sheafe St Infrastructure Improvements
 RWG&A Project No. 0515-121
 Location: Portsmouth, New Hampshire
 Client: Underwood Engineers, Inc.
 RWG&A Representative: C. Morrell
 Boring Location: Near Sta. 33+50
 Boring Abandonment Method: Backfilled with cuttings
 Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring
 Drill Rig: Acker B-53
 Driller Rep.: Jeff Lee
 Date Started: 03/03/2015
 Date Completed: 03/03/2015
 Surface Elevation: ()
 Drilling Method: SSA
 Casing Type: N/A

DEPTH, FT.	SYMBOL SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT %	LAB TESTS
0		ASPHALTIC PAVEMENT (3 inches). FILL; Sand with gravel, moist, fine to medium sand, little gravel, brick fragments, dark brown and red.					
3	S-1	FILL; Silty sand, loose to medium dense, moist, fine sand, some silt, trace gravel, brick and wood fragments, dark brown.	10	3 3 4 4	7	15.0	MC
6	S-2		4	15 7 4 4	11	20.8	MC
9	S-3		13	10 12 12 14	24		
9	S-4	SILTY SAND (SM); Medium dense, moist, fine sand, some silt, trace gravel, gray with brown mottling.	21	13 12 13 15	25		
12		Bottom of Exploration at 11'; Not Refusal.					
15							

Notes:

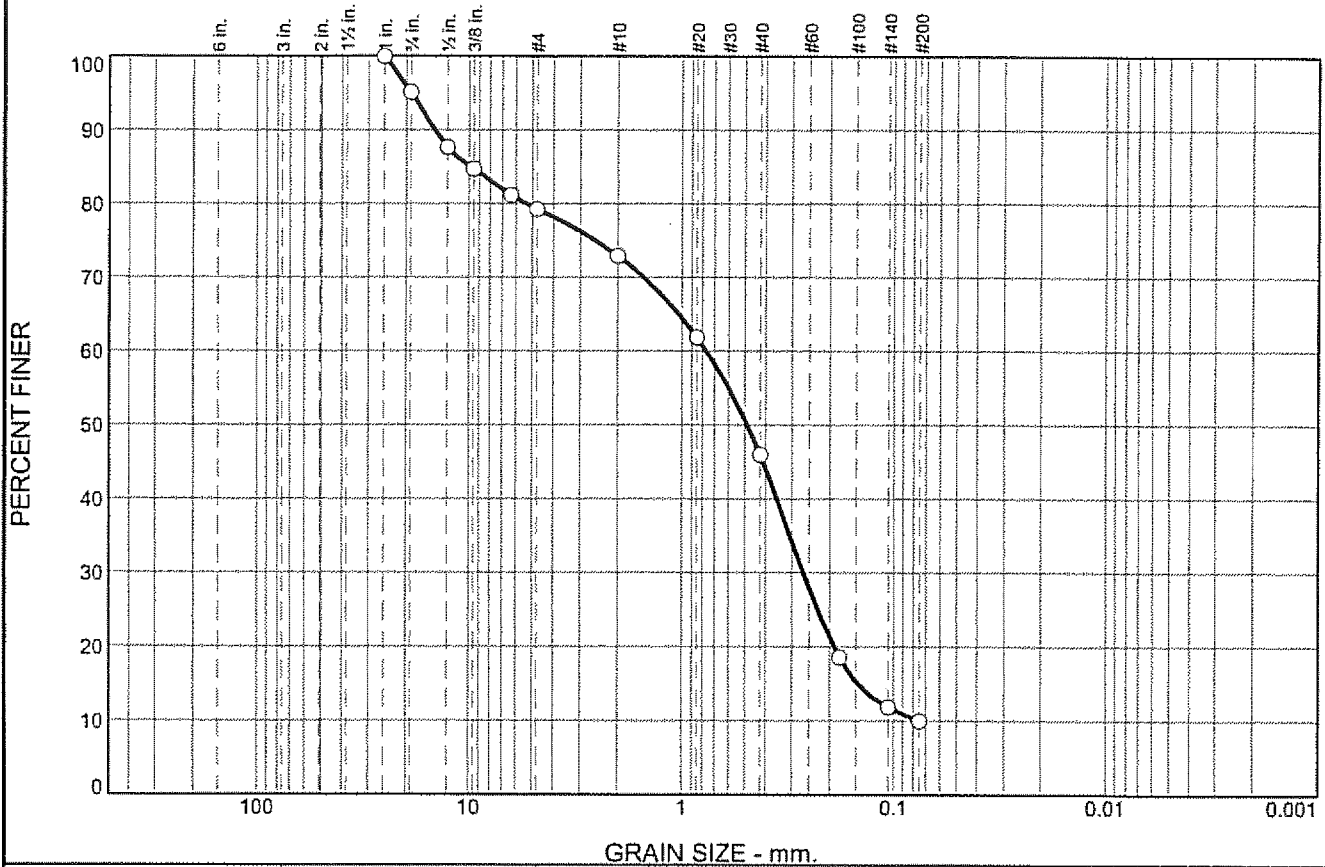
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APPENDIX B

LABORATORY TEST RESULTS

Geotechnical Evaluation
Chapel Street and Sheafe Street Infrastructure Improvements Project
Portsmouth, New Hampshire

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.8	15.9	6.4	26.9	36.0	10.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	95.2		
1/2"	87.7		
3/8"	84.7		
1/4"	81.2		
#4	79.3		
#10	72.9		
#20	61.8		
#40	46.0		
#80	18.6		
#140	11.9		
#200	10.0		

Soil Description

well-graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D₈₅= 9.8509 D₆₀= 0.7661 D₅₀= 0.4890
D₃₀= 0.2660 D₁₅= 0.1471 D₁₀= 0.0750
C_u= 10.21 C_c= 1.23

Classification

USCS= SW-SM AASHTO= A-1-b

Remarks

Moisture Content - 6.9%

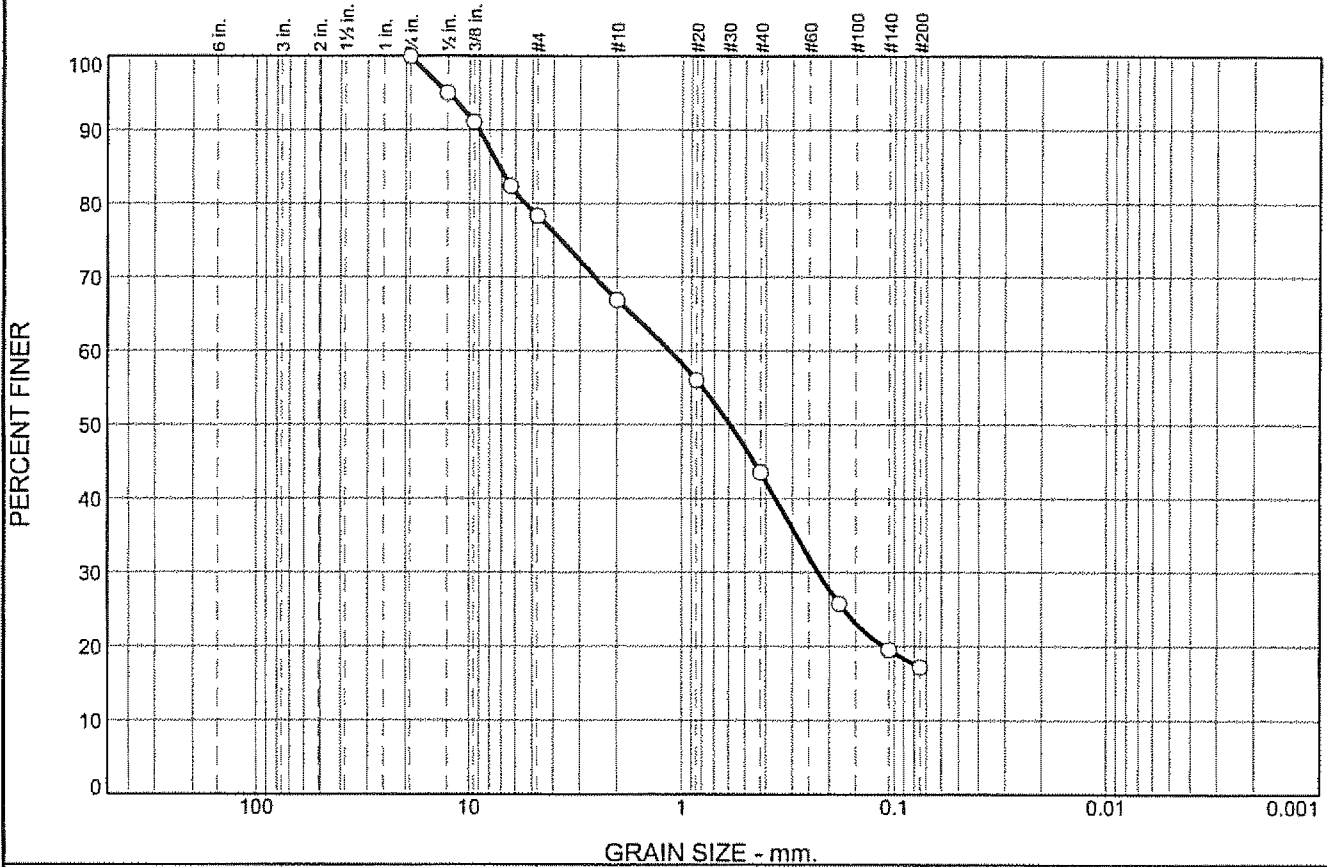
* (no specification provided)

Sample No.: S-1 Source of Sample: B-101 Date: 3/4/2015
Location: Portsmouth, NH Elev./Depth:

R.W. Gillespie & Associates, Inc. Saco, Maine	Client: Underwood Engineers, Inc. Project: Chapel Street and Sheafe Street Infrastructure Improvements Project No: 0515-121 Lab No. 13516a
--	---

Tested By: JSL Checked By: MTG *JMB*

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.7	11.4	23.4	26.3	17.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	95.0		
3/8"	91.1		
1/4"	82.4		
#4	78.3		
#10	66.9		
#20	56.0		
#40	43.5		
#80	25.8		
#140	19.5		
#200	17.2		

Soil Description
silty sand with gravel

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₈₅= 7.2068 D₆₀= 1.1389 D₅₀= 0.5902
 D₃₀= 0.2270 D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO= A-1-b

Remarks
 Moisture Content - 8.7%

* (no specification provided)

Sample No.: S-1 Source of Sample: B-104 Date: 3/4/2015
 Location: Portsmouth, NH Elev./Depth:

R.W. Gillespie & Associates, Inc. Saco, Maine	Client: Underwood Engineers, Inc. Project: Chapel Street and Sheafe Street Infrastructure Improvements Project No: 0515-121 Lab No. 13516b
--	---

Tested By: JB Checked By: MTG *JMB*

C. CITY TIE SHEETS AND RECORD INFORMATION

CMA Engineers, Inc.
 35 Bow Street
 Portsmouth, New Hampshire 03801
 CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
 Owner: City of Portsmouth, New Hampshire
 Contractor: Gove Construction
 Street: #3 Sheafe Street

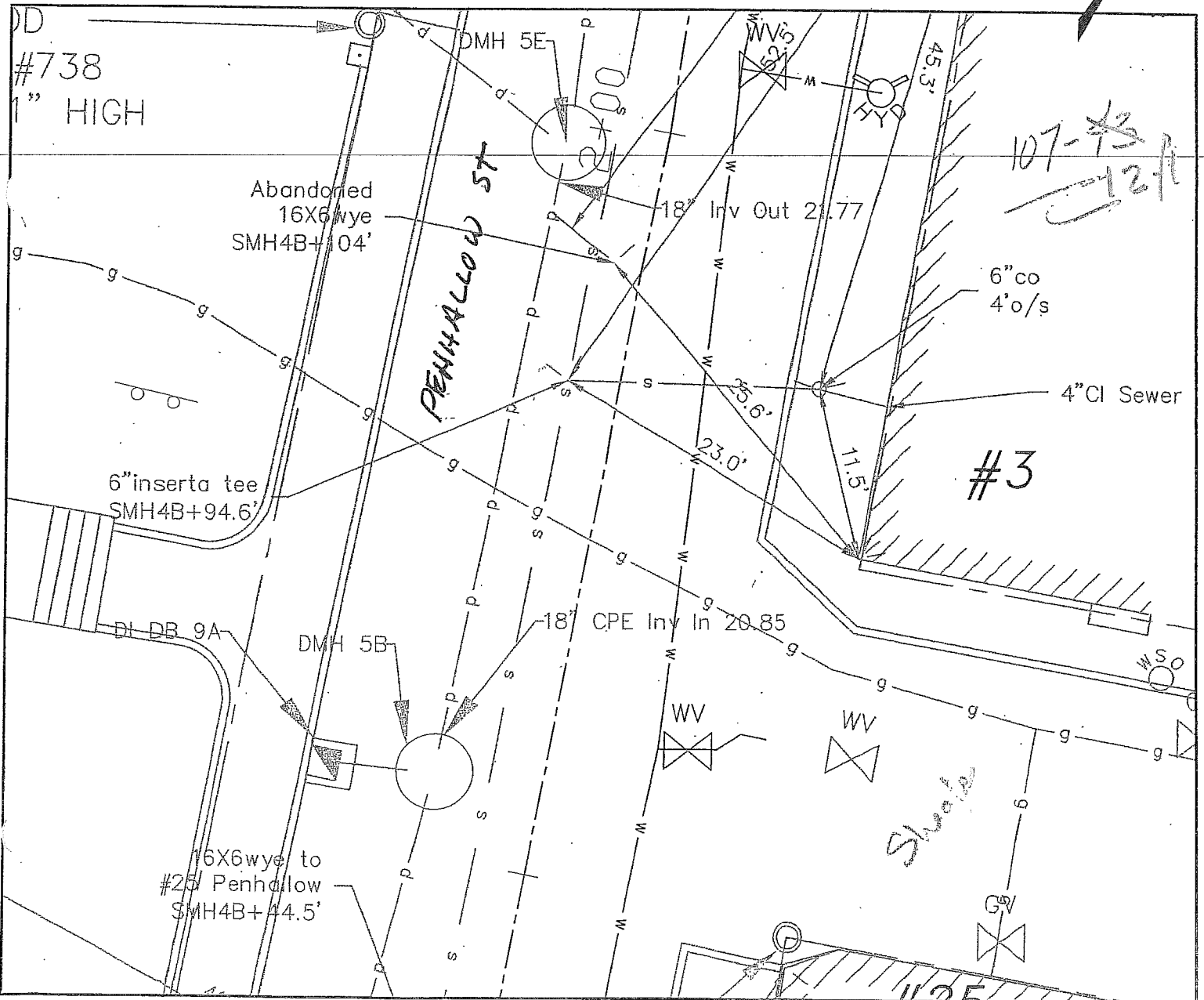
Installed Date 10-19-10, 11-1-10
 STA 1+83 Length 22'
 Size 6" Material PVC
 95" up stream from SMH 4B

1. Connection to Main Sewer: 6" INSERTA TEE
2. General Comments: 6" SHC CONNECTED TO 6" PVC SEWER

3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

CHECKS AND APPROVED JCK
 Owner's Representative



CMA Engineers, Inc.
35 Bow Street
Portsmouth, New Hampshire 03801
CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
Owner: City of Portsmouth, New Hampshire
Contractor: Gove Construction
Street: #9 ~~Custom House Court~~ **SHRAPE**

Installed Date 4-11-11
STA 0+57 Length 8'
Size 6" Material PVC
60' up stream from SMH 4C

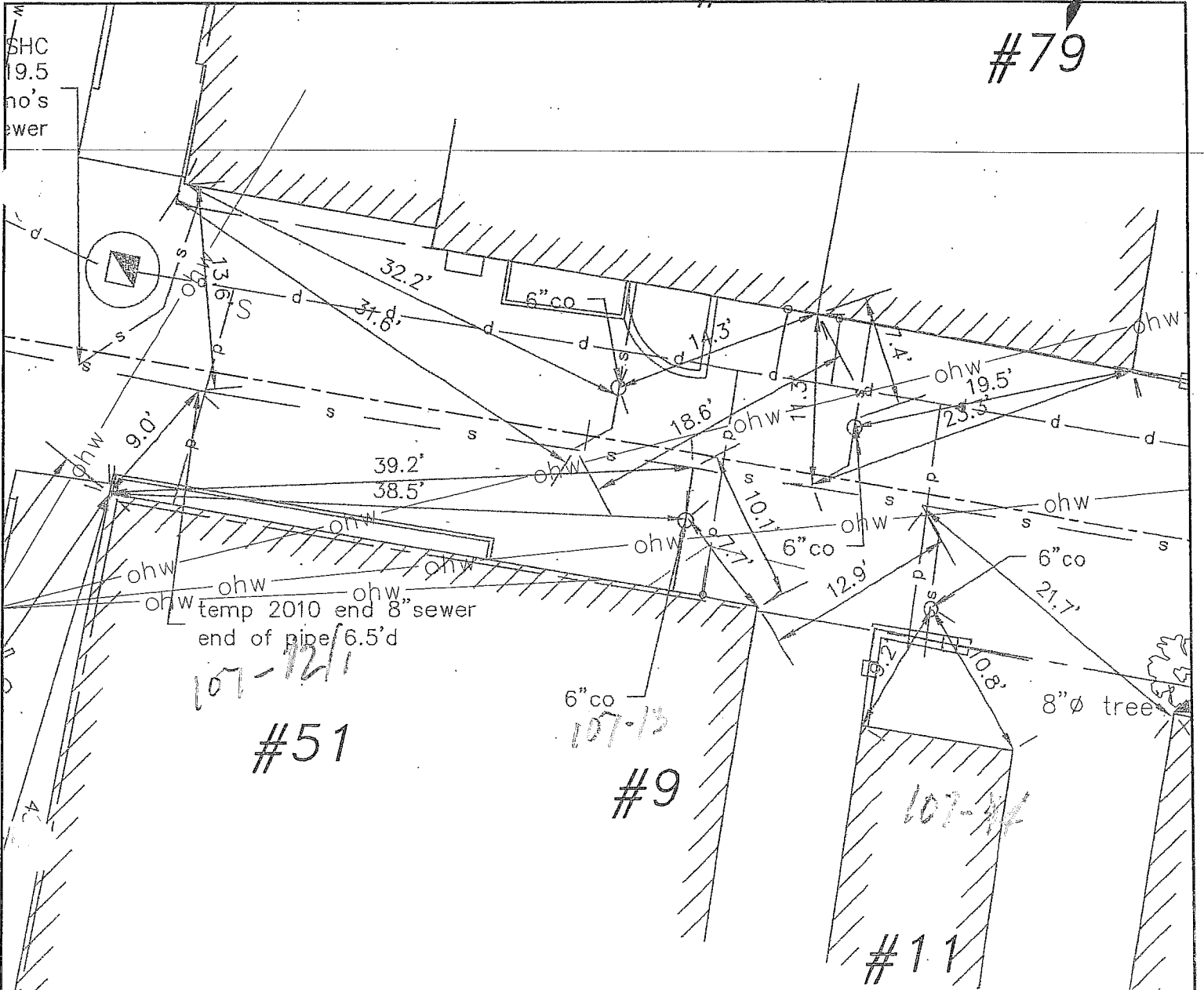
1. Connection to Main Sewer: EXC WYE

2. General Comments: _____

3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

CHECKS AND APPROVED: JCK
Owner's Representative



CMA Engineers, Inc.
35 Bow Street
Portsmouth, New Hampshire 03801
CMA Project # 737

EWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements

Owner: City of Portsmouth, New Hampshire

Contractor: Gove Construction

Street: ~~#11 Custom House Court~~

#11 SHEAFE ST.

Installed Date 4-12-11

STA 0+73

Length 10'

Size 6"

Material PVC

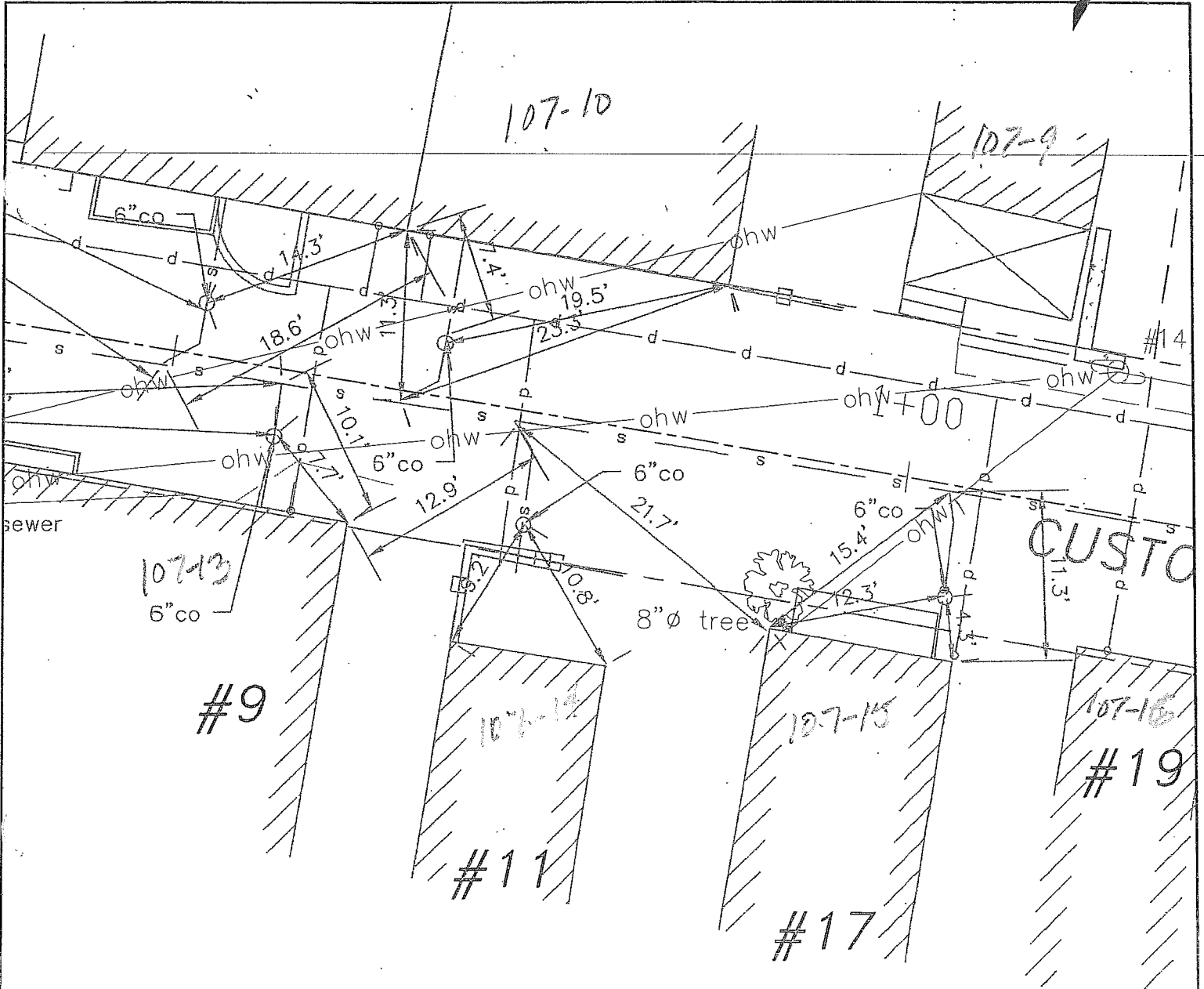
75' up stream from SMH 4C

1. Connection to Main Sewer: 8x6 WYE

2. General Comments: _____

3. Sketch (Location and Depth Lateral) Scale: 1" = 10'

CHECKS AND APPROVED JCK
Owner's Representative



CMA Engineers, Inc.
35 Bow Street
Portsmouth, New Hampshire 03801
CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements

Owner: City of Portsmouth, New Hampshire

Contractor: Gove Construction

Street: #19 Custom House Court

#19 SHEAFE ST

Installed Date 4-18-11

STA 1+39.

Length 20'

Size 6"

Material PVC

_____ tied directly into SMH 4F

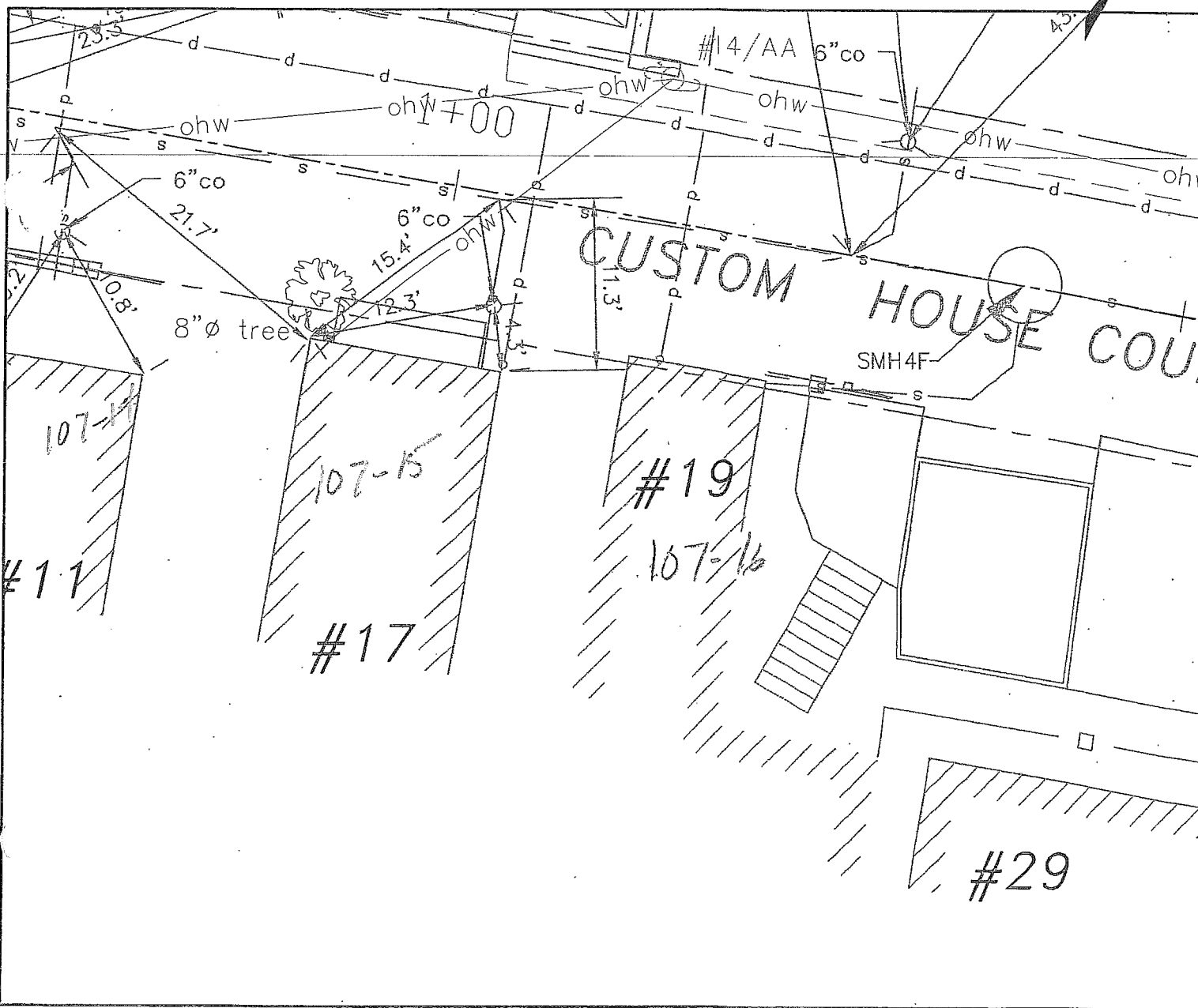
1. Connection to Main Sewer: SMH 4F

2. General Comments: DIRECT CONNECTION TO SMH

3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

CHECKS AND APPROVED JCK
Owner's Representative



CMA Engineers, Inc.
35 Bow Street
Portsmouth, New Hampshire 03801
CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
Owner: City of Portsmouth, New Hampshire
Contractor: Gove Construction
Street: #25 Sheafe Street

Installed Date 10-18/10, 11-2-10
STA 1+31 Length 17'
Size 6" Material PVC
44' up stream from SMH 4B

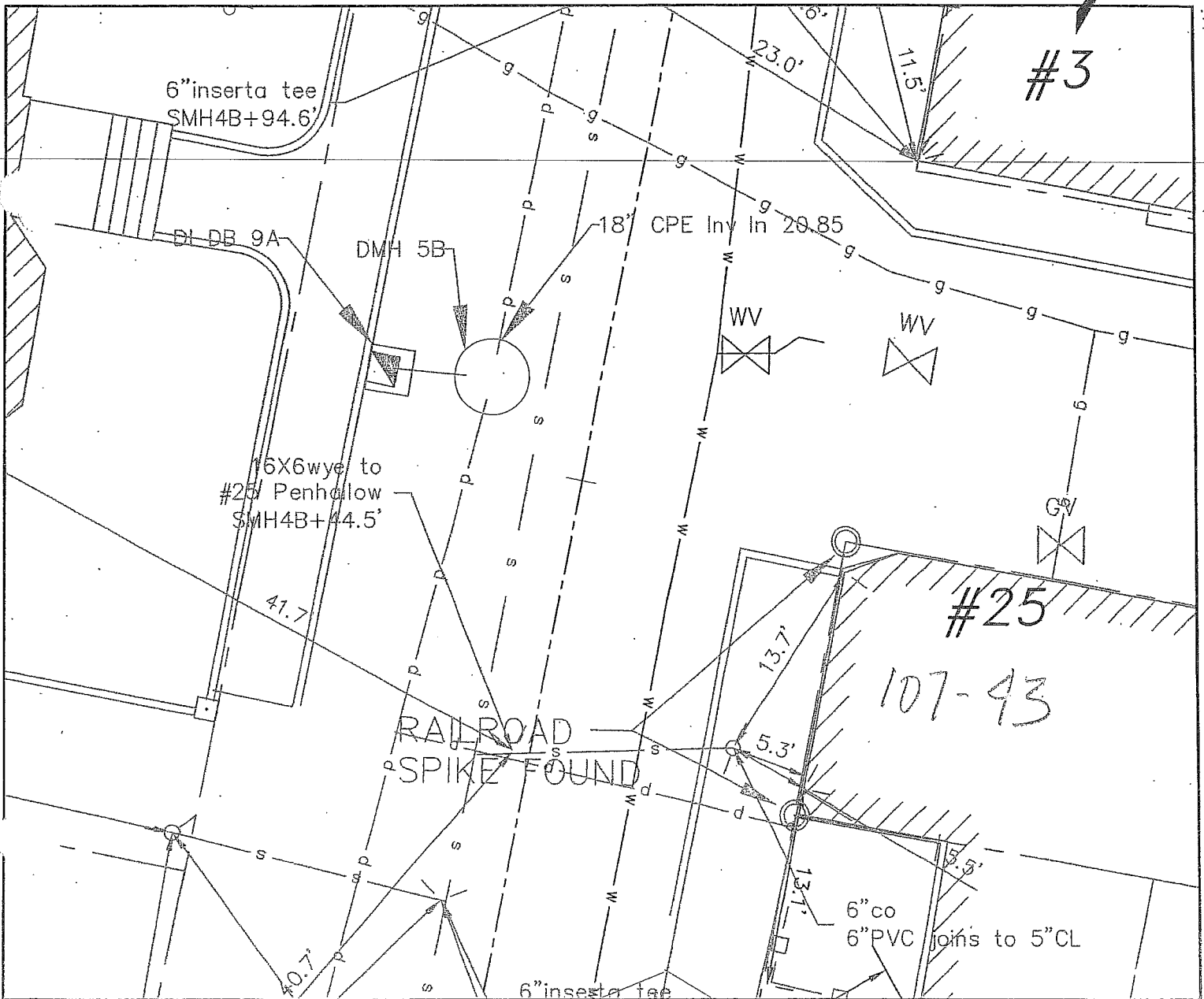
- 1. Connection to Main Sewer: 16 x 6 WYE
- 2. General Comments: _____

6" SHC to 16" C900 SEWER MAIN

- 3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

CHECKS AND APPROVED JCK
Owner's Representative



CMA Engineers, Inc.
 35 Bow Street
 Portsmouth, New Hampshire 03801
 CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
 Owner: City of Portsmouth, New Hampshire
 Contractor: Gove Construction
 Street: #175 State Street

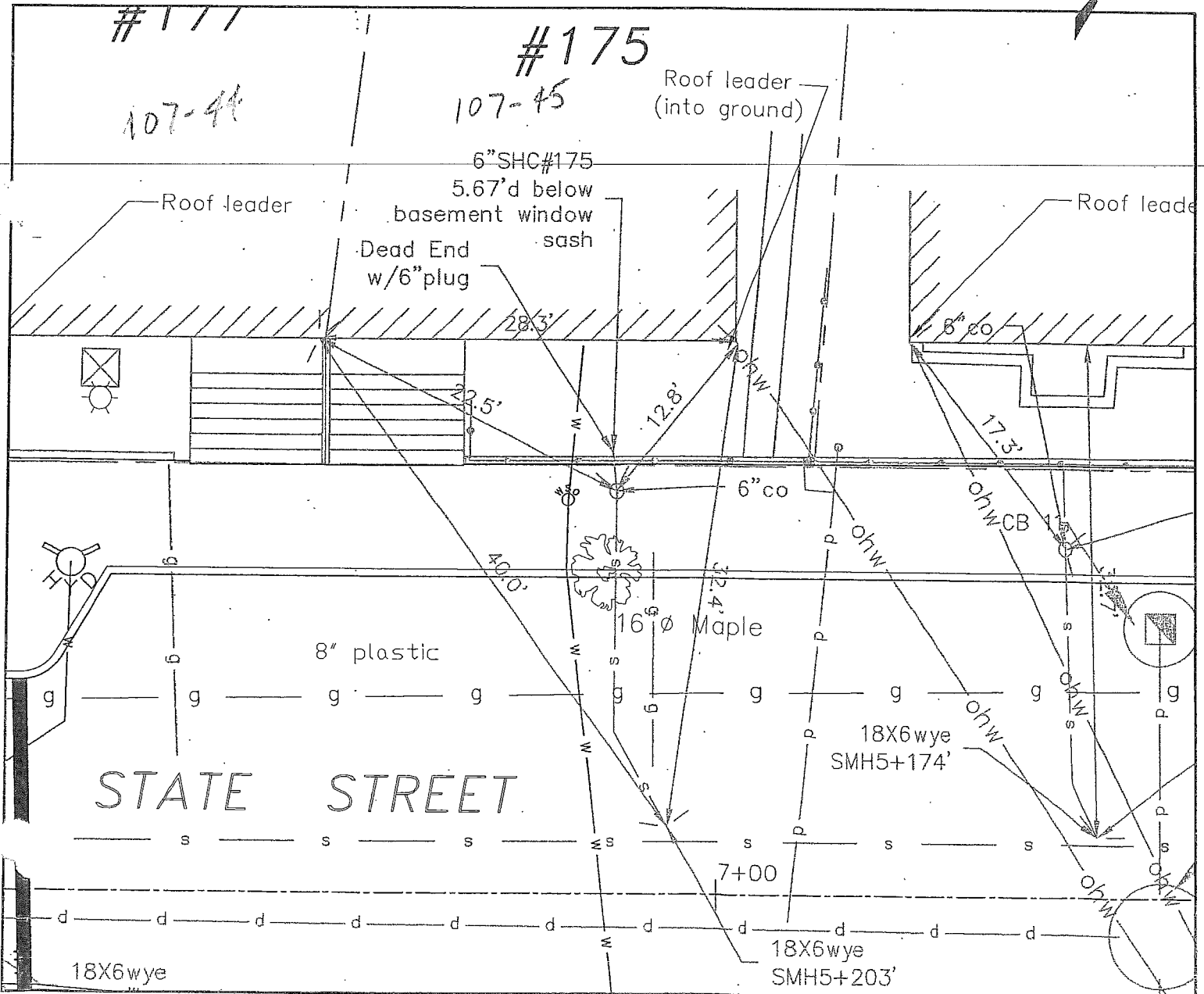
Installed Date: 7/13/10, 7/19/10, 8/16/10, 8/18/10
 STA 6+97 Length 27'
 Size 6" Material PVC
 203' up stream from SMH 5

1. Connection to Main Sewer: 18 x 6 WYE
2. General Comments: SHC INSTALLED FOR FUTURE CONNECTION BY PROP OWNER. EXISTING SEWER DRAINS VIA COMBINED SEWER FOR #177 STATE INTO SMH 4B.
NOTE: PAST GREASE CLOGGING FROM RESTAURANT USE AT #177 STATE

3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

CHECKS AND APPROVED SCK
 Owner's Representative



CMA Engineers, Inc.
 35 Bow Street
 Portsmouth, New Hampshire 03801
 CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
 Owner: City of Portsmouth, New Hampshire
 Contractor: Gove Construction
 Street: #147 State Street

Installed Date 7/1/10, 8/16/10
 STA 8+47 Length 26'
 Size 6" Material PVC
 54' up stream from SMH 5

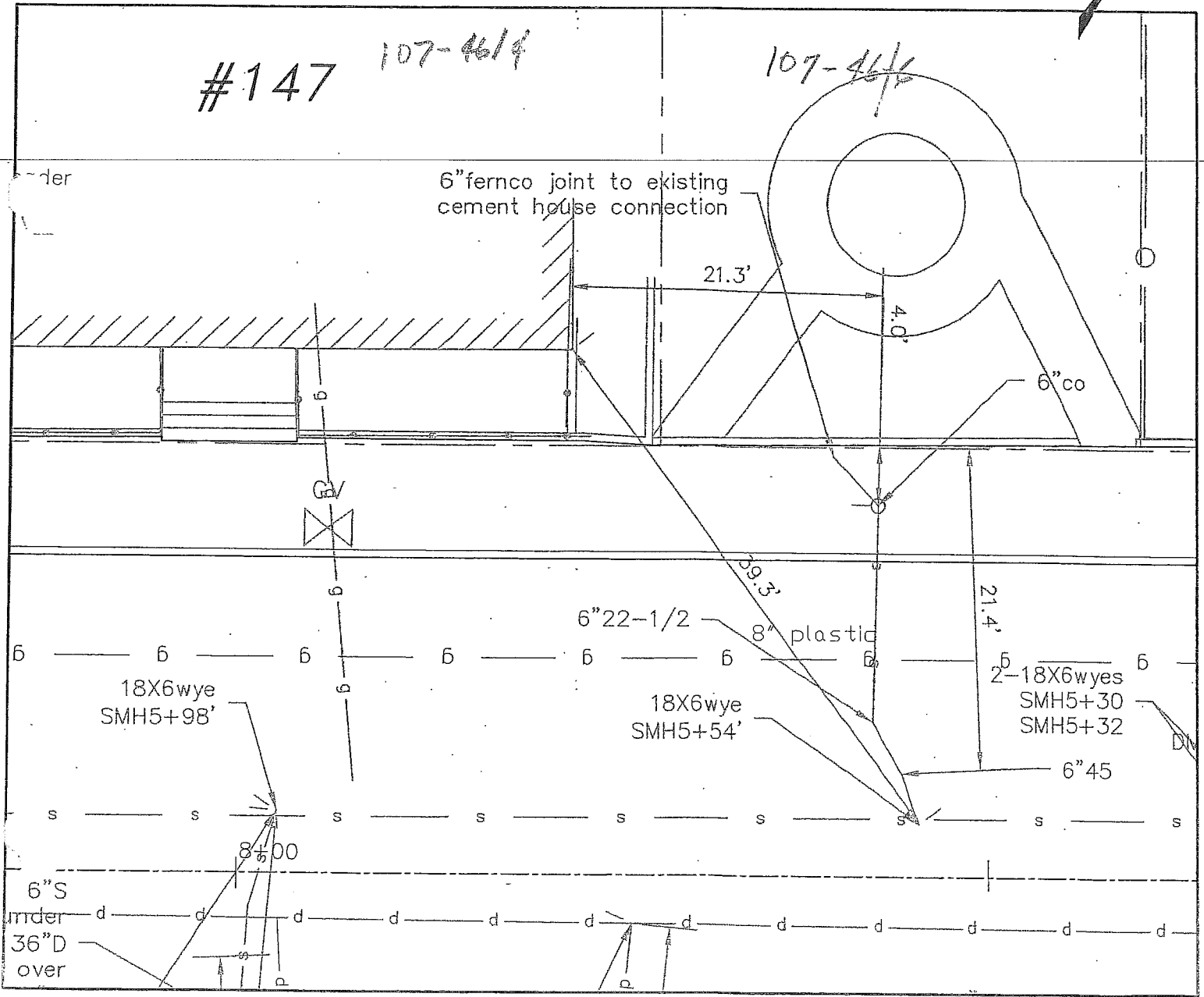
1. Connection to Main Sewer: 18 x 6 WYE

2. General Comments: BUILDING SEWER FEELS STRUCTURE AT EAST WALL. CLEAN OUT AT PAVEMENT/SIDEWALK GRADE. SEWER LIKELY RUNS UNDER PARK PROPERTY

3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

CHECKS AND APPROVED JCK
 Owner's Representative



CMA Engineers, Inc.
 35 Bow Street
 Portsmouth, New Hampshire 03801
 CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements

Owner: City of Portsmouth, New Hampshire

Contractor: Gove Construction

Street: #129 State Street

Installed Date 5/10/10, 6/24/10
 STA 8+94 Length 26'
 Size 6" Material PVC
 6.6' up stream form SMH 5

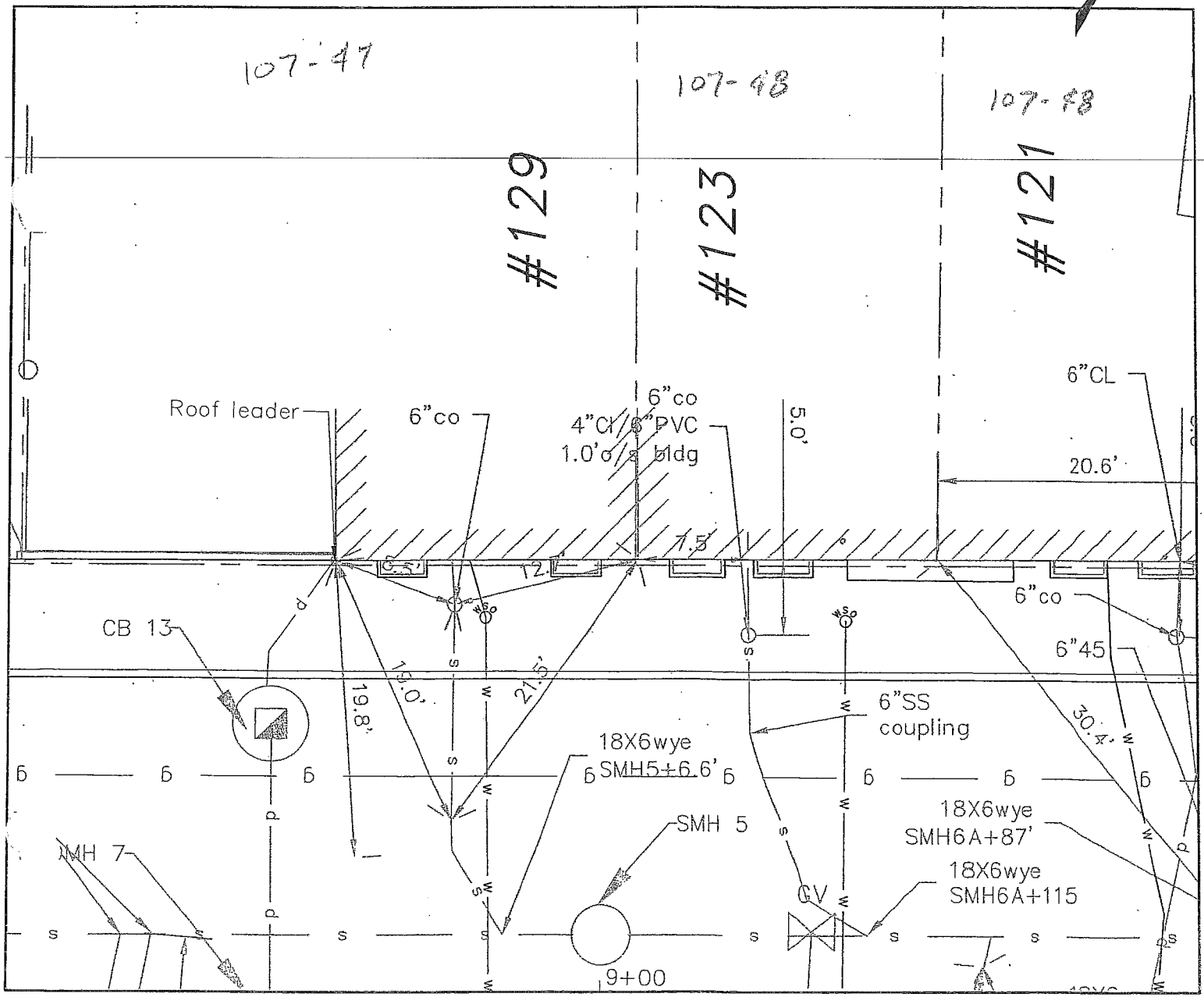
1. Connection to Main Sewer: 18 x 6 WYE

2. General Comments: _____

3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

CHECKS AND APPROVED JCK
 Owner's Representative



CMA Engineers, Inc.
 35 Bow Street
 Portsmouth, New Hampshire 03801
 CMA Project # 737

SEWER CONNECTION DATA SHEET

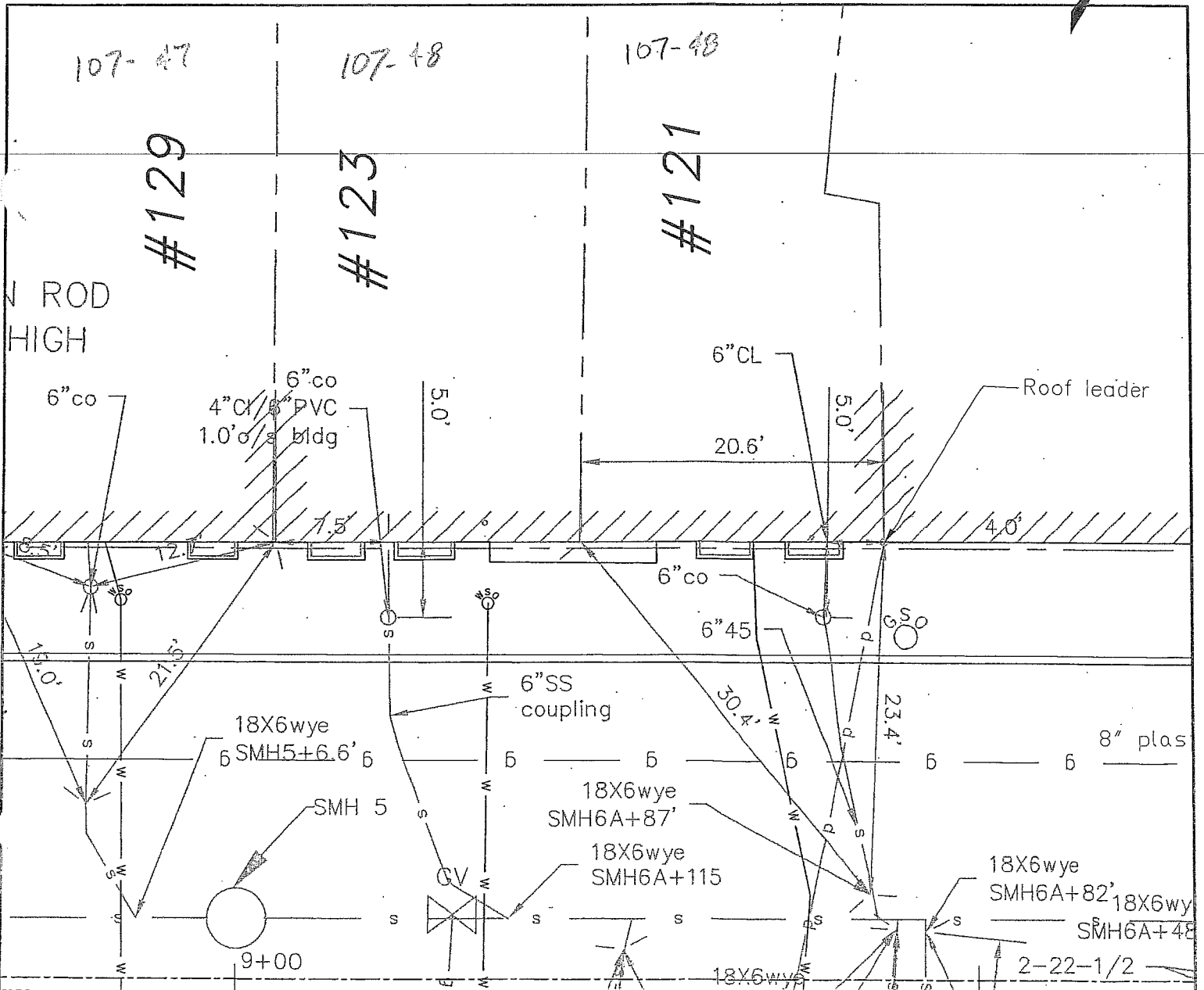
Job Title: State St. Utilities Upgrade and Roadway Improvements
 Owner: City of Portsmouth, New Hampshire
 Contractor: Gove Construction
 Street: #123 State Street

Installed Date 6/21/10, 6/29/10
 STA 9+19 Length 27'
 Size 6" Material PVC
 115' up stream from SMH 6A

1. Connection to Main Sewer: 18 x 6 WYE
2. General Comments: _____

3. Sketch (Location and Depth Lateral) Scale: 1" = 10'

CHECKS AND APPROVED JCK
 Owner's Representative



CMA Engineers, Inc.
 35 Bow Street
 Portsmouth, New Hampshire 03801
 CMA Project # 737

tax Map

107-48

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
 Owner: City of Portsmouth, New Hampshire
 Contractor: Gove Construction
 Street: #121 State Street (Byrne & Carlson Chocolates)

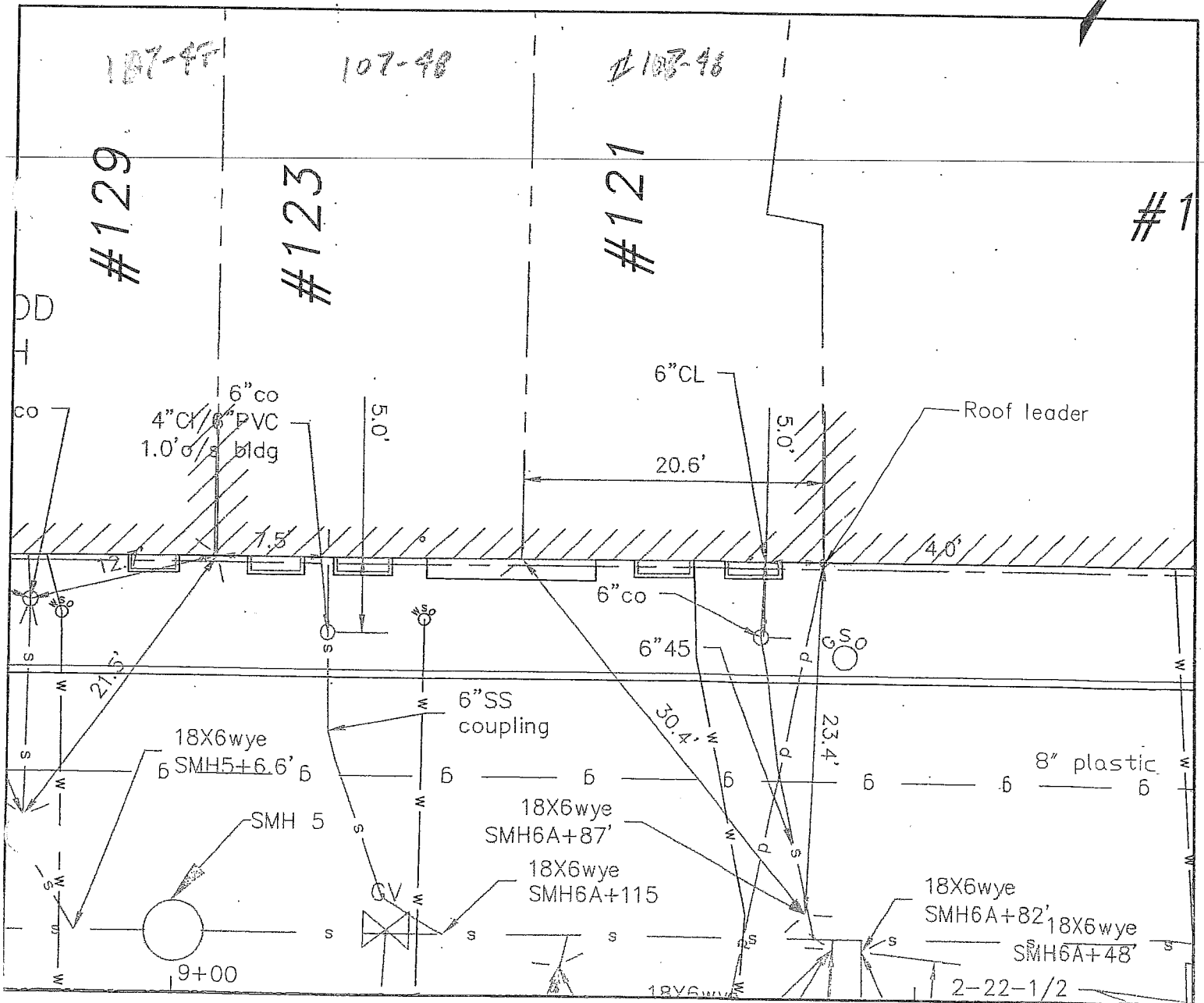
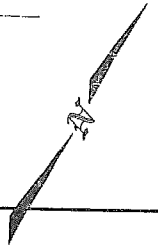
Installed Date: 6/14/10, 6/15/10, 6/17/10
 STA 9+43 Length 25'
 Size 6" Material PVC
 87' up stream from SMH 6A

1. Connection to Main Sewer: 18 x 6 WYE
2. General Comments: _____

3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

CHECKS AND APPROVED JCK
 Owner's Representative



CMA Engineers, Inc.
 35 Bow Street
 Portsmouth, New Hampshire 03801
 CMA Project # 737

SEWER CONNECTION DATA SHEET

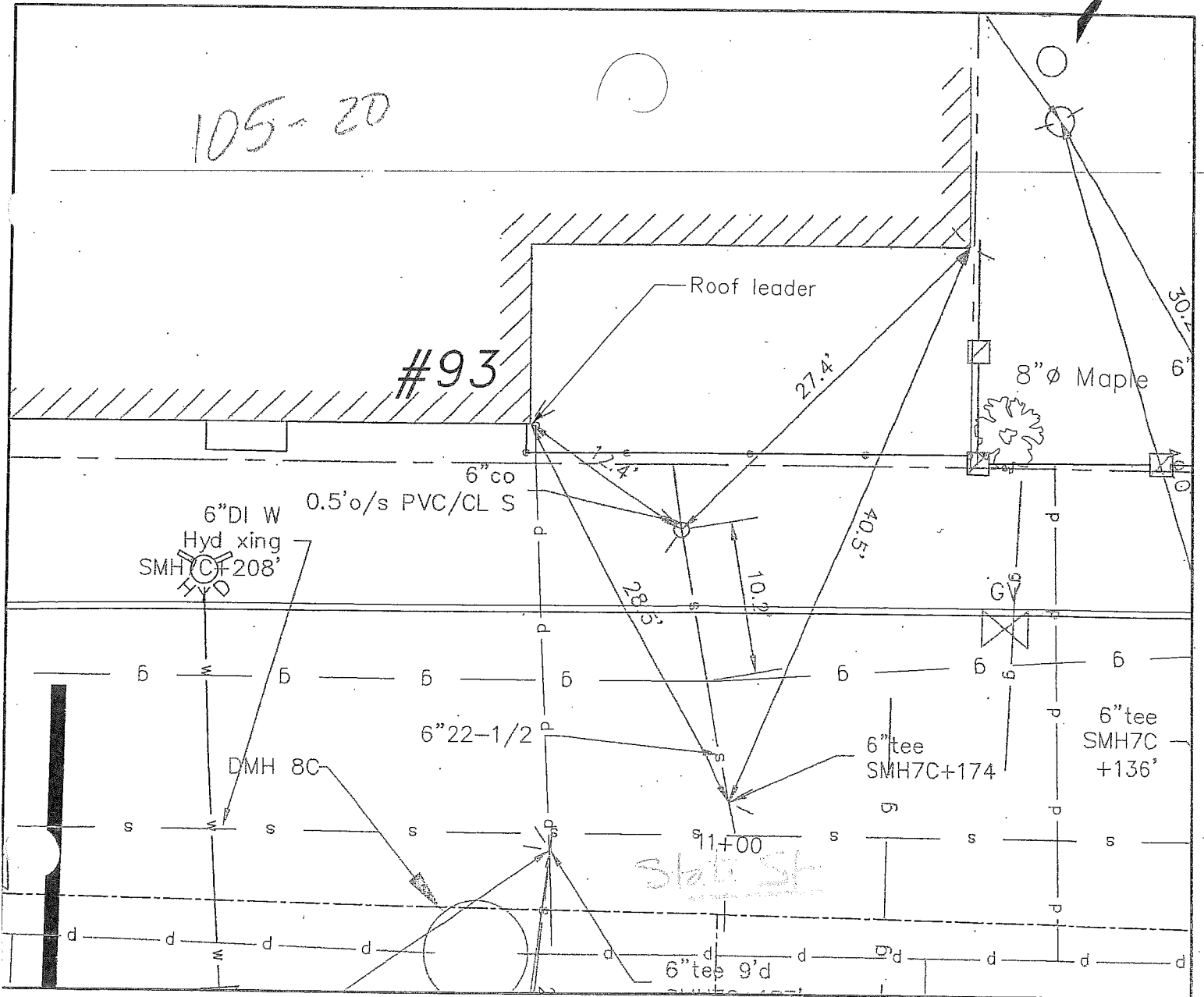
Job Title: State St. Utilities Upgrade and Roadway Improvements
 Owner: City of Portsmouth, New Hampshire
 Contractor: Gove Construction
 Street: #93 State Street (Kingsbury House)

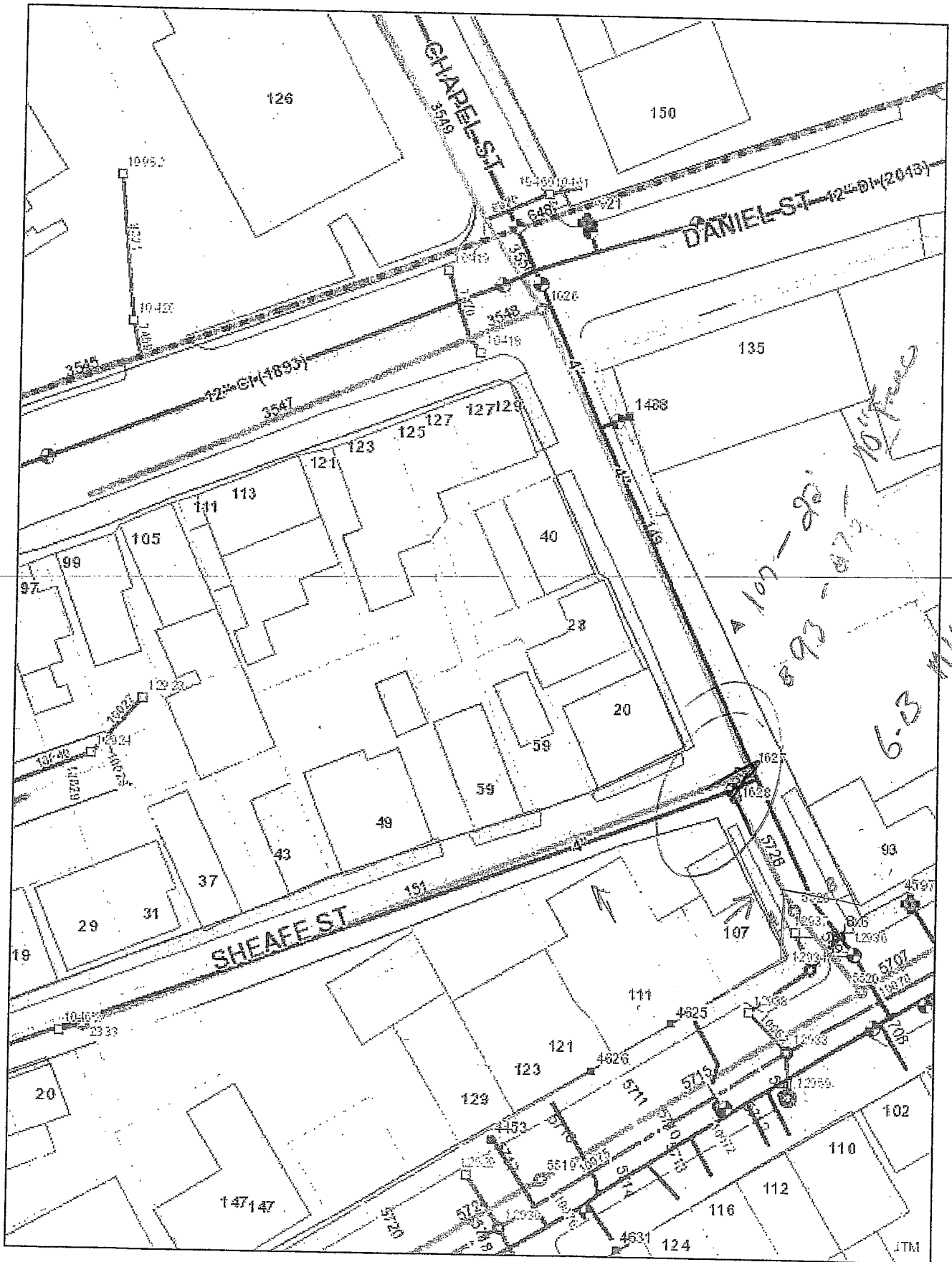
Installed Date: 5/13/10, 5/17/10
 STA 11+01 Length 25'
 Size 6" Material PVC
 174' up stream from SMH 7C

1. Connection to Main Sewer: 6" TEE
2. General Comments: _____

3. Sketch (Location and Depth Lateral) Scale: 1" = 10'

CHECKS AND APPROVED: JCK
 Owner's Representative





107-20
893-075
6-3 W.M.

JTM

CMA Engineers, Inc.
 35 Bow Street
 Portsmouth, New Hampshire 03801
 CMA Project # 737

EWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
 Owner: City of Portsmouth, New Hampshire
 Contractor: Gove Construction
 Street: #73 Custom House Court

Installed Date 11-23-10, 11-24-10
 STA 0+16 Length 15'
 Size 6" Material PVC
 18' up stream from SMH 4C

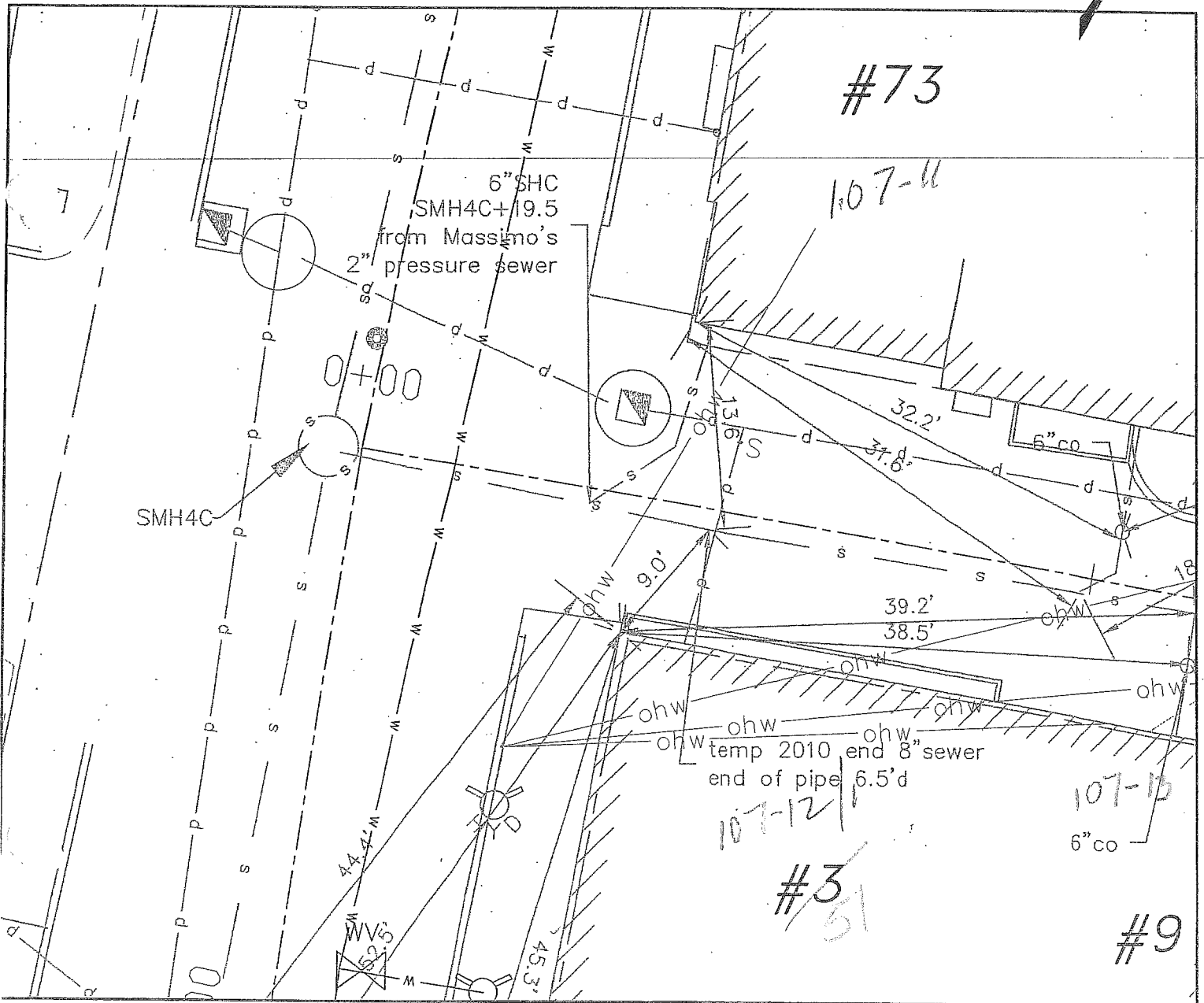
1. Connection to Main Sewer: 6" x 8" WYE

2. General Comments:
2" REJECTOR SPURNER FORCE MAIN CONNECTS TO
EXTERNAL 6" PVC GRAVITY SEWER → 8" PVC SEWER MAIN

3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

CHECKS AND APPROVED JCK
 Owner's Representative



CMA Engineers, Inc.
35 Bow Street
Portsmouth, New Hampshire 03801
CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
Owner: City of Portsmouth, New Hampshire
Contractor: Gove Construction
Street: #49B Custom House Court

Installed Date 4-18-11
STA 1+39 Length _____
Size 8" Material PVC
ties directly into SMH 4F

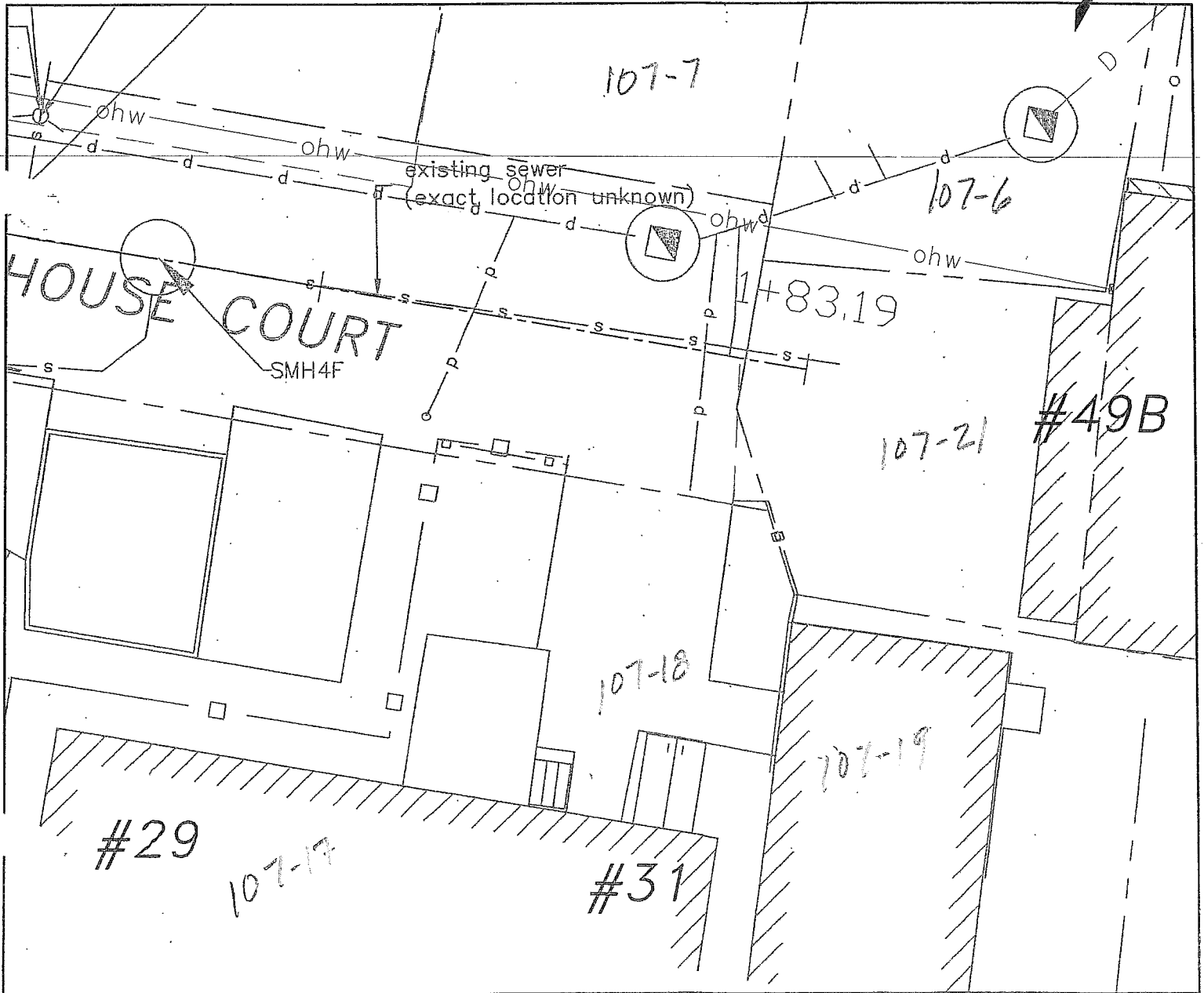
1. Connection to Main Sewer: SMH 4F

2. General Comments:
EXISTING 8" PVC BUILDING SEWER WAS TIED DIRECTLY INTO
OLD SMH REPLACEMENT SMH 4F INSTALLED AT SAME LOCATION
4.4' 8" PVC INSTALLED TO CONNECT EXISTING 8" PVC.

3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

CHECKS AND APPROVED JCK
Owner's Representative



CMA Engineers, Inc.
35 Bow Street
Portsmouth, New Hampshire 03801
CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
Owner: City of Portsmouth, New Hampshire
Contractor: Gove Construction
Street: #77 ~~Custom House Court~~ DANIEL ST

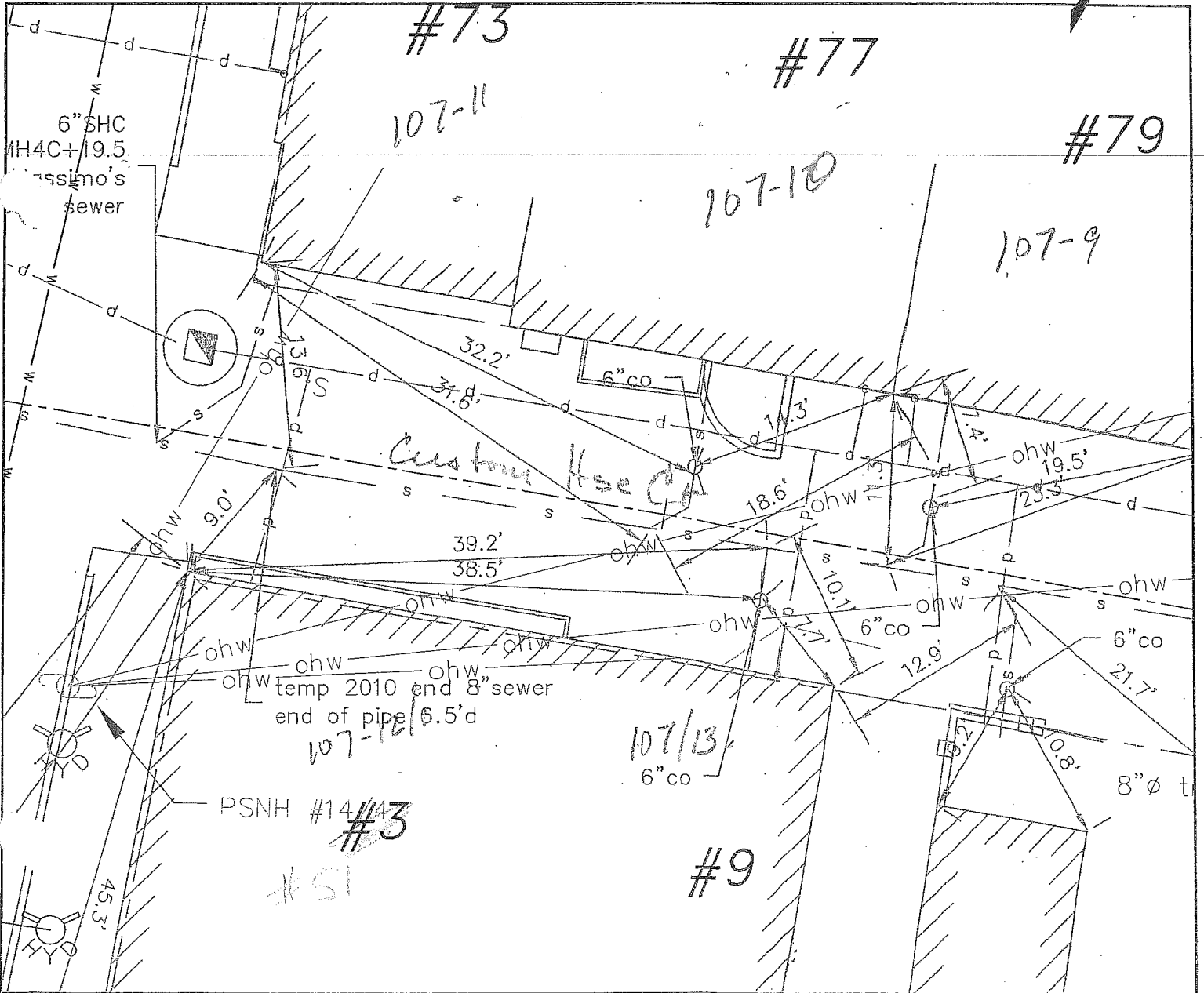
Installed Date 4-11-11
STA 0+49 Length 13'
Size 6" Material PVC
52' up stream from SMH 4C

1. Connection to Main Sewer: 8" 6 WYE

2. General Comments: _____

3. Sketch (Location and Depth Lateral) Scale: 1" = 10'

CHECKS AND APPROVED JCK
Owner's Representative



CMA Engineers, Inc.
35 Bow Street
Portsmouth, New Hampshire 03801
CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
Owner: City of Portsmouth, New Hampshire
Contractor: Gove Construction
Street: #79 Custom House Court DANIEL

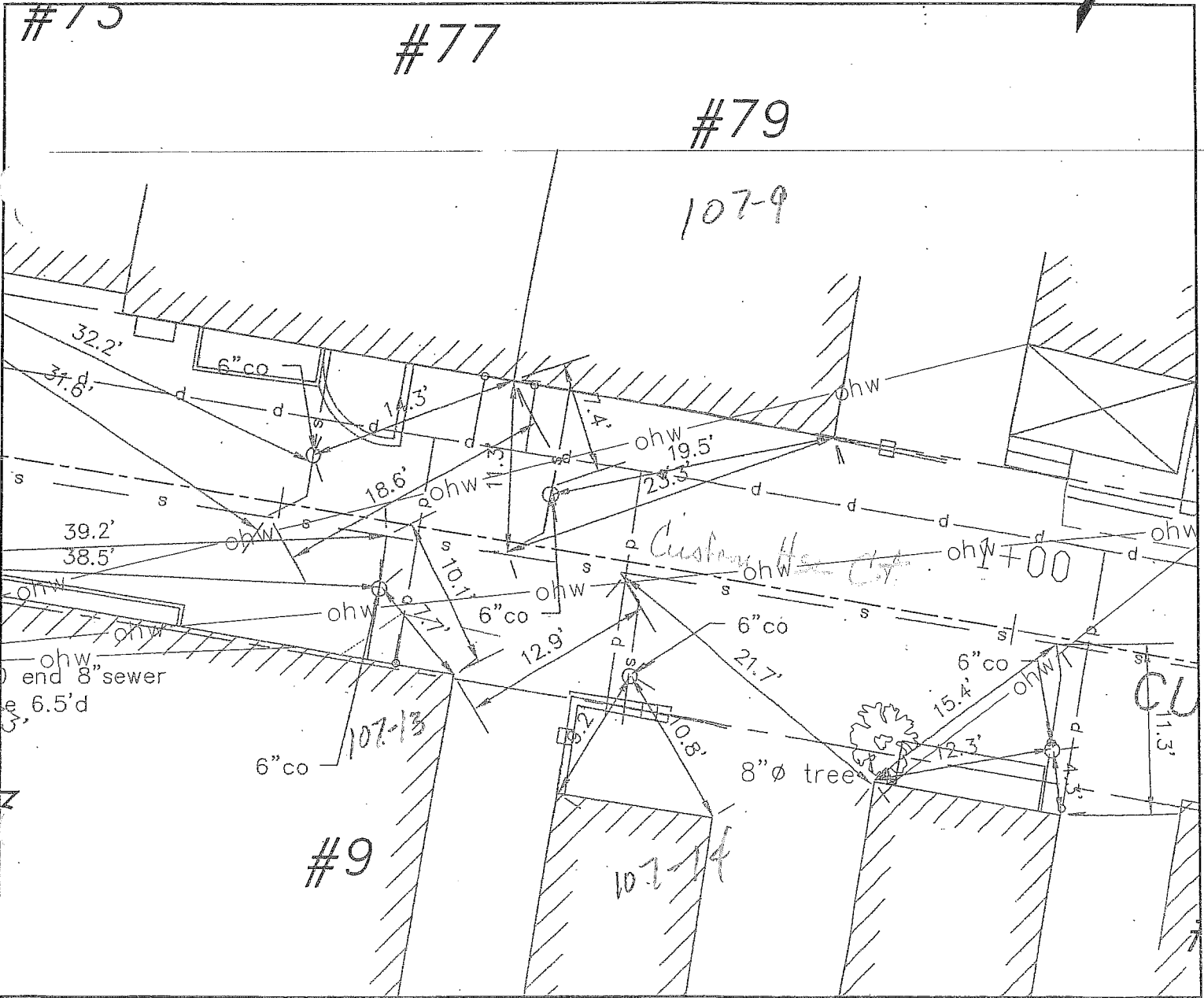
Installed Date 4-15-11
STA 0+66 Length 13'
Size 6" Material PVC
68' up stream from SMH 4C

1. Connection to Main Sewer: EXG WYE

2. General Comments: _____

3. Sketch (Location and Depth Lateral) Scale: 1" = 10'

CHECKS AND APPROVED JCK
Owner's Representative



CMA Engineers, Inc.
35 Bow Street
Portsmouth, New Hampshire 03801
CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
Owner: City of Portsmouth, New Hampshire
Contractor: Gove Construction
Street: #85 Daniel Street

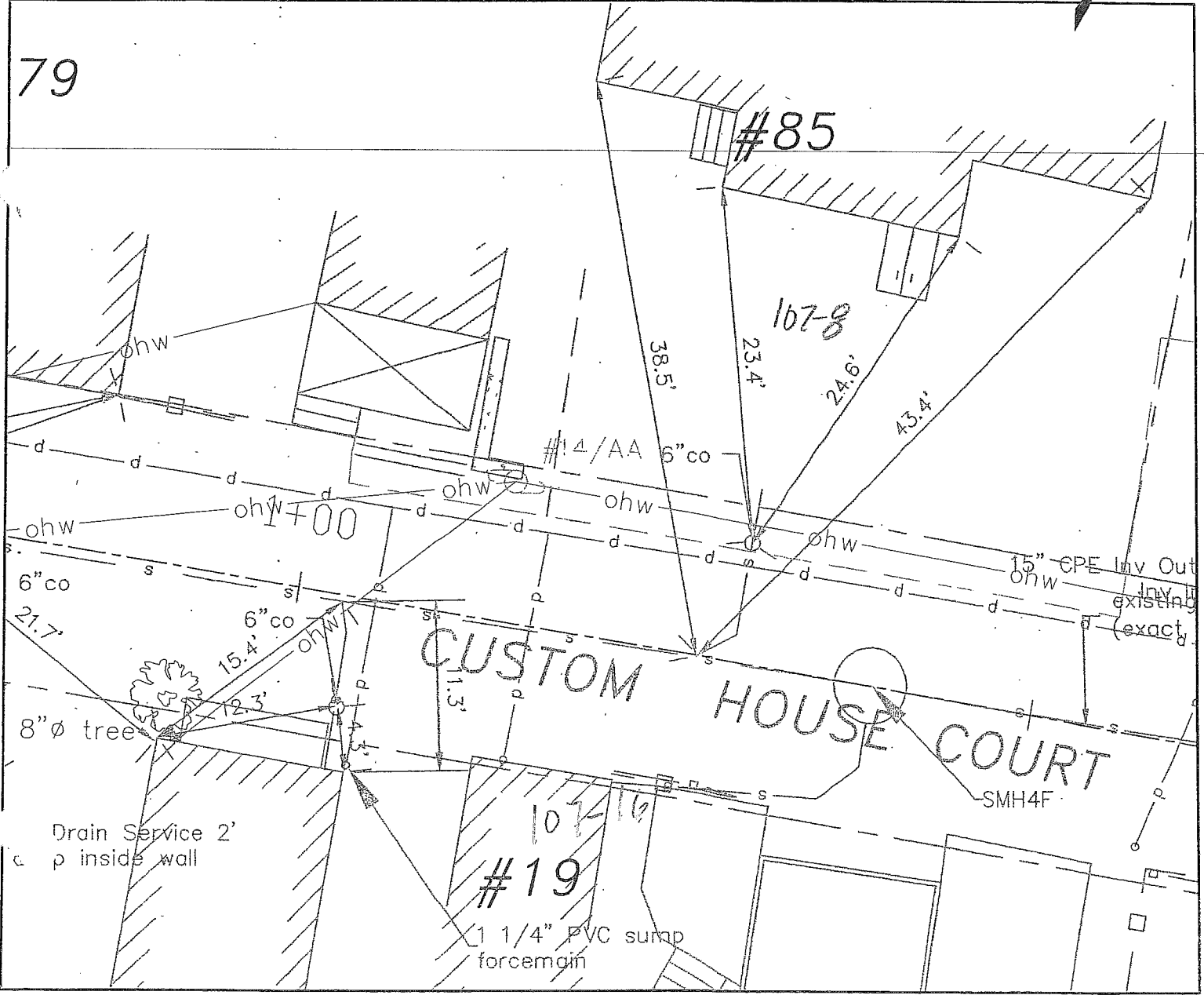
Installed Date 4-18-11
STA 1+26 Length 13'
Size 6" Material PVC
130' up stream from SMH 4C

1. Connection to Main Sewer: 8x6 WYE

2. General Comments: _____

3. Sketch (Location and Depth Lateral) Scale: 1" = 10'

CHECKS AND APPROVED JKK
Owner's Representative



CMA Engineers, Inc.
 35 Bow Street
 Portsmouth, New Hampshire 03801
 CMA Project # 737

SEWER CONNECTION DATA SHEET

Job Title: State St. Utilities Upgrade and Roadway Improvements
 Owner: City of Portsmouth, New Hampshire
 Contractor: Gove Construction
 Street: #159 State Street

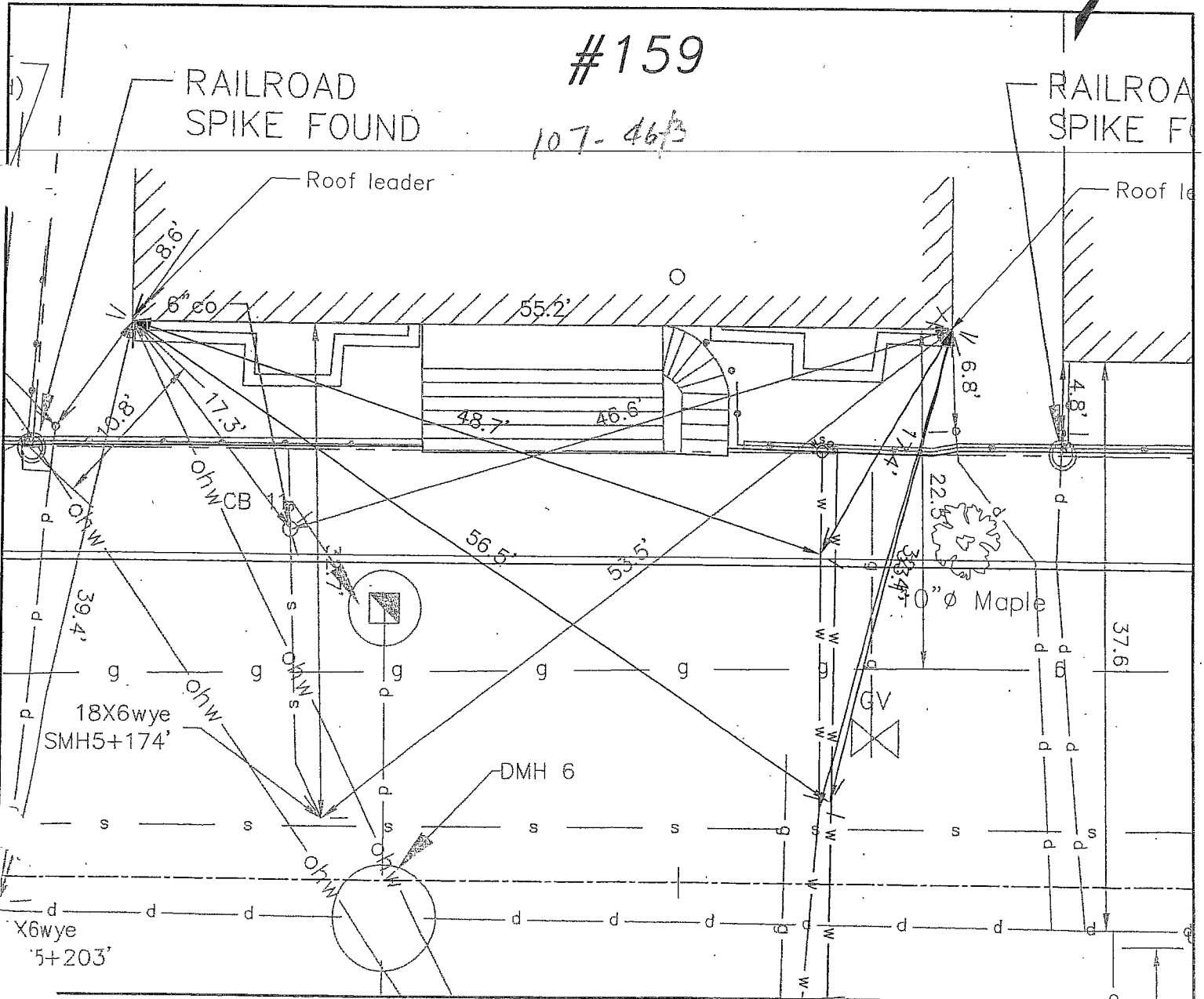
Installed Date 8/18/10, 7/15/10
 STA 7+27 Length 21'
 Size 6" Material PVC
 174' up stream from SMH 5

1. Connection to Main Sewer: 18 x 6 WYE
2. General Comments: _____

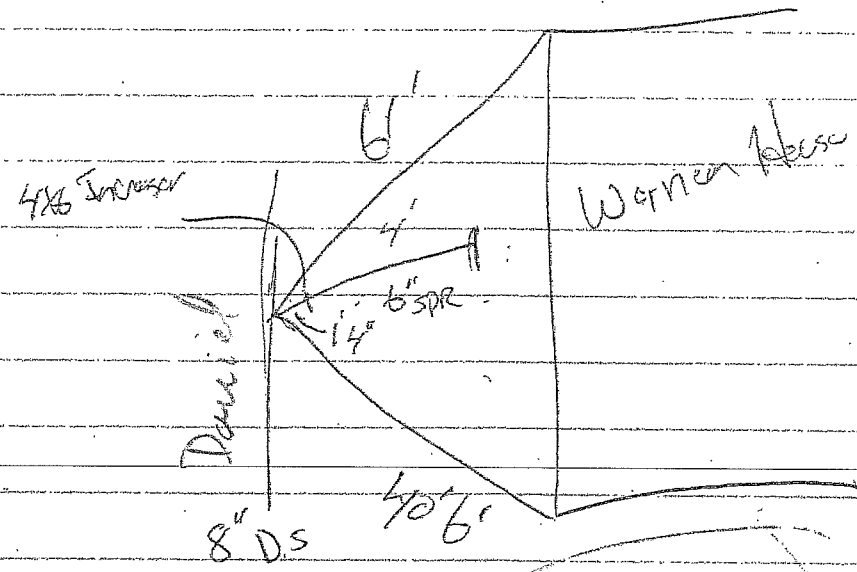
3. Sketch (Location and Depth Lateral)

Scale: 1" = 10'

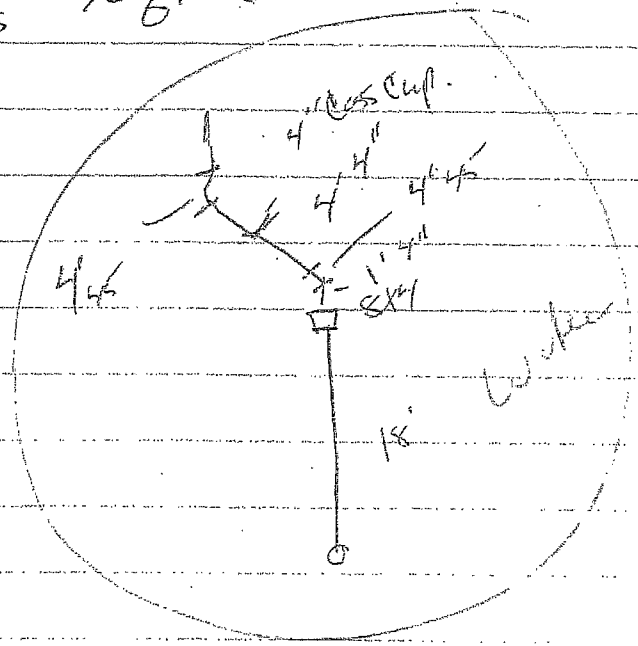
CHECKS AND APPROVED JCK
 Owner's Representative



Jim Towner
812-9774



Man
5' Deep



D. CITY OF PORTSMOUTH BLASTING ORDINANCE



PUBLIC WORKS DEPARTMENT

CITY OF PORTSMOUTH
680 Peverly Hill Road
Portsmouth N.H. 03801
(603) 427-1530 FAX (603) 427-1539

CITY OF PORTSMOUTH BLASTING RULES AND PROCEDURES

1.0 General

All blasting work shall comply with the following regulations:

- City Ordinance Article VII: Section 5:02;
- State of New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction – 1997
- Storage and Transportation of explosives shall be in accordance with State of New Hampshire Code of Administrative Rules: Chapter/Part Saf-c 1600. In case of conflict, the more stringent regulation shall govern

2.0 Insurance

- 2.1 The blasting contractor shall procure and maintain \$5,000,000 of personal injury & property damage liability insurance covering the permitted blasting operations, or such an amount as may be determined necessary by extraordinary circumstances.
- 2.2 The Certificate shall name the City as an additional insured.

3.0 Permit Process

- 3.1 The blasting contractor shall apply in person at the Department of Public Works for a permit to perform blasting operations before commencing the pre-blast survey procedure.
- 3.2 At the time of application, the blasting contractor shall provide the following items:
- a) Plan showing location and extent and purpose of proposed blasting operations
 - b) Copy of valid Use and Transportation License for the blasting company as required by Article VII, Section 5:702.
 - c) Copy of valid Insurance Certificate as required by Article VII, Section 5:702 and defined in Section 2 of these rules and procedures.

4.0 Pre-Blast Condition Surveys

- 4.1 Pre-blast surveys shall be performed as required in City Ordinance Article VII: Section 5:02 and the following procedures.
- 4.2 The pre-blast condition survey shall consist of a written description of the interior and exterior condition of each of the structures examined. Descriptions shall locate any existing cracks, damage or other defects and shall include such information so as to make it possible to determine the effect, if any, of the construction operations on the defect. Where significant cracks or damage exist, or for defects too complicated to describe in words, photographs shall be taken. A good quality videotape survey with appropriate audio description of locations, and conditions, and defects can be used.
- 4.3 The Pre-Blast Contractor shall send a pre-blast survey letter by regular mail to all abutters within a 500 foot radius of the blasting site, with copies of the letter sent also to:
 - Deputy Director of Public Works City Manager
680 Peverly Hill Rd. 1 Junkins Avenue
Portsmouth, NH 03801 Portsmouth NH 03801
 - Fire Chief Chief of Police
170 Court Street 3 Junkins Avenue
Portsmouth, NH 03801 Portsmouth NH 03801
 - Zoning Officer, Housing Code Inspector Chief Building Inspector
City Hall, Legal Dept. City Hall
1 Junkins Avenue 1 Junkins Avenue
Portsmouth, NH 03801 Portsmouth, NH 03801
- 4.4 The pre-blast survey company shall make at least three attempts over a minimum 1-week period to contact a property owner before that property is listed as non-respondent.
- 4.5 Copies of the Pre-blast Condition Survey shall be made available to the Department of Public Works and/or the property owner upon request. The blasting company shall maintain copies of all pre-blast survey records for a period of no less than one year from the completion of the blasting operations.
- 4.6 Before the issuance of a Blasting Permit, The blasting contractor shall submit to the Department of Public Works a list of all properties within the 500-foot radius of the blasting. The list shall include names, addresses, with tax map and lot numbers of all abutters within the 500-foot radius and the status of the survey, whether completed, refused or non-respondent.

5.0 Blasting Permit

- 5.1 The blasting contractor shall submit to the Engineering Division of the Public Works Department all items described in sections 2, 3 and 4 of these procedures. The blasting contractor will be authorized to proceed with the mailing blasting notification letter described in Article VII Section 5: 702 B upon approval of the submitted material.
- 5.2 A copy of the certified mail recipients of the blasting notification letter shall be submitted prior to issuance of the permit. Copies of the certified letter shall also be sent the Deputy Director of Public Works, Chief of Police, Building Inspector, and Fire Chief, indicating when the blasting is scheduled to begin.

6.0 Blasting Operations

- 6.1 All blasting operations shall be conducted in accordance with State of New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction – 1997.
- 6.2 All blasting operations shall require vibration measuring equipment meeting the following minimum requirements:
 - a) Measure, display, and provide a permanent record on a strip chart of particle velocity components.
 - b) Measure three mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source.
 - c) Have a velocity frequency response of 2Hz to 150 Hz and be capable of measuring Peak Particle Velocity (PPV) of up to 250 mm/s (10 in/s)
 - d) All seismographs used shall display the date of the most recent calibration.
 - e) Calibration must have been performed within the last 12 months and must be performed to a standard traceable to the National Institute of Standards and Technology.
- 6.3 The blasting contractor shall maintain daily logs of all blasting activities. Those records, including seismic monitoring records shall be made available to the City of Portsmouth for a period of 5 Years.

ARTICLE VII: BLASTING

Section 5:702 BLASTING PERMIT REQUIRED

No person shall perform or cause to be performed any blasting within the City limits unless a Blasting Permit is obtained from the City Engineer. This permit shall not be issued until the following terms and conditions have been satisfied by the applicant:

- A. All abutters within five hundred (500) feet of the area where the blasting will occur shall receive notice by certified mail two full business days (excluding Saturday, Sunday and holidays) in advance of the blasting. The term "abutter" shall be defined in the manner used for the notification of zoning abutters. (Amended 9/17/2001)
- B. That the City Engineer's office as well as the Building Inspector shall receive the same notice, also sent by certified mail, at least two full business days (excluding Saturday, Sunday and holidays) in advance of the blasting.
- C. The name and address of the blasting company be provided.
- D. The name of a company representative be provided and the twenty-four (24) hour telephone number of the representative; such representative being a person who is capable of responding to claims and issues arising from the blasting performed.
- E. A pre-blast survey shall be completed by the blasting company for an area within five hundred (500) feet of the proposed blasting. (Amended 9/17/2001)
- F. Any reports, measurements or video tapes made in connection with this pre-blast survey or with the subsequent blasting shall be made available upon request to all abutters within five hundred (500) feet of the area. (Amended 9/17/2001)
- G. That the cost of such a pre-blast survey shall be borne by the blasting company.
- H. The Use and Transport License of the hauler shall be designated.
- I. The route of removing blasting material shall be designated.
- J. The location of the blasting shall be designated.
- K. The blasting shall take place within the hours of 8:00 A.M. to 5:00 P.M. Monday through Friday.
- L. An Insurance Certificate shall be posted with the City Engineer in an amount and type deemed appropriate by the City Engineer and the City Attorney. (Amended 9/20/93)
- M. The Public Works Director is hereby authorized to promulgate blasting rules consistent with the intent of this ordinance, such rules shall become effective on acceptance by the City Council. (Item M. adopted 9/17/2001)

E. SAMPLE DOCUMENTS FOR PRIVATE PROPERTY WORK



City of Portsmouth Department of Public Works
680 Peverly Hill Road
Portsmouth, New Hampshire 03801

SAMPLE TEMPLATE

MEMORANDUM OF UNDERSTANDING

To: [Owner]
[Address1]
[City], [State] [zip]
Map [MapNo], Lot [LotNo]

Reference: Sheafe and Chapel
Street Improvements

From: City of Portsmouth
Department of Public Work

Date: [date]

This memorandum confirms the City's understanding that you as the owner of record of Map [Map No.] Lot [Lot No.] agree to grant the City authorization to construct a new drain service lateral to your home located at _____ Street. The City will construct a new drain line pipe in the street and at your option connect a new service line to your home for sump pump discharges. Roof leaders discharging to the surface will be connected to the new drain service lateral. Work for which your authorization is requested includes extending a new drain service lateral from the drain line in the street to your home and may include certain plumbing modifications in the basement if a sump pump will be connected to the new drain service lateral. Property restoration will resemble existing conditions. Work will be completed by a licensed Contractor, at the City's expense. Efforts to minimize inconvenience to property owners will be considered.

A plan of work for this property is attached. The plan shows the approximate location of the new pipe extending to the street. The exact location may depend on basement plumbing, finished spaces encountered (to be reviewed), and obstructions within the yard area. An assessment of your property and access to your home is needed to finalize the service location and plumbing needs.

The work is anticipated to take place in 2015. You will be contacted in advance of the work. This Memorandum of Understanding will expire upon completion of the work. It is also understood by both parties that this does not change the ownership and maintenance responsibilities of the City and the Owner as described by the City Ordinance

Please undersign this memorandum to signify your general agreement with the foregoing information and willingness to provide right of entry for the proposed work. We also ask that you provide a contact telephone number and indicate a time period that may be convenient for our Contractor to contact you concerning implementation of the work.

Thank you for your cooperation, if you have any questions or would like to schedule an appointment to review the work, please contact David DesFosses at (603) 766-1411.

Owners of Map [map No.], Lot [lot No.]

John Bohenko
City Manager

[Owner]

[Date]

Terry L. Desmarais Jr., PE
Water and Sewer Engineer

Telephone

Contact Time



City of Portsmouth Department of Public Works
680 Peverly Hill Road
Portsmouth, New Hampshire 03801

SAMPLE TEMPLATE

MEMORANDUM OF UNDERSTANDING

To: [Owner]
[Address1]
[City], [State] [zip]
Map [MapNo], Lot [LotNo]

Reference: Sheafe and Chapel
Street Improvements

From: City of Portsmouth
Department of Public Work

Date: [date]

This memorandum confirms the City's understanding that you as the owner of record of Map [Map No.] Lot [Lot No.] agree to grant the City authorization to construct a new sewer service to your home located at _____ Street. The City will construct a new sewer main line pipe in the street and connect a new service line to your home which directly abuts the street/sidewalk. Work for which your authorization is requested includes extending a new sewer pipe from the sewer main in the street to your home and certain plumbing modifications that may be required in the basement to connect the new sewer line. Property restoration will resemble existing conditions. Work will be completed by a licensed Contractor, at the City's expense. Efforts to minimize inconvenience to property owners will be considered.

A plan of work for this property is attached. The plan shows the approximate location of the new pipe extending to the street. The exact location may depend on basement plumbing, finished spaces encountered (to be reviewed), and obstructions within the yard area. An assessment of your property and access to your home is needed to finalize the service location and plumbing needs.

The work is anticipated to take place in 2015. You will be contacted in advance of the work. This Memorandum of Understanding will expire upon completion of the work. It is also understood by both parties that this does not change the ownership and maintenance responsibilities of the City and the Owner as described by the City Ordinance

Please undersign this memorandum to signify your general agreement with the foregoing information and willingness to provide right of entry for the proposed work. We also ask that you provide a contact telephone number and indicate a time period that may be convenient for our Contractor to contact you concerning implementation of the work.

Thank you for your cooperation, if you have any questions or would like to schedule an appointment to review the work, please contact David DesFosses at (603) 766-1411.

Owners of Map [map No.], Lot [lot No.]

John Bohenko
City Manager

[Owner]

[Date]

Terry L. Desmarais Jr., PE
Water and Sewer Engineer

Telephone

Contact Time



City of Portsmouth Department of Public Works
680 Peverly Hill Road
Portsmouth, New Hampshire 03801

SAMPLE TEMPLATE

MEMORANDUM OF UNDERSTANDING

To: [Owner] Reference: Sheafe and Chapel
[Address1] Street Improvements
[City], [State] [zip]
Map [MapNo], Lot [LotNo]
From: City of Portsmouth Date: [date]
Department of Public Work

This memorandum confirms the City's understanding that you as the owner of record of Map [Map No.] Lot [Lot No.] agree to grant the City authorization to construct certain sidewalk improvements and related property restoration on your property at _____ Street as outlined in this document. The City will construct new roadway pavement and sidewalks adjacent to your property. Property restoration will resemble existing conditions. Work will be completed by a licensed Contractor, at the City's expense and efforts to minimize inconvenience to property owners will be considered.

Work for which your authorization is requested includes the following:

- Temporarily remove and replace screening enclosures
- Sidewalk construction and interface with existing surface grades
- Property restoration

A plan of work for this property is attached. The plan shows the approximate location of new sidewalks and property restoration requirements. The exact locations of the work may depend on field conditions. An assessment of your property may be needed prior to construction to plan the related work sequences.

The work is anticipated to take place in 2015. You will be contacted in advance of the work. This Memorandum of Understanding will expire upon completion of the work. It is also understood by both parties that this does not change the ownership and maintenance responsibilities of the City and the Owner as described by the City Ordinance

Please undersign this memorandum to signify your general agreement with the foregoing information and willingness to provide right of entry for the proposed work. We also ask that you provide a contact telephone number and indicate a time period that may be convenient for our Contractor to contact you concerning implementation of the work.

Thank you for your cooperation, if you have any questions or would like to schedule an appointment to review the work, please contact David DesFosses at (603) 766-1411.

Owners of Map [map No.], Lot [lot No.]

John Bohenko
City Manager

[Owner]

[Date]

Terry L. Desmarais Jr., PE
Water and Sewer Engineer

Telephone

Contact Time

F. CITY OF PORTSMOUTH ELECTRICAL PERMIT APPLICATION



Portsmouth Commercial Electrical Permit Application

City of Portsmouth, New Hampshire
 Inspection Department
 1 Junkins Ave, Portsmouth NH 03801
 Telephone: (603) 610-7264
 Fax: (603) 427-1593

Email: inspections@cityofportsmouth.com



Map #
 Lot #
 Block #
 Zoning

Location (Street # & Street Name):

Owner: Address:
 City: State: Zip: Telephone:

Contractor: Address:
 City: State: Zip: Telephone:

Master's Name: Cell #:

N.H. Master Electrician License Number:

Email:

Preferred Contact Method: Office Cell Email Other

Commercial Industrial Restaurants Retail Multi Use Building

Services, Panels, Disconnects	Quantity	Devices	Quantity	Luminaires	Quantity
60 conductor size	<input type="text"/>	Receptacles	<input type="text"/>	Incandescent	<input type="text"/>
100 conductor size	<input type="text"/>	Switches	<input type="text"/>	Fluorescent	<input type="text"/>
200 conductor size	<input type="text"/>	Motion Sensor	<input type="text"/>	Neon	<input type="text"/>
400 conductor size	<input type="text"/>	Carbon Monoxide	<input type="text"/>	L.E.D.	<input type="text"/>
600 conductor size	<input type="text"/>	Smoke Detectors	<input type="text"/>	Exit/Emergency Lts	<input type="text"/>
800 conductor size	<input type="text"/>	Other	<input type="text"/>	Exh/Paddle Fan	<input type="text"/>
1000 conductor size	<input type="text"/>	UPS	<input type="text"/>	Pole lights	<input type="text"/>
1200 conductor size	<input type="text"/>	Equipment			
1600 conductor size	<input type="text"/>	Range	<input type="text"/>	Washer	<input type="text"/>
2000 conductor size	<input type="text"/>	Oven	<input type="text"/>	Dryer	<input type="text"/>
3000 conductor size	<input type="text"/>	Microwave	<input type="text"/>	Boiler Gas Oil	<input type="text"/>
Meters	<input type="text"/>	Dishwasher	<input type="text"/>	Furnace Gas Oil	<input type="text"/>
Motors	<input type="text"/>	Disposal	<input type="text"/>	A/C Unit	<input type="text"/>
Air Comp/Cond.	<input type="text"/>	HW Heater	<input type="text"/>	Door openers	<input type="text"/>
Electric Heat	<input type="text"/>	Refrigerator/Freezer	<input type="text"/>	Sump Pump	<input type="text"/>
Heat Pump	<input type="text"/>	Condensers	<input type="text"/>	Exhaust hoods	<input type="text"/>
Split System units	<input type="text"/>	Transformers			
Solar panels	<input type="text"/>	Up to 25 KVA	<input type="text"/>	480 to 208 step down	<input type="text"/>
Fire Pump	<input type="text"/>	25 KVA & over	<input type="text"/>	208 to 480 step up	<input type="text"/>
Standard Temp Service	<input type="text"/>	Inverters	<input type="text"/>	Autotransformers	<input type="text"/>
Illuminated Sign	<input type="text"/>	Generators and Transfer Switches			
Grounding electrode size	<input type="text"/>	Up to 10 KVA	<input type="text"/>	Over 75 KVA	<input type="text"/>
Available arc fault current	<input type="text"/>	10KVA- 75 KVA	<input type="text"/>	Transfer Switches	<input type="text"/>
Motor loads below	<input type="text"/>	Life Safety panels	<input type="text"/>	Optional emergency	<input type="text"/>

Description of Work:

Instructions for Permit Applications

1. All information must be printed legibly.
2. Owner name, address and phone number.
3. Location and address of work site.
4. Complete description of work to be done.
5. Number of fixtures, appliances and equipment to be installed.
6. Plans must be submitted on all new buildings and major renovations.

INSPECTIONS REQUIRED: (48 hours notice required)

1. Underground conduit installations.
2. When service is installed and a work order number has been obtained from PSNH.
3. When rough-in is complete and visible (Rough).
4. When job is complete, but before occupancy (Final).

Notes:

- The property owner of record may exercise their right to perform their own electrical work on their residence if they live at the residence and the residence is a Single Family Dwelling occupied by the owner of record. (RSA 319-C)
- It is the responsibility of all contractors, electricians to obtain the necessary permits from the Portsmouth Building Department before any work has begun. Work must begin within six (6) months of the issuance of any permit. **PERMIT IS VALID FOR 1 YEAR.**
- **If this is an "After the Fact" permit, it will be subject to a fee two times the normal permit fee.**
- Electricians must have a valid license from the State of New Hampshire to obtain a permit. Permits are not transferable.
- It is the responsibility of the contractor to obtain all inspections required. A rough-in inspection is required before any work is covered, and a final inspection is required when all work is complete.
- This signed application constitutes consent to allow for all inspections at the property location listed.
- No permit will be issued until all information is furnished, and all the above conditions met.
- It is the responsibility of the property owner and/or the contractor to contact PSNH after City approval to schedule for connection.
- The City of Portsmouth Building Department approval would certify that the applicant could proceed with installing electrical fixtures in accordance with specifications submitted. Any deviation from the specifications submitted will require an amendment to this permit or additional permits.

Statement of Compliance:

THE CITY OF PORTSMOUTH HAS A NO LIVE WORK POLICY ACCORDING TO NFPA 70-E AND OSHA.

I have read and understand the statement and hereby agree to all of the terms stated therein. I agree to abide by any and all codes relating to my field of work, including all national, state and local codes. I also realize that any false statement made in the application for permit may be grounds for revocation of said permit.

CERTIFICATION

The undersigned hereby certifies under the pains and penalties of perjury that he/she has carefully reviewed this application, that each and every statement contained it is accurate and the he/she has the authority granted by the property owner to execute this document in the name of that property owner to induce the City of Portsmouth to issue the permit for which this application has been filed.

Applicant Signature _____ Date _____

Inspectors Signature _____ Date _____

Cost of Construction: \$ _____ **Permit Fee:** _____

Paid: Cash \$ _____ Check # _____

This application will not be approved until the City Electrical Inspector has signed off above.